

JAG MANUAL
INVESTIGATION

BLUE ANGEL #6 CRASH

21 APRIL 2007

MCAS BEAUFORT, SC



DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON, D.C. 20350-2000

5800

Ser N1/127001

8 Jan 08

FIFTH ENDORSEMENT on Lieutenant Colonel Javier J. Ball, USMC,
ltr of 23 May 07

From: Deputy Chief of Naval Operations (Manpower,
Personnel, Training and Education) (N1)

To: File

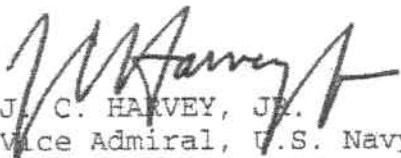
Subj: COMMAND INVESTIGATION TO INQUIRE INTO CIRCUMSTANCES
SURROUNDING THE NAVAL FLIGHT DEMONSTRATION SQUADRON
MISHAP AT MARINE CORPS AIR STATION BEAUFORT, SOUTH
CAROLINA, ON 21 APRIL 2007

1. Subject to the following, the findings of fact and opinions in the basic correspondence as modified by endorsement are approved. Specifically, I approve Opinion 1 that LCDR Davis died in the line of duty and not due to his own misconduct.
2. Recommendations 3-13 and 17, as modified by endorsement, are approved and forwarded to Commander, Naval Air Forces for implementation. I note that Recommendations 3-4 and 9-12, as modified, have already been implemented.
3. Although some risk of casualty is inherent in naval aviation, including Naval Flight Demonstration Squadron training and performance, such risk must be continuously and vigilantly identified and aggressively reduced. I am particularly concerned with Opinion 17 and its supporting Findings of Fact documenting that a waiver of the requirement of NFDS pilots to wear G-suits had expired January 1, 2005. A waiver extension was requested by NFDS on April 10, 2006, fifteen months after its expiration, but had not yet been approved as of the time of the mishap. As related in Findings of Fact 126-130, NAVAIR Aircrew Systems TECHMAN 13-1-6.7-1, Table 3-17, does not list G-suits among required equipment for F/A-18 Blue Angels configured aircraft, creating some confusion as to whether this reference constituted a waiver of the G-suit requirement. Notwithstanding, by its message request for extension in April 2006, NFDS recognized the continued need for a waiver, yet this outstanding request was not attentively pursued leading up the mishap during which time NFDS continued to operate.

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4. This lack of careful attention to operating requirements is unacceptable and also reflected a lack of proper risk management oversight by Chief of Naval Air Training. I remain concerned about this administrative lapse that highlights the need for increased higher-level supervision of all aspects of NFDS operations and administration; however, I am satisfied that it did not contribute to the subject mishap. Based on a preliminary opinion and supporting findings, now approved, that pilot impairment was caused by rapid G onset and would not have been prevented by use of a G-suit, the Naval Flight Demonstration Squadron was authorized to continue its 2007 demonstration schedule after implementing changes in pilot training and receiving an updated waiver by the Chief of Naval Operations.

5. Achieving improvements in safety in Navy operations has historically relied on constant evaluation and update of training, operating procedures and also on continued technological development. We owe every margin of safety to the aviators and aircrew operating our aircraft and those who live and work in the areas in which we operate. To that end, I specifically concur with Recommendation 13 that focused research is required. Accordingly, I have coordinated with Commander, Naval Air Forces to implement such research in order to develop a G-suit for appropriate use by the Naval Flight Demonstration Squadron.


J. C. HARVEY, JR.
Vice Admiral, U.S. Navy



DEPARTMENT OF THE NAVY
COMMANDER
NAVAL EDUCATION AND TRAINING COMMAND
250 DALLAS STREET
PENSACOLA, FLORIDA 32508-5220

5800
Ser N00/212
25 Oct 07

FOURTH ENDORSEMENT on Lieutenant Colonel Javier J. Ball, USMC,
ltr of 23 May 07

From: Commander, Naval Education and Training Command
To: Chief of Naval Personnel

Subj: COMMAND INVESTIGATION TO INQUIRE INTO CIRCUMSTANCES
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MISHAP AT MARINE CORPS AIR STATION BEAUFORT, SOUTH
CAROLINA, ON 21 APRIL 2007

1. Forwarded.
2. Commander, Naval Air Forces letter of 22 October 2007 is included as the third endorsement.
3. The following modifications to the investigation are made:
 - a. Enclosures (46) through (56) have been reduced to writing and are adequately summarized in enclosures (57) through (59). Enclosures (46) through (56) are removed and deleted from the basic investigation.
 - b. The photographs, enclosures (72) through (75), have been printed and included in the investigation. The CDs are hereby removed.
 - c. The witnesses listed in enclosures (97), (98), and (99) provided no information or statements germane to the investigation. Enclosures (97), (98), and (99) are hereby removed from the basic investigation.
 - d. Finding of Fact (76) is modified to read: "Out of his right hand 270 degree turn, LCDR Davis went somewhat wings level." The words "in an attempt to maintain/regain airspeed" are deleted as opinion.
 - e. Finding of Fact (104) is an opinion and is deleted.

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f. Finding of Fact (110) is modified to read as follows:
"MCAS Beaufort personnel and Beaufort County EMS, Sheriff and
Police forces responded to the mishap site. First responders
arrived at the crash site within 3-4 minutes."

g. Finding of Fact (143) is deleted.

h. Finding of Fact (155) is modified to read as follows:
"During a G-LOC episode, the pilot loses consciousness and all
motor control resulting in the relaxation or release of all
flight control inputs. Absolute incapacitation lasts between 2
and 38 seconds followed by 2-97 seconds of disorientation. The
pilot is unable to maintain flight control during either period
(enclosure (125))."

i. Finding of Fact (165) is deleted. There is no evidence
to suggest the mishap pilot experienced negative Gs immediately
prior to the positive 6.8 Gs encountered at the time of impact.
Absent the negative G to positive G forces, the "push-pull"
effect is not a factor.

j. Findings of Fact (191) through (203) are deleted.

k. Opinion (5) is deleted.

l. Opinion (18) is modified to read as follows: "Even
though the CNO life support equipment waiver to allow the
flights to be flown without G-suits had expired, based on
evidence and findings of facts presented, that the pilot was not
wearing a G-suit did not contribute to this mishap. A proper
anti-G straining maneuver (AGSM) would have fully and adequately
provided the needed G-tolerance during LCDR Davis's last high G
pull rendezvous maneuver."

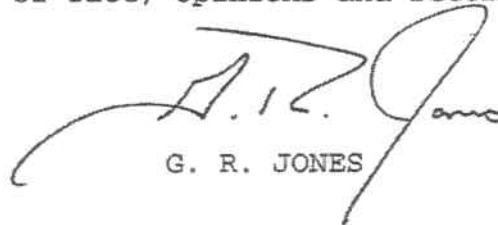
m. Opinion (20) is added: "The ejection seat handle was
not pulled by the pilot. The ejection seat handle was dislodged
due to the seat breaking up as it impacted the trees or the
ground (FoF (101), (102), (103), (105) and (106))."

4. I specifically concur that LCDR Davis died in the line of
duty and not due to his own misconduct.

Subj: COMMAND INVESTIGATION TO INQUIRE INTO CIRCUMSTANCES
SURROUNDING THE NAVAL FLIGHT DEMONSTRATION SQUADRON
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CAROLINA, ON 21 APRIL 2007

5. It is my opinion that, although the high rate of turn and sudden onset of positive Gs during the rendezvous maneuver resulted in possible physiological impairment to LDCR Davis, the impairment did not result in either G-LOC or G-excess illusion. LCDR Davis had fully demonstrated through his Centrifuge training, previous NFDS practice and show events and overall flight proficiency an adequate G-tolerance for all demonstration maneuvers. However, the mishap pilot's failure to perform a proper AGSM resulted in him suffering from possible physiological effects that contributed to his loss of situational awareness of his rate of descent and ultimately a controlled flight into the terrain (CFIT). Had the mishap pilot performed a proper AGSM throughout the maneuver and maintained full situational awareness of his flight attitude, this mishap may have been averted.

6. Subject to the foregoing and the comments of the previous endorsers, the findings of fact, opinions and recommendations are approved.



G. R. JONES

Copy to:
CNAF
CNATRA
COMNAVSAFECEN
OJAG (Code 15)
NFDS
LtCol Ball



DEPARTMENT OF THE NAVY
COMMANDER NAVAL AIR FORCES
BOX 357051
SAN DIEGO, CALIFORNIA 92135-7051

5800
Ser N01J/ 1243
22 Oct 07

From: Commander, Naval Air Forces
To: Commander, Navy Education and Training Center

Subj: COMMAND INVESTIGATION TO INQUIRE INTO CIRCUMSTANCES
SURROUNDING THE NAVAL FLIGHT DEMONSTRATION SQUADRON
MISHAP AT MARINE CORPS AIR STATION BEAUFORT, SOUTH
CAROLINA ON 21 APRIL 2007.

Encl: (1) LCDR Reiner's memo of 28 Sep 07

1. Forwarded. Enclosure (1) is the subject matter
expert's (SME) results of investigation.


S. C. STEWART
By direction

28 September 2007

MEMORANDUM

From: LCDR Craig Reiner, N3A1 (F/A-18A-D Readiness)
To: CNAP Judge Advocate Group, N01J
Via: CAPT Michael Cross, N3/40

Subj: COMMAND INVESTIGATION TO INQUIRE INTO CIRCUMSTANCES SURROUNDING THE NAVAL FLIGHT DEMONSTRATION SQUADRON MISHAP AT MARINE CORPS AIR STATION BEAUFORT, SOUTH CAROLINA ON 21 APRIL 2007.

Ref: (a) N01J Memorandum dated 25 September 2007

1. On or about 1600 (L) 21 April 2007, a Blue Angel F/A-18 Hornet (BUNO 162897) crashed in the vicinity of Pine Grove Road and White Pine Road during a performance at the 2007 Marine Corps Air Station Beaufort, South Carolina Air Show. The mishap pilot was Blue Angel #6. The last two maneuvers of the performance were the Loop Break Cross (LBX) and the Pitch Up Break (PUB). Out of the LBX, Blue Angel #6 executed a right-hand 270 degree high G turn, estimated at 6-7 G's, crossing over #'s 4 and 5. Out of this right hand turn, Blue Angel #6 went somewhat wings level in an attempt to maintain/regain airspeed. Blue Angel #6 maintained a relatively level flight path while accelerating towards the Delta for the rendezvous. Blue Angel #6's next turn was a "squatting of the jet" with a rapid onset rate turn of at least 6.8 G in an attempt to rendezvous with the Delta. After "squatting the jet," Blue Angel #6 was seen to maintain a right wing down, slightly nose low attitude until he disappeared below the tree line, impacting the ground.

2. Per ref (a), I have thoroughly reviewed enclosure (1) for accuracy and completeness in regards to F/A-18 procedures and policy. From a technical perspective, I concur with the findings of fact, opinions, and recommendations of the Investigating Officer with the following modifications:

a) Concur with all findings of fact with the following technical corrections

1. Findings of Fact (44). Change SU-5/A to SJU-5/A
2. Findings of Fact (45). Change SU-5/A to SJU-5/A
3. Findings of Fact (92). Change 250,000' to 25,000'
4. Findings of Fact (96). Change to read, "The landing gear was up, the canopy was down..."

5. Findings of Fact (183). Change to read, "The F/A-18 design load limit is "7.5 Gs" at 32,357 lbs gross weight and "-3 Gs" at all gross weights and stores loadings. G Limited overshoots up to 8.0 G (permitted by G limiter) do not constitute an overstress.

A handwritten signature in black ink, appearing to be 'CR' with a long horizontal stroke extending to the right.

Craig Reiner
LCDR USN



DEPARTMENT OF THE NAVY

CHIEF OF NAVAL AIR TRAINING
CNATRA
250 LEXINGTON BLVD SUITE 102
CORPUS CHRISTI TX 78419-5041

5800
Ser 00J/ 0126
21 Sep 07

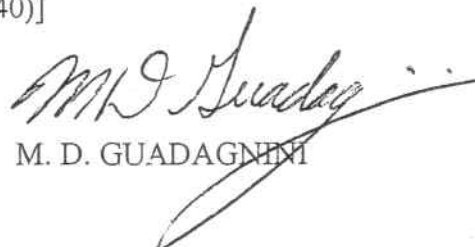
SECOND ENDORSEMENT on Lieutenant Colonel Javier J. Ball, USMC,
ltr of 23 May 07

From: Chief of Naval Air Training
To: Chief of Naval Personnel
Via: 1) Commander, Naval Education and Training Command
2) CNAF – For Technical Evaluation WRT Adequacy of Aviation Analysis

Subj: COMMAND INVESTIGATION TO INQUIRE INTO CIRCUMSTANCES
SURROUNDING THE NAVAL FLIGHT DEMONSTRATION SQUADRON
MISHAP AT MARINE CORPS AIR STATION BEAUFORT, SOUTH
CAROLINA, ON 21 APIL 2007

Encl: (141) LCDR Kevin Davis Biography
(142) Lt Col Javier Ball Qualifications

1. Readdressed and forwarded.
2. The following additional findings of fact are made:
 - a. Additional finding of fact 205: LCDR Davis joined the Blue Angels in September 2005. [encl (141)]
 - b. Additional finding of fact 206: In accordance with reference (a), the Investigating Officer (IO) was selected from a unit other than the mishap unit or a unit subordinate to the mishap unit. The IO has the following flight qualifications: section lead, division lead, mission commander, air combat tactics instructor, Naval Air Training and Operating Procedures Standardization Program instructor, instrument instructor, night vision goggles high altitude, night vision goggles low altitude, low altitude tactics instructor, low altitude tactics standardization, forward air controller (airborne), post maintenance check-flight pilot, and operational risk management instructor. He also completed Aviation Safety Officer School and Maintenance Officer School, and has over 2200 hours total flight time, with 1900 hours in the Hornet. [encl (142)]
 - c. Additional finding of fact 207: There were various damages on the ground, resulting in a number of potential claimants. [encl (140)]


M. D. GUADAGNINI

Kevin J. Davis
Lieutenant, U.S. Navy
Narrator

Lt. Kevin Davis is a native of Pittsfield, Mass., and graduated from Reading Memorial High School in 1992. He graduated with honors from Embry Riddle Aeronautical University with a B.S. degree in Aeronautical Science in 1996.

Kevin reported to NAS Pensacola, Fla., for Officer Candidate School and aviation indoctrination in September 1996. He completed primary flight training at NAS Corpus Christi, Texas, and transferred to NAS Meridian, Miss., for intermediate and advanced flight training. While there, he flew the T-2C Buckeye and TA-4J Skyhawk, and was awarded the Commodore's Battle "E" for precision bombing and was selected as the Training Squadron 7 (VT 7) student of the month for April 1999. He received his wings of gold in June 1999.

Kevin reported to Fighter Squadron 101 (VF 101) at NAS Oceana, Va., for training in the F-14 Tomcat and was the "Top Stick" in his class. In July 2000, he reported to the VF 11 "Red Rippers" where he completed deployments aboard the aircraft carriers USS Dwight D. Eisenhower (CVN 69) and USS John F. Kennedy (CV 67). His deployments included extended operations in the North Arabian Sea and Arabian Gulf in support of *Operation Enduring Freedom*.

In July 2003, Kevin transferred to the F/A-18 Hornet through Strike Fighter Squadron 125 (VFA 125) at NAS Lemoore, Calif., and then reported to the Fighter Composite Squadron 12 (VFC 12) "Omars," stationed at NAS Oceana. While at VFC 12, Kevin served as a Navy adversary pilot providing valuable air-to-air training for fleet squadrons. In December of 2004, Kevin graduated from the United States Navy Fighter Weapons School (TOPGUN) as an adversary pilot.

Kevin joined the Blue Angels in September 2005. He has accumulated more than 2,500 flight hours and 200 carrier arrested landings. His decorations include the Air Medal, Navy and two Marine Corps Achievement Medals, and various personal and unit awards.

LtCol Javier Ball Qualifications (provided to LCDR Harris by LtCol Ball)

Commissioned in 1989 - ground tour with 2D Tank Bn for Desert Shield/Storm, fleet accession to aviation in '92 - Designated an aviator in May 1995.

Flight quals - Section lead, division lead, mission commander, air combat tactics instructor, NATOPS Instructor, Instrument Instructor, NVG HI, NVG LOW, Low altitude tactics instructor, low altitude tactics stan, FAC(A), post maintenance checkflight pilot, ORM instructor,

Military Education - Aviation Safety Officer School, Maintenance Officer School, Joint Targeting School, USAF Joint Air Commander's Course, USAF Air Command and Staff College, USMC Logistics Officer School, USAF Airlift Planners Course,

Over 2200 hrs total, 1900 hornet hrs.

92-93 - T-34's

93-94 - T-2's

94-95 - T-45's

95-05 - F/A-18A/B/C/D

06-pres - T-34 Instructor Pilot

Been F/A-18 Squadron OpsO and Maintenance Officer II MEF(FWD) Deputy
Current OpsO and II MEF(FWD) COPSO

ENCL (147)



DEPARTMENT OF THE NAVY

CHIEF OF NAVAL AIR TRAINING
CNATRA
250 LEXINGTON BLVD SUITE 102
CORPUS CHRISTI TX 78419-5041

5800

Ser 00J/0090

24 JUL 07

FIRST ENDORSEMENT on Lieutenant Colonel Javier J. Ball,
USMC, ltr of 23 May 07

From: Chief of Naval Air Training

To: File

Subj: COMMAND INVESTIGATION TO INQUIRE INTO CIRCUMSTANCES
SURROUNDING THE NAVAL FLIGHT DEMONSTRATION SQUADRON
MISHAP AT MARINE CORPS AIR STATION BEAUFORT, SOUTH
CAROLINA, ON 21 APRIL 2007

Encl: (140) Judge Advocate General Memo of 17 Jun 07

1. Retained. Concur with the findings of fact, opinions
and recommendations of the investigating officer, as
modified below.

2. Findings of Fact:

a. Finding of fact (116) is modified to read, "This is
a Class A mishap because of the fatality and destruction of
the aircraft."

3. Opinions:

a. I concur with Opinion (2) in that LCDR Davis was
going faster than normal to make up time in his rendezvous
with the Delta. [REDACTED]

(b)(5) [REDACTED]. The culture of the Naval Flight
Demonstration Squadron (NFDS) is that they constantly
strive to perform a perfect show, every show. I believe
that LCDR Davis was simply trying to meet this standard,
just as he would have at any other show. [REDACTED]

[REDACTED]. The quest
for perfection is part of every Blue Angel practice and
performance.

4. Recommendations:

a. Recommendation (1) is disapproved.

Subj: COMMAND INVESTIGATION TO INQUIRE INTO CIRCUMSTANCES SURROUNDING THE NAVAL FLIGHT DEMONSTRATION SQUADRON MISHAP AT MARINE CORPS AIR STATION BEAUFORT, SOUTH CAROLINA, ON 21 APRIL 2007

[REDACTED]

(b)(5)

b. Recommendation (2) is disapproved, as it is not relevant to this investigation. [REDACTED]

(b)(5)

[REDACTED]

c. Recommendation (5) is modified to delete "CNO, NAVAIR" as CNATRA is primarily responsible for this action.

d. Recommendation (6) is modified to delete "NAVAIR" as it is not responsible for this action.

e. I concur with Recommendation (7). The new FA-18-Cs are currently being modified at the depot level to include HUD tape capabilities. I anticipate the new planes will be in operation beginning in the 2009 season.

f. I do not concur with Recommendation (10) as written. However, I do recommend that NFDS continue to work closely with the CFET physiologist to tailor a program that will optimize NFDS pilot G toleration. This program will likely consist of a multi-day syllabus, which will focus on improving the G technique of each NFDS pilot. All new NFDS pilots will go through this program in September 2007, and the entire team will attend refresher training in October or November 2007.

g. I do not concur with Recommendation (11) as written. However, I direct that the NFDS Flight Surgeon develop a weight training program based on the latest research that will specifically target the muscle groups needed to maximize G tolerance. Once developed and approved, this program will be mandatory for all NFDS pilots.

Subj: COMMAND INVESTIGATION TO INQUIRE INTO CIRCUMSTANCES SURROUNDING THE NAVAL FLIGHT DEMONSTRATION SQUADRON MISHAP AT MARINE CORPS AIR STATION BEAUFORT, SOUTH CAROLINA, ON 21 APRIL 2007

h. Recommendations (14) through (16) are disapproved.

(b)(5)

i. Recommendation (17) is modified to read as follows:
"Recommend an entry be made in the medical record for all military personnel who responded to the mishap or walked the crash scene shortly after the mishap with words to the effect of: '21 APR 07: MCAS BEAUFORT. Potential Health Hazard: SNM was exposed to the crash debris of a U.S. Navy Blue Angel F/A-18. As such, SNM was potentially exposed to carbon fibers and other hazardous materials released in the crash. The likelihood and nature of any potential long-term health hazard as a result of this exposure is unknown at this time.'"

5. Enclosure 140 is added.


D. P. QUINN

Copy to:
COMNAVSAFECEN
NETC
NFDS
OJAG (Code 15)

Ser 00J
23 May 2007

(b)(6)
From: Lieutenant Colonel Javier J. Ball, USMC, [REDACTED]
To: Chief of Naval Air Training

Subj: COMMAND INVESTIGATION TO INQUIRE INTO CIRCUMSTANCES
SURROUNDING THE NAVAL FLIGHT DEMONSTRATION SQUADRON MISHAP AT
MARINE CORPS AIR STATION BEAUFORT, SOUTH CAROLINA, ON 21 APRIL 2007

Ref: (a) JAGINST 5800.7D

- Encl:
- (1) Convening Order
 - (2) NFDS CASREP DTG 212332Z APR 07
 - (3) NFDS OPREP-3 SIR DTG 21235Z APR 07
 - (4) NFDS Initial MDR DTG 220110Z APR 07
 - (5) NFDS First Amended MDR DTG 232338Z APR 07
 - (6) NFDS Second Amended MDR DTG 262340Z APR 07
 - (7) Copy of Mishap Aircraft AIB - BUNO 162897
 - (8) Excerpts from LCDR Davis' Logbook
 - (9) E-mail regarding Flight Time Totals from LCDR Davis' Logbook
 - (10) Excerpts from LCDR Davis' NATOPS Jacket
 - (11) Memo from the Director of the Aviation Survival Training Center at NAS Lemoore, CA regarding LCDR Davis' Physiological Training Record
 - (12) Excerpt from LCDR Davis' Aircrew Personal Equipment Record
 - (13) Excerpt from Blue Angels Flight Demonstration Communication and Maneuver Profiles dtd Feb 2007
 - (14) Excerpt from Blue Angels' Solo Pilot SOP
 - (15) Blue Angels' Emergency Procedures SOP
 - (16) NAVFLIGHTDEMRONINST 3750.1P - Pre-Mishap Plan and Aircraft Incident Reporting Procedures
 - (17) NAVAIR Interim Flight Clearance message for NFDS maneuvers DTG 022020Z FEB 05
 - (18) NFDS message requesting extension of life support equipment waiver DTG 041519Z Dec 01
 - (19) CNO message granting NFDS life support equipment waiver DTG 071857Z MAY 02
 - (20) NFDS message requesting extension of life support equipment waiver DTG 101654Z Apr 06
 - (21) CNATRA readdressal of NFDS message concurring with it DTG 181636Z Apr 06
 - (22) CNATRA message non-concurring with permanent waiver request of life support equipment DTG 221658Z Dec 06
 - (23) E-mail from NAVAIR discussing NFDS life support equipment waiver dtd 11 May 2007
 - (24) E-mail traffic from OPNAV Aircrew Systems Requirements Officer discussing NFDS life support equipment waiver dtd 16 May 2007
 - (25) Excerpt from NAVAIR Aircrew Systems TECHMAN 13-1-6.7-1
 - (26) E-mail Concerning NFDS F/A-18 OFP
 - (27) F/A-18 Flight Operating Differences/Supplemental Data for Navy Flight Demonstration Team Aircraft
 - (28) NFDS FAA Waiver for Flight Demonstration Maneuvers Package
 - (29) NFDS Flight Schedule for 18-22 April 2007
 - (30) Excerpts from OPNAVINST 3710.7T
 - (31) FAA Certificate of Waiver for MCAS Beaufort Air Show, 2007
 - (32) NFDS Air Show planning photo of MCAS Beaufort and Obstruction Data

- (33) Weather Brief for Mishap Flight
- (34) Avian Hazard Advisory System (AHAS) Risk Table for MCAS Beaufort, SC for 21 April 2001
- (35) Bird Avoidance Model (BAM) level for MCAS Beaufort from 9-22 April 2001
- (36) U.S. Naval Observatory Sun Altitude/Azimuth Table for MCAS Beaufort, SC for 21 April 2007
- (37) NOTAMS in effect at MCAS Beaufort for the Air Show
- (38) Weather Observation at time of Incident from MCAS Beaufort Weather Service
- (39) Aircraft Mishap Weather Report from MCAS Beaufort Weather Service
- (40) CD of MCAS Beaufort ATIS broadcast at the time of Mishap Flight and Crash Net/Phone audio
- (41) DVD of the RADAR tape of MCAS Beaufort showing Mishap flight maneuver
- (42) DVD of [REDACTED] HUD tape during MCAS Beaufort, SC Air Show
- (43) DVD of Blue Angel's Air Show tape taken by NFDS personnel
- (44) CD of Blue Angel's Air Show tape broadcast on CNN
- (45) CD of Interval Camera of Blue Angle Crash
- (46) DVD of JAGMAN IO interviews with [REDACTED] disc one
- (47) DVD of JAGMAN IO interviews with [REDACTED] and Blue Angel #2, [REDACTED]
- (48) DVD of JAGMAN IO interviews with Blue Angel [REDACTED]
- (49) DVD of JAGMAN IO interviews with Blue Angel [REDACTED]
- (50) DVD of JAGMAN IO interviews with Blue Angel [REDACTED]
- (51) DVD of JAGMAN IO interviews with Blue Angels [REDACTED] and Maint Officer
- (52) DVD of JAGMAN IO interviews with Blue Angels' Maintenance Officer and Maint Chief (at the time of the mishap)
- (53) DVD of JAGMAN IO interviews with Blue Angels [REDACTED] and [REDACTED]
- (54) DVD of JAGMAN IO interviews with Blue Angels [REDACTED], [REDACTED], and [REDACTED]
- (55) DVD of JAGMAN IO interviews with Blue Angels' Flt Surgeon and PAO
- (56) DVD of JAGMAN IO interviews with Blue Angels' AdminO
- (57) Summary of JAGMAN IO interview with Blue Angel CO, CDR [REDACTED]
- (58) Summary of JAGMAN IO interview with Blue Angel [REDACTED]
- (59) Summary of JAGMAN IO interview with Blue Angel [REDACTED]
- (60) Summary of JAGMAN IO interview with Blue Angel [REDACTED]
- (61) Summary of JAGMAN IO interview with Blue Angel [REDACTED]
- (62) Summary of JAGMAN IO interview with Blue Angels' Maint Officer
- (63) Summary of JAGMAN IO interview with Blue Angels' Maint Chief
- (64) Summary of JAGMAN IO interview with Blue Angel [REDACTED]
- (65) Summary of JAGMAN IO interview with Blue Angel [REDACTED]
- (66) Summary of JAGMAN IO interview with Blue Angels [REDACTED]
- (67) Summary of JAGMAN IO interview with Blue Angels [REDACTED]
- (68) Summary of JAGMAN IO interview with Blue Angels' [REDACTED]
- (69) Summary of JAGMAN IO interview with Blue Angels' AdminO
- (70) DVD of Crash Scene Aerial Footage 070421
- (71) DVD of Aerial Crash Site Footage 070423
- (72) CD of Aerial Crash Site Photos 20070423 Images 3709 to 3908
- (73) CD of Post-mishap photos taken by Beaufort SC Fire Department pictures 1-278
- (74) CD of Post-mishap photos taken by Beaufort SC Fire Department pictures 279-379
- (75) CD of Aircraft Mishap Photos taken by MCAS Beaufort Combat Camera

000002

- (76) CD of NAS Lemoore Centrifuge based flight environment training (CFET) Briefs and Profiles
- (77) DVD of LCDR Davis' CFET training dtd 18 October 2005
- (78) Mishap Aircraft Maintenance Signal Data Recording System (MSDRS) ("MAG Tape") Visualization of last two minutes of recorded data
- (79) Photos of mishap site taken by MCAS Beaufort Combat Camera on 21 April 2007
- (80) Pre-mishap imagery of the crash site annotated to show primary crash pattern, damage to houses, and distance between point of first tree impact and end of crash site
- (81) Air Show Incident Map dtd 23 April 2007 showing crash distance from MCAS Beaufort, SC
- (82) Air Show Incident Map dtd 23 April 2007 showing debris field
- (83) Key to debris field shown on Air Show Incident Map dtd 23 April 2007
- (84) Statement from [REDACTED], witness to the crash
- (85) Statement from [REDACTED] MCAS Beaufort ARFF SNCOIC who treated LCDR Davis
- (86) Summary of follow up interview with [REDACTED]
- (87) Statement from [REDACTED] MCAS Beaufort ARFF Section Leader who treated LCDR Davis
- (88) Statement from [REDACTED] MCAS Beaufort ARFF who treated LCDR Davis
- (89) Summary of follow up interview with [REDACTED]
- (90) Statement from [REDACTED] MCAS Beaufort ARFF who treated LCDR Davis
- (91) Summary of follow up interview with [REDACTED]
- (92) Statement from [REDACTED] MCAS Beaufort ARFF who treated LCDR Davis
- (93) Summary of follow up interview with [REDACTED]
- (94) Statement from [REDACTED], MCAS Beaufort ARFF who treated LCDR Davis
- (95) Summary of follow up interview with [REDACTED]
- (96) Marine Corps News Article dtd 4 May 2007
- (97) List of Witnesses to the Mishap in the MCAS Beaufort Control Tower
- (98) List of eyewitnesses to the mishap collected by MCAS Beaufort Emergency Operations Center
- (99) List of eyewitnesses who called in to the MCAS Beaufort OOD
- (100) Statement and enclosures from [REDACTED] MCAS Beaufort ARFF who was the Initial On Scene Commander
- (101) MCAS Beaufort ARFF Incident Roster for 070421
- (102) Beaufort County, SC POC list
- (103) Roster of Beaufort County, SC first responders
- (104) MCAS Fire Dept Memo concerning crew assignments on mishap day
- (105) Copy of Emergency Operations Logbook at MCAS Beaufort EOC, POC is [REDACTED] MCAS Beaufort, SC
- (106) Copy of Beaufort County EMS treatment records from 21 - 24 April in vicinity of crash site, POC is [REDACTED], Beaufort County EMS.
- (107) Summary of Verbal Toxicology report on LCDR Davis from AMB Flight Surgeon
- (108) Preliminary Autopsy report on LCDR Davis
- (109) Current Mishap Definitions from the Naval Safety Center
- (110) Preliminary MIST report on Mishap Aircraft Ejection Seat
- (111) Excerpts from A1-F18AC-NFM-000, F/A-18A/B/C/D NATOPS Manual
- (112) Engineering Investigation of Mishap Aircraft's Port Engine
- (113) Engineering Investigation of Mishap Aircraft's Starboard Engine

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- (114) Engineering Investigation of Mishap Aircraft's Port Aileron Servo-cylinder.
- (115) Engineering Investigation of Mishap Aircraft's Starboard Aileron Servo-cylinder.
- (116) E-mail concerning mission computer data from the Mishap Aircraft
- (117) Interim Flight Incident Recording (FIR) Report Pass 1 - from Mishap Aircraft MSDRS
- (118) Interim FIR Report Pass 2 - from Mishap Aircraft MSDRS
- (119) Interim FIR Report Pass 3 - from Mishap Aircraft MSDRS
- (120) MSP report from mishap aircraft MSDRS data
- (121) F/A-18 MSP Code Pocket Guide
- (122) FIR Cautions from mishap aircraft MSDRS data
- (123) Memo from Director of the Aviation Survival Training Center at NAS Lemoore, CA discussing the USN/USMC TACAIR G-AWARENESS PROGRAM.
- (124) Excerpt from F-16 Webpage at <http://www.infoplease.com/spot/fightingfalcon.html>
- (125) Excerpt from Aeromedical Aspects of Aviation, 3rd edition, edited by Roy L. DeHart and Jeffrey R. Davis
- (126) Article on A-LOC from Winter 2004 Indian Air Force Aerospace Medical Journal
- (127) Excerpt on G-excess Illusion from http://nostalg.org/des/illusions_in_flight.htm
- (128) Power Point slide-describing G-excess Illusion
- (129) Power Point slide describing "Push-Pull" Effect
- (130) History of F/A-18 Positive G Overstresses in BUNO 162897 for the 6 months prior to the mishap
- (131) History of F/A-18 Negative G Overstresses in BUNO 162897 for the 6 months prior to the mishap
- (132) NAVFLIGHTDEMROININST'1610.1J, Blue Angel Policies
- (133) Follow up e-mail from Blue Angel OpsO, LCDR Allison
- (134) Department of the Navy F/A-18 Class A Mishaps and hours table from the Naval Safety Center for the life of the F/A-18
- (135) Blue Angels' Class A Mishap Table from the Naval Safety Center since 1980
- (136) E-mail from the Naval Safety Center regarding the Blue Angel Mishap Rate
- (137) NFDS Flight Schedule for 30 Apr 2007, the date they resumed practice
- (138) NFDS Flight Schedule for 9 May 2007, the date they resumed Air Shows
- (139) Privacy Act Statements signed by Blue Angels

Preliminary Statement

1. Pursuant to enclosure (1), and in accordance with ref (a), a one-officer JAGMAN investigation was conducted to inquire into the circumstances surrounding the Naval Flight Demonstration Squadron (NFDS) mishap at MCAS Beaufort, SC, on 21 April 2007. I consulted with [REDACTED] of CNATRA Legal for advice. All reasonably available and relevant evidence was collected. I have not received the following evidence and it should be forthcoming: (1) a written toxicology report, (2) a death certificate, (3) a final autopsy report, (4) the final EI on the ejection seat, (5) copies of all civilian claims handled by the OJAG, and (6) positive and negative G overstress MAF's for the lead solo aircraft and spare solo aircraft for the

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six months prior to the mishap to compare to ones for the mishap aircraft. There were some difficulties encountered and are addressed below in paragraphs (7), (8), and (9). While certain minor conflicts appear in the evidence, none was of sufficient degree or materiality to warrant comment.

2. Because of the purpose of this investigation, the death investigation portion exceeded the 20 day timeframe. However, a Line of Duty determination has been forwarded to PERS62 prior to the completion of this investigation.

3. All documentary evidence included is certified to be either the original or a copy that is a true and accurate representation of the original document represented. The summaries of my video recorded interviews with the NFDS are not signed by them because they were out of town and unavailable once the summaries were transcribed from the original DVD recordings. However, I have enclosed Privacy Act Statements signed by them and their statements have been sent to them to be signed and returned.

4. The social security number of LCDR Davis was obtained from official sources; the last four digits from other NFDS members were solicited from the individual service members with their signed privacy act statements enclosed.

(b)(6) 5. [REDACTED] of the Department of the Navy's Office of the Judge Advocate General handled all civilian claims in and around the vicinity of the mishap site. He may be reached at [REDACTED] or [REDACTED].

6. There were significant and potentially "show-stopping" difficulties encountered with NMCI. The primary obstacle I encountered was the inability to log on to NMCI computers at MCAS Beaufort. MCAS Beaufort is on the "Marine" side of NMCI and being attached to TRAWING-5 I currently have a "Navy" side account. So even though I have an NMCI account and there is an abundance of NMCI computer assets at MCAS Beaufort, I could not log-on to a single one of them because they are on the "Marine" side. Luckily, VFA-86 resides on MCAS Beaufort and it happens to be on the "Navy" side of NMCI. The VFA-86 Commanding Officer graciously allowed me access to his computers so that I would have computer connectivity while TAD to MCAS Beaufort.

7. An additional problem with NMCI is that as I come across POC's, either Marine or Navy, I can only access "Navy side" POC's in the Global Address List (GAL). Any Marines that I need e-mail addresses for, I either have to call on the phone or hope they have a current e-mail address in Marine On-Line. The same problem affects Navy personnel of the Medical Branch. Their e-mail addresses cannot be found in the GAL and I have to either call them (if a number is known), or try to find their e-mail address via other means. For this to be a Navy and Marine Corps Intranet, I found that I was able to succeed IN SPITE of NMCI, not because of it.

8. Still yet another problem with NMCI is that I am unable to go out onto the internet to websites such as www.youtube.com or www.break.com to collect video of the mishap. I had to access sites such as this from my home computer. The inability to access these sites from work hindered my ability to fully investigate and complete this investigation.

9. MCAS Beaufort and Marine Aircraft Group 31 deserve to be commended for the professional way in which they handled this mishap. From having the foresight to position ARFF personnel "off-base" at Laurel Bay Housing which allowed them to respond to the mishap within 3 to 4 minutes of the aircraft crash, to securing the crash site, collecting and securing evidence, setting

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up and operating a 24 hour Emergency Operations Center (EOC), to the outstanding administrative support they provided me. My hat is off to these two fine organizations.

Findings of Fact

1. The mishap aircraft was a Naval Flight Demonstration Squadron (NFDS) F/A-18 BUNO 162897. [encls (3), (4), (5), (6), (7)]
2. The mishap aircraft was properly preflighted. [encls (7)]
3. The mishap aircraft had a proper daily inspection completed at 1730 on 20 April 2007. [encls (7)]
4. There were no downing discrepancies noted in the mishap aircraft ADB. [encls (7)]
5. The mishap aircraft ADB contained only minor "up" gripes. [encls (7)]
6. The mishap aircraft had a 14 day special inspection on 07106 (16 Apr 07). [encls (7)]
7. The mishap aircraft had a 30 hour inspection on 07105 (15 Apr 07). [encls (7)]
8. The mishap aircraft had a 30 engine hour inspection on 07091 (01 Apr 07). [encls (7)]
9. The mishap aircraft had a 91 day special inspection on 07057 (26 Feb 07). [encls (7)]
10. The mishap aircraft had a 100 engine hour and a 200 engine hour inspection on 07054 (23 Feb 07). [encls (7)]
11. The mishap aircraft had an 84 day special inspection on 07032 (01 Feb 07). [encls (7)]
12. The mishap aircraft had a 224 day inspection on 07020 (20 Jan 07). [encls (7)]
13. The mishap aircraft had a 112 day inspection on 07008 (08 Jan 07). [encls (7)]
14. The mishap aircraft had a 364 day special inspection on 06331 (27 Nov 06). [encls (7)]
15. The mishap aircraft had a Phase "D" inspection on 06299 (26 May 06). [encls (7)]
16. The mishap aircraft had a Phase "C" inspection on 06130 (10 May 06). [encls (7)]
17. The mishap aircraft had a Phase "B" inspection on 05279 (06 Oct 05). [encls (7)]
18. The mishap aircraft had Phase "A" inspection on 04127 (04 May 04). [encls (7)]
19. The sole aircrew member on board and pilot in command was LCDR Kevin Jens Davis, 014-60-6893, 1310, active duty, USN. [encls (2), (3), (4)]
20. Night vision goggles were not employed as this was a day flight. [encls (4), (29)]
21. LCDR Davis was designated as a Naval Aviator on 18 Jun 1999 from VT-7. [encls (10)]
22. LCDR Davis possessed a current F/A-18 NATOPS qualification dtd to expire on 30 Nov 07. [encls (8), (10)]
23. LCDR Davis possessed a current special instrument rating dtd to expire on 30 Nov 07. [encls (8), (10)]
24. LCDR Davis possessed a current aeromedical flight clearance (also known as an "up-chit"), dtd 11 Jul 06 and set to expire on 30 Jun 07. [encls (10)].
25. LCDR Davis possessed a current annual ejection seat brief and egress training dtd to expire 30 Nov 07. [encls (10)]
26. LCDR Davis possessed current Aviation Physiology and Water Survival training (R1/RP1). This is a four year qualification and it was last

completed at Norfolk, VA on 15 Aug 2005 and set to expire in Aug of 2009.
[encls (10)]

27. LCDR Davis had no previous military mishaps or flight violations. [encls (10)]

28. LCDR Davis had been to the NAS Lemoore, CA CFET centrifuge training twice. Once in 1999 and most recently in Oct 2005. [encls (10), (11), (77)]

29. LCDR Davis' flight qualifications included SFWT(I) LVL III on 12 Nov 02, F-14B PMCF pilot on 9 Jan 03, F/A-18 Adversary pilot LVL IV on 4 Jan 05, F/A-18 PMCF pilot on 10 Nov 05, and F/A-18 PMCF instructor on 29 Nov 06. [encls (10)]

30. LCDR Davis amassed the following flight time: F/A-18: 851.5 hrs; F-14A/B: 766.6 hrs; TA-4J: 123.0 hrs; T-2C: 97.4 hrs; and T-34C: 56.8. [encls (9)]

31. LCDR Davis amassed a total of 1895.3 total military flight hours. [encls (9)]

32. In the last 7/30/60/90 days before the mishap, LCDR Davis amassed 5.7/28.9/72.8/143.6 hrs respectively. [encls (8), (9)]

33. LCDR Davis was fully qualified to fly this aircraft. [encls (8), (10)]

34. LCDR Davis' oxygen mask, helmet, and torso harness were all current and due for inspection on 17 May 2007. [encls (12)]

35. The last two maneuvers of the "high" show are the Loop Break Cross (LBX) and the Pitch Up Break (PUB). [encls (13)]

36. The Blue Angels Solo SOP does not specify how much G to pull out of the LBX. [encls (14)]

37. The "standard" pull is 5-6 G's. [encls (50), (61)]

38. After the break portion of the LBX, on a single turn rendezvous, #6 makes a right hand climbing turn to cross above #'s 4 and 5 for a level airspace rendezvous. G in the turn is not specified in the SOP, but should be 5-6 G's. [encls (14), (50), (61)]

39. In the event of an in-flight emergency, Blue Angel SOP is the "standard" rule of aviate, navigate, and communicate. [encl (15)]

40. The emergency aircraft should detach from the formation for trouble shooting, and attempt to maneuver behind the crowd. [encl (15)]

41. The NFDS possesses an up to date pre-mishap plan. [encl (16)]

42. The NFDS possesses a current NAVAIR interim flight clearance for Blue Angel flight maneuvers and aircraft modifications dtd to expire on 31 Mar 2008. [encl (17)]

43. The NFDS aircraft are significantly modified from fleet aircraft. [encls (17), (27)]

44. The airplane was equipped with a modified SU-5/A ejection seat. [encls (27)]

45. The SU-5/A ejection seat is capable of a zero/zero ejection. [encls (111)]

46. The ejection seats are the same as fleet F/A-18A/B ejection seats, but the ejection seat harness is a modified USAF harness with USN parachute riser fittings so that the pilot may leave the harness in the ejection seat between flights. [encl (27)]

47. The NFDS flies with its own special software load (OPF) developed at China Lake. [encl (17), (26)]

48. The NFDS possesses a current FAA Waiver for their Air Show maneuvers package. [encls (28)]

49. Blue Angel #1 is the only one who flies with a HUD tape. [encls (46), (47), (57)]

50. The mishap flight was authorized in accordance with OPNAV 3710.7T by CDR Kevin Mannix, Commanding Officer of the Naval Flight Demonstration Squadron. [encls (29), (30)]

51. The mishap flight was not scheduled in compliance with the format specified by OPNAV 3710.7T. [encls (29), (30)]

000007

52. The mishap flight flight purpose code (FPC) was a 2Q4 - Flight Demonstration. [encl (7)]

53. The shows are scheduled at the same time each day so that the pilots know how the sun angle will affect the show, and it will not vary greatly from day to day. [encls (46), (48), (50), (56), (57), (59), (61)]

54. MCAS Beaufort possessed a current FAA Certificate of Waiver for the Air Show. [encl (31)]

55. On Thursday, 19 April 2007, the NFDS was scheduled to depart NAS Pensacola as a 6-plane Delta. [encls (29)]

56. They actually departed as a 5 plane Delta. #6, piloted by LCDR Davis, departed as a single due to a minor fuel leak problem which was quickly resolved, and he followed in trail approximately 10-20 minutes behind the 5-plane delta. [encls (46), (47), (48), (49), (50), (51), (55), (56), (57), (58), (59), (60), (61), (62), (66), (69)]

57. Upon arrival of all aircraft at MCAS Beaufort on 19 April 2007, the NFDS then briefed and executed their circle maneuver. [encls (46), (47), (48), (49), (55), (56), (57), (58), (59), (60), (69)]

58. The circle maneuver is performed in order to pick out timing check points and get a feel for the Air Show airspace and landmarks. Encls (46), (47), (56), (57), (58), (69)]

59. The NFDS planning and obstruction charts for MCAS Beaufort show all obstructions within 5 NM from center point at 150' AGL and higher. [encls (32), (46), (57)]

60. The Blue Angels brief the obstructions in their pre-flight brief. [encls (46), (47), (48), (49), (56), (57), (58), (59), (60), (69)]

61. The bird condition/level is not routinely briefed, but rather the NFDS relies on tower to inform them of birds, and they attempt to gauge the bird condition in their circle maneuver. [encls (46), (47), (48), (49), (50), (56), (57), (58), (59), (60), (61), (69)]

62. The forecast bird condition at the time and day of the mishap was moderate. [encls (34), (35)]

63. The actual bird condition reported on MCAS Beaufort ATIS information X-ray at 1856Z (1456L) was low. [encls (40)]

64. After the circle maneuver on Thursday, 19 April 2007, the NFDS then briefed and executed a high show that included the LBX to the PUB. [encls (46), (47), (48), (49), (56), (57), (58), (59), (60), (69)]

65. LCDR Davis had no perceived issues or problems executing the LBX to the PUB during the practice show on Thursday, 19 April 2007. [encls (46), (48), (49), (50), (54), (56), (57), (59), (60), (61), (65), (67), (69)]

66. On Friday, 20 April 2007, due to overcast, the NFDS briefed a flat show, but audibled to a low show after walking to the aircraft. [encls (49), (56), (60), (69)]

67. For the MCAS Beaufort Air Show 2007, the LBX to the PUB was executed only during Thursday 19 April's practice show, and then again during the mishap Air Show on Saturday, 21 April 2007. [encls (50), (55), (56), (60), (61), (69)]

68. Neither the flat nor low shows included a LBX to the PUB. [encls (13), (49), (60)]

69. On Saturday, 21 April 2007, the day of the mishap, the NFDS briefed and executed a high show. [encls (46), (47), (49), (55), (56), (57), (60), (69)]

70. During the mishap Air Show, LCDR Davis' parents were in the audience and this was the first time that had seen him fly as a Blue Angel. [encls (47), (53), (55), (54), (56), (57), (60), (64), (66), (67), (68), (69)]

71. The weather was briefed to be 20,000' ceiling, unrestricted visibility, winds 050-080 at 8-12 kts, max temperature of 75°F with a dew point of 50°F and relative humidity of 42%. [encls (4), (33)]

72. MCAS Beaufort ATIS information X-ray reported 1856Z WX, winds 120 at 3, 7 miles visibility, clouds few at 500', scattered at 25,000, temperature 23,

000008

dew point 05, altimeter 30.21, runway 32 visual approach in use, bird activity low [encls (40)]

73. The sun angle at 1600 EST on 21 April 2007 at Beaufort, SC was approximately 260 degrees horizontal at 36 degrees vertical. [encls (36)]

74. MCAS Beaufort had a NOTAM out for a temporary flight restriction (TFR) due to the Air Show, and the NOTAM was effective from 19 to 22 April, and from 5 nm up to 15,000' of MCAS Beaufort. [encls (4), (5), (37)]

75. Out of the LBX, LCDR Davis executes a right hand 270 degree high G turn, estimated at 6-7 G's, crossing over #'s 4 and 5. [encls (41), (43), (46), (49), (50), (51), (56), (57), (60), (61), (62), (69)]

76. Out of his right hand 270 degree turn, LCDR Davis went somewhat wings level in an attempt to maintain/regain airspeed. [encls (43), (44)]

77. LCDR Davis maintained a relatively level flight path while accelerating towards the Delta for the rendezvous. [encls (44), (51), (55), (56), (60), (61), (62), (69)]

78. LCDR Davis' next turn was a "squatting of the jet" with a rapid onset rate turn of at least a 6.8 G in an attempt to rendezvous with the Delta. [encls (44), (56), (69), (84), (116)]

79. After "squatting the jet," LCDR Davis is seen to maintain a right wing down, slightly nose low attitude until he disappears below the tree line, impacting the earth. [encls (44), (56), (69), (116)]

80. It was on this rendezvous out of the LBX that the mishap occurred. [encls (4), (40), (44), (46), (48), (49), (50), (51), (52), (53), (55), (56), (57), (58), (59), (60), (61), (62), (63), (64), (69)]

81. Credible witnesses stated the #6 was faster than usual and seemed to really "squat" the jet with a high G turn in his attempt to rendezvous prior to impact. [encls (50), (51), (56), (61), (62), (68), (69), (84)]

82. As the NFDS is rendezvousing behind the crowd and setting up for the PUB, they are supposed to check in with their call signs after the Boss' call. All members checked in but #6. [encls (42), (46), (47), (48), (49), (50), (51), (55), (56), (57), (58), (59), (60), (61), (62), (69)]

83. There is a mike click heard on the radios when LCDR Davis should be checking in with his callsign. [encls (42), (46), (49), (50), (51), (52), (56), (57), (60), (61), (62), (69)]

84. The other pilots, not sure where LCDR Davis is, assumed he had a minor problem and continued with the performance per their Emergency SOP until they realized he had crashed. [encls (42), (43), (46), (47), (48), (49), (50), (51), (55), (56), (57), (58), (59), (60), (61), (62), (69)]

85. The MO has realized there is a crash but doesn't speak up right away per Blue Angel Emergency SOP. [encls (51), (52), (62)]

86. The ADMINO in the tower has watched #6 impact the deck but does not speak up right away per Blue Angel Emergency SOP. [encl (56), (69), (97)].

87. Per the SOP, there is a specific time to speak up so as not to interfere with others' comms. [encls (15)]

88. The Delta continues in the PUB, and once they realize #6 has crashed, #'s 1 and 3 wave off their landings and head over to the crash site. [encls (46), (51), (55), (56), (57), (59), (60), (68), (69)]

89. #1 directs #3 to land and #1 assumes on scene commander duties over the crash site. [encls (49), (51), (55), (56), (60), (62), (68), (69)]

90. The approximate time of the mishap was 1600 EST. [encls (2), (3), (4), (5), (38), (39)]

91. The precise location of the mishap is N 32 26 89, W 080 46 31. [encls (5)]

92. The observed weather at the time of the mishap was few clouds at 5,000', scattered at 250,000', no obstructions to vision, unlimited visibility, temperature 74°F, dew point 44°F, relative humidity 33%, winds variable at 3 kts, altimeter 30.18. [encls (4), (38), (39)]

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93. The aircraft impacted in a sparse residential area approximately 3 miles to the west of MCAS Beaufort. [encls (5), (44), (45), (70), (71), (72), (73), (74), (75), (79), (80), (81), (82), (100)]
94. Just prior to impact, the aircraft was in max A/B at 320 kts, in a 6.8G, 54 degree right hand AOB turn with -1.4 degrees nose down. [encls (116)]
95. The flight control stick was 1 inch to the left with a 16 degree per second roll to the left, and 3.4 inches aft for a 21 degree per second pitch rate nose up. [encls (116)]
96. The landing gear and canopy were up, and all flight controls appear to have been fully operational. [(encls (44), (114), (115), (117), (118), (119), (122))]
97. According to the recoverable MSDRS and Mission Computer data, the mishap aircraft had no warning or caution lights displayed during the flight and there were no flight control (FCS) X's displayed during the flight. [encl (78), (116), (117), (118), (119), (120), (121)]
98. All flight control actuators were functioning normally. [encl (116), (117), (118), (119)]
99. Both engines were operating at the time of impact and at max A/B. [encls (112), (113), (116)]
100. The distance from the point of first impact with a tree to the end of the debris field is approximately 2,000 feet. [encls (80), (82)]
101. The ejection seat had not moved in its frame prior to initial ejection seat and ground/tree impact. [encls (110)]
102. The drogue chute deployed during ejection seat and tree/ground impact. [encls (110)]
103. The canopy rocket motors were not fired. [encls (110)]
104. [REDACTED] [encls (110)]
105. The normal ejection sequence is (1) the pilot initiates ejection by pulling the ejection handle. 2) The IFF is actuated, the inertia reel positions the occupant, and the canopy jettisons. 3) The canopy fires and the seat is propelled up the guide rail. The occupant's legs are restrained. Emergency oxygen is actuated, and the time release mechanism and drogue gun are tripped. The rocket pack fires near the end of the catapult stroke. 4) The drogue gun fires. Controller drogue and stabilizer drogue are deployed to stabilize and decelerate the seat. If below 7500 feet MSL, the time release mechanism actuates approximately 1.5 seconds after ejection. [encls (111)]
106. Ejection seat sequencing and component operation were not normal due to ejection seat break-up during ejection seat and ground/tree impact. [encls (110)]
107. The pilot was found without a pulse, face down, still strapped into the seat, at the far end of the debris field. [encls (85), (86), (87), (88), (89), (90), (91), (92), (93), (94), (95)]
108. The mishap aircraft was completely destroyed in the mishap. [encls (4), (5), (70), (71), (72), (73), (74), (75), (79), (81), (82), (83)]
109. The terrain around the crash site is basically level and covered with pine trees approximately 50' tall with some widely spaced houses interspersed. [encls (70), (71), (72), (73), (74), (75), (79), (81), (82), (83)]
110. MCAS Beaufort personnel and Beaufort County EMS, Sheriff and Police forces all responded to the mishap site in a timely manner. [encls (85), (86), (87), (88), (89), (90), (91), (92), (93), (94), (95), (96), (101), (102), (103), (104), (106)]
111. MCAS Beaufort stood up an Emergency Operations Center (EOC) as they provided security to the mishap site. [encls (105)].
112. The MCAS Beaufort EOC collected a list of eyewitness to the mishap and also collected a list of people who called into the MCAS Beaufort OOD with

000010

possible information. I contacted all the people on the list who said they had either video or still footage of the wreck, but nobody had anything substantial to add. [encls (98), (99)]

113. The MCAS Beaufort EOC stood down on 26 April 2007, after the last of the wreckage began transportation to NAS Pensacola, FL and all Marines were secured from the crash site. [encls (105)]

114. Once they found the pilot, MCAS Beaufort ARFF personnel attempted to administer first aid. [encls (84), (85), (86), (87), (88), (89), (90), (91), (92), (93), (94)]

115. LCDR Davis did not survive. [encls (2), (3), (4), (5), (6), (108)]

116. This is a Class A mishap because of the fatality. [encls (4), (5), (6), (109)]

117. The cause of death was multiple blunt force injuries. [encls (108)]

118. The toxicology report shows nothing abnormal in LCDR Davis's blood. [enclosure (107)]

119. LCDR Davis was not under the influence of alcohol or drugs at the time of the mishap. [encls (107)]

120. There were no pre-existing diseases or conditions that may have contributed to this mishap. [encls (108)]

121. No other aircraft were involved as this mishap was neither the result of a mid-air collision nor a near mid-air collision. [encls (4), (5), (6), (44), (45), (46), (47), (48), (49), (50), (51), (56), (57), (58), (59), (60), (61), (62), (69)]

122. The current COMNAVAIR Interim Flight Clearance (IFC) references the CNO life support equipment waiver of 7 May 02. [encls (17)]

123. The CNO life support equipment waiver referenced by the current IFC expired on 31 Dec 2004. [encls (19)]

124. On 4 Dec 2001, the NFDS requested an extension of the life support equipment waiver. [encls (18)]

125. On 7 May 2002, the CNO waived the requirement for G-Suit and oxygen mask wear by the NFDS and referenced the NFDS message of 4 Dec 2001. [encls (19)]

126. The CNO waiver of 7 May 2002 also referenced NAVAIR TECHMAN 13-1-6.7-1. [encls (19)]

127. According to NAVAIR TECHMAN 13-1-6.7-1, the NFDS pilots do not rate G-suits. [encls (25)]

128. As of 14 May 2007, OPNAV N88 personnel were under the impression that page 3-36 of NAVAIR TECHMAN 13-1-6.7-1 constituted a life support equipment waiver from the CNO to the NFDS. [encls (24)]

129. Page 3-36 of NAVAIR TECHMAN 13-1-6.7 is a table of life support equipment that basically says who rates what. [encls (25)]

130. As of 16 May 2007, OPNAV N88 personnel agreed that NAVAIR TECHMAN 13-1-6.7-1 does not constitute a life support equipment waiver. [encls (24)]

131. The CNO life support equipment waiver of 7 May 2002, expired on 31 Dec 2004. [encls (19)]

132. On 10 Apr 2006, almost 14 months after the life support equipment waiver expired, the NFDS released a message requesting an extension of the life support equipment waiver from 1 Jan 2005 to 31 Mar 2008. [encls (20)]

133. This waiver request from the NFDS referenced the expired CNO waiver of 7 May 2002. [encls (19), (20)]

134. On 18 April 2006 CNATRA issued a readdressal of the life support waiver extension request from the NFDS, concurring with it. [encls (21)]

135. On 22 Dec 2006, CNATRA released a message nonconcurring with a permanent waiver request asked for by the NFDS in a September 2006 message dtg 251733ZSEP2006. CNATRA instead recommended a temporary waiver for life support equipment from Dec 2006 thru Dec 2009. [encls (22)]

136. Both CNATRA messages of 18 Dec 2006 and 22 Dec 2006 referenced the same CNO waiver message of 7 May 2002, and that waiver had expired on 31 Dec 2004. [encls (19), (21), (22)]

000011

137. As of 1345 on 11 May 2007 neither the NFDS, nor the archives of PMA202 and AIR 4.6 have a current CNO response to the waiver requests in 2006. [encls (23)]
138. The current life support equipment waiver issued by the CNO to the NFDS expired on 31 Dec 2004. [encls (19)]
139. Paragraph 8.2.1.1.1 of OPNAVINST 3710.7T states that anti-blackout suits shall be worn and connected in all aircraft equipped for their use. [encls (30)]
140. Paragraph 8.2.4.3 of OPNAVINST 3710.7T requires the use of oxygen in tactical jets from takeoff to landing. [encls (30)]
141. The NFDS resumed flying practice flights on 30 April 2007. [encls (137)]
142. The NFDS resumed flying Air Show demo's on 12 May 2007. [encls (138)]
143. [REDACTED] (b)(5)
[encls (137)]
144. Because there is no current waiver to the life support equipment requirement of OPNAV 3710.7T, the NFDS has been flying in violation of OPNAV 3710.7T since 1 Jan 2005. [encls (19), (30)]
145. NFDS pilots do not wear oxygen masks unless going above 10k' pressure altitude. [encls (47), (49), (57), (58), (60)]
146. Instead of an oxygen mask, NFDS pilots wear a boom mike. [encls (17), (47), (49), (57), (58), (60)]
147. NFDS pilots fly with an artificial feel system ("on the spring") which basically commands a 40 pound nose down attitude on the aircraft to allow them to precisely maneuver their aircraft in close proximity to other aircraft. [encls (17), (58), (59), (60), (61)]
148. In order to counter this nose down force, they must "lock" their right elbow down on their right knee. [encls (46), (47), (48), (49), (50), (57), (58), (59)]
149. When a NFDS pilot releases the flight controls in flight, there is a rapid and pronounced nose down attitude due to the spring on the control stick forcing the nose down. [encls (17), (50), (61), (133)]
150. NFDS Solo pilots fly "on the spring" during the show. [encls (133)]
151. LCDR Davis was the Opposing Solo pilot. [encls (50), (61)]
152. NFDS pilots do not wear G-suits because as the suits inflate with air to counter the effects of G, it results in uncommanded movements of the pilot's arm, which then moves the control stick resulting in a potentially unsafe act in close proximity to other aircraft. [encls (47), (48), (49), (57), (58), (59), (60)]
153. The cockpit configuration of the F-16 allows the USAF Thunderbird demonstration pilots to wear G-suits because they have a side mounted control stick and not a center mounted one. [encls (47), (48), (49), (57), (58), (59), (60), (124)]
154. G-Induced Loss Of Consciousness (G-LOC) is defined as the transition from normal consciousness to a state of unconsciousness that results when blood flow to the nervous system is reduced below the critical level necessary to support conscious function. [encls (125), (126)]
155. During a G-LOC episode, the pilot releases the flight controls. [encls (125)]
156. The mishap aircraft did not pitch nose down after LCDR Davis "squatted the jet" in his attempt to rendezvous. [encls (44), (56), (69), (116)]
157. Almost G-Induced Loss Of Consciousness (A-LOC) is defined as a transient incapacitation without loss of consciousness which occurs during and after short-duration, rapid onset positive G's. [encls (125), (126)]
158. A-LOC is characterized by unresponsiveness to voice communication and may include transient paralysis. [encls (125), (126)]
159. The wearing of a G-suit only provides an extra 1 to 1.5 increase in G tolerance. [encls (76), (123), (125), (126)]

000012

160. The wearing of a G-suit does not protect against G onset rate. [encls (123)]
161. The anti-G straining maneuver (AGSM) remains the principal method to increase G tolerance above the protection offered by the G suit. [encls (125)]
162. A 10-12 week weight lifting program can increase G-duration tolerance by approximately 50%. [encls (125)]
163. The NFDS mandates a program of health, and to exercise at least 3 times a week. [encls (132)]
164. A program of exercising each muscle group a minimum of 3 times a week will increase G tolerance. [encls (125)]
165. [REDACTED] [encls (76), (125), (129)]
166. G-excess illusion is a false or exaggerated sensation of body tilt that can occur when the G environment is sustained at greater than 1 G. [encls (127), (128)]
167. G-excess illusion is caused by misinterpreting inner ear balance input and "seat-of-the-pants" proprioceptive information. While in a turn, it may give the sensation that you are less banked than you really are causing you to overbank. [encls (127), (128)]
168. The G-excess illusion can give a false sense of pitch and roll. [encls (127), (128)]
169. The G-excess illusion can occur when turning the head in yaw and pitch while in a turn. [encls (127), (128)]
170. In fast-moving aircraft, the G-excess illusion can occur as a result of the moderate amount of G force pulled in a turn, leading to a sensation of being underbanked and increasing bank angle when looking outside the turn. [encls (127)]
171. In the past, G-excess illusion has become a suspect in a number of mishaps involving fighter/attack aircraft making 2 to 5.5 G turns at low altitudes in conditions of essentially good visibility. [encls (127)]
172. A pilot who fails to keep visual reference with the earth's surface may cause the aircraft to descend in response to the effects of the G-excess illusion. [encls (127)]
173. G-induced tunnel vision can result in the loss of visual cues with the ground causing the pilot to misjudge his height and hit the ground. [encls (127)]
174. The NAS Lemoore Centrifuge based flight environment training (CFET) consists of an annual lectures and a one-time centrifuge ride. [encls (11), (55), (68), (76), (123)]
175. NFDS pilots are required to attend CFET for an initial centrifuge ride upon joining, and then annual lectures. [encls (55), (68)]
176. The centrifuge ride consists of 5 profiles and is modeled off maneuvers expected to be encountered as a fleet aviator but modified slightly for the NFDS. [encls (11), (76), (77), (123)]
177. The centrifuge profiles are not broken down into Solo or Diamond pilot profiles. [encls (11), (76), (77), (123)]
178. Paragraph 8.4.7.2.a of OPNAV 3710.7T mandates that all tactical aircrew receive CFET/NP5 training as soon as operationally practical. [encls (30), (123)]
179. CNATRA and OPNAV 3710.7T do not require tactical jet aircrew to successfully complete each CFET profile in order to be considered qualified. [encls (30), (123)]
180. Aircrew may elect to terminate any profile when desired. [encls (30), (123)]
181. Per OPNAV 3710.7T, an entry is made into the aircrew's record jacket showing which profiles were not completed. [encls (30), (123)]

(6)(5)

182. CNATRA and Chapter 8.4.7.5.d of OPNAV 3710.7T do not require tactical jet aircrew to return and complete those profiles marked incomplete. Remedial training is recommended but not required. [encls (30), (123)]

183. The F/A-18 NATOPS G limits are positive 8.0 G's, and negative 3 G's. [encls (111)]

184. The NAVAIR clearance message does not authorize NFDS members to violate F/A-18 NATOPS G limits. [encls (17)]

185. NFDS pilots do not write their own MAFs as evidenced by the lack of aircrew names on the overstress history of BUNO 162897. [encls (130), (131)]

186. In the six months prior to the mishap, the positive G NATOPS limits for BUNO 162897 were exceeded 6 times. [encls (130), (131)]

187. In the six months prior to the mishap, the negative G NATOPS limits for BUNO 162897 were exceeded 9 times. [encls (130), (131)]

188. In the six months prior to the mishap, the positive G NATOPS limits for #5 were exceeded 6 times. [encls (130), (131)]

189. In the six months prior to the mishap, the negative G NATOPS limits for #5 were exceeded 9 times. [encls (130), (131)]

190. Blue Angel pilots attempt to fly the same aircraft for each flight. [encls (46), (47), (49), (50), (57), (60), (61)]

191. [REDACTED] [encls (134)]

192. [REDACTED] [encls (134)]

193. [REDACTED] [encls (134)]

194. [REDACTED] [encls (135), (136)]

195. [REDACTED] [encls (134)]

196. [REDACTED] [encls (134)]

197. [REDACTED] [encls (134)]

198. [REDACTED] [encls (134)]

199. [REDACTED] [encls (135)]

200. [REDACTED] [encls (134), (135)]

201. [REDACTED] [encls (134), (135)]

202. [REDACTED] [encls (134), (135)]

203. [REDACTED] [encls (134), (135)]

204. All the NFDS team members who were interviewed signed a privacy act statement. [encls (139)]

(b)(5)

Opinions

1. LCDR Davis' death resulted while in the line of duty and not due to his own misconduct or willful negligence. [FF (22), (23), (24), (25), (26), (33), (50), (118)]
2. LCDR Davis' was going faster than normal due to being late and was attempting to catch up with his timing for the rendezvous with the Delta, [REDACTED] [FF (70), (76), (77), (81)]
3. This led to at least a 6.8G, rapid G onset rate turn during the rendezvous out of the LBX. [FF (78), (81)]
4. At the time of the mishap, LCDR Davis was physiologically impaired due to the effects of a rapid positive G onset rate. [FF (77), (78), (81), (83), (94), (172), (173)]
5. [REDACTED] [FF (76), (78), (165)]
6. Although seemingly in control of the aircraft, it is unknown what LCDR Davis' visual acuity and/or level of useful consciousness was. However, we can tell from the attempt to roll left and pitch up in max A/B just prior to impact that he did not let go of the flight controls and, in the last few seconds he may have been aware of his low altitude and was attempting to save the aircraft. [FF (94), (95), (155), (156)]
7. Weather was not a factor in this mishap. [FF (71), (72), (92)]
8. Sun angle was not a factor in this mishap. The NFDS attempts to fly their air shows at the same time everyday and to use their practice sessions to help determine when sun angle will be a factor. At MCAS Beaufort, it had not been a factor in the practice shows prior to the mishap Air Show. [FF (73), (53)]
9. There was no attempt at pilot initiated ejection. [FF (94), (95), (101), (104), (105), (106)]
10. This mishap was not caused by mechanical malfunction. [FF (97), (98), (99)]
11. This mishap was not caused by a bird-strike. [FF (97), (98), (99)]
12. This mishap was not caused by G-LOC. [FF (83), (94), (95), (154), (155), (156)]
13. This mishap was not caused by the effects of G excess illusion. [FF (94), (95), (166), (167), (168), (169), (170), (171), (172)]
14. No other NFDS team member could have prevented this mishap from occurring because they had already joined and were focused on position keeping and maintaining safe separation. [FF (77), (84)]
15. The CNO, COMNAVAIR, CNATRA, and the NFDS Commanding Officer knew or should have known that a current life support equipment waiver did not exist. [FF (122), (123), (124), (125), (126), (131), (132), (133), (134), (135), (136), (137), (138)]
16. As the world's premiere flight demonstration team and the Department of the Navy's example of United States Naval Air professionalism and performance, the NFDS has been flying and continues to fly without the OPNAV 3710.7T required life support equipment since 01 Jan 2005. [FF (122), (123), (124), (125), (126), (131), (132), (133), (134), (135), (136), (137), (138), (139), (140), (141), (142), (143), (144), (145), (146)]
17. Since 1 January 2005, the NFDS has been flying in violation of OPNAV 3710.7T. [FF (122), (123), (124), (125), (126), (131), (132), (133), (134), (135), (136), (137), (138), (139), (140), (141), (142), (143), (144), (145), (146)]
18. Even though a G-suit was required because of the expired waiver, the lack of a G-suit did not contribute to this mishap. Due to the apparent rapid G

000015

onset rate of LCDR Davis's last high G pull, the wearing of a G-suit would not have prevented this mishap. [FF (78), (79), (81), (160), (161), (165)]
19. This mishap was caused by pilot error. Specifically, LCDR Davis attempted to perform an excessively high G, rapid G onset rate turn in order to affect a rejoin with the Delta. This self-induced low altitude turn led him to suffer from the combined effects of rapid G onset rate induced A-LOC and the subsequent loss of situational awareness due to G induced tunnel vision. He did not G-LOC as he did not release his flight controls, but he was impaired due to the effects of the rapid G onset which contributed to his having tunnel vision and thereby losing visual reference with the ground and descending in his turn. Once he realized he was too low, he attempted to roll wings level and pull nose high in full A/B in an attempt to avoid impacting the earth, but he was too low to recover the aircraft. [FF (94), (95), (149), (150), (154), (155), (156), (157), (158), (173)]

Recommendations.

1. [REDACTED]
2. [REDACTED]
3. Recommend that the CNO grant an extension to the life support equipment waiver dated to expire 4 years from issuance.
4. Recommend that the NFDS resume flying without G-suits and oxygen masks once a waiver is granted.
5. Recommend that the CNO, NAVAIR, CNATRA, and the NFDS implement a stringent periodic review of required life support equipment prior to either requesting or granting any subsequent life support equipment waivers or extensions.
6. Recommend that the CNO, NAVAIR, CNATRA, and the NFDS implement a stringent tracking system to ensure that the NFDS does not fly with expired life support equipment waivers or extensions in such a way as to violate OPNAV 3710.7T.
7. Recommend that all NFDS pilots fly with HUD tapes, not just Blue Angel #1, to make it easier to reconstruct any future mishaps which might occur.
8. Recommend that all NFDS pilots write their own MAFs to make it easier to track histories of pilot overstresses in the aircraft.
9. Recommend a CFET/NP5 syllabus be created specifically for the NFDS and as long as the NFDS flies without G-suits, it should include a requirement for an annual centrifuge ride. The centrifuge profiles should be based not on expected fleet maneuvers and engagements, but rather tailored to the maneuvers executed in the NFDS Air Show as either a Solo or Diamond pilot.
10. Recommend OPNAV 3710.7 and CNATRA mandate that all CFET/NP5 profiles be successfully completed prior to granting a CFET/NP5 qualification for all tactical jet aircrew, both NFDS and "fleet".
11. Recommend the NFDS modify its policies from mandating exercising a minimum of 3 times a week, to mandating the exercising of each muscle group a minimum of 3 times a week to further increase G tolerance in an exercise program recommended by their Flight Surgeon and/or Aeromedical Safety Officer.
12. Recommend that in their briefs and SOP's, the NFDS emphasize the amount of time available to rejoin while behind the crowd to prevent a pilot from rushing and then "squatting" the aircraft with an excessively high G, rapid G onset rate turn thereby increasing the risk of a G related mishap.

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13. Recommend both NAVAIR and the NFDS research the feasibility, usefulness, risks, and benefits of modifying the G suit connection in the F/A-18 for use by the NFDS. The potential may exist to allow the NFDS to perform wearing G-suits which will not begin to inflate until above a G level when they are not flying in close proximity to each other, i.e. break maneuvers. The use of such G-suits should not increase the chance of a mid-air when in close proximity to each other as long as the inflation valve is designed not to operate at "low" G. The use of such G-suits may also reduce the risk of future G related mishaps.

14. [REDACTED]

[REDACTED]

15. [REDACTED]

[REDACTED]

[REDACTED]

16. Recommend, with the appropriate safeguards in place, NMCI allow users to access internet sites such as www.youtube.com in order to enhance information access vice inhibit it.

17. Recommend an entry be made on the appropriate page in the service record books for all military personnel who responded to the mishap or walked the crash scene shortly after the mishap with words to effect of:

"21 APR 07: MCAS BEAUFORT. Potential Health Hazard: SNM was exposed to the crash debris of a US Navy Blue Angel's F/A-18. As such, SNM was likely exposed to carbon fibers and other hazardous materials released in the crash. The likelihood and nature of any potential long-term health hazard as a result of this exposure is unknown at this time."



J. J. Ball, LtCol, USMC

(b)(5)