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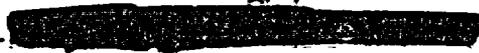
AIRCRAFT ACCIDENT INVESTIGATION REPORT

**AIRCRAFT ACCIDENT INVOLVING
F-16/C, SERIAL NUMBER 84-1267**

Official Exh. No. 134

In the matter of PFS

Status	_____	IDENTIFIED	_____ <input checked="" type="checkbox"/>
Applicant	_____ <input checked="" type="checkbox"/>	RECEIVED	_____ <input checked="" type="checkbox"/>
Intervenor	_____	REJECTED	_____
Other	_____	WITHDRAWN	_____
DATE	<u>7/1/02</u>	Witness	_____

PILOT - 

**184TH TACTICAL FIGHTER GROUP
KANSAS AIR NATIONAL GUARD**

13 JANUARY 1992

PFS Exh. 134

Submitted By:
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57348

SUMMARY OF FACTS

A. HISTORY OF FLIGHT

Zoot 61 flight, composed of two F-16 aircraft, Zoot 61 lead and Zoot 62 wing, was scheduled for a 1030 CST takeoff on 13 January 1991. The flight was BFM-4 of the July 1990 F16C001CT ANG Conversion Training Course for Zoot 62 with Zoot 61 the instructor. The flight was scheduled to use the Eukera Military Operating Area (MOA), East of McConnell AFB, but was rescheduled for the Bison MOA, Northeast of McConnell AFB. The flight departed at 1032 CST and was uneventful until recovery. Following a low approach, Zoot 61 declared an In Flight Emergency (IFE) for stuck engine RPM. He set up for another approach and landed the aircraft but was unable to shut down the engine. He missed the departure end barrier, took off again, was unable to sustain flight, and, at approximately 1117 CST, crashed. The aircraft hit a house in a sparsely populated area approximately one mile east of McConnell AFB, Ks., destroying the house and the aircraft. The lone occupant of the house at the time of impact was uninjured.

Information about the mishap was released through the 384 Wing Public Affairs Office and the 184 TFG Public Affairs Office, both of McConnell AFB, and the Public Information/Relations Director, Adjutant General's Department, Kansas National Guard, on 13 January 1991. Both television and print media from the Wichita area were on the crash scene shortly after the mishap.

B. MISSION

The mission for Zoot 61 flight was to be flown in accordance with BFM-4 of the July 1990 F16C001CT ANG Conversion Training Course. The primary objective of the mission was high aspect BFM instruction for Zoot 62.

C. BRIEFING AND PREFLIGHT

Crew rest for [REDACTED] was 6-7 hours which is normal for [REDACTED].

Briefing was conducted by [REDACTED]. [REDACTED] briefed a formation takeoff, air-to-air systems checks, and tactical formation practice enroute to the

area. In the working area a G-warm up exercise, expendables checks, and high aspect engagements in accordance with the syllabus were planned. For recovery, ILS approaches were briefed due to the forecast weather for McConnell.

Preflight and start for Zoot 61 were normal with nothing out of the ordinary noted. Zoot 61's original area assignment, the Eureka MOA East of McConnell AFB, was changed to the Bison MOA, Northwest of McConnell AFB, due to adverse weather in the Eureka MOA.

D. FLIGHT ACTIVITY

The flight took off at 1032 CST. The formation takeoff was uneventful: the planned systems checks and tactical formation were conducted enroute to Bison MOA. In the Bison MOA, the flight was conducted as briefed. Following the G-warm up maneuvers and expendables checks, the briefed BFM engagements took place. Zoot 61 simulated a category three (MIG-23 type) aircraft for the first engagement. The engagement was terminated when the flight reached the floor of the area (11,500 ft MSL). The second engagement, with Zoot 61 simulated a category one (MIG-21 type) adversary, was also terminated for the flight reaching the floor of the area. The third engagement, with Zoot 61 simulated a Fulcrum type adversary, was terminated when Zoot 62 called Bingo fuel. Bingo fuel was set higher than normal due to the forecast weather at McConnell AFB; an alternate recovery base was required. The flight rejoined, performed a battle damage check, and headed home. Zoot 62's performance was good throughout the engagements and nothing out of the ordinary occurred.

The weather at McConnell was better than forecast. The flight changed their arrival plan and proceeded to the VFR pattern. They planned to use the extra fuel to practice VFR patterns. During Zoot 61's first approach to runway 01R, [redacted] was unable to control [redacted] airspeed normally - the jet wouldn't slow down. When [redacted] pushed the throttle forward to go-around, there was no response from the engine. [redacted] was unable to control engine RPM with the throttle; engine RPM was stuck at approximately 76%. [redacted] declared an emergency with tower stating that [redacted] had "an in-flight emergency with my engine" and that "I've just got some low RPM."

Zoot 61 turned East to a wide downwind at a lower than normal altitude (2600 ft MSL vs 3200 ft MSL for a normal pattern). [redacted] stated that [redacted] turned the Electronic Engine Control (EEC) Off, with no change in engine response. Throttle movement did not change engine RPM. [redacted] configured for landing and turned base for a long final approach to runway 01R. [redacted] selected the Backup Fuel Control (BUC); engine RPM decreased to approximately 69%, and [redacted] still could not control engine RPM with the throttle. [redacted] felt that [redacted] now did not have enough thrust to continue flying so [redacted] deselected BUC. [redacted] told tower that [redacted] had "stuck engine RPM, about 76%, so I may be landing fast and uh, shut the engine down and roll out and take the wire."

Zoot 61 landed, put the hook down, and attempted to shut down the engine with the throttle. The engine continued to run at 76%. Zoot 61 then checked that [redacted] hook was down and prepared to engage the departure end cable. The departure end cable on runway 01R is a BAK-14 converted to a BAK-12, approximately 1450 feet from the departure end of the runway. The runway has

a 1500 feet overrun. Witnesses stated that the hook was down but was 6 to 10 inches above the runway at the cable. Zoot 61 missed the departure end cable.

Zoot 61 took-off again, turned East (away from the city), and raised the landing gear. [REDACTED] stated [REDACTED] again tried to regain control of the engine by selecting BUC. RPM again decayed to 69% so [REDACTED] deselected BUC. [REDACTED] stated [REDACTED] also tried selecting afterburner several times, with no response. [REDACTED] climbed to 600-700 feet AGL; airspeed was decaying through 130 knots and AOA was increasing. [REDACTED] then began to descend. [REDACTED] stated [REDACTED] realized [REDACTED] was going to have to eject so [REDACTED] attempted to point the aircraft away from population centers and, at 1117 CST, ejected.

Last thirteen data points taken from the Electronic Component Assembly Memory Data and the Flight Data Recorder Assembly Memory Data (TAB O, Pages O-9 through O-13) show the following:

<u>System Time</u>	<u>AOA</u> <u>Deg</u>	<u>Airspeed</u> <u>Knots Cal</u>	<u>System</u> <u>Altitude</u> <u>Feet MSL</u>	<u>Weight</u> <u>on</u> <u>Wheels?</u>	<u>Ldg Gear &</u> <u>TE Flaps</u> <u>Down?</u>
00:37:20	1.92	349	3162	No	No
00:38:18	4.27	243	3162	No	Yes
00:38:24	0.52	227	3040	No	Yes
00:39:19	2.86	168	1482	No	No
00:39:28	5.68	200	1600	No	No
00:40:32	7.32	190	2795	No	No
00:41:06	5.21	200	2675	No	Yes
00:41:36	9.66	142	2553	No	Yes
00:42:40	5.44	155	1482	No	Yes
00:43:16	0.05	155	1366	Yes	Yes
00:43:17	0.05	155	1366	No	Yes
00:43:44	8.72	127	1954	No	Yes
00:43:59	14.58	110	1954	No	No

E. IMPACT

The mishap aircraft (F-16/C, 84-1267) impacted the ground one mile East of McConnell AFB, KS, just North of 39th Street South and Webb Road, Sedgwick County, Kansas at 1117 CST. Crash Data from the FCC OFP (TAB O Page O-14):

Airspeed 145.75 Knots Calibrated
 AOA 11.3 degrees
 Pitch -6.6 degrees (nose down)
 Roll 5.1 degrees left wing down
 G at impact 1.72 G's
 Vert. Vel. -75.32 Ft/Sec (descending)

F. EJECTION SEAT

Ejection occurred at approximately 1116:50 CST at less than 500 feet AGL. Aircraft attitude was approximately wings level with a mild descent rate. Ejection was within the envelop of the seat. Ejection seat performed normally.

G. PERSONAL AND SURVIVAL EQUIPMENT

All personnel and survival equipment inspections were current and, with the exception of the Emergency Locator Beacon, all equipment functioned properly.

The Emergency Locator Beacon did not function. The beacon rocker switch bracket did not separate from the seat pan, resulting in the severing of the electrical line between the actuator switch and the beacon. TCTOs 14S1-11-504, 13A5-56-545, and 1F-16-1815, all dated 15 Nov 91, are designed to eliminate this problem. These TCTOs were received by the unit 22 Jan 92, nine days after the accident.

[REDACTED] was drug after landing. Surface winds were 25-35 knots. The pilot is an experienced sport parachutist and realized that the high surface winds would be a problem. Following chute opening, [REDACTED] concentrated on configuring the canopy and setting up for the landing. [REDACTED] performed the four-line cut and turned into the wind. Following a hard landing, [REDACTED] was drug by the canopy. [REDACTED] disconnected one harness connection, rolled over on [REDACTED] stomach, and was attempting to disconnect the other connection when the parachute canopy hit a fence and stopped.

H. RESCUE/CRASH RESPONSE

McConnell AFB Fire Department, 384 SPTG/DEF, was notified of an aircraft emergency at 1113 CST via primary crash phone. They responded and were in place along the active runway as Zoot 61 made [REDACTED] approach and landing. Informed that Zoot 61 would be making a cable engagement, emergency equipment pulled on the runway after Zoot 61 passed their position to chase [REDACTED] down the runway. Following Zoot 61's missed cable engagement and go-around, emergency equipment was in the process of resetting for another landing attempt when they were informed (at 1116:53) that Zoot 61 had ejected approximately three miles east of McConnell AFB.

Responding off base to the crash site (TAB V Page V-F-1) were the fire chief, assistant chief of operations, rescue vehicle, one P-2, one P-20, one P-18, and a foam trailer. All equipment was at the scene by 1126 CST. Sedgwick County Fire Department was notified, via 911, of the crash and also responded. All fires were extinguished by 1140 CST. The pilot and occupant of the house hit by the aircraft were uninjured and at the crash site when emergency vehicles arrived.

Emergency equipment was delayed slightly in arriving at the crash site by confusion over location of the crash site. Crash site location was relayed to the tower by Zoot 62, a student pilot unfamiliar with the local area. Tower personnel did not have maps of the local area, however, tower personnel familiar with the local area talked Zoot 62 through local landmarks and determined the crash site to be on Webb Road (a North-South road one mile East of the Eastern boundary of McConnell AFB), and South of 31st Street (an East-West road extending East from the center of McConnell AFB). The crash location was relayed to responding units as "on Webb Road South of 31st

Street." Webb Road was not well marked on 31st Street and units responding on 31st Street drove one mile past Webb Road to the next North-South road. There they sorted out their location and proceeded to the crash site.

I. MAINTENANCE DOCUMENTATION

A review of the mishap aircraft AFTO 781 series and associated maintenance records indicated no discrepancies.

There were no overdue Time Compliance Technical Orders (TCTO). However, three changes covered by TCTOs, not incorporated on this aircraft, would have had a bearing on this accident. As of the date of the accident these changes either: had not been received by the unit, or parts were on order, or parts were not yet available. These TCTOs are (the first three TCTOs cover one modification):

<u>TCTO</u>	<u>Title</u>	<u>Status as of Accident</u>
14S1-11-504	Upgrade of Aces II Survival Kit Container and Beacon Rocker Switch Mounting Bracket	Not received by unit
13A5-56-545	Rework of the Aces II Ejection Seat Pan Lid and Survival Kit Container	Not received by unit
1F-16-1815	Rework of the Aces II Ejection Seat Pan Lid and Survival Kit Container, F-16	Not received by unit
1F-16-1837	Modification of Forward and Aft Fuel Control Panels	Not received by unit & parts not available
1F-16-1727	Safety TCTO - Modification of Arresting Hook	Parts on order

There were no overdue inspections.

See Tab H for additional maintenance documentation comments.

THROTTLE CONTROL RACK COUPLING CHANGE

A Throttle Control Rack coupling change was directly related to this accident. The coupling connects the Throttle Control Rack to the PLA shaft. If the coupling fails or is disconnected, the throttle is no longer connected to the engine; the pilot will have no control over engine RPM. The engine will continue to run at whatever RPM it was operating at when the disconnection occurred.

The Throttle Control Rack coupling connects to the PLA shaft by means of splines on the interior of the coupling which engage splines on the exterior of the PLA shaft (Tab 7, page 4). A bolt is inserted through the coupling, passing through a groove in the PLA shaft. With this bolt properly inserted, the coupling cannot be pulled off the PLA shaft. A nut is installed on the

bolt and tightened. The bolt will hold the coupling on the PLA shaft with or without the nut. Tightening the nut compresses the coupling around the PLA shaft, firmly holding the coupling to the PLA shaft.

Prior to the change to the coupling: The old coupling is shown in Tab Z, page 5. The splines in the coupling begin past the center of the bolt hole - the coupling is counterbored to past the hole (Tab Z, page 6). The splines of the coupling and of the PLA shaft will not engage until the bolt hole in the coupling is blocked by the PLA shaft (Tab Z, page 6, bottom photograph). The PLA shaft must be further inserted into the coupling until the groove in the PLA shaft is aligned with the bolt hole before the bolt can be inserted. The coupling cannot be misassembled on the PLA shaft with the bolt installed. The only possible assembly of these parts, that does not fall apart immediately when they let go of, is the correct one. The counterbore in the coupling is sufficiently larger than the diameter of the PLA shaft that the PLA shaft simply falls out of the coupling if the splines are not engaged - and - engaging the splines blocks the bolt hole until the parts are properly aligned.

Following the change: See Tab U, page 2, Question C for history of change. In the new configuration of the coupling, the splines on the interior of the coupling are extended to the front end of coupling (vs the counterbore with splines beginning past the bolt hole) (Tab Z, page 7). The splines in the coupling now immediately engage the splines on the PLA shaft, well before the bolt hole in the coupling is blocked. At this point, and through the point where the PLA shaft blocks the bolt hole in the coupling, the bolt may be inserted through the coupling without the bolt hole in the coupling being properly aligned with the groove in the PLA shaft. If tightened at this point, the bolt will compress the coupling around the PLA shaft, holding it tightly. The assembly will hold together and pass the pull test outlined in the TO 1F-16C-2-70JG-10-1 and 1F-16C-2-76JG-00-1 (Tab U, pages 3 & 4), but, it is incorrectly assembled. If the coupling loosens on the PLA shaft - the bolt will not function as designed and the coupling will separate from the PLA shaft, disconnecting the throttle from the engine.

Maintenance personnel were not aware of this change.

TOs 1F-16C-2-70JG-10-1 and 1F-16C-2-76JG-00-1 do not reflect any change in procedures or warnings concerning the revised coupling. In fact, the latest change to TO 1F-16C-2-76JG-00-1, Change 16, 19 Aug 91, removed the warning concerning improper alignment of the Rack coupling and the PLA shaft. See Tab U, pages 3, 4, 5, & 6. The latest change to 1F-16C-2-70JG-10-1 also changed the page containing coupling installation instructions; a copy of the page prior to the change was not available.

This change, while not necessitating a change to the installation procedures, none the less changed the feel of the installation:

Prior to the change, splines of the coupling and the PLA shaft did not engage until approximately 3/8 inches of travel prior to alignment of the hole in the coupling with the groove in the PLA shaft, and at this point the hole in the coupling was blocked. The installer would engage the splines, push the coupling another approximately 3/8

inches, aligning the hole in the coupling with the groove in the PLA shaft, and drop the bolt through.

- Following the change, the splines engage immediately. The first 3/16 inches or so of travel after engaging the splines on the coupling with the splines on the PLA shaft leaves the hole in the coupling short of the groove in the PLA shaft - but - still allows installation of bolt. The coupling must be pushed on an additional approximately 3/8 inches for proper alignment of the bolt hole in the coupling with the groove in the PLA shaft.
- Prior to the change, there was not a position of the coupling on the PLA shaft, with splines engaged, which allowed installation of the bolt other than the correct position.
- Following the change, not only was there an incorrect position of the coupling on the PLA shaft that allowed bolt installation - but - that position roughly corresponded to the correct position for previous couplings (in terms of movement of the coupling on the PLA shaft after spline engagement). If you put it on like you always had before, you probably had an incorrect installation.

J. MAINTENANCE PERSONNEL AND SUPERVISION

Procedures for connecting the Throttle Control Rack to the PLA shaft are contained in TO 1F-16C-2-70JG-10-1 (Tab U page 3). For the new configuration of the Throttle Control Rack coupling, if the steps are not performed in order - if the pull check is performed after the nut is torqued down - and the clamping action of the coupling loosens on the PLA shaft, the coupling can separate from the PLA shaft disconnecting the throttle from the UFC.

The last Throttle Control Shaft installation logged in the AFForm 781H was on 6 Dec 1991 (Tab H, page 5). Interviews with the crew chief who made this installation and with the dock chief who QC'ed the installation indicate that they were not aware of the significance of the order of the steps, were not aware that the coupling could be assembled incorrectly; conversely, they believed that it could not be assembled incorrectly. During their interviews they indicated they now believe the installation must have been improperly made.

K. HYDRAULIC AND OIL INSPECTION ANALYSIS

All inspection analyses were found normal or satisfactory.

L. AIRFRAME AND AIRCRAFT SYSTEMS

All aircraft systems were functioning normally at impact with the exception of the coupling between the Throttle Control Rack and the Unified Fuel Control. This coupling was found disconnected at the crash site (TAB Z, page 1). This coupling had not been forcibly disconnected from the properly installed configuration, it was not connected at the time of impact (see Technical and Engineering Evaluation of Material on page J-5 and the F-16 Engine Control Rack Assembly Analysis, page J-7).

M. OPERATIONS PERSONNEL AND SUPERVISION

The mishap flight was conducted under the authority of the 184 TFG Commander in accordance with AFR 60-1 and ANG Conversion Training Course Syllabus F16C001CT, July 1990, which has been approved by the Director, Air National Guard. The daily flying schedule for this flight was approved by the Commanders' delegated representative, the 127 TFS Operations Officer. Before approval it is reviewed for compliance with crew rest requirements, pilot qualifications, turn times, mission/syllabus requirements, working area deconfliction, and any other operations factors impacting effective mission accomplishment. The mishap pilot was current in all administrative requirements for flight. The briefing guide used by the flight is approved and published by the 184 TFG Standardization/Evaluation Section.

N. PILOT QUALIFICATIONS

[REDACTED] was a fully qualified F-16C instructor pilot at the time of the accident. [REDACTED] flying time and experience of the mishap pilot is covered in TAB E. At the time of the mishap, [REDACTED] had a total of 3013.5 military flying hours with approximately 220 hours in the F-16. The remainder of [REDACTED] military flying time was in USAF F-15A/C and AT-38 aircraft and Marine F-4 and A-4 aircraft.

O. MEDICAL

[REDACTED] was medically qualified for the flight at the time of the mishap.

A post accident medical examination of [REDACTED] was conducted by the USAF Hospital, McConnell AFB. No injuries were revealed. Toxicological analysis were conducted by the Armed Forces Institute of Pathology, Washington, DC; all tests were negative (Tab G, page 5).

P. NAVIGATIONAL AIDS AND FACILITIES

There were no navigational aids or facilities that contributed to this mishap.

Q. WEATHER

The local observation, taken at 17:21:51 Zulu, was 2,600 scattered, measured 11,000 broken, 25,000 overcast, 7 miles visibility, winds 350 degrees at 26 gusting to 33 knots, altimeter setting 29.92, temperature 35 degrees F, pressure altitude 1370 feet. A weather advisory #1-6, was issued at 1430 Zulu for northerly wind gust to 35 knots, valid time 0900 - 1300 local. Another weather advisory #1-07, was issued at 1641 Zulu, for crosswinds in excess of 20 knots within 5 NM, valid time 1045 - 1300 local.

R. DIRECTIVES AND PUBLICATIONS

Publications applicable to the operation of the mission are:

AFR 60-1
AFR 60-16
F-16C-1
TACM 51-50
TACR 55-116
TACR 55-79
ANG Syllabus F16C001CT

F-16C-1 contains procedures for Abnormal Engine Response. The first step is "EEC Off." If sufficient response is not regained, two series of steps are offered; one for "Insufficient Thrust" and the other for "Thrust Too High To Permit a Safe Landing."

For "Insufficient Thrust," Afterburner is recommended. If thrust is still insufficient or if serious engine problem exists, the throttle is to be placed at Military Power or below, BUC selected, stores jettisoned, and a landing made as soon as practical.

For "Thrust Too High For a Safe Landing," throttle is placed to military power or below, BUC selected, and if thrust remains too high to permit a safe landing, a flame-out landing is recommended.



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