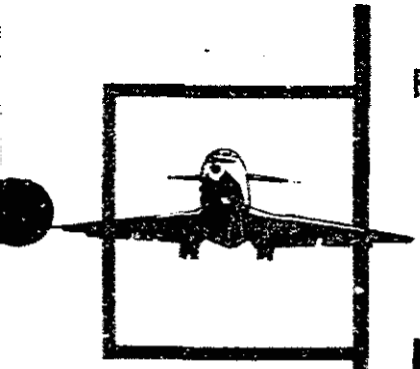

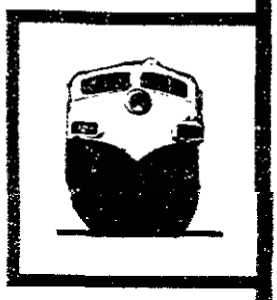

PB84-910407

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 26594

AIRCRAFT ACCIDENT REPORT

MIDAIR COLLISION
McDONNELL DOUGLAS F-4C/
BEECH D-55 BARON
CHERRY POINT, NORTH CAROLINA
JANUARY 9, 1983

NTSB/AAR-84/07

UNITED STATES GOVERNMENT

TECHNICAL REPORT DOCUMENTATION PAGE

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16. Abstract

At 1641 eastern standard time, on January 9, 1983. a Beech D-55 Baron, N7142N, and a McDonnell-Douglas F-4C Phantom II, collided in flight at 9,300 feet about 30 miles south of Cherry Point, North Carolina. The twin-engine Beech Baron was operating under visual flight ruies from Nassau, the Bahamas, to Norfok, Virginia. with a pilot and six passengers on board. The Baron crashed at sea and none of the occupants were recovered during tne C.S. Coast Guard's search and rescue effort; all are presumed dead. The U.S. Air Force F-4C from the Michigan Air National Guard was operating a Special Military Instrument Intercept Clearance Mission from Seymour Johnson Air Force Base, Goldsboro. North Carolina. The purpose of the mission was to intercept an unknown target. The aircrew of the F-4C consisted of a pilot and a weapons systems officer seated in tandem. The F-SC sustained substantial damage to the left wing, and the left drop tank assembly separated. The F-4C flightcrew was not injured in the accident, and the airplane returned to Seymour Johnson Air Force Base without further incident.

The Safety Board did no: determine the probable cause of this accident. (See page 26.)

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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

AIRCRAFT ACCIDENT REPORT

Adopted: June 19,1984

MIDAIR COLLISION
McDONNELL-DOUGLAS F-4C/BEECH D-55 BARON,
CHERRY POINT, NORTH CAROLINA,
JANUARY 9,1983

SYNOPSIS

At 1644 eastern standard time, on January 9, 1983, a Beech D-55 Baron, N7142N, and a McDonnell-Douglas F-4C Phantom II, collided in flight at 9,300 feet about 30 miles south of Cherry Point, North Carolina. The twin-engine Beech Baron was operating under visual flight rules from Nassau, the Bahamas, to Norfolk, Virginia, with a pilot and six passengers on board. The Baron crashed at sea and none of the occupants were recovered during the U.S. Coast Guard's search and rescue effort; all are presumed dead. The U.S. Air Force F-4C from the Michigan Air National Guard was operating on a Special Military Instrument Intercept Clearance Mission from Seymour Johnson Air Force Base, Goldsboro, North Carolina. The purpose of the mission was to intercept and identify an unknown target. The aircrew of the F-4C consisted of a pilot and a weapons systems officer seated in tandem. The F-4C sustained substantial damage io the left wing, and the left drop tank assembly separated. The F-4C flightcrew was not injured in the accident, and the airplane returned to Seymour Johnson Air Force Base without further incident.

The Safety Board did not determine the probable cause of this accident. (Seepage 26.)

1. FACTUAL INFORMATION

1.1 History of the Flight

The Beech Baron

About 1300, 1/ on January 9, 1983, the pilot of a Beech D-55 Baron, N7142N, entered the Flight Service Station in Nassau, the Bahamas, to file a visual flight rules (VFR) flight plan to Norfolk International Airport, Norfolk, Virginia. The flight plan indicated Atlantic Route 3 to Wilmington, North Carolina, then direct to Norfolk at a VFR altitude of 8,500 feet 2/ and at a true airspeed of 180 knots; the flight was to be 4 hours en route. The plan stated that there would be six persons on board and that six life jackets and one life raft would be available. However, according to the Bahamian Civil Aviation Authorities, the pilot was correctly advised that the flight plan was unacceptable since U.S. Government Regulations require that flights to the U.S. enter through Florida in order to clear U.S. Customs. Upon being giver! this advice, the pilot filed another flight ptan, this one for entry through Fort Pierce, Florida, followed by a direct flight to Norfolk. (See figure 1.)

1/ Unless otherwise indicated, all times herein are eastern standard time, based upon the 24-hour clock.
2/ Unless otherwise indicated, all altitudes are mean sea level.

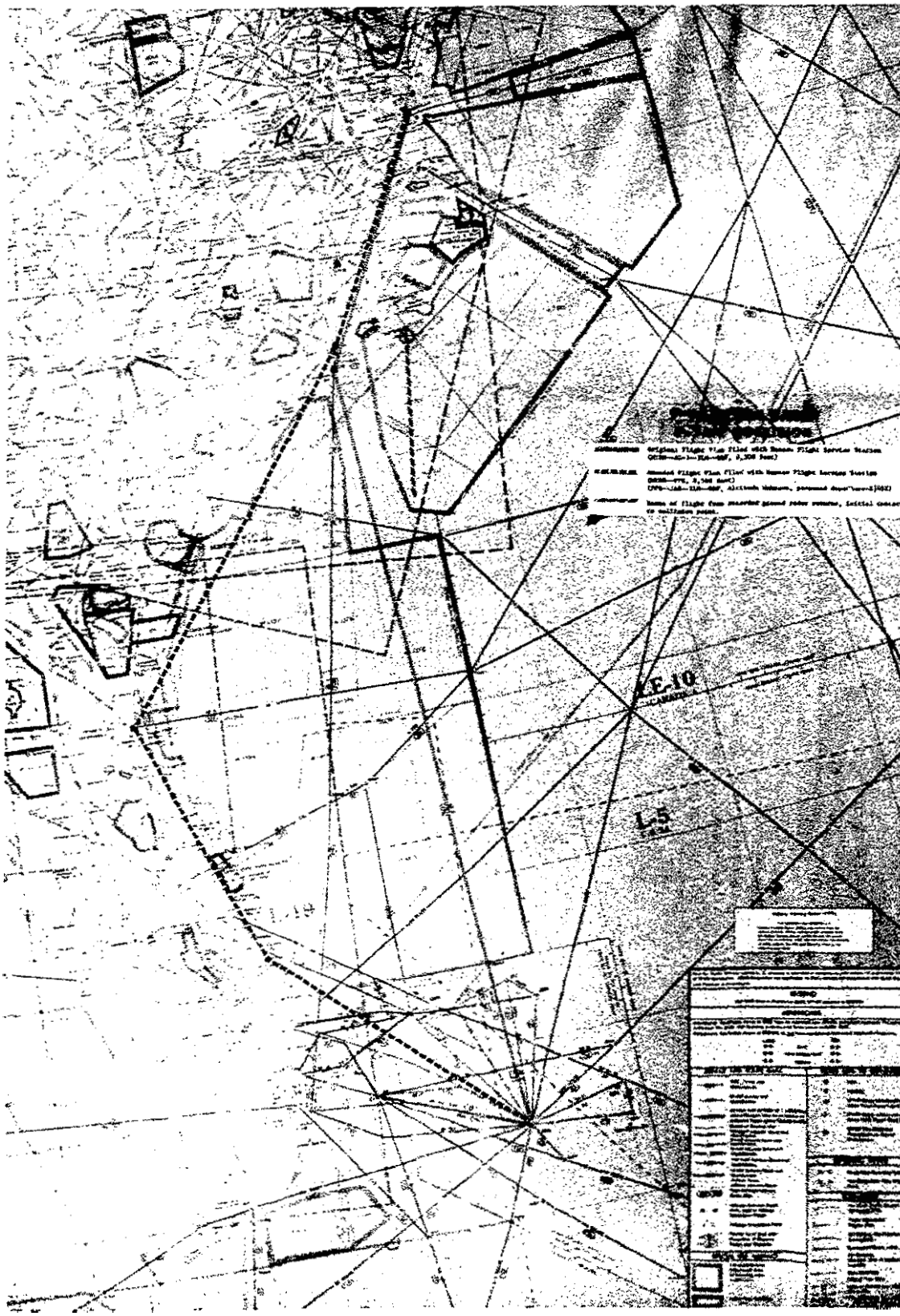


Figure 1.--Flight plan routes as filed by the Baron piiot and actual route as detected by NORAD radar.

About 1340, the Baron pilot contacted the Nassau Tower and requested taxi instructions for a VFR departure. The flight departed at 1349 and was instructed to contact en route VFR advisory service for activation of its VFR flight plan. The pilot acknowledged the frequency change, but there is no record of the pilot's contacting the en route VFR advisory service as instructed. Bahamian authorities stated that had the Baron pilot contacted the advisory service, his VFR flight plan would have been activated from Nassau to Fort Pierce, Florida, and the flight would have been requested to provide an estimate of when it would enter the Air Defense Identification Zone (ADIZ). 3/ The estimated time of entry into the ADIZ and the complete VFR flight plan would then have been transmitted to the appropriate US. Federal Aviation Administration (FAA) flight service station. However, there is no express requirement for pilots to activate the filed flight plan before-entering U.S. airspace.

At 1630:32, the Beech Baron pilot called the Washington Air Route Traffic Control Center (ARTCC) New Bern low altitude sector radar controller on frequency 127.4 mhz, but received no answer. At 1631:24, he called Jacksonville ARTCC on 127.4 mhz. At 1631:26, the Washington Center controller replied, "7142N, Washington Center, go ahead." At 1631:28, the pilot transmitted, "We're about 50 miles south of New Bern - squawking 1200 4/ and would like radar traffic advisories and once you pick us up, you could vector us around some of these cells, we'd appreciate it." The pilot stated he was operating at 9,500 feet and that his destination was Norfolk, Virginia.

At 1631:56, the Washington Center controller assigned the Baron a transponder code of 0524; at 1632:41, the Washington Center controller asked the pilot if he had entered the assigned transponder code, because he was not detecting a target at the flight's reported location. At 1633:14, the pilot questioned the controller about the weather cells between New Bern and Norfolk. The controlle: advised the flight that no cells were observed north of New Bern and that there were scattered cells just southwest of New Bern. The pilot advised that he was in moderate precipitation south of New Bern, and at 1635:30 stated that the flight was on the 133° radial of the Wilmington VOR 56 miles at 9,500 feet. At 1637:29, the pilot requested that the controller notify Norfolk to have Customs standing by upon landing.

The F-4C

At 1607:40, the U.S. Air Force's (USAF) 20th North American Air Defense Region (NORAD) Semi-Automatic Ground Equipment facility (Fertile Control) detected an airborne radar target within the Atlantic Coastal ADIZ but was not able to correlate the radar return with known or proposed aircraft flight information. At 1610:35, the Fertile Control Identification Officer (see Appendix D) declared the target return an "unknown" aircraft. As a result of the Parget's unknown status, the Fertile Control Senior Director issued a scramble order to the 191st Fighter Interceptor Group Alert Detachment Facility located at Seymour Johnson Air Force Base (AFB), North Carolina.

At 1614, Fertile Control requested FAA's Washington ARTCC to provide identification information on an airplane with a VFR transponder code (1200) in the W-122 warning area. 5/ After conferring with Jacksonville ARTCC, Washington Center informed Fertile Control that FAA facilities were not in contact with OF controlling any traffic within the W-122 warning area.

3/ Pilots are required by 14 CFR Part 99 to provide AD12 penetration estimates to air traffic control which are forwarded to the eppropriate Air Defense facility by the FAA.
4/ A VFR transponder code.
5/ International airspace which mag involve hazards to nonparticipating aircraft.

At 1618, two F-4C aircraft, Juliet Lima 25 (JL 25) and Juliet Lima 26 (JL 26), took off from Seymour Johnson AFB to intercept and identify the unknown target in the W-122 warning area south of Cherry Point, North Carolina. The aircraft climbed to flight level (FL) 230 and the pilots were instructed to fly a heading of 130°. Washington Center coordinated with Jacksonville Center for FL 250 and a 160° heeding that would take the aircraft into Jacksonville's airspace. Approval was granted by Jacksonville Center, and the aircraft were handed off to Fertile Control at 1622:25.

At 1623, JL 25 made initial contact with Fertile Control and advised the Fertile Control Weapons Director that their on-board weapons control systems were in the safe mode. The weapons director advised the pilots of both aircraft that they were paired on a single target located 170° from their position at 110 miles and that the aircraft were to continue on the 160° heading. Additionally, the weapons director informed the F-4Cs that the unknown target was tracking 010° at an altitude of 6,500 feet (height finder radar) and a ground speed of 200 knots. The weapons director also informed the fighters that they were to make a stern intercept (approach the target from the rear) to visually identify the unknown target and to approach no closer than 500 feet from the intercepted airplane.

At 1627, the fighter pilots reported leaving 25,000 feet for 15,000 feet, which was to be their initial intercept altitude. The pilot of JL 25 advised the weapons director that there was a cloud deck below them about 13,000 feet and, "It looks to be pretty dense below." The weapons director first cleared the aircraft to descend, and JL 25 reported the aircraft leaving 15,000 feet for 13,000 feet; the weapons director then cleared the aircraft to descend to 10,000 feet.

At 1633, the weapons director advised the aircraft to set speed at mach .78 (about 437 knots airspeed) and informed the pilots that their aircraft were 10 miles from the target; JL 25 acknowledged. At 1634, the weapons director advised the F-4Cs that they were "coming into target hot at this time," indicating that they were overtaking the target at a higher than planned airspeed. The weapons director again instructed the pilots to come no closer than 500 feet to the unknown target. At 1635, the pilot of JL 25 stated that instrument meteorological conditions existed below 13,000 feet. Neither aircraft was able to obtain an airborne radar contact with the unknown target, and at 1636:30, the weapons director, on instructions from the weapons assignment officer, turned the F-4Cs away from the unknown target in order to reposition them for another attempted intercept.

At 1637:38, Washington Center contacted the Fertile Control weapons assignment technician advising him that Washington Center had an aircraft on its frequency whose pilot stated that he was Beech Baron N7142N, flying in visual conditions at 9,500 feet, positioned on the 130° radial 56 miles from the Wilmington, North Carolina, VOR. 6/Center also gave the registration number of the airplane as N7142N and stated that it could be the unknown target for which the F-4Cs were searching. Tnis conversation was monitored by the Fertile Control identification section on the drop line.

Meanwhile, the F-4Cs executed an in-place 360° turn at 14,000 feet, and JL 26 assumed the lead position. JL 26 established radar contact with the unknown target and descended to a position about 1,000 feet below it, based on indications from the onboard weapons control system radar.

6/ Visual Omni Range is a navigational aid maintained by the FAA.

At 1639, the weapons director advised JL 25: "Sir, we talked to Center; Center reported that the aircraft you're rolling behind in trail now is at approximately 9,000 feet, climb angels 11 (11,000 feet), call when level." At 1640:05, the weapons director advised the F-4Cs that the target was bearing 360° and 7 miles from their position.

At 1640:12, the senior director technician (SDT), the weapons assignment officer (WAO), and the weapons assignment technician (WAT), engaged in the following conversation:

Senior Director Technician:

"WAO, the WAT just called ID (identification section) with an ID on this guy and to my knowledge we don't have one, is that accurate?

Weapons Assignment Officer:

"Not yet, this is a Center report, they think this guy is a BE55 that's lost."

Weapons Assignment Technician:

"No, ID has already talked to Center. They listened to the same thing I listened to on the hot line. They're not going to ID him until they're sure."

(1640:47) Senior Director Technician:

"OK, now I understand, thank you."

At 1640:10, the senior director (SD) senior director technician (SDT) and the identification officer (IDO) had the following conversation:

Senior Director:

"SD"

Identification Officer:

"SD, ID, be advised Washington has informed us of a possible ID, a BE55, call sign N7142N.

Senior Director:

"Say call sign again."

Senior Director Technician:

"N7142N OK, hold it a second."

Senior Director:

"Possible ID is not close enough, we hove to get an ID."

Identification Officer:

"Just passing info. The type of aircraft is a BE55 and he's supposed to be landing at Norfolk. This is all speculation."

Senior Director:

"Thank you."

Identification Officer:

(1640:45) "You're welcome, sir."

From 1640:10 to 1641:31 the weapons director continued to vector the F-4Cs to the unknown target. At 1640:10, the pilot of JL 25 advised the weapons director that his aircraft was level at **13,000** feet. He also reported Popeye 7/ and requested to climb to 14,000 feet. At this time, JL **26,** which was being maintained at **14,000** feet, advised that he also was Popeye.

After being told by the weapons director that the unknown target was 360° at 5 miles, the pilot of JL **26** transmitted "**26** has a contact 8/ 020" for 6." The weapons director confirmed that the contact was the unknown target, and JL **26** transmitted "Roger, we're going to move on in, lead, you go back 2 or **3** miles." At **1641:48,** JL **26** advised "Judy 9/" with the unknown target. The weapons director acknowledged the Judy transmission and again instructed the flight to maintain 500 feet separation from the target aircraft.

The Collision

At 1641:55, the Washington Center controller instructed the Baron pilot to "squawk ident" on his transponder. At **1642:20,** another Washington Center controller advised the Fertile Control weapons director technician that the Baron had identified himself and ". ..that is him down there at Juliet Lima's **12** o'clock, and about **6 to 7** miles, 0524, (assigned transponder code) we're advising him of his position now"; this transmission was acknowledged at **1642:30.**

At **1642:57,** the following conversation took place between the Fertile Control identification officer (IDO) and weapons director technician (WDT):

Identifieation Officer:

"Yea, ...I understand you guys got a possible ID on this guy.':

Weapons Director Technician:

"Roger, that, he's a BE55, N. .."

7/ Terminoiogy used by military flightcrews to indicate instrument meteorological conditions (IMC).
8/ Terminology used by crew:; of fighter aircraft to indicate that the fighter has established radar contact with the target.
9/ Terminology used by crews of fighter aircraft to indicate that the fighter has radar contact with the target and will complete the interception on its own.

Identification Officer:

"7142N"

Weapons Director Technician:

"Roger."

Identification Officer:

"OK, that is confirmed."

Weapons Director Technician:

"OK, he's just confirmed, Center just had him squawk ident and it was him so. . . ." "We're continuing with the intercept though."

(1643:30) Identification Officer

"OK, thank you, I'll contact the SD."

At 1642:09, JL 26 had been positioned behind the target in a left low position with an airspeed of 230 knots indicated airspeed (KIAS) and an overtake speed of 50 knots. The weapons systems officer aboard JL 26 continued to provide the pilot with clearance and closure information, while JL 25 maintained 13,000 feet in a 1.8-mile trail position. The crew of JL 26 stated that the instrument meteorological conditions (IMC) intercept clearance limit was 1,500 feet slant range. As the airplane approached the clearance limit, the weapon systems officer received a "break X" 10/ indication on the radarscope; the pilot immediately began a left turn away from the target.

At 1642:33, the Baron pilot asked the Washington Center controller, 'Say, you have us in radar contact?" At 1642:35, the controller replied, " N7142N, yes sir, I want to advise you of something sir, you are in a warning area, and they did send out military aircraft to scramble on your flight; are you proceeding from your present position direct Norfolk? The pilot replied, ". . .we're coming up AR 3 and we hit pretty good cells, we just deviated around them." At 164256, the controller transmitted, "Okay sir, well, you got some F-4s right on your tail, sir, I just want you to be aware of that, is there any way at all you can proceed direct New Bern, direct Norfolk." The pilot requested the controller to repeat and the controller transmitted, "Direct New Bern, direct Norfolk." The controller stated in an interview that he requested the turn to get the Beech Baron out of the warning area as quickly as possible. The pilot read back this transmission, and at 1643:17, the pilot questioned the controller, "Affirmative, we're going direct New Bern right now aren't we?" The controller answered, "I don't know; I asked you before if you were going direct Norfolk and you said yes." At 1643:34, the pilot transmitted, "That's about direct Norfolk, about 5° off or something. . . . We can go direct New Bern now -- looks like these cells out here are lightening up just a little bit, the rain seems to be ending, turning to light rain right now.?' The pilot added, "You say you want us to go direct New Bern?"

10/ The computed minimum launch range for the weapon selected is displayed on the radar screen as an "X". It varies according to overtake speed, altitude, and intercept geometry.

At 1644:04, the controller answered, "7142N, yes sir, head towards New Bern and I'll give you vectors to Norfolk, but head towards New Bern." At 1645, an unintelligible transmission from the Baron was recorded, but it was the last transmission from the flight.

Approximately 1644:41, the senior director was informed by the identification officer that the Weapons Team and Washington Center had confirmed by the aircraft transponder code that the unknown target was N7142N. The senior director replied, "Roger, that we have an ID, we'll knock it off.!'

Approximately 1644:46, JL 26 transmitted "We went by him, no." This transmission terminated abruptly after the word "no." At 1644:49, the weapons director transmitted, "JL 25 flight, knock it off, knock it off, post attack, left 250, left 250." Receiving no response from the flight, the weapons director controller transmitted, "JL 25 flight, did you copy; knock it off." At 1644:57, JL 26 transmitted, "26 had a midair with the target, we're now climbing past eleven thousand; we're leaking fuel out of the left wing." The F-4C flightcrew declared an emergency and requested clearance to Seymour Johnson AFB, where the aircraft was landed without further incident. The collision occurred during daylight hours over the Arlantic Ocean at 34°17'N latitude and 76° 46'W longitude at about 1644:46. (See figure 2.)

In a pustaccident interview, the pilot of JL 26 recounted that after Fertile Control had repositioned the flight for the second intercept, the weapons systems officer obtained a radar contact and JL 26 then took over as lead to complete the identification run. He stated that he estimated the target's altitude, using the radar display, at 9,500 feet, and that he descended his aircraft to 9,000 feet, maintaining 230 KIAS with a 50-knot overtake. The weapons system officer gave heading corrections So maintain the target at 15° right azimuth. The pilot recalled looking inside the aircraft at the radar to confirm target pcsition and then outside the aircraft to obtain visual contact with the target. He recalled that while looking at the radar, a "break X" was displayed, and he began a 30° left-hand bank away from the target. During the turn and as he looked out of the right side of the canopy, he felt a thump and determined that his aircraft had collided with the target.

The weapons systems officer stated that as the flight was being repositioned, he received an onboard radar contact at 5 to 6 miles and 30° right azimuth, while on a northerly heaaing; he requested a descent to 9,000 feet. At 3 miles in trail, he estimated by interpreting data being displayed on his radarscope that the target's altitude was 9,900 feet. He gave tine pilot a number of left turns to keep the target at 15° right azimuth. The weapons system officer stated that the target was at 15° to 20° right azimuth at 1,500 feet slant range. A "break X" with the target at 25° right azimuth, he called for a hard left turn, and during the turn he heard and felt the collision with the target.

1.2 Injuries to Persons

Beech Baron, N7142N

Injuries	Crew	Passengers	Others	Total
Fatal	1	6	0	7
Serious	0	0	0	0
Minor/None	0	0	0	0
Total	1	6	0	7

MID-AIR COLLISION EVENTS TIMING

Figure 2.—

Time	Baron	ARTCC	Time	NORAD	F-4C
1300	piled Flight plans				
1349	Departed Nassau.				
			1607	Detected target.	
			1610	Target "unknown."	
			1614	No FAA correlation.	
			1618		F-4s scrambled.
			1622		F-4s to Fertile Control.
1630	Call DCA-JAX Contact WX-related transmissions	DCA responds to Baron, assigns 0524 code.	1631	Directs F-4s on to unknown	JLZ5 reports IMC conditions below 13,000 ft.
			1636		No contact-repositioned.
1637					
1637:38		Contact Fertile concerning Baron information.	163798	WAT + ID rx DCA message	
			1640	WD advises F-4 tgt 360°/7 mi.	
			1640:40	SDT, WAD, WAT and SD, SDT and IDO discuss Baron information from DCA.	
			1641:18	To F-4 tgt 360°/5.	Contact 020°/6 "Judy."
1641:55	Ident "squawk."	Ask Baron for "ident."			
1642:20		Called Fertile Control. Baron identified,	164290	WDT takes Baron ID call.	
1642:33	Ask DCA if they are in radar contact.	Answer - Yes sir.	1642:50		3626 positioned 1,000 feet behind unknown.
	Discuss weather and him with DCA.	Informs Baron of intercept.	1642:57	WDT/IDO discuss DCA information.	
		Directs turn to clear ADIZ. "Turn to New Bern"	43:30	IDO decides to call SD.	
44:04			1644:41	IDO calls SD SD decides to terminate intercept.	
			1644:46	(COLLISION)	We went by him, No."
			1644:48	WD terminates intercept "knock it off."	
			1644:57		"26 had a midair with target... "

McDonnell-Douglas F4C

Injuries	Crew	Passengers	Others	Total
Fatal	0	0	0	0
Serious	0	0	0	0
Minor/None	2	0	0	2
Total	2	0	0	2

1.3 Damage to Aircraft

The left wing on the McDonnell-Douglas F-4C was damaged substantially. Beech Baron N7142N was not recovered and is presumed to have been destroyed.

1.4 Other Damage

None.

15 Crew Information

The pilot and the weapons systems officer of the F-4C were qualified and current in accordance with USAF and Federal Aviation Regulations. (See Appendix B.) Both crewmembers were on current military orders with the Michigan Air National Guard with further duty at Seymour Johnson AFB. The pilot's active duty orders were effective January 1, 1983, and #e weapon systems officers orders were effective October 17, 1982, for 90 and 104 days, respectively. The pilot was wearing glasses at the time of the accident, as required by his medical certificate.

The review of FAA files revealed that the Beech Baron pilot was qualified for the flight; however, compliance with currency requirements of 14 CFR 61.57, Recent Flight Experience - Pilot in Command, could not be established because the pilot logs apparently were destroyed in the crash.

16 Aircraft Information

Thr F-4C was maintained in accordance with approved USAF maintenance procedures. A search of FAA files revealed that Beech Baron N7142N was registered to Orr Chevrolet, Inc., of Texarkana, Texas; it was in whet was described as "sales status.:' Since neither the aircraft nor accompanying airframe and engine maintenance logs were recovered, the airworthiness of the aircraft could not be determined. (See Appendix C.)

1.7 Meteorological Information

Review of weather data indicated that at the time of the collision, cloud bases were between 1,500 and 2,000 feet with solid cloud conditions from the cloud bases to above 10,000 feet. The flight visibility ranged from 0 to 3 miles in and near clouds at about the altitude of the collision. Rainshowers with light turbulence were present below 10,000 feet. Upper level winds were reported to be from 179° at 19 knots at 10,000 feet, and from 177° at 20 kcots at 9,000 feet. The temperature at 10,000 feet was -1° C and at 9,000 feet was +1° C. There also was mixed icing of at least moderate intensity in clouds above 9,500 feet m.s.l.

The National Weather Service (NWS) area forecast issued at 1240 pertinent to the time and area of the accident called generally for clouds at 2,000 feet overcast, layered to above 20,000 feet, with occasional 1,000 feet overcast; visibility was 3 miles in moderate rainshowers with fog. In addition, the forecast called for occasional ceilings below 1,000 feet and visibilities below 3 miles in fog mainly along the coastal plains.

1.8 Aids to Navigation

There were no difficulties with navigational aids.

1.9 Communications

There were no known communication malfunctions; however, each aircraft was in contact with a different air traffic controlling agency. The F-4C was communicating with NORAD Fertile Control on UHF radio, while the Beech-Baron was in contact with Washington Center on VHF radio. The communication radios in these aircraft were not compatible.

1.10 Aerodrome Information

Not Applicable.

1.11 Flight Recorders

The airplanes were not equipped with either cockpit voice recorders or flight data recorders, and none were required.

1.12 Wreckage and Impact Information

The major damage to the F-4C consisted of leading edge damage to the left wing and its fuel tank. Damage to the left wing leading edge consisted of propeller slashes and other impact damage. Parts and debris from the Beech Baron were embedded in the damaged leading edge. Using the wing joint as a reference and measuring parallel to the wing leading edge, the following was noted: (See figure 3.)

1. A propeller slash was found which began 68 inches inboard from the wing joint and progressed into the wing to a distance of 10 inches perpendicular to and aft of the leading edge. The slash ended 72 inches from the wing joint.

2. A V-shaped propeller slap mark was found from 10 inches to 21 inches inboard of the wing joint along the leading edge. The leading edge of the mark was 31 inches long, and its trailing edge was 36 inches long.

3. The wing joint forgings were damaged by impact.

4. A section of a Beech Baron window frame was found embedded in the leading edge of the F-4C's wing, 38 inches outboard from the wing joint.

5. A nut from the Beech Baron manifold pressure gauge was found embedded in the leading edge of the F-4C's wing? 18 inches inboard from the wingtip. The manifold pressure gauge was the top instrument in the center of ?he instrument panel.

The National Weather Service (NWS) area forecast issued at **1240** pertinent to the time and area of the accident called generally for clouds at **2,000** feet overcast, layered to above 20,000 feet, with occasional 1,000 feet overcast; visibility was **3** miles in moderate rainshowers with fog. In addition, the forecast called for occasional ceilings below 1,000 fee: and visibilities below **3** miles in fog mainly along the coastal **plains.**

1.8 Aids to Navigation

There were no difficulties with navigational aids.

1.9 Communications

There were no known communication malfunctions; however, each aircraft was in contact with a different air traffic controlling agency. The F-4C was communicating with **NORAD** Fertile Control on **UHF** radio, while the Beech-Baron was in contact with Washington Center on VHF radio. The communication radios in these aircraft were not compatible.

1.10 Aerodrome Information

Not Applicable.

1.11 Flight Recorders

The airplanes were not equipped with either cockpit voice recorders or flight data recorders, and none were required.

1.12 Wreckage and Impact Information

The major damage to the F-4C consisted of leading edge damage to the left wing and its fuel tank. Damage to the left wing leading edge consisted of propeller slashes and other impact damage. Parts and debris from the Beech Baron were embedded in the damaged leading edge. Using the wing joint as a reference and measuring parallel to the wing leading edge, the following was noted: (See figure 3.)

1. **A** propeller slash was found which began **68** inches inboard from the wing joint and progressed into the wing to a distance of **10** inches perpendicular ***to*** and aft of the leading edge. The slash ended 72 inches from the wing joint.

2. A V-shaped propeller **slap** mark was found from 10 inches to **21** inches inboard of the wing joint along the leading edge. The leading edge of the mark was **31** inches long, and its trailing edge was **36** inches long.

3. The wing joint forgings were damaged by impact.

4. A section of a Beech Baron window frame was found embedded in the leading edge of the F-4C's wing, **38** inches outboard from the wing joint.

5. A nut from the Beech Baron manifold pressure gauge was found embedded in the leading edge of the F-4C's wing, **18** inches inboard from the wingtip. The manifold pressure gauge was the top instrument in the center of the instrument panel.

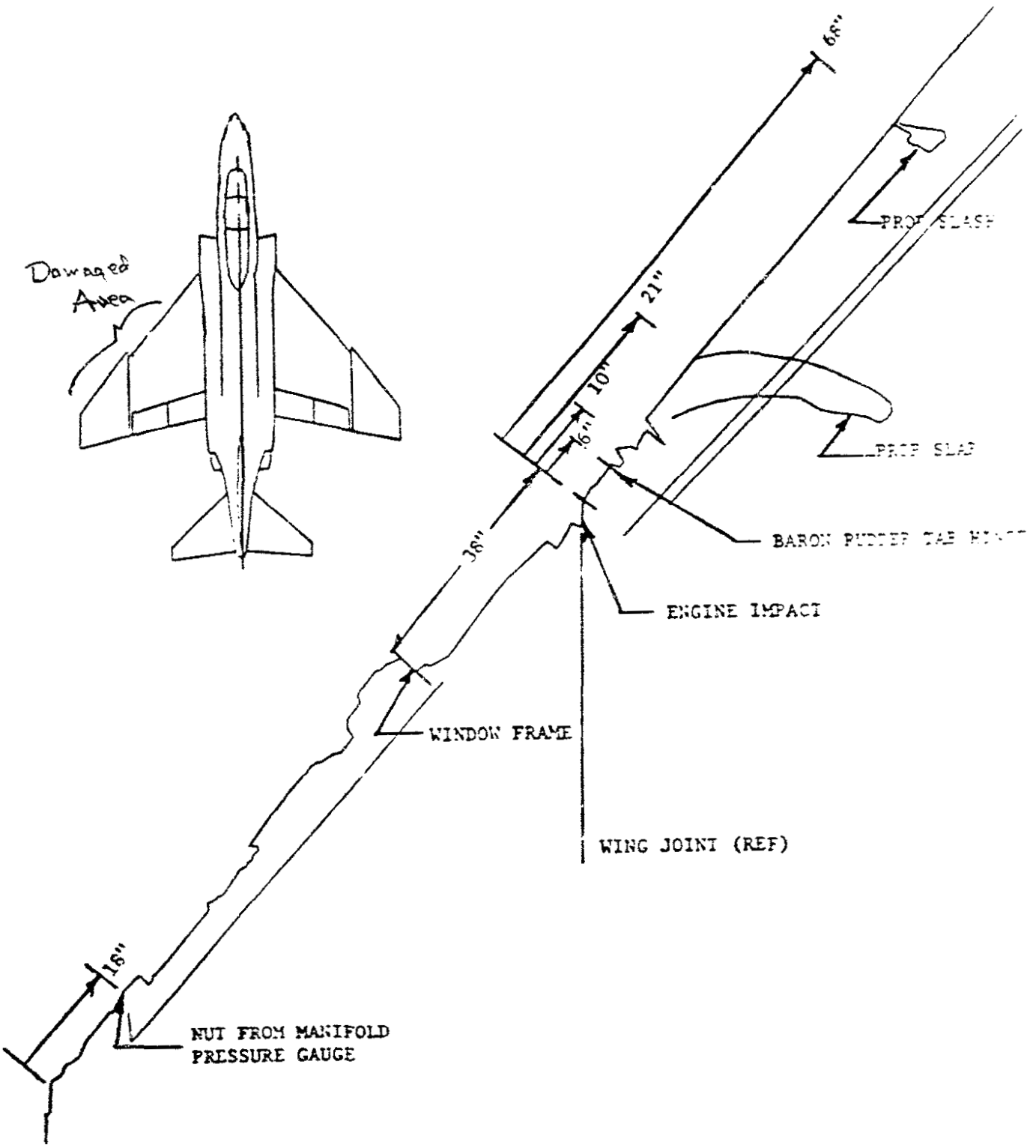


Figure 3.--Damage to McDonnell-Douglas F-4C Left Wing.

6. A Beech Baron rudder tab hinge wire was found embedded in the leading edge of the F-4C wing 6 inches inboard from the wing joint. The pin would have been located in the trailing edge of the Baron rudder 8 to 32 inches from the bottom.

Four radar-guided Sparrow missiles were mounted on the fuselage of the F-4C. The two front missiles were positioned forward near the junction of the wing leading edge and fuselage. Each was about 1 1/2 feet off the airplane centerline. The two aft Sparrow missiles were positioned longitudinally just aft of the main gear and each was about 2 feet off the airplane centerline. The lower fins of the front missiles and the left aft missile were demaged. Scrapes were found on the bottom of the F-4C to the left of the right aft missile.

The fuel tank on the left wing separated during the collision, and the bottom of the missile launcher for heat seeking missiles on the left wing was also damaged. The bottom of the fuel tank was 37 inches beiow the bottom of tne wing and the tank centerline was 10 feet 6 inches from the junction of the wing leading edge and fuselage. The wing-mounted launcher was 22 inches below the bottom of the wing. The centerline of the iauncher was 4 feet from the junction of the wing leading edge and fuselage.

Four areas of the left wing of the F-4C had come in contact with occupants of the Beech Baron. Hair and smeared blood were found on the wingtip and at 17 inches, 54 inches, and 69 inches inboard from the wingtip.

Scratches on the bottom of tine left wing of the F-4C were at an angle of 7.8° from the airplane centerline. The scratches moved aft and outboard. The tips of the two propeller marks were also aligned at 7.8°.

1.13 Medical and Pathological Information

At least some of the seven occupants onboard the Baron are presumed to have received fatal injuries in the collision. The only evidence recovered relevant to the occupants was blood and hair found embedded in the leading edge of the F-4C's left wing.

1.14 Fire

Not Applicable.

1.15 Survival Aspects

After the Collision, at 1645, the weapons director transmitted "Feet dry 320/20" 11/ and instructed the F-4C aircraft to squawk emergency and requested nature of the emergency. JL 25 replied that JL 26 had had a "midair (collision) with extensive damage to the left wing." Fertile Control initiated handoff to Washington Center at 1645:56 stating that the flight was an emergency but did not state the nature of the emergency. Fertile Control initially asked Washington Center to recover JL flight at Cherry Point Marine Air Station, North Carolina, but the pilot of JL 25 requested a return to Seymour Johnson AFB.

11/ Terminology used by GSAF Intercept Controllers to advise flightcrews of the nearest point to land when aircraft are operating over water. Heading and distance are always issued.

At 1650:16, Fertile Control advised Washington Center that JL 26 had been involved in a midair collision with a civilian aircraft. Washington Center requested a Marine helicopter to proceed to the collision area through Cherry Point Approach Control at approximately 1652 and one was launched at 1717. The U.S. Coast Guard Air Station at Elizabeth City, North Carolina, was notified about 1655. At 1800, the Coast Guard dispatched two aircraft to search for the Beech Baron and any survivors. Following 3 days of searching using both aircraft and cutters, the Coast Guard terminated the search. Some debris from the Baron's interior, an inflatable life raft, and some personal items of those on board were recovered.

The accident was not survivable for the occupants of the Beech Baron. The F-4C cockpit was not damaged in the collision, and the flightcrew was able to maintain sufficient control of the airplane to make a successful emergency landing.

1.16 Tests and Research

1.16.1 Flight Reconstruction

The pilot of the F-4C stated that his speed during the intercept was 230 KIAS and at "break X", he began a 30° left-hand bank while applying military power, which is maximum thrust without afterburner. An F-4C simulator at Andrews Air Force Base was flown by USAF pilots to establish acceleration data of the F-4C. The simulator was set at 9,500 feet altitude and at 250 KWS. Full military power was applied and the simulator took 30 to 35 seconds to accelerate to 350 knots in a 30° left bank.

Radar data consistently placed the Beech Baron at 203 knots ground speed on a northerly heading. By subtracting the 20-knot southerly wind, a true airspeed of about 180 knots was derived. A pilot's operating handbook for the Baron suggests that a reasonable power setting to achieve 180 knots true airspeed at 9,500 feet would be at 2,100 rpm and 55 percent power.

The F-4C pilot stated he was at 230 KIAS at 2 miles separation with a 50-knot overtake which was about 255 knots true airspeed **(KTAS)** at 9,500 feet. Adding the 20-knot tailwind would yield a 275-knot ground speed. Radar data show a constant acceleration from about 275 to about 320 knots ground speed at impact. The closure rate would have been the difference between the F-4C and the Baron's ground speeds or about 120 kncts.

Propeller slash marks, which were 36.9 inches apart, also were used as a basis to compute the closure rate. The engine rpm was estimated at 2,100 rpm, *or* 35 revolutions per second, or one blade hit every .01428 second. Thus, closure velocity was 36.9 inches in .01428 second or 215 feet per second, which equals 127 knots. The true airspeed *of* the F-4C at impact would then have been 180 KTAS (Baron) + 127 **KTAS** (closure), or 307 KTAS, or 327 knots ground speed. Using the true airspeeds of the F-4C and Baron (307 KTAS and 180 KTAS), a closure rate of 127 KTAS, and the relative scratch mark angle on the F-4C of 7.8° in an aft and outboard direction, a vector diagram yielded a 5.5° heading difference with the Baron heading to the left of the F-4C.

A sequence of events was reconstructed by using the 5.5° heading difference and the calculated true airspeed of each airplane. (See figure 4.) This was accomplished by:

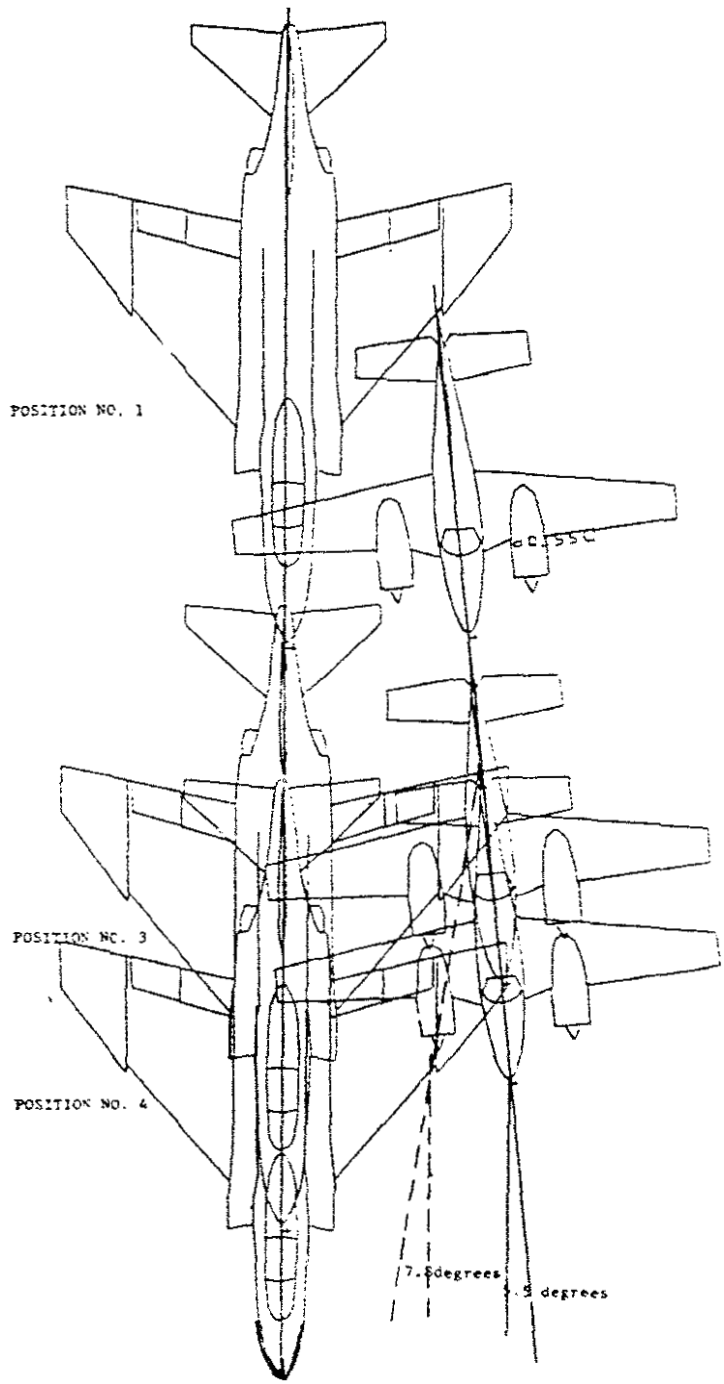


Figure 4.--Reconstructed sequence of positions of **each** airplane (top view).

(1) Aligning the rudder tab of the Baron to the position where the rudder tab hinge pin was embedded into the F-4C left wing leading edge.

(2) Matching the propeller blade tip with the first slash mark in the wing leading edge.

(3) Matching the original installation location of the manifold gauge in the Baron with the location where the manifold gauge installation nut was found along the F-4C leading edge.

Figure 4 presents a sequence of the position of each airplane in x,y coordinates, as the collision progressed, as plotted with the Safety Board's Laboratory Services computer. The computer produces drawings in proper heading and relative position. Position No. 1 is the position of each airplane at the initial point of impact.

The relative position of each airplane and its movements from positions 1, 3, and 4 as the collision progressed are illustrated in figure 2. When a straight Line is drawn through the centerline of each airframe, the line from positions 1, 3, and 4 remained straight. This consistency was also illustrated as the F-4C left wing leading edge penetrated the Baron's tail. The line scribed by the Baron's tail across the F-4C left wing was 7.8° and was parallel to the scratch marks found on the left wing of the F-4C. The Baron right wing was in such a position that the only missile that could not be hit and was not hit during the collision was the right aft missile. The right Baron engine would have been aligned with the F-4C wing joint, and the Beech Baron occupants could have contacted .he F-4C wing where the blood and hair were noted.

The vertical sequence of events was established by matching the vertical position of the F-4C wing with the rudder tab hinge wire and the manifold pressure gauge nut from the Beech Baron. (See figure 5.) The angle of attack of the F-4C was not established since relative difference in height of the two wing strikes (tab hinge and nut) would not change significantly with the P-4C angle of attack.

The pilot of the Baron was instructed to turn ieft ("direct New Bern") by Washington Center just before impact and collision impact marks confirm that the Baron was in a left turn. A standard rate turn at 180 KTAS would require a bank angle of 26°. The F-4C pilot stated that he rolled 30° left at "break X"; a bank angle of 4" more than that of the Baron. Since the radius of turn of the Beech Baron would havt? been smaller than that of the F-4C, the relative closure angle was such that the F-4C would have been closing onto the Baron. Based on the point of impact of the Baron tail, the impact on the bottom of the heat-seeking missile launcher, and the strikes on the Sparrow missile fins, the roll angle of the Baron relative to the F-4C was established at 3.5° left wing down.

Three sources of radar data also were used to reconstruct the flightpaths of the F-4C and the Beech Baron; the radar data were from the Washington ARTCC, Leesburg, Virginia, the Fleet Air Control Surveillance Facility (FACSFAC), Oceana, Virginia, and the terminal ATC radar at Cherry Point Marine Corps Air Station, North Carolina. Obviously erroneous data points were deteted and the coordinates of each data set were rotated to minimize cross range changes. This was done so data from each radar site could be compared. Each set of data had common points with the other sets of data, and each set of data had unique data points not available from the other sets.

Figure 5.--Reconstructed sequence of positions of each airplane (side view).

Impact time (reference to radar timing) was at 1644:36 and the altitude was about 9,300 feet. (Impact time based on Washington Center voice recording is 1644:46 and is considered more accurate.) Radar data indicated that the Beech Baron was flying reasonably straight and level for some time before it began the left turn just before the collision. The F-4C, however, was climbing at 2,000 feet per minute at an angle of 3.8° with respect to the horizon. A left turn by the F-4C was indicated for at least 8 seconds before the collision and the roll angle increased to more then 20° left wing down at or near the impact point. (See figure 6.) The horizontal separation distance at 8 seconds before the collision was about 1,830 feet and at 4 seconds was about 900 feet. The difference in roll angles of both airplanes explains how the F-4C could be climbing and still have a descending impact angle (2°) relative to the top of the Baron.

1.16.2 Weapons Control System (Radar)

The F-4C was equipped with a Westinghouse AN/APQ-100 weapons control system that provided both air-to-air and air-?<%roundstrike capabilities. According to maintenance records, the system was last inspected on December 6, 1982, in accordence with USAF procedures. On January 17, 1983. radar maintenance built-in test checks were conducted and during the first check run, the Unlock Time Delay Test, the radar failed to break lock within the prescribed 4 to 6 seconds. Further test results were satisfactory except for intermittent failures of the unlock time delay in 30 percent of the checks.

Following the accident on January 26 and 27, 1983, built-in test checks and the following tests were performed in the presence of two Westinghouse technical representatives — radar transmitter and alignment check, minimum discernible signal check, angle track check, and synchronizer check. The results of each were satisfactory. The minimum range limitatic of the AN/UPM 141 Test set used to perform the tests was about 1/2 mile.

To further test the capability of the radar on the F-4C. a T-33 aircraft was used ai an airborne target. The F-4C was towed out of the hangar end parked facing the runway. The radar was placed in the operate mode (no test equipment) and the T-33 made four passes over the runway. The radar locked on *to* the T-33 without difficulty and held the lock-on within acceptable parameters on each pass. The Westinghouse technical representatives verified that the test procedures used were valid to check the lock on capability of the weapons system. These tests were under the supervision of the Safety Board's investigator-in-charge.

The radar receiver/transmitter unit was removed and taken to the USAF Avionics Center a1 Warner Robins AFB, Georgia. A functional *test* of the unit was conducted which confirmed that the receiver/transmitter tube recovery time was well within acceptable limits of applicable technical data. This functional check was conducted by an electronics integrated systems mechanic at Warner Robins Air Logistics Center. All tests were conducted using lhe appiopriatc test set and ?he results of these tests were satisfactory.

During the simulator intercept check conducted ut Andrews AFB, it was noted that the overtake speed ring 12/ on the intercept scope of the simulator randomly fluctuated by 30 to 40 knots. Overtake was difficult to read precisely since 30° of clockwise movement of the ring gap is equal to 50 knots overtakc. Simulator personnel stated that :he zero reference point at the top of the scope ring would also drift by a significant amount.

12/ A circular display on the outer perimeter ci the F-4's radarscope, which has a 10° - to 20° gap to indicate overtake when the radar is "locked on" to a target.

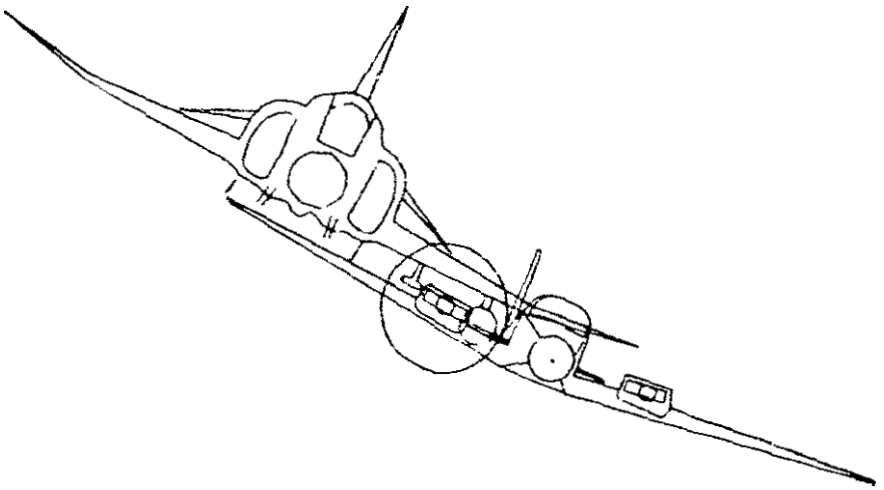


Figure 6.--Probable bank angles at collision.

1.17 Additional Information

1.17.1 ADIZ Penetration Requirements.--14 CFR Part 99 (Security Control of Air Traffic) defines ADIZ as an area of airspace over land and water in which the ready identification, location, and control of civil aircraft are required in the interest of national security. Section 99.11 further states that no person may operate an aircraft in or penetrate a coastal or domestic **ADIZ** unless he has filed a flight plan with the appropriate aeronautical facility. Section 99.19 requires that, before penetration, the pilot report to the appropriate aeronautical facility the following: time, position, and altitude at which the aircraft passed the last reporting point before penetration; the estimated time of arrival over the next appropriate reporting point along the flight route. This information is extensively discussed in Section 10, "National Security and Interception Procedures," of the Airman's Information Manual (AIM).

1.17.2 **NORAD Regulation 55-14 and AFR-3-26**

NORAD Regulation **55-14** establishes policies and procedures, designates responsibilities: and outlines the methods and criteria to be employed to identify airborne objects within the NORAD and Aerospace Defense Command (ADCOM) systems. The regulation states, in part. that one method of establishing an airborne object as "friendly" is by air traffic control correlation. ATC agencies may possess late flight plan or radar information (that is position reports, transponder identifications, etc.) that could not be passed prior to the unknown's system penetration. Positional information obteined from ATC agencies may be used to establish a reclassification of "friendly."

Attachment 2 to NORAD Regulation **55-14** specifies interception and recognition procedures to be used by "all interceptor aircraft engaged in air defense of the North American Continent, and the approaches thereto." Attachment 2, dated May 5, 1980, as amended on October **2,** 1980, and October 9, 1981, states. in pert:

> All aircraft used in the defense of the North American Continent and its approaches where CINCNOKAD has operational control, will follow these procedures and those in **AFR** 3-16. when scrambled for an intercept.
>
> a. Limit closure distances to those in AFR 3-16. (AFR **3-16** *is* classified since it discloses the capabilities of different weapons control systems.)
>
> b. Dangerous or reckless flying for the purpose of obtaining recognition is prohibited.
>
> c. Practice intercepts will not be made against civilian aircraft.
>
> d. Every effort will be made **by** the interceptor pilot to prevent startling intercepted aircraft crews. The effect desired is one which assures personnel in the intercepted aircraft that the interceptor is making a routine investigation in the interest of properly conducting the mission oi this command.
>
> e. VFR and IFR interception patterns will be in accordence with standard tactics prescribed by the component command to whom the interceptor **is** assigned.

6

f. Contact of intercepted aircraft by interplane radio communication or hand signal will not be attempted by interceptor pilots except as ordered by the controlling air defense facility. Air defense control facilities are not encouraged to direct such contact unless necessary for emergency assistance or directed by the NCP Command Director.

g. The interceptor pilot will keep the controlling air defense facility advised of marginal conditions of visibility.

* * * * *

j. If the intercepted aircraft is positively identified as 'Friendly.' The interceptor will withdraw immediately, unless the intercepted aircraft exhibits behevior indicating it is in distress. Upon withdrawing or reporting distress behavior by the intercepted aircraft, the interceptor will proceed in accordance with icstructions received from the controlling air defense facility.

On April 25, 1983, NORAD issued an amended and updated Regulation 55-14 setting forth the procedures to be utilized for identification of airborne objects within the NORAD/ADCOM systems. Attachment 2 of the regulation was amended as follows:

1. General. All interceptor aircraft engaged in air defense activities in defense of the North American Continent, end the approaches, where CINCNORAD/CINCAD exercises operational control, will be governed by the following interception and recognition procedures in addition to those procedures described in AFR 3-16 when scrambled for an identification interception:

a. Interceptors' closure distance will be in accordance with AFR 3-16, N/A sup 1.

b. Flying safety will not be compromised for the purpose of obtaining recognition.

* * * * *

h. When more than one interceptor is used on an interception, only one pilot will effect visual recognition. The other aircraft will maintain surveillance from a position where an attack could be made against the intercepted aircraft. The surveillance aircraft will, where possible, record the identification particulars as transmitted by the aircrew effecting visual recognition.

According to AFR 3-16, NORAD/ADCOM Sup 1, the minimum closure distance specified for JL 26 during the conduct of the accident intercept was: "approximately 3,000 feet but no? normally inside 500 feet." (This information was declassified by the USAF for inclusion in this report.)

After the accident, the minimum safe distance for the F-4C was amended to: "VMC-close only to the range necessary to accomplish the assigned task.!' At night or IMC, "to use extreme caution, a minimum of 500 feet vertical separation with a minimum

lateral closure to a 'break X" or 3,000 feet, whichever occurs first." If visual contact is not established at the minimum slant range, fighter shall continue to maintain 500 feet minimum vertical separation and perform a positive breakway."

Additionally, AFR 60-16 specifies that "Pilots will not fly an aircraft so close to another as to create a collision hazard. Use 500 fee? separation (well clear) as an approximate guide." Intercept procedures are summarized in paragraphs 431 and 432, Section IO, of the AIM.

At the time of the collision, the 20th NORAD Region was operating in Defense Readiness Condition Five (DEFCON5), the normal peacetime operating condition. Under these operating conditions, personnel on duty at Fertile Control have 2 minutes to correlate an airborne radar return with a positive identification. If the correlation cannot be made, the radar return or target is declared as unknown and actions are initiated to scramble fighters to visually identify the target. Once airborne, the fighters are directed to the unknown target until they estabiish radar contact and continue the intercept on their own.

An average of about 200 aircraft annually are classed as unknown targets by the 20th NORAD Region. Fighter aircraft are scrambled to identify about 80 percent of these unknowns, the remainder being identified through coordination with military or FAA facilities. During calendar year 1982, tine 20th NORAD Region intercepted 10 Soviet Block aircraft operating off the east coast of the United States between the Virginia Capes and Fiorida.

1.18 New Investigation Techniques

The computer-generated graphic presentations of the dynamics of the coilision presented in this report were developed by the Safety Board's Bureau of Technology for this accident investigation.

Collision contact points and scratch marks found on the F-4C and which could De related to the Beech Baron were aligned on three airplane views -- plane, side. end ahead in differing scales and then digitized and replotted on the same scale. The contact points and scratcn marks were matched by maneuvering computer-generated views; when marks matched. a printout was made.

Also, the Safety Board was able to obtain computer processed data derived from military long range radar. A videotape was obtained which displayed radar targets as the air traffic controller would have see.; them on their radarscopes.

2. ANALYSIS

The F--lC fiightcrew was certificated properly and was current in accordance with existing USAF regulations. Both F-4C crewmembers had completed numerous intercepts within the last few months and had complied with applicable regulations during these intercepts. The F-4C airplane was maintained according to prescribed USAF procedures. Since neither the Beech Baron nor its maintenance logs were recovered, the airworthiness of this aircraft could not be determined. The pilot of the Baron was properly certificated to conduct this flight; however, since pilot logs were not recovered compliance with 14 CFR 61.57, Recent Fiight Experience — Piiot in Command, -- could not be determined. The weather in the intercept area was forecast IMC, with reduced

visibility in the clouds. In this accident, since both airplanes were operating in actual instrument conditions and were unable to see one another, the "see and avoid" concept was not applicable.

The collision

The physicial evidence found on the left wing of the **F-4C** proves conclusively that the F-4C came in contact with the tail of the Beech Baron and continued in a forward/descending direction through the the fuselage and cockpit of the Baron. The physical evidence also indicates that both airplanes were banked left and at similar roll angles. The Washington Center had requested that the pilot of the Beech Baron turn to expedite leaving the warning area just before the collision; the planes may not have collided had the Beech Baron not turned to the left. Therefore, the Safety Board concludes that the turn inadvertently placed the Beech Baron in the path of the F-4C. The Washington Center controller's decision to turn the Baron to more rapialy exit the warning area instead cf maintaining level flight during the intercept was reasonable and in compliance with procedures. Based upon this accident, it may be more prudent for controllers to not turn aircraft under their control until the intercept has been completed or broken off.

The radar data indicate that the F-4C pilot had started a left breakaway maneuver 8 to 12 seconds before the coilision and the bank angle probably exceeded 20°, the Baron was in level flight. and the F-4C was climbing at 3.8° with repect to the horizon. This was consistent with the F-4C pilot's statement that the Baron was high and to the right before impact. The F-4C was closing from the left side end when the Baron was banked 20° to 30°, the top of the cabin would have been exposed to a closing strike by the F-4C. The Beech Baron's; turn was not confirmed on radar, since it was initiated just before the collision. When the Baron was hi?, it may have Seen rolled toward wings level again for the next *20* seconds, since the impact forces on the right engine and vertical stabilizer would tend to cause the airplane to roll to the right. The Baron radar return descended rapidly about 20 seconds after the collision. The Safety Board conciudes that both aircraft were in left Sanks at the time of the collision, that the Beech Baron was in level flight, and that the F-4C was climoing.

The F-4C pilot stated that the closure rate was 50 knots at 2 miles and that he started his turn at "break X." At a 50-knot closure rate, "break X" is less than 1,000 feet. However, the higher the closure rate, the greater the "break X" distance. Radar data and propeller siash marks indicate that the closure rate was 127 knots ai impact and that the "break X" distance was 1.800 to 2,000 feet. The higher closure rate significantly reduced the time available to the F-4C pilot to execute a successful breakaway maneuver and the higher airspeed increased the airplane's radius of turn. Fiuctuations of the overtake speed ring during intercepts and the coarse calibration scale of the scope as detected in post-accident tests may have hindered the pilot's ability to discern accurately the rate of closure. However, the pilot's technique in allowing the airspeed to increase during the latter part **of** the intercept was not prudent. The Safety Board concludes that the F-IC pilot did not monitor and control the interceptor's airspeed adequately during the latter portions of the intercept and that he failed to maintain a reasonable overtake speed.

The F-4C pilot was instructed three times by the weapons director to maintain at least 500 fee? separation from the target. Uncias5ified documents available to the Safety Board concerning separation distances also define 500 feet **as** a minimum. Since the F-4C's weapons control system radar lacks the refinement neccssary to distinguish minimum separation ranges of less than 1 mile, the only positive means a pilot has to

insure separation minima is by vertical separation. The flightcrew did select 9,000 feet for the initial phase of the intercept but had climbed to 9,300 feet when the planes collided. Had the pilot maintained proper altitude separation, the F-4C would not have contacted the target. The Safety Board concludes that the F-4C pilot failed to maintain appropriate vertical separation.

The radarscope on the F-4C's weapons control system can be adjusted to variable ranges, the lowest being 20 miles. The face of the scope is about 4 inches quare. Because of the scope size, target resolution may be considered accurate up to about 1 mile separation. Since the intercept was being conducted in instrument meteorological conditions, the weapons systems officer would not have been able, using the onboard weapons system, to determine accurately a separation of less than 1 mile. Later weapons systems in the F-4 series employ a j-mile scope which allows the weapons systems officer to maneuver the aircraft within about 1/2 mile of the target.

The investigation revealed that the weapons control system installed was properly maintained in accordance with current USAF maintenance procedures. The last maintenance check was normal, and the weapons systems officer had not reported any malfunction of the system. During the built-in test check on the first day of tests, the system failed to break lock about 30 percent of the times checked. The cause of the malfunction was not discovered, and additional tests failed to indicate any malfunction. The failure of the weapons control sysrems to break lock, however, would not have affected its capability to successfully complete the identification intercept. During the functional check using the T-33, ?he weapons system maintained track and lock-on. Therefore, the exact functional capability of the weapons system at the time of tine collision could not be determined. However, based upon previously described information, the weapons system probably functioned normally in providing range and bearing information throughout the intercept.

The Baron pilot did no: aztivate his filed flight plan. In fact, the collision occurred at nearly the same time the flight was supposed to leave Fort Pierce. Florida, for the second leg of the planned flight. Apparently! the pilot intenticnally chose not to eo-ply with procedures which require that all aircraft from the Bahamas to the U.S. ciear Customs in Florida. The flight was apparently also conducted in instrument meteorological conditions not visual meteorological conditions, as indicated in the filed fight plan, and seven persons were aboard the Baron, while the airplane only had scats. restraints, and water survival equipment for six. Additionally, the Beech Baron pilot failed to follow prescribed procedures and regulations for operating near or within the ADIZ, and he did not inform Washington Center that he was in instrument meteorological conditions. The Safety Board concludes that the Beech Baron pilot failed to follow established procedures and regulations in the conduct of his flight.

Identification of the Beech Baron by Fertile Control

The Beech Baron pilot contacted Washington Center at 1631:28 and gave his position, identification number, altitude, VFR transponder code, and aircraft type. Washington Center assigned the Baron a transponder code of 0524, but was not able to detect and identify the target. Six minutes later, at 1637:28, the Washingron Center controller contacted the Fertile Control weapons assignment technician and the identification section advising them of the information he had received from the Baron pilot. At 1640:10 to 1640:47, the senior director, senior director technician, the weapons assignment officer, the weapons assignment technician, and the identification section discussed the information passed by Washington Center which includec! the airplane type

and identification number. However, the senior director stated, "Possible ID is not close enough, we have to get an ID." At 1642:20, Washington Center advised the Fertile *Control* weapons director technician that the Baron had identified himself and stated, "that is him down there at Juliet Lima's 12 o' clock, and about 6-7 miles, 0524. ..."

,Washington Center had positively correlated the Baron's assigned transponder code with the airplane the F-4Cs were intercepting and made this inform: ... known to at least the Fertile Control weapons director technician. At 1642:57, the weapons director technician contacted the identification officer and stated that Washington Center had confirmed the identity of the Baron. This conversation ended about 1643:30. At 1644:41, the senior director was informed by the identification officer that the unknown target had been identified by transponder code and the senior director decided to terminate the intercept *in* accordance with applicable regulations as the identification changed the Beech Baron's status from "Unknown': to "Friendly." The weapons director directed the F-4Cs to terminate the intercept at 1644:49. Unfortunately the collision had occurred seconds before the order to "knock it off."

After the Beech Baron pilot contacted Washington Center at 1631:28 and reported his position, this information was passed to Fertile Control. The senior director decided to continue the intercept knowing the possible identification from Wsshington Center and with the additional information that the intercept was being conducted in instrument meteorological conditions. About 1642:20, 2 minutes before the collision, individuals in both Washington Center and Fertile Control both had correlated information that the airplane being intercepted was the Beech Baron. The lack of timely coordination within Fertile Control led to the senior director's not being informed of the positive identification unril about 1644:30. By the time a termination order was issued to the F-4Cs, the collision had occurred. Adequate information was avaiiable to justify rermination of the intercept before the collision. The senior director was charged with the responsibility for operations within the entire 20th NORAD Region at the time of the accident, and he alone could make the decision either to continue OF to terminate the intercept based on information available to him both from his staff and from the FAA. The Safety Board believes that the senior director's decision to continue the intercept ***was*** reasonable; however, timely coordination of the information concerning the Beech Baron's identification might have permitted the senior director to make an evaluation to terminate the intercept earlier and may have prevented the accident.

The collision occurred at 1644:46; however, Fertiie Control did not inform Washington Center of the accident until 1650:16, a delay of abour 5 1/2 minutes. Search and rescue efforts started about 1652. The Safety Board concludes that in this case the occupants of the Beech Baron probably were killed in the collision or on impact with the water, ***so*** the delay was not critical. Under other circumstances, Fertile Control's delay in notifying agencies of the collision and initiating search and rescue activities could have been life threatening.

Since 16 of the about 160 live intercepts of unknown aircraft the 20th NORAD Region conducted in 1982 were Soviet Block aircraft, the need for airborne identification of unidentified aircraft as a matter of national security is clear. However, the Safety Board believes that the identification mission can **be** accomplished without placing the lives of civilians in danger. Had the F-4C flightcrew techniques in making the intercept beer: **more** precise, had the Beech Baron pilot, in the first instance, complied with applicable procedures and regulations, *or* had the Fertile Control coordinated available identification information in a timely manner the accident would have been avoided.

3. CONCLUSIONS

31 Findings

1. The F-4C flightcrew was properly trained and current in accordance with existing USAF regulations.

2. The F-4C airplane and weapons systems were maintained according to prescribed USAF procedures.

3. The pilot of the Baron was properly certificated to conduct this flight, however, compliance with 14 CFR Part 61.57, Recent Flight Experience -- Pilot-in-command, could not be determined.

4. Neither the aircraft nor the maintenance logs from the Beech Baron were recovered for examination. Consequentiy, the airworthiness of the Beech Baron could not be determined.

5. The Baron pilot did not operate his airplane in accordance with his unactivated filed flight plan and conducted the flight in instrument meteorological conditions without clearance. The Baron pilot had seven persons on board, while the airplane only had seats, restraints, and water survival equipment for six.

6. The failure of the Baron pilot to activate a flight plan made it impossible for Fertile Control to correlate its radar contact with the position of the Baron and necessitated declaring it an "unknown."

7. Informetion from Washington Center concerning the identification of the Baron was passed to Fertile Control in a timely manner.

8. The Fertile Control senior director was the only person in a supervisory capacity with knowledge that the intercept was being conducted in instrument meteorological conditions.

9. Fertile Control staff did not coordinate in a timely manner to terminate the intercept when the identification of the unknown airplane was confirmed as the Baron.

10. The F-4C weapons system has shortcomings in target resolution and is not capable of aceurateiy displaying less than 1 mile separation.

11. The closure rate between ?he F-4C and the Baron was 127 knots just before impact, not ?he preplanned 50 knots.

12. The F-4C pilot did not adequately monitor end control the interceptor's airspeed and failed to maintain a reasonable overtakc speed.

13. The F-4C pilct failed to maintain appropriate vertical separation.

14. The Eeech Baron turned ieit, as requested by Washington Center, seconds before the collision, which turned it into the path of the overtaking interceptor, which also had just turned left to break off the intercept.

15. Both aircraft were in E left bank at the time of the collision. The most probable angles of bank were Baron--26° F-4C--30°. The Beech Baron was in level flight and the **F-4C** was climbing.

16. Fertile Control did not act promptly after the collision *to* notify Washington Center of the nature of the incident or to initiate search and rescue activities.

3.2 Probable Cause

The National Transportation Safety Board did not determine the probable cause of this accident and offered the following statements of cause:

Staff Proposed Probable Cause Statement
Endorsed by Chairman Burnett

The National Transportation Safety Board determines that the probable cause of this accident was the failure of the F-4C pilot io maintain an appropriate intercept closing speed and a safe separation distance between his airplane and the Beech Baron and the failure of the Baron pilot to activate a flight plan following departure or to establish radio contact with appropriate FAA facilities before penetrating the Air Defense Identification Zone, or to file and activate an instrument flight plan before operating in instrument meteorological conditions. Contributing to the accident was the failure of the Fertile Control staff to coordinate information concerning positive identification of the Baron in a timely manner precluding a decision to terminate the intercept mission.

Member Goldman's and Member Bursley's
Probable Cause Statement

The National Transportation Safety Board determines that the probable cause of this accident was the failure of the F-4C pilot to maintain an appropriate intercept closing speed and a safe separation distance between his airplane and the Beech Baron. Contributing to the accident were the Beech Baron pilot's penetration of the Air Defense Identification Zone and his faiiure to follow any of several prescribed procedures which would have permitted early positive identification after penetration, and the failure of the Fertile Controi staff *to* coordinate information concerning positive identification of the Baron in a timely manner, delaying a decision to terminate the intercept mission.

Member Grose's
Statement on Probable Causation

The probable causes of this accident were (a) the unauthorized penetration of an Air Defense Identification Zone (ADIZ), (b) ambiguity in responsibility between the Air Route Traffic Control Centers (ARTCC) and NORAD **SAGE** facilities regarding identification and control of unknown aircraft, (c) deviation by the Baron pilot from a requirement to activate a previously filed VFR flight plan and thus declare ADIZ penetration, (d) fsilure of the Baron pilot to file and activate an instrument flight plan before operating in instrument meteorological conditions (IMC), (e) inadequate tracking sensitivity for both ground and airborne radar for the intended mission, (f) use of *an* excessive closure rate between unidentified aircraft and F4-C while depending on visual identification in IMC, and (g) continuation of the F4-C intercept mission after identification of the Baron hed been established.

4. RECOMMENDATIONS

None.

BY THE NATIONAL TRAYSPORTATION SAFETY BOARD

/s/ JIM BURNETT
Chairman

/s/ PATRICIA A. GOLDMAN
Vice Chairman

/s/ G. H. PATRICK BURSLEY
Member

/s/ VERNON L. GROSE
Member

June 19, 1984

5. APPENDIXES

APPENDIX A

INVESTIGATION AND HEARING

1. Investigation

The Safety Board was notified of the accident about 1730 on January 9, 1983. A field investigetor was immediately dispatched from the Atlanta, Georgia, Field Office. He was joined later in the investigation by air traffic control and collision reconstruction specialists from Washington, D.C., headquarters.

Parties to the investigation were the Federal Aviation Administration, the United States Air Force, Beech Aircraft Corporation, and Westinghouse Electric Corporation.

2. Public Hearing

A public hearing was not held. Depositions were not taken.

APPENDIX B

PERSONNEL INFORMATION

Pilot, F-4C, Captain John A. Wellers

Capt. Wellers, 35, is a fully qualified F-4C pilot in accordance with USAF requirements. Although not required for military operations, he holds Commercial Pilot Certificate No. 1634126 with single-engine land and multiengine land ratings. He also has an airplane instrument rating. His second-class medical certificate was issued on April 24, 1982, with a vision limitation that glasses must be worn while utilizing the privileges of his certificate.

He had a total of about 1,400 flight-hours with 500 hours in the F-4C. He had flown 30 hours in the previous 90 days, 10 hours in the previous 30 days, and 2 hours in the previous 24 hours before the accident, all in the F-4C.

Weapons Systems Officer, F-4C, Lieutenant Colonel Lester Williams

Lt. Col. Williams, 40, has aceumuleted a total of 2,428 flight-hours of which 1,174 hours were in the F-4C aircraft. He completed an annual tactical qualiiication flight check which includes air to air intercepts and has maintained a mission ready status as a weapons system officer for the Air Defense Command since September 1982. Within the lest 6 months, Lt. Col. Williams had completed 89 visual intercepts with the most recent on December 2, 1982.

Pilot, Beech Baron. Henry H. Tiffanv

Mr. Tiffany, 47, held Private Pilot Certificate No. 01490193 with single-engine land and multiengine land ratings. He also had an airplane instrument rating. His second-class medical certificate was issued on September 24, 1981, without limitations or waivers.

He had a total of about 4,455 flight-hours; however, no other records were found giving a breakdown of that time.

Senior Director, 20th NORAD Region, First Lieutenant Gerald F. Tooker

1/Lt. Tooker, 31, is fully qualified for his duties as Senior Director in accordance wtih USAF requirements. His third-class medical certificate was issued in September 1982 without waivers.

He has been in the Air Force since April 1971 and in his assigned speciaiilty/career field since Apri! 1980.

Weapons Assignment Officer, 20th NORAD Region, First Lieutenant Michael D. Castle

1/Lt. Castle, 25, is fully qualified for his duties as Weapons Assignment Officer in accordance wtih USAF requirements. His third-class medica! certificate was issued in January 1982 without waivers. He has Seen in the Air Force since April 1980 and in his assigned speciaiilty/career field since October 1980.

Weapons Director, 20th NORAD Region, Second Lieutenant Calvin Hazel, Jr.

2/Lt. Hazel, 26, is fully qualified for his duties as Weapons Director in accordance with USAF requirements. His third-class medical certificate was issued in October 1982 without waivers. He has been in the Air Force since October 1981 and in his assigned specialilty/career field since September 1982.

R-25 Radar Controller, Washington AKTCC, Mr. Rudolph C. Trautner

Mr. Trauter, 49, is a fully qualified en route air traffic control specialist in accsrdarce with FAA requirements. His FAA medical certificate was issued in March 1982, with a vision limitation that glasses must be worn while exercising the privileges of his ATCS certificate. He entered on dtity with the FAA at the Washington ARTCC in August 1958 and has been qualified in his area of operation since November 1959.

D-25 Manual Controller, Washington ARTCC. Mr. Robert D. Pesto

Mr. Pesto, 46, is a fully qualified en route air traffic control specialist in accordance with FAA requirements. his FAA medical certificate was issued in April 1982, with e vision limitation that glasses must be worn while exercising the privileges of his ATCS certificate. He entered on duty with the FAA at the Washington ARTCC in August 1958 and has been qualified in his area of operation since November 1958.

APPENDIX C

AIRCRAFT INFORMATION

McDonnell-Douglas F-4C

The McDonnell-Douglas F-4C is a two place, all-metal, low wing, twin-engine monoplane extensively in use in miiitary service throughout the world. It is a multi-purpose fighter used in intercept, air superiority, and strategic and tactical bombing roles. It is powered by two General Electric J-79-15A engines rated at 17,500 pounds of thrust each. The USAF serial No. of the accident airplane is 637536, and the maximum gross weight is 56,000 pounds. Weight and balance and the center of gravity were within limits at the time takeoff.

The airplane is maintained according to USAF standards and specifications. Total airframe time was 42,392 hours at the time of the accident. The last inspection before the accident was on September 22, 1982, and the airplane flew 34.9 hours to January 9, 1983. Engine No. 1 (Serial No. E420446) had a total of 3,746.8 hours and 36.4 hours since last inspection. Engine No. 2 (Serial No. E440101) had a total of 2,491.6 hours and 5.0 hours since last inspection.

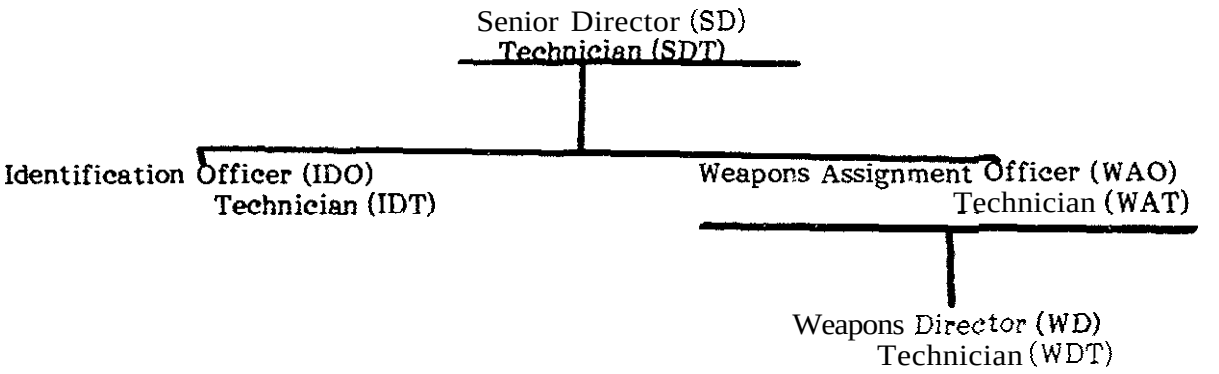
Beech D-55 Baron

The Beech D-55 Baron is a six place, all-metal low wing, twin-engine monoplane with fully retractable tricycle landing gear. It is powered by Continental IO-520-C six-cylinder, horizontally-opposed, fuel injection engines rated at 285 horsepower each, at 2,700 rpm. Each engine drives a McCauley tws-bladed, 78-inch diameter, constant speed, fully feathering hydraulically controlled propeller. The serial number of the aircraft was TE-397, and the certificated maximum gross weight was 5,300 pounds.

Since neither the airframe nor engine maintenance records were recovered, the airplanes airworthiness history could not be reconstructed.

APPENDIX D

OPERATIONAL CONTROL STRUCTURE AT 20TH NORAD REGION (Fertile Control)



SD	-	Officer in charge of the region's resources as they are employed in the Air Defense enviroment. Acts for the Commander.
WAO	-	Subordinate to the SD. Assigns fighters (or weapons) to targets. Supervises and assigns work (fighters, weapons) to Weapons Directors.
WD	-	Controls and communicates with fighters (or weapons) during entire intercept phase as assigned by the WAO.
IDO	-	Subordinate to the SD. Responsible for correlating and identifying observed traffic. Responsible for declaring targets unknown.
Technician	-	The SD, WAO, WD, and IDO are each assisted by a technician who sits alongside to handle communications coordination and other assigned tasks.

All positions have direct communications with Washington Center.

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