National Transportation Safety Board

FACTUAL REPORT AVIATION

1 NTSB Accident/Incident Number: FTW87FA088

2: [X] 1 Accident [ ] 2 Incident

3 Investigation: [X] 1 NTSB [ ] 2 FAA Delegated

4 Aircraft Registration Number	5 Flight Number	For collision between aircraft, enter reg. no. and flt. no. for other aircraft	6 Aircraft Registration Number	7 Flight Number
N8191V	A Other Ø6			A Other Ø6

8 Nearest City/Place	9 State	10 Zip Code (First 5 numbers only)	11 Accident Site Elevation
Marlin	TX	76661	418 Feet MSL

12 Date of Accident (Nos. for M, D, Y)	13 Day of Week (First 2 letters)	14 Local Time (24 hour clock)	15 Time Zone
3/30/87	MO	1257	CST

16 Narrative Statement of Facts, Conditions and Circumstances Pertinent to the Accident/Incident

HISTORY OF FLIGHT

On March 30, 1987, at 1257 Central Standard Time, a Piper PA-28-181, N8191V was destroyed when it collided with the ground following an in-flight wing separation while in low level cruise flight near Marlin, Texas. The airplane, owned and operated by the Griffin Pipeline Patrol Company and flown by a commercial pilot, had departed Borger, Texas, at 0845 CST, on a pipeline patrol flight to Conroe, Texas, with a planned refueling stop in Cleburne, Texas. The operation required that the pilot fly down the 570 mile pipeline at low altitude and observe abnormalities or incursions into the right of way. There was no flight plan filed and VMC conditions prevailed throughout the area. The pilot, the sole occupant, received fatal injuries and there was no fire.

The flight had departed Borger, Texas, at about 0845 CST. A flight log found in the wreckage indicated that by 0857, it had progressed to mile post 30 and from there to Skellytown at 0908, Wichita Falls at 1033, Fort Worth at 1113. At approximately 1145 CDT, the airplane landed at the municipal airport in Cleburne for a scheduled lunch and refueling stop. During the layover at Cleburne, the pilot commented to the airport operator that it was "rough out there today". At about 1230 CDT, the airplane departed Cleburne to continue the patrol that would have ultimately terminated in Conroe, Texas.

At about 1257 CDT, witnesses observed the airplane crossing State Highway 147, about 3 miles north of Marlin, Texas, at low altitude and high speed, flying down

Additional Persons Participating in this Accident/Incident Investigation (Name, address, affiliation, Continue on page 2 if necessary)

Mr. Davy Crocker
FAA-SW-FSDO-63
Dallas, TX

Investigated By:

17 Date (Nos. for M, D, Y)	18 Agency	19 Name/Signature
10/31/88	NTSB FTW	Warren V. Wandel

NTSB Form 6120.4 (Rev. 1-84)

6 Narrative Statement of Facts, Conditions and Circumstances Pertinent to the Accident/Incident *(continued)*

the pipeline right-of-way in a southerly direction. About 1 mile south of the highway, a witness observed a wing separate from the airplane and it nosed over and descended below a tree line. The airplane impacted in an open field on a westerly heading in a right wing low, nose low attitude. The separated left wing was located 588 feet north northwest of the main impact crater.

INJURIES TO PERSONS

The pilot, the sole occupant, received fatal injuries.

DAMAGE TO AIRCRAFT

The aircraft was destroyed as a result of the wing separation and impact forces.

WITNESSES

Two witnesses were identified during the investigation and statements were obtained from both. One observed the airplane cross the highway, flying south bound at low altitude and high speed. The witness observed the airplane for 2 to 3 seconds and did not observe the wing separation. The second witness also observed the airplane cross the road at high speed at an altitude that he estimated at between 200 and 400 feet AGL. That witness continued to observe the airplane and saw the wing separate and the airplane disappear below a distant tree line. The witness then turned onto a county road that ran parallel to the pipeline right-of-way and discovered the wreckage in the field. He subsequently called his office over a company radio and had the sheriff's office notified.

CREW INFORMATION

The pilot was properly certificated for the operation that was being conducted at the time of the accident. Mr. Carr held a commercial pilot's certificate with airplane, single engine land privileges and no instrument rating. He had been issued a Class II medical certificate on 5-30-86 with a limitation that he wear glasses for near and distant vision. A pair of prescription bifocal glasses were found in the wreckage. In addition, Mr. Carr held an airframe and powerplant mechanic's license. Records indicated that he had complied with the biennial flight review requirement on 12-10-86. It was also noted that he had received an FAA license suspension for 30 days that was ordered on 1-16-87, however, he had continued to fly during the suspension period.

A review of Mr. Carr's personal log books indicated that he had accumulated a total of 9,144 hours flight time, all single engine land, and that he had about 2,500 hours in the accident make and model of aircraft. He had flown 352 hours in the 90 days preceding the accident and 127 hours during the 30 days before the accident, all in the accident make and model. And during the 24 hours prior to the accident, he had flown 8 hours, all of which were in the accident make and model.

AIRCRAFT INFORMATION

The airplane, a Piper PA-28-181, serial number 28-8090115, was properly certificated on 3-5-80 in the Normal and Utility categories. It was originally delivered to the Griffin Pipeline Patrol Company and had spent it's entire history being operated on low level, terrain following pipeline patrol. At the time of the accident, it had accumulated a total of 7,489.56 flight hours. An audit of the airplane's maintenance records indicated that it had received annual and 100 hour inspections on 4-15-86 at a total time of 7,015.08 hours, about 474.48 hours prior to the accident. No discrepancies were noted in the records which would have affected the airworthiness of the airplane. It was noted however, that there was no mention of wing skin cracks that had developed and been stop drilled on the left wing upper skin surface. There was no evidence found during the investigation that indicated that the airplane had ever experienced a flight or ground mishap or been subjected to a hard landing.

METEOROLOGICAL INFORMATION

The closest weather observation facility to the accident site was Waco, Texas, which was 15 nautical miles north northwest. Waco reported the weather at 1330 CST, as being clear, 15 miles visibility, temperature 47 degrees, dew point 16 degrees, winds from 300 degrees at 20 knots with peak gusts to 27 knots and an altimeter setting of 30.26" Hg.

COMMUNICATIONS

The pilot was not in communication with any air traffic control facilities at the time of the accident. However, shortly before the accident, he did contact an employee of the Diamond Shamrock Corporation via company frequency. The Diamond Shamrock employee was interviewed and stated that the communication was a routine report regarding a right of way incursion and that the pilot commented that it was turbulent due to the gusty wind conditions.

WRECKAGE

The airplane impacted in an open field on a heading of about 270 degrees, in a right wing low, nose low attitude. After principal impact, the main wreckage bounced and came to rest 60 feet southeast of the impact crater. The separated left wing was located 588 feet to the north northwest of the main impact point and about 300 feet southwest of the pipeline's 453 mile post. At the point where the accident occurred, the pipeline ran about 155 degrees magnetic. The point where the pipeline crossed State Highway 147 was mile post 452, one mile north of the location of the separated left wing. With the exception of the left wing and the propeller, which had separated on impact, the airplane remained intact during the impact sequence. The cockpit/cabin area was destroyed during impact and the pilot, with his seat, was thrown clear of the wreckage.

16 Narrative Statement of Facts, Conditions and Circumstances Pertinent to the Accident/Incident *(continued)*

The separated left wing had impacted in an open field wing root first, bounced, and came to rest against a barbed wire fence. Examination of the wing revealed that it was intact on impact except for the left flap. The outer 1/3rd of the flap was located about 30 feet southeast of the wing and the inboard section remained attached to the fuselage and was found with the main wreckage. All of the remaining flight control surfaces remained attached in their respective positions. Control continuity was established from all of the control surfaces up through the center section of the airplane with one exception. The left aileron control cables remained attached to the fuselage, but had ripped out of the left wing along with the aileron bell crank.

Inspection of the left wing separation fractures revealed an area that appeared to be a progressive type failure in the lower spar cap. Field examination of the fracture indicated a point of origin near the outer most fuselage center section attachment bolt hole. In addition to the abnormal appearance of the lower spar cap fracture, it was noted that there were a series of three preexisting cracks in the left wing upper skin surfaces. These cracks were located about 8 inches outboard of the first rib and radiated in a semicircular fashion. One of the cracks had been stop drilled. And a similar crack, also stop drilled, was noted on the left wing upper skin in the area of the wing to fuselage gap strip, forward of the main spar. That crack appeared to have been progressing forward and was stop drilled at the aft terminus only. The right wing main spar had separated on impact. Examination of it's fracture surfaces indicated an overstress type failure.

FIRE

No evidence of either inflight or post-crash fire was found during the investigation.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy and toxicology studies were ordered and performed on the pilot. There were no significant findings.

SURVIVAL ASPECTS

This accident was not survivable in that the impact forces encountered exceeded the human tolerance limits.

TESTS AND RESEARCH

Examination of Sister Ship: During the investigation, it was determined that the Griffin Pipeline Patrol Company owned a second PA-28-181. The airplane, N31648, serial number 28-7890473, was delivered to the operator in 1978 and like the accident airplane, had spent it's entire history on pipeline patrol. As part of the accident investigation, the sister ship was examined for similar type signatures that were found during the field investigation of N8191V. At the time

it was examined, N31648 had accumulated a total of 7,878 hours of flight time. Both wings were pulled and examined. The left wing upper skin exhibited a crack similar to the one found on N8191V, in the area of the wing root, forward of the main spar. In addition, evidence of radial skin cracking was also found on the left wing and what appeared as a visible crack was found on the left wing lower spar cap in the same vicinity as the origin of the fatigue crack in the spar of N8191V. Close examination of the abnormal area indicated a crack visually, however, it did not appear during a dye penetrant check or the application of other non-destructive testing techniques. The spot was blended out after removal of .001 of an inch of the spar surface. It was the opinion of Piper Aircraft Corporation's metallurgist that the blemish was a fold that had been developing in the metal. No explanation for why a fold would develop was given with the report.

NTSB Materials Laboratory Examination: Sections of the left wing spar assembly, wing skin pieces, and right wing spar were removed during the investigation and forwarded to the Board's Materials Lab for metallurgical examination and study. The examinations revealed that the right main spar had fractured as a result of overstress loads associated with impact. The left lower spar cap was found to have failed in fatigue, while the upper spar cap was found to have failed in overstress; a result of the initial failure of the lower spar cap. The fatigue was determined to have originated near one of the outboard fuselage carry through attachment bolt holes, but outside of the bolt hole itself. The lab determined that the spar material appeared to be typical of the specified material and manufacture, a 2024-T3511 extrusion. Microstructure, hardness, conductivity and chemistry were all within acceptable limits for that material.

Research conducted by the lab revealed a study conducted by NASA (NASA Technical Memorandum 84660) on the relative loads experienced by general aviation aircraft during different mission applications. It was determined by the study that aircraft operating in survey type mission profiles, such as pipeline patrol, encountered flight loads in the 0.4 to 0.5 G range 16 times more frequently than a similar aircraft being operated in an instructional mission environment. In addition, the study found that in the range of between 0.4 to 1.0 G's, the pipeline aircraft averaged load events per hour (in the cited range) at a rate 30 times higher than the instructional aircraft.

Piper Aircraft Corporation Structural Evaluation: Following the NTSB investigation, the Piper Aircraft Corporation purchased the wreckage of N8191V and the sister ship (N31648) from the Griffin Pipeline Patrol Company. The airplanes were moved to Piper's Vero Beach facilities where they underwent additional testing and evaluation. A copy of the report that resulted from the testing is included as an attachment to this report.

Corrective Action: As a result of the investigation findings, the NTSB issued Safety Recommendations A-87-40 through A-87-42 to the FAA on 4-10-87. The FAA responded with AD-87-08-08, which was issued on 4-21-87, and called for a visual

16 Narrative Statement of Facts, Conditions and Circumstances Pertinent to the Accident/Incident *(continued)*

inspection of high time Piper PA-28 and PA-32 aircraft lower wing spar caps. The airworthiness directive was subsequently suspended after a total of 454 airplanes had been inspected with only 3 positive results reported.

ADDITIONAL DATA

ELT: The airplane was equipped with a NARCO ELT-10 beacon, serial number 79158, that had a battery expiration date of 3-31-87. Examination of the unit in the field revealed that it had not activated due to the remote switch being in the "OFF" position. Also, the unit would not activate during a functional test in the field. The reason for the unit's failure was not determined.

Wreckage Release: The wreckage was released to the Piper Aircraft Corporation, with the owner's permission on 4-20-87. The retained parts were subsequently returned to Piper on 12-9-87.

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number: FTW87FA088

Airport/Approach/Landing Information

24 [ ] Not applicable *(Go to block 39)*

Airport Name: MARLIN MUNI
A Other

26 Airport Identifier: T15

27 Accident Location
1 [X] Off airport/airstrip
2 [ ] On airport
3 [ ] On airstrip
A Other

28 Distance From Airport Center *(Nearest SM)*
1 SM
A Other 12

29 Direction From Airport
315 °mag
A Other 12

VFR Approach/Landing *(Multiple entry)*
1 [X] None
2 [ ] Traffic pattern
3 [ ] Straight-in
4 [ ] Valley/terrain following
5 [ ] Go around
6 [ ] Touch and go
7 [ ] Full stop
8 [ ] Stop and go
9 [ ] Simulated forced landing
10 [ ] Forced landing
11 [ ] Precautionary landing
A Other

31 Type Instrument Approach Flown *(Multiple entry)*
1 [X] None
2 [ ] ADF/NDB
3 [ ] SDF
4 [ ] VOR/TVOR
5 [ ] VOR/DME
6 [ ] TACAN
7 [ ] ILS-complete
8 [ ] ILS-localizer
9 [ ] ILS-backcourse
10 [ ] RNAV
11 [ ] MLS
12 [ ] LDA
13 [ ] ASR
14 [ ] PAR
15 [ ] Sidestep
16 [ ] Visual
17 [ ] Contact
18 [ ] Circling
19 [ ] Practice
A Other

32 Runway Used Identifier
A Other

33 Runway Length
Feet
A Other

34 Runway Width
Feet
A Other

35 Airport Elevation
Ft. MSL
A Other

Runway/Landing Surface
1 [ ] Macadam
2 [ ] Asphalt
3 [ ] Concrete
4 [ ] Gravel
5 [X] Dirt
6 [ ] Grass/turf
7 [ ] Snow
8 [ ] Ice
9 [ ] Water
10 [ ] Metal/wood
A Other

37 Runway/Landing Surface Condition
1 [X] Dry
2 [ ] Wet
3 [ ] Ice covered
4 [ ] Snow—dry
5 [ ] Snow—wet
6 [ ] Snow—crusted
7 [ ] Snow—compacted
8 [ ] Vegetation
9 [ ] Water—calm
10 [ ] Water—choppy
11 [ ] Water—glassy
12 [ ] Rubber deposits
13 [ ] Soft
14 [ ] Rough
15 [ ] Slush covered
16 [ ] Holes
A Other

If accident occurred during approach, departure or on airport, see instructions for completing Supplement Q.

Aircraft Information

Aircraft Manufacturer: PIPER

40 Aircraft Model/Series: PA-28-181

41 Serial No.: 28-8090115
A Other

42 Certificated Maximum Gross Weight: 2,550
A Other

Type of Aircraft
1 [X] Airplane
2 [ ] Helicopter
3 [ ] Glider
4 [ ] Balloon
5 [ ] Blimp/dirigible
6 [ ] Ultralight
7 [ ] Gyroplane
A Specify

44 Type Airworthiness Certificate *(Multiple entry)*
Standard
1 [X] Normal
2 [X] Utility
3 [ ] Acrobatic
4 [ ] Transport
Special
5 [ ] Restricted
6 [ ] Limited
7 [ ] Provisional
8 [ ] Special flight
9 [ ] Experimental
A Other

45 Home Built
1 [ ] Yes
2 [X] No
A Other

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number: FIT W87FA088

Aircraft Information (continued)

46 Landing Gear (Multiple entry)
1 [X] Tricycle—fixed
2 [ ] Tricycle—retractable
3 [ ] Tailwheel—all fixed
4 [ ] Tailwheel—all retractable
5 [ ] Tailwheel—retractable mains
6 [ ] Amphibian
7 [ ] Hull
8 [ ] Float
9 [ ] Emerg. float
10 [ ] Ski
11 [ ] Ski/wheel
12 [ ] Skid
13 [ ] High Skid
A Other

48 No. of Seats: 04
A Other

49 Stall Warning System Installed
1 [X] Yes
2 [ ] No
A Other

50 IFR Equipped
1 [X] Yes
2 [ ] No
A Other

51 Icing Certification/Equipped (Multiple entry)
1 [ ] Certified
2 [X] Not Certified
3 [ ] Equipped
4 [X] Not Equipped
A Other

52 Engine Type
1 [X] Reciprocating—carburetor
2 [ ] Reciprocating—fuel injected
3 [ ] Turbo prop
4 [ ] Turbo jet
5 [ ] Turbo fan
6 [ ] Turbo shaft
A Other

If not Engine powered, go to block 59

53 Engine Manufacturer: LYCOMING

54 Engine Model and Series: O-360-A4M

55 Engine Rated Power
A 180 Horsepower
B _____ Lbs. Thrust
C Other

56 Number of Engines: 1
A Other

If 3 or more engines enter times in Supp. C

Engine Time (Hours)	A Total Time	B Time Since Inspection	C Time Since Major Overhaul	D Other
57 Engine No. 1	7490	1082	4001	
58 Engine No. 2				

59 Type Maintenance Program
1 [X] Annual
2 [ ] Manufacturer's Inspection Program
3 [ ] Other approved inspection program (AAIP)
4 [ ] Continuous airworthiness
A Other

60 Type of Last Inspection
1 [X] Annual
2 [ ] 100 hour
3 [ ] AAIP
4 [ ] Continuous airworthiness
A Other

61 Date Last Inspection Performed (Nos. for M, D, Y): 4-15-86
A Other

62 Time Since Inspection: 1082 Hours
A Other

63 Airframe Total Time: 7490 Hours
A Other

64 Source of Maintenance Information
1 [X] Tach
2 [ ] Flight
3 [ ] Hobbs
4 [X] Logbooks Records
5 [ ] Estimate
6 [ ] Pilot/Operator Report
A Other

65 Hazardous Materials on Aircraft
1 [X] No
A (Type) _____
B Other

Emergency Locator Transmitter (ELT)	1 Yes	2 No	A Other
67 Installed	X		
68 Required	X		
69 Operated		X	
70 Aided in location of accident site		X	

66 Hazardous Material Spill/Factor
1 [ ] Yes
2 [X] No
A Other

Owner/Operator Information

71 Registered Aircraft Owner
Name: M.E. GRIFFIN

72 Address: P.O. BOX 3408, BORGER, TX 79009

73 Operator of Aircraft 1 [X] Same as registered owner
A Name:
B dba GRIFFIN PIPELINE PATROL CO.
C Other

74 Address 1 [X] Same as registered owner
A _____
B Other

75 Operator Certificate No.
A Other 86

76 Operator Designator Code

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number: FTW87FA088

Owner/Operator Information (continued)

77 Operator Status of This Aircraft
1 [X] Owner
2 [ ] Lessee
3 [ ] Renter
4 [ ] Borrower
5 [ ] Unauthorized
A Other

78 Pilot Status of This Aircraft
1 [ ] Owner
2 [ ] Lessee
3 [ ] Renter
4 [ ] Borrower
5 [ ] Unauthorized
6 [X] Employee
A Other

Type of Certificate(s) Held

79 None [X] (Go to block 83)

80 Air Carrier Operating Certificate (Check all applicable)
1 [ ] Flag carrier/domestic (121)
2 [ ] Supplemental
3 [ ] All cargo (418)
4 [ ] Large helicopter (127)
5 [ ] Commuter air carrier
6 [ ] On-demand air taxi

81 Operating Certificate
[ ] Other operator of large aircraft

82 Operator Certificate
1 [ ] Rotorcraft—external load operator (133)
2 [ ] Agricultural aircraft (137)

Regulation Flight Conducted Under

83 Regulation Flight Conducted Under
1 [X] 14 CFR 91 (only)
2 [ ] 14 CFR 91D
3 [ ] 14 CFR 103
4 [ ] 14 CFR 105
5 [ ] 14 CFR 121
6 [ ] 14 CFR 125
7 [ ] 14 CFR 127
8 [ ] 14 CFR 133
9 [ ] 14 CFR 135
10 [ ] 14 CFR 137
11 [ ] 14 CFR 129 (Foreign flag)
A Specify

Type of Flight Operation Conducted

(Complete 84a, b, c **ONLY** if flight was a revenue operation conducted under 121, 125, 127, 129, 135)

84a
1 [ ] Scheduled
2 [ ] Non-scheduled

84b
1 [ ] Domestic
2 [ ] International

84c
1 [ ] Passenger
2 [ ] Cargo
3 [ ] Passenger/cargo
4 [ ] Mail contract ONLY

(Complete 86 **ONLY** if 84a, b, c is not applicable)

85
1 [ ] Personal
2 [ ] Business
3 [ ] Instructional (Including air carrier training)
4 [ ] Executive/corporate
5 [ ] Aerial application
6 [X] Aerial observation
7 [ ] Other work use
8 [ ] Public use
9 [ ] Ferry
10 [ ] Positioning
A Specify

First Pilot Information

87 Name (Last, First, Initial): CARR, MARVIN A.
A Other

88 Pilot Certificate No.
A Other

89 Street Address: P.O. Box 5633
A Other

90 City: BORGER
A Other

91 State: TX

92 Date of Birth (Nos. for M, D, Y)
A Other

93 Age: 45 Yrs.
A Other

94 Sex
1 [X] Male
2 [ ] Female

95 Seat Occupied
1 [X] Left
2 [ ] Right
3 [ ] Center
4 [X] Front
5 [ ] Rear
A Other

96 Principal Profession
1 [X] Pilot—civilian
2 [ ] Pilot—military
3 [ ] Other—military
4 [ ] Aircraft mechanic
5 [ ] Business
6 [ ] Lawyer
7 [ ] Doctor dentist
8 [ ] Police
9 [ ] Student
10 [ ] Clergy
11 [ ] Teacher
12 [ ] Engineer
13 [ ] Farmer/rancher
14 [ ] Retired
A Other

97 Certificate(s) (Multiple entry)
1 [ ] Student
2 [ ] Private
3 [X] Commercial
4 [ ] Airline Transport
5 [ ] Flight Instructor
6 [ ] Flight Engineer
7 [ ] Military
8 [ ] None
9 [ ] Foreign
A Other

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number: FTW87FA088

First Pilot Information (continued) (Multiple entry - blocks 98-102)

98 Ratings—Airplane
1 [ ] None
2 [X] Single engine land
3 [ ] Multiengine land
4 [ ] Single engine sea
5 [ ] Multiengine sea

99 Rotorcraft/Glider/LTA
1 [X] None
2 [ ] Helicopter
3 [ ] Gyroplane
4 [ ] Airship
5 [ ] Free balloon
6 [ ] Glider

100 Instrument Rating
1 [X] None
2 [ ] Airplane
3 [ ] Helicopter

101 Instructor Rating(s)
1 [X] None
2 [ ] Airplane SE
3 [ ] Airplane ME
4 [ ] Helicopter
5 [ ] Gyroplane
6 [ ] Glider
7 [ ] Instrument plane
8 [ ] Instrument helicopter

102 Ground Instructor
1 [X] None
2 [ ] Basic
3 [ ] Advanced
4 [ ] Instrument

103 Type Rating Endorsement This Aircraft
1 [ ] Yes
2 [X] No *(Go to block 105)*
A Other

104 Months Since Check/Endorsement This Aircraft
_____ Months
A Other

105 Biennial Flight Review *(Or equivalent)*
1 [X] Yes
2 [ ] No
A Other

106 Months Since Last BFR
3 Months
A Other

107 BFR *(or equivalent)* **Aircraft Make/Model**
A Make PIPER
B Model PA-28-181
C Other

108 Medical Certificate
1 [ ] None
2 [ ] Class 1
3 [X] Class 2
4 [ ] Class 3
A Other

109 Medical Certificate Validity
1 [ ] Valid medical—no waivers/limitations
2 [X] Valid medical—with waivers/limitations
3 [ ] Non valid medical for this flight
4 [ ] Expired
5 [ ] No medical certificate
A Other

110 Date of Last Medical *(Nos. for M, D, Y)*
5-30-86
A Other _____

111 Medical limitation
1 [ ] None
2 [X] Vision
A Specify _____
B Other

112 Medical wavier
1 [X] None
2 [ ] Vision
3 [ ] Hearing
A Specify _____
B Other

113 Statement of Demonstrated Ability
1 [ ] Yes
2 [X] No
A Other

114 Correcting Lenses *(Multiple entry)*
1 [ ] Not required
2 [ ] Required to be in possession
3 [ ] Required, not in possession
4 [X] Required to be worn
5 [ ] Required, not worn
6 [X] Worn at time of accident
A Other

115 Source of Pilot Flight Time *(Multiple entry)*
1 [X] Pilot log
2 [ ] Company
3 [ ] FAA
4 [ ] Pilot/Operator Report
5 [X] Investigator's Estimate
6 [ ] Relative
7 [ ] Other Person
A Other

Flight Time	A All A/C	B This Make & Model	C Airplane Single Engine	D Airplane Multiengine	E Night	F Instrument Actual	G Instrument Simulated	H Rotorcraft	I Glider	J Lighter Than Air	K Other
125 Total Time	9144	2500	9144	0	324	4	7	0	0	0	
126 Pilot In Command (PIC)	7630	2500	7630	0	300	0	0	0	0	0	
127 Instructor	0	0	0	0	0	0	0	0	0	0	
128 This Make/Model					53	0	0				
129 Last 90 Days	352	352	352	0	11	0	0	0	0	0	
130 Last 30 Days	127	127	127	0	2	0	0	0	0	0	
131 Last 24 Hours	8	8	8	0	0	0	0	0	0	0	

132 Landings—Last 90 Days **All Aircraft**
84 Day
A Other

133 Landings—Last 90 Days **All Aircraft**
14 Night
A Other

134 Landings—Last 90 Days **This Make/Model**
84 Day
A Other

135 Landings—Last 90 Days **This Make/Model**
14 Night
A Other

136 Seatbelt Available
1 [X] Yes
2 [ ] No
A Other

137 Seatbelt Used
1 [X] Yes
2 [ ] No
A Other

138 Shoulder Harness Available
1 [X] Yes
2 [ ] No
A Other

139 Shoulder Harness Used
1 [X] Yes
2 [ ] No
A Other

140 Autopsy Performed *(This pilot)*
1 [X] Yes
2 [ ] No
A Other

141 Toxicology Performed *(This pilot)*
1 [X] Yes
2 [ ] No
A Other

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number: FTW87FA088

Pilot Information (continued)

142 Person at Controls
1 [X] Pilot in command
2 [ ] Second pilot
3 [ ] Both pilots
4 [ ] Non-pilot
5 [ ] No one
A Other

143 Simulated Instrument Flight
1 [ ] Yes
2 [X] No
A Other

144 Vision Restricting Device Used
1 [ ] Yes
2 [X] No
A Other

145 Second Pilot
1 [ ] Yes *(Complete second pilot supplement)*
2 [X] No

Flight Itinerary Information

155 Last Departure Point *(Multiple entry)*
1 [ ] Same as accident/incident location or
A Airport identifier F18
B City/Place CLEBURNE
C State TX
D Other

156 Time of Departure
A Time 1230
B Time Zone CST
C Other

157 Destination *(Multiple entry)*
1 [ ] Same as accident/incident location or
2 [ ] Local flight
A Airport Identifier CXO
B City/Place CONROE
C State TX
D Other

158 Flight Plan Filed *(Multiple entry)*
1 [X] None
2 [ ] Visual Flight Rules (VFR)
3 [ ] Instrument Flight Rules (IFR)
4 [ ] VFR/IFR
5 [ ] Company (VFR)
6 [ ] Military (VFR)
A Other

159 Type of Clearance
1 [X] None
2 [ ] VFR
3 [ ] Special VFR
4 [ ] IFR
5 [ ] Special IFR
6 [ ] VFR on top
7 [ ] Cruise
8 [ ] Traffic Advisory
9 [ ] VFR Flight Following
A Other

160 Airspace
1 [X] Uncontrolled
2 [ ] Controlled
3 [ ] Airport traffic area
4 [ ] Control zone
5 [ ] Airport advisory area
6 [ ] Positive control area
7 [ ] Terminal control area
8 [ ] Stage II TRSA
9 [ ] Stage III TRSA
10 [ ] Prohibited area
11 [ ] Restricted area
12 [ ] Military Operating Area (MOA)
13 [ ] Student Jet Training Area
14 [ ] Demo Area
15 [ ] Warning area
16 [ ] FAR 93
[ ] (Special air traffic areas)
A Other

161 Control Area
1 [X] None
2 [ ] Victor airway
3 [ ] Jet airway
4 [ ] Control airway
5 [ ] Colored airway
A Other

162 Route
1 [X] None
2 [ ] Standard instrument departure
3 [ ] Standard terminal arrival
4 [ ] RNAV/OMEGA/LORAN/INS
5 [ ] Direct
6 [ ] Profile Descent
7 [ ] VR route (military)
8 [ ] IR route (military)
9 [ ] SR route (military)
10 [ ] Refueling route (military)
A Other

163 Last Two Way Communications Established
1 [X] None
2 [ ] Yes
A Facility Identifier
B Other 12

Aircraft Loading Information

164 Fuel on Board at Takeoff *(Multiple entry)*
1 [X] Estimated
2 [ ] Verified
A 48 Gallons or
B Pounds
C Other

165 Fuel Types *(Multiple entry)*
1 [ ] 80/87
2 [X] 100 low lead
3 [ ] 100/130
4 [ ] 115/145
5 [ ] Kerosene
6 [ ] JP 3, 4, 5, 6
7 [ ] Jet A
8 [ ] Jet B
9 [ ] Mixture
10 [ ] Automotive
11 [ ] Anti-ice additive added *(If known)*
A Other

166 Aircraft Weight at Takeoff *(Multiple entry)*
1 [X] At or below max cert. gross takeoff weight
2 [ ] Above max certified gross takeoff weight
3 [X] Estimated
4 [ ] Verified
A Other

167 Aircraft CG at Takeoff *(Multiple entry)*
1 [X] Within limits
2 [ ] Exceeded fwd limit
3 [ ] Exceeded aft limit
4 [ ] Exceeded lateral limit
5 [X] Estimated
6 [ ] Verified
A Other

168 Aircraft Weight at Accident *(Multiple entry)*
1 [ ] Same as takeoff
2 [X] At or below max cert. gross takeoff weight
3 [ ] Above max certified gross takeoff weight
4 [X] Estimated
5 [ ] Verified
A Other

169 Aircraft CG at Accident *(Multiple entry)*
1 [ ] Same as takeoff
2 [X] Within limits
3 [ ] Exceeded fwd limit
4 [ ] Exceeded aft limit
5 [ ] Exceeded lateral limit
6 [X] Estimated
7 [ ] Verified
A Other

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB Accident/Incident Number: FTW87FA088

Aircraft Loading Information (continued)

170 Load Description (Multiple entry)
1 [X] None; 2 [ ] Passengers; 3 [ ] Cargo; 4 [ ] Towing glider; 5 [ ] Towing banner; 6 [ ] Other external; 7 [ ] Parachutists; 8 [ ] Water; 9 [ ] Chemical; 10 [ ] Livestock; 11 [ ] Illegal cargo; A Other

Weather Information

180 Source of Weather Briefing (Multiple entry)
1 [X] No record of briefing (Go to block 183)
2 [ ] National Weather Service (NWS)
3 [ ] Flight Service Station
4 [ ] PATWAS (Pilot Automated Tel. WX Answering Svc)
5 [ ] VRS (Voice Response System)
6 [ ] Company
7 [ ] Commercial weather service
8 [ ] TV/radio weather
9 [ ] Military
A Other

181 Method of Briefing (Multiple entry)
1 [ ] In person
2 [ ] Teletype
3 [ ] Telephone
4 [ ] Aircraft radio
5 [ ] TV/radio
A Other

182 Completeness of Weather briefing
1 [ ] Weather not pertinent
2 [ ] Full
3 [ ] Partial—limited by pilot
4 [ ] Partial—limited by briefer/forecaster
A Other

183 Investigator's Source of Weather Information
1 [ ] Pilot (Go to block 185)
2 [ ] Witness (Go to block 185)
3 [X] Weather observation facility

184 Weather Observation Facility
A Identifier ACT
B Time of observation 1330 zone CST
C Elevation 516 feet MSL
D Distance from accident site 15 NM
E Direction from accident site 310 °magnetic

185 Basic Weather Conditions at Accident Site
1 [X] Visual Meteorological Conditions (VMC)
2 [ ] Instrument Meteorological Conditions (IMC)
A Other

186 Conditions of Light
1 [ ] Dawn
2 [X] Daylight
3 [ ] Night (Dark)
4 [ ] Night (Bright)
5 [ ] Dusk
A Other

187 Sky/Lowest/Cloud Condition
1 [X] Clear
2 [ ] Scattered
3 [ ] Thin broken
3 [ ] Thin overcast
4 [ ] Partial obscuration
A _____ Feet AGL
B Other

188 Lowest Ceiling
1 [X] None
2 [ ] Broken
3 [ ] Overcast
4 [ ] Obscured
A _____ Feet AGL
B Other

189 Visibility (decimals)
A 15 SM
B RVR _____ Feet
C RVV _____ SM
D Other

190 Temperature
47 ° F
A Other

191 Dew Point
16 ° F
A Other

192 Wind (From)
1 [ ] Variable
A 300 ° Magnetic
B Other

193 Wind Speed
1 [ ] Calm
2 [ ] Light and Variable
A 20 Kts.
B Other

194 Gusts
1 [ ] None
A 27 Kts.
B Other

195 Altimeter Setting
30.26 " Hg
A Other

196 Density Altitude
_____ Feet
A Other 06

197 Restrictions to Visibility
1 [X] None
2 [ ] Haze (H)
3 [ ] Dust (D)
4 [ ] Smoke (K)
5 [ ] Fog (F)
6 [ ] Ice fog (IF)
7 [ ] Ground fog (GF)
8 [ ] Blowing spray (BY)
9 [ ] Blowing dust (BD)
10 [ ] Blowing snow (BS)
11 [ ] Blowing sand (BN)
A Other

198 Type of Precipitation
1 [X] None (Go to block 200)
2 [ ] Rain (R)
3 [ ] Snow (S)
4 [ ] Hail (A)
5 [ ] Rain showers (RW)
6 [ ] Freezing rain (ZR)
7 [ ] Snow shower (SW)
8 [ ] Drizzle (L)
9 [ ] Ice pellets (IP)
10 [ ] Snow pellets (SP)
11 [ ] Snow grains (SG)
12 [ ] Freezing drizzle (ZL)
13 [ ] Ice crystals (IC)
14 [ ] Ice pellet shower (IPW)
A Other

199 Intensity of Precipitation
1 [ ] Light
2 [ ] Moderate
3 [ ] Heavy
A Other

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number: FTW87FA088

Accident Information

200 Aircraft Damage
1 [ ] None
2 [ ] Minor
3 [ ] Substantial
4 [X] Destroyed

201 Aircraft Fire
1 [X] None
2 [ ] In-flight
3 [ ] On ground
A Other

202 Explosion
1 [X] None
2 [ ] In-flight
3 [ ] On ground
A Other

203 Damage to Property
1 [X] None
2 [ ] Residence
3 [ ] Residential area
4 [ ] Commercial bldg.
5 [ ] Vehicle(s)
6 [ ] Airport facility
7 [ ] Trees
8 [ ] Crops
9 [ ] Fence
10 [ ] Wires/poles
11 [ ] Other property

204 Injury Index *(Most critical injury)*
1 [ ] None 2 [ ] Minor 3 [ ] Serious 4 [X] Fatal

Injury Summary (Enter only one digit per block)	A Fatal	B Serious	C Minor	D None	E Total
205 First Pilot	001				001
206 Co-pilot					
207 Dual Student					
208 Check Pilot					
209 Flight Engineer					
210 Cabin Attendants					
211 Other Crew					
212 Passengers					
213 TOTAL ABOARD	001				001
214 Other Aircraft					
215 Other Ground					
216 GRAND TOTAL	001				001

217 Classification
1 [X] U.S. Registered Aircraft on U.S. Soil, Territories and Possessions, or International Waters
2 [ ] U.S. Registered Aircraft on Foreign Soil
3 [ ] U.S. Registered Aircraft operated by a Foreign Operator
4 [ ] Foreign Registered Aircraft on U.S. Soil, Territories or Possessions
5 [ ] Military Aircraft
6 [ ] Aircraft not Registered

Part Failure/Incorrect Part

220 Part Failure/Malfunction *(Multiple entry)*
1 [ ] None
2 [X] Part/component #1
3 [ ] Part/component #2
4 [ ] Part/component #3
A Other _____

221 Incorrect Part *(Multiple entry)*
1 [ ] None
2 [ ] Part/component #1
3 [ ] Part/component #2
4 [ ] Part/component #3
A Other _____

	A Part/Component #1	B Part/Component #2	C Part/Component #3
222 Part Name	WING		
223 ATA Code			
224 Manufacturer	PIPER		
225 Mfg. Part #	N/A		
226 Mfg. Model #	N/A		
227 Serial #	N/A		
228 Part Condition	FATIGUE FAILURE		
229 Total Time	7490		
230 TSO	N/A		
231 TSI	N/A		
232 Cycles Total	UNK		
233 Cycles Since Overhaul	N/A		
234 Cycles Since Inspection	N/A		
235 Service Difficulty Report or Malfunction/Defect Report Submitted	1 [X] Yes 2 [ ] No	1 [ ] Yes 2 [ ] No	1 [ ] Yes 2 [ ] No
236 Bogus Part	1 [ ] Yes 2 [X] No	1 [ ] Yes 2 [ ] No	1 [ ] Yes 2 [ ] No

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number

FTW87FA088

Supplement A
Wreckage Documentation: Single and Twin Reciprocating Engine and Unpowered Aircraft

Engine #1 Serial No.	2 Engine #2 Serial No.	3 Supercharger Installed	4 Turbocharger Installed	5 Propeller Manufacturer	6 Propeller Model/Series
L-27392-36A		1 ☐ Yes	1 ☐ Yes	SENSENICH	76EM8S5-0-62
A Other	A Other	2 ☒ No	2 ☒ No	A Other	A Other
		A Other	A Other		

Propeller Type *(Multiple entry)*
1 ☐ Wood
2 ☒ Metal
3 ☐ Composite
4 ☐ Constant speed-controllable pitch
5 ☐ Ground Adjustable/variable pitch
6 ☐ Reversable
7 ☐ Full automatic feathering
8 ☐ Full manual feathering
A Other

8 Aircraft STOL Modification Installed
1 ☐ Yes
2 ☒ No
A Other

Landing Gear Positions *(If fixed gear, go to block 12)*	9 Nose/Tail	10 Left Main	11 Right Main	*For Rotorcraft or Balloon accidents, go to block 20.*
	1 ☐ Up 2 ☐ Down 3 ☐ Intermediate A Other	1 ☐ Up 2 ☐ Down 3 ☐ Intermediate A Other	1 ☐ Up 2 ☐ Down 3 ☐ Intermediate A Other	

Control Surface Positions	12 Left Trailing Edge Flap	13 Right Trailing Edge Flap	14 Speed Brake	15 Spoiler
	1 ☒ Up A Extended _____ deg. B Other	1 ☒ Up A Extended _____ deg. B Other	1 ☒ Not Installed 2 ☐ Stowed 3 ☐ Deployed A Other	1 ☒ Not Installed 2 ☐ Stowed 3 ☐ Deployed 4 ☐ Deployed Asymetrically A Other

Trim Tab Positions *(Multiple entry)*	16 Left Aileron	17 Right Aileron	18 Rudder	19 Elevator/Stabilator/ Ruddervator
	1 ☒ Not Installed 2 ☐ Neutral 3 ☐ Up 4 ☐ Down A _____ deg. B Other	1 ☒ Not Installed 2 ☐ Neutral 3 ☐ Up 4 ☐ Down A _____ deg. B Other	1 ☐ Not Installed 2 ☒ Neutral 3 ☐ Left 4 ☐ Right A _____ deg. B Other	1 ☒ Neutral 2 ☐ Up 3 ☐ Down A _____ deg. B Other

Cargo Restraint System	20 Cargo Restraint Installed *(Multiple entry)*	21 Cargo Restraint Used *(Multiple entry)*	22 Cargo Restraint Failed *(Multiple entry)*
	1 ☒ None *(Go to block 26)* 2 ☐ Cargo net 3 ☐ Straps/tie down A Other	1 ☐ None *(Go to block 26)* 2 ☐ Cargo net 3 ☐ Straps/tie down A Other	1 ☐ None 2 ☐ Cargo net 3 ☐ Straps/tie down A Other

Computed Weight and Balance Information- *Complete when weight and/or center of gravity limitations are exceeded on accident flight. (Otherwise go to block 32)*

Takeoff

26 Weight	27 Center of Gravity	28 CG Range *(Multiple entry)*	
_____ Lbs.	A _____ % MAC or B _____ Inches	1 ☐ At takeoff weight 2 ☐ At max gross weight	A _____ % MAC to _____ % MAC or B _____ Inches to _____ Inches

Accident

29 Weight	30 Center of Gravity	31 CG Range *(Multiple entry)*		32 Fuel On Board At Accident
_____ Lbs.	A _____ % MAC or B _____ Inches	1 ☐ At takeoff weight 2 ☐ At max gross weight	A _____ % MAC to _____ % MAC or B _____ Inches to _____ Inches	1 ☒ Estimated 2 ☐ Verified A Total gallons 40 B Other

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number

FTW87FA018

Supplement A—Wreckage Documentation, Single and Twin Reciprocating Engine and Unpowered Aircraft (continued)

Fuel Tanks	Fuel on Board at Accident: A Gallons Estimated	B Gallons Verified	C Other	D Tank Construction: 1 Wet Wing	2 Bladder	3 Metal	E Other	F Spillsafe Fittings: 1 Yes	2 No	G Other	H Fuel Leakage/Rupture: 1 None	2 Line	3 Fitting	4 Tank	I Other
33 Left Wing	20					X			X			X			
34 Right Wing	20					X			X			X		X	
35 Left Tip															
36 Right Tip															
37 Fuselage															
38 (Specify)															

41 Fuel Found In #1 Engine *(Multiple entry)*

1 ☐ None
2 ☐ Lines
3 ☒ Gascolator/strainer
4 ☐ Carburetor/fuel injector
5 ☐ Engine driven pump
6 ☐ Auxiliary fuel pump
7 ☐ Filter(s)
8 ☐ Selector valve
9 ☒ Fuel manifold/spider
10 ☐ Accumulator tank
A Other

42 Fuel Found In #2 Engine *(Multiple entry)*

1 ☐ None
2 ☐ Lines
3 ☐ Gascolator/strainer
4 ☐ Carburetor/fuel injector
5 ☐ Engine driven pump
6 ☐ Auxiliary fuel pump
7 ☐ Filter(s)
8 ☐ Selector valve
9 ☐ Fuel manifold/spider
10 ☐ Accumulator tank
A Other

43 Flight Controls, Evidence or Operational Failure or Malfunction *(Multiple entry)*

1 ☒ None
2 ☐ Pitch control
3 ☐ Roll control
4 ☐ Yaw control
A Other

44 Airframe/Structure, Evidence of In-Flight Separation/Failure *(Multiple entry)*

1 ☐ None
2 ☐ Helicopter *(Complete Supp. G)*
3 ☐ General disintegration
4 ☒ Left wing
5 ☐ Right wing
6 ☐ Left stab/elevator
7 ☐ Right stab/elevator
8 ☐ Vertical fin/rudder
9 ☐ Canard
10 ☐ Powerplant
11 ☐ Cabin/cargo door
A Other

45 Propeller, Evidence of In-Flight Separation/Failure

1 ☐ Yes
2 ☒ No
A Other

46 Powerplant, Evidence of In-Flight Mechanical Malfunction

1 ☐ Yes
2 ☒ No
A Other

47 Fuel, Evidence of Improper Grade or Contamination *(Multiple entry)*

1 ☒ None
2 ☐ Improper grade
3 ☐ Contamination
A Other

48 Oil, Evidence of Improper Grade or Contamination *(Multiple entry)*

1 ☒ None
2 ☐ Improper grade
3 ☐ Contamination
A Other

Emergency Locator Transmitter (ELT) Information

51 ELT Manufacturer

NARCO

A Other

52 ELT Model No.

ELT-10

A Other

53 ELT Battery Type

1 ☒ Alkaline
2 ☐ Cadmium
3 ☐ Nicad
4 ☐ Nickel
5 ☐ Lithium
A Other

54 ELT Battery Expiration Date *(Nos. for M, D, Y)*

3-31-87

A Other

55 Preimpact ELT Location(s) *(Multiple entry)*

1 ☐ Cockpit
2 ☐ Cabin
3 ☐ Tailcone
4 ☒ Empennage
5 ☐ Raft
6 ☐ Survival Kit
A Other

56 ELT-Reason for Noneffectiveness/Failure *(Multiple entry)*

1 ☐ Operated effectively
2 ☐ Insufficient G's
3 ☐ Improper installation
4 ☐ Battery dead
5 ☐ Battery corroded
6 ☐ Battery installation incorrect
7 ☐ Incorrect battery
8 ☐ Fire damage
9 ☐ Impact damage
10 ☐ Antenna broken/disconnected
11 ☐ Water submersion
12 ☐ Unit not armed
13 ☐ Shielded by wreckage
14 ☐ Shielded by terrain
15 ☐ Internal failure
16 ☐ Test satisfactorily after accident
17 ☐ Signal direction altered by terrain
18 ☐ Packing device still installed
19 ☒ Remote switch off
A Other

NTSB Form 6120.4 Supplement A (1-84)

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB Accident/Incident Number

FTW87FA088

Supplement B - Cockpit Documentation, Single and Twin Reciprocating Engine and Unpowered Aircraft

1 Cockpit Secured, Readings Not Pertinent 1 ☐ Yes *(Go to block 3)*

2 Cockpit/Instrument Panel Destroyed 1 ☐ Yes *(Go to block 3)*

Cockpit Instrument Inspection—*Enter direct in appropriate category*

Flight Instruments		Engine/System Instruments	
Item	Reading/Setting	Item	Reading/Setting
Airspeed	Ø	Oil Press.	destroyed
Att Ind.	destroyed	Oil Temp.	destroyed
Altimeter	57.000', 30.26"	Fuel Press.	destroyed
Turn Coord	85° ® bank, ball full right	ⓛ Fuel Qty	10 gal.
		ⓡ Fuel Qty	destroyed
Dir Gyro	160°, 150 bug	Hour meter	7632.9
VSI	+400 fpm	Tachometer	950 rpm, 6881.95
Clock	12:57		

Comm/Nav Equipment		Miscellaneous	
Item	Frequency/Remark	Item	Remark
Comm * 1	124.00		
Nav * 1	109.2		
ADF	940 kHz, 170°		

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number

FTW87FA088

Supplement B—Cockpit Documentation, Single and Twin Reciprocating Engine and Unpowered Aircraft (continued)

3 Navigational Equipment/Displays Installed *(Multiple entry)*
1 ☒ OMNI Head(s)
2 ☒ Glide slope
3 ☐ HSI
4 ☐ Flight director
5 ☐ RMI
6 ☐ RNAV
7 ☐ LORAN/Omega/INS
8 ☐ DME
9 ☒ ADF
10 ☐ Marker beacons
A Other

4 Autopilot
1 ☒ Not installed
2 ☐ Engaged
3 ☐ Not engaged
A Other

5 Digital Electronic/ Nav/Com Displays
1 ☒ Not installed
2 ☐ Installed
A Other

6 Primary Altimeter Type
1 ☐ Counter-pointer
2 ☐ Drum-pointer
3 ☒ 3-pointer
4 ☐ 2-pointer
A Other

7 Standby Altimeter Installed
1 ☐ Yes
2 ☒ No
A Other

8 Radar Altimeter Installed
1 ☐ Yes
2 ☒ No
A Other

9 Transponder
1 ☐ Not installed
2 ☒ Installed-not used
3 ☐ Installed-used
4 ☐ Installed-used-Altitude encoding
A Other

10 Attitude Indicator Installed
1 ☒ Yes
2 ☐ No
A Other

11 Attitude Indicator Power Source *(Multiple entry)*
1 ☒ Pressure/vacuum system
2 ☐ Pressure/vacuum system-with backup power source
3 ☐ Electrical
4 ☐ Standby indicator with alternate power source
A Other

12 Type of Stall Warning Indicator
1 ☐ None
2 ☒ Visual/light
3 ☐ Visual/gauge
4 ☐ Aural
5 ☐ Stickshaker
A Other

13 Weather Radar/Detection Equipment
1 ☒ Not installed
2 ☐ Installed-on
3 ☐ Installed-off
4 ☐ Installed, on/off unknown
A Other

14 Type Weather Radar/Detection Equipment *(Multiple entry)*
1 ☐ Storm scope
2 ☐ Black and white radar
3 ☐ Color radar
A Other

Electrical/System Switches

18 ☐ **Switches Destroyed/Inaccessible** *(Go to block 56)*
19 ☐ **Switch Positions Not Pertinent** *(Go to block 56)*

Switch/Item	1 Not Installed	2 On	3 Off	A Other	Pertinent Setting/Remark
20 Electrical Master		X			
21 Battery		X			
22 #1 Gen/Alternator		X			
23 #2 Gen/Alternator	X				
24 Inverter	X				
25 Avionics Master	X				
28 Pitot Heat			X		
29 Ice Detection	X				
30 Propeller Deice/Anti-ice	X				
31 Windshield Deice	X				
32 Windshield Anti-Ice	X				
33 Airframe Deice	X				
36 Cabin Air/Fan	X				
37 Cabin Heater	X				
38 Air Conditioning	X				
39 Cabin Pressure Altitude	X				
40 Cabin Pressure Temperature	X				
41 Crew Oxygen	X				
42 Cabin/Passenger Oxygen	X				
45 Taxi Lights				Ø6	
46 Landing Lights				Ø5	
47 Rotating Beacon				Ø5	

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number

FTW87FA088

Supplement B Cockpit Documentation, Single and Twin Reciprocating Engine and Unpowered Aircraft (continued)

Instrument Panel (continued)

Switch/Item	1 Not Installed	2 On	3 Off	A Other	Pertinent Setting/Remark
48 Strobes				Ø5	
49 Navigation Lights				Ø5	
50 Instrument Panel Lights				Ø5	
51 Cockpit/Storm Lights				Ø5	
52 Cabin Lights				Ø5	
53 ELT Remote				Ø5	

Engine Controls-No. 1 Engine

56 ☐ Engine Control Positions Not Pertinent *(Go to block 65)*

57 Throttle Position
1 ☐ Not installed
2 ☐ Full forward
3 ☐ Midrange
4 ☐ Idle
A Other Ø5

58 Propeller
1 ☐ Not installed
2 ☐ Full increase (Low pitch)
3 ☐ Midrange
4 ☐ Full decrease (High pitch)
5 ☐ Feather
A Other Ø5

59 Mixture
1 ☐ Not installed
2 ☐ Full rich
3 ☐ Midrange
4 ☐ Idle cutoff
A Other Ø5

60 Carburetor Heat
1 ☐ Not installed
2 ☐ Full on
3 ☐ Partial
4 ☐ Off
A Other Ø5

61 Alternate Air
1 ☒ Not installed
2 ☐ Open
3 ☐ Closed
4 ☐ Midrange
A Other

62 Cowl Flaps
1 ☒ Not installed
2 ☐ Open
3 ☐ Closed
4 ☐ Midrange
A Other

63 Magneto Switch Position
1 ☐ Not installed
2 ☐ Both
3 ☐ Left
4 ☐ Right
5 ☐ Off
6 ☐ Start
A Other Ø5

64 Throttle Friction
1 ☐ Not installed
2 ☐ Tight
3 ☐ Loose
A Other Ø5

Engine Controls-No. 2 Engine

65 ☐ Engine Control Positions Not Pertinent *(Go to block 74)*

66 Throttle Position
1 ☐ Not installed
2 ☐ Full forward
3 ☐ Midrange
4 ☐ Idle
A Other

67 Propeller
1 ☐ Not installed
2 ☐ Full increase (Low pitch)
3 ☐ Midrange
4 ☐ Full decrease (High pitch)
5 ☐ Feather
A Other

68 Mixture
1 ☐ Not installed
2 ☐ Full rich
3 ☐ Midrange
4 ☐ Idle cutoff
A Other

69 Carburetor Heat
1 ☐ Not installed
2 ☐ Full on
3 ☐ Partial
4 ☐ Off
A Other

70 Alternate Air
1 ☐ Not installed
2 ☐ Open
3 ☐ Closed
4 ☐ Midrange
A Other

71 Cowl Flaps
1 ☐ Not installed
2 ☐ Open
3 ☐ Closed
4 ☐ Midrange
A Other

72 Magneto Switch Position
1 ☐ Not installed
2 ☐ Both
3 ☐ Left
4 ☐ Right
5 ☐ Off
6 ☐ Start
A Other

73 Throttle Friction
1 ☐ Not installed
2 ☐ Tight
3 ☐ Loose
A Other

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number: FTW87FA088

Supplement B—Cockpit Documentation, Single and Twin Reciprocating Engine and Unpowered Aircraft (continued)

Landing Gear Controls/Indicators, Flight Controls/Indicators, and Fuel Selectors/Pumps

74 Landing Gear Control
1 [X] Not installed
2 [ ] Up
3 [ ] Down
4 [ ] Off
A Other

75 Landing Gear Indicator
1 [X] Not installed
2 [ ] Up
3 [ ] Down
4 [ ] Transit/unsafe
A Other

76 Trailing Edge Flap System
1 [ ] Not installed
2 [X] Manual
3 [ ] Electric
4 [ ] Hydraulic
A Other

77 Trailing Edge Flap Control
1 [ ] Not installed
2 [X] Up
A Down ____ deg.
B Other

78 Trailing Edge Flap Indicator
1 [X] Not installed
2 [ ] Up
A Down ____ deg.
B Other

79 Speed Brake Control
1 [X] Not installed
2 [ ] Stowed
3 [ ] Deployed
A Other

80 Spoiler Control
1 [X] Not installed
2 [ ] Stowed
3 [ ] Deployed
A Other

81 Dual Controls
1 [ ] Not installed
2 [X] Installed
A Other

82 Throwover Control Yoke/Position
1 [X] Not installed
2 [ ] Left
3 [ ] Right
4 [ ] Intermediate
A Other

83 Elev/Stab Trim Control *(Multiple entry)*
1 [ ] Not installed
2 [X] Manual
3 [ ] Electric
A Other

84 Elev/Stab Trim Indicator
1 [ ] Not installed
2 [ ] Up
3 [ ] Down
4 [ ] Neutral
A Other Ø5

85 Aileron Trim Control *(Multiple entry)*
1 [X] Not installed
2 [ ] Manual
3 [ ] Electric
A Other

86 Aileron Trim Indicator
1 [X] Not installed
2 [ ] Left
3 [ ] Right
4 [ ] Neutral
A Other

87 Rudder Trim Indicator
1 [ ] Not installed
2 [ ] Left
3 [ ] Right
4 [ ] Neutral
A Other Ø5

88 Fuel Selector Position(s) *(Multiple entry)*
1 [ ] Left main
2 [ ] Right main
3 [ ] Both
4 [ ] Left auxiliary
5 [ ] Right auxiliary
6 [ ] Center
7 [ ] Forward
8 [ ] Aft
9 [ ] External tank
10 [ ] Between tanks
11 [ ] X-feed left to right
12 [ ] X-feed right to left
13 [ ] On-engine #1
14 [ ] Off-engine #1
15 [ ] On-engine #2
16 [ ] Off-engine #2
A Other Ø5

89 Fuel Boost Pump, Engine #1
1 [ ] Not installed
2 [ ] On
3 [ ] High
4 [ ] Low
5 [ ] Off
A Other Ø5

90 Fuel Boost Pump, Engine #2
1 [X] Not installed
2 [ ] On
3 [ ] High
4 [ ] Low
5 [ ] Off
A Other

91 Fuel Transfer Pump
1 [X] Not installed
2 [ ] Off
A On (____ tank to ____ tank)
B Other

92 Primer, Engine #1
1 [ ] Not installed
2 [ ] Locked
3 [ ] Unlocked
A Other Ø5

93 Primer Engine #2
1 [ ] Not installed
2 [ ] Locked
3 [ ] Unlocked
A Other

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number

FTW87FA088

Supplement I - Crash Kinematics

1 Accident Site Geographic Coordinates—Latitude *(Multiple entry)*

1 ☒ North
2 ☐ South
A 32 deg. 20 minutes
B Other

2 Accident Site Geographic Coordinates—Longitude *(Multiple entry)*

1 ☐ East
2 ☒ West
A 96 deg. 51 minutes
B Other

3 Impact Sequence—*(Number in sequence. Multiple entry.)*

1 ☐ None
2 ☐ Rock face
3 ☐ Rigid structure
4 ☐ Rocks to 1' diam.
5 ☐ Rocks 1'-2' diam.
6 ☐ Rocks > 2' diam.
7 ☒ Ground ①
8 ☐ Dirt bank
9 ☐ Scrub tree
10 ☐ Trees/limbs to 6" diam.
11 ☐ Trees/limbs 6"-9" diam.
12 ☐ Trees/limbs 9"-12" diam.
13 ☐ Trees/limbs 12" diam. and up
14 ☐ Frangible approach aid
15 ☐ Non-frangible approach aid
16 ☐ Submerged obstacle
17 ☐ Vehicle
18 ☐ Aircraft
19 ☐ Runway light
20 ☐ Water
21 ☐ Wire
22 ☐ Pole
23 ☐ Snow bank
A Other

4 Terrain at Principal Impact Point *(Multiple entry)*

1 ☐ None
2 ☐ Wet cultivated soil
3 ☒ Dry cultivated soil
4 ☐ Dry packed clay
5 ☐ Boggy swampy
6 ☐ Packed snow
7 ☐ Loose snow
8 ☐ Concrete
9 ☐ Asphalt
10 ☐ Loose rock
11 ☐ Dry sod
12 ☐ Wet sod
13 ☐ Water
14 ☐ Tundra
15 ☐ Dirt
16 ☐ Rock
17 ☐ Ice
18 ☐ Mud
19 ☐ Sand
A Other

Principal Impact Kinematics

5 Airspeed At Impact *(Enter direct or mark estimated range)*

1 ☐ 0-15
2 ☐ 15-30
3 ☐ 30-45
4 ☐ 45-60
5 ☐ 60-75
6 ☒ 75-90
7 ☐ 90-120
8 ☐ 120-150
9 ☐ 150-180
10 ☐ 180-210
11 ☐ 210 plus knots
A ____ Knots
B Other

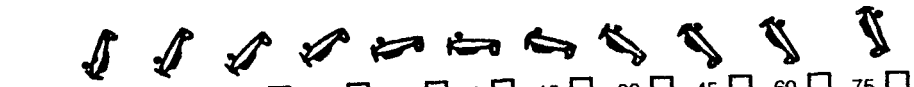
6 Flight Path Angle *(Enter direct or mark estimated range)*

1 ☐ Up
2 ☒ Down
3 ☐ 0-5
4 ☐ 5-10
5 ☐ 10-15
6 ☐ 15-20
7 ☐ 20-25
8 ☐ 25-30
9 ☐ 30-45
10 ☒ 45-60
11 ☐ 60-90
A ____ Degrees
B Other

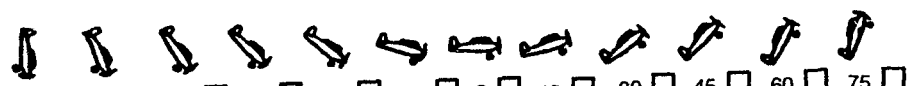
7 Pitch Attitude At Impact *(Enter direct or mark estimated range.)*

Pitch Attitude
1 ☒ Down
2 ☐ Up
A ____ Deg.

Nose Down Angle With Horizon — Nose Up Angle With Horizon



☐ 75 ☐ 60 ☐ 45 ☐ 30 ☐ 15 ☐ 0 ☐ 15 ☐ 30 ☐ 45 ☐ 60 ☐ 75 ☐



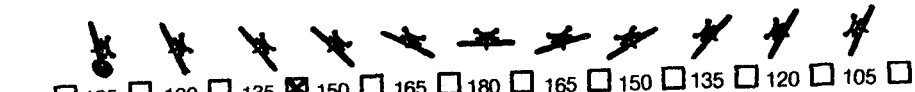
90 ☐ 75 ☐ 60 ☐ 45 ☒ 30 ☐ 15 ☐ 0 ☐ 15 ☐ 30 ☐ 45 ☐ 60 ☐ 75 ☐ 90 ☐

B or Other

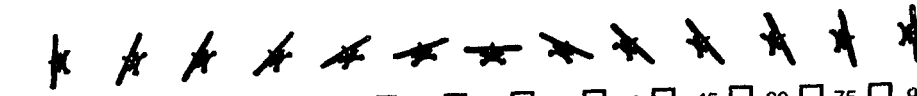
8 Roll Attitude At Impact *(Enter direct or mark estimated range.)*

Roll
1 ☒ Left
2 ☐ Right
A ____ Deg.

Aircraft Rolled Left — Aircraft Rolled Right



☐ 105 ☐ 120 ☐ 135 ☒ 150 ☐ 165 ☐ 180 ☐ 165 ☐ 150 ☐ 135 ☐ 120 ☐ 105 ☐



90 ☐ 75 ☐ 60 ☐ 45 ☐ 30 ☐ 15 ☐ 0 ☐ 15 ☐ 30 ☐ 45 ☐ 60 ☐ 75 ☐ 90 ☐

B or Other

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number

FTW87FA088

Supplement I—Crash Kinematics (continued)

9 Yaw Attitude at Impact *(Enter direct or mark estimated range.)*

1 ☒ Nose left
2 ☐ Nose right
A _____ Deg.

Aircraft Yawed Left — Aircraft Yawed Right

90 ☐ 75 ☐ 60 ☐ 45 ☐ 30 ☒ 15 ☐ 0 ☐ 15 ☐ 30 ☐ 45 ☐ 60 ☐ 75 ☐ 90 ☐

or
B Other

10 Terrain Angle
1 ☒ Level
A Up _____ deg.
B Down _____ deg.
C Other

11 Principal Impact Ground Scar Length
1 ☐ None
A 6 feet
B Other

12 Principal Impact Ground Scar Depth
1 ☐ None
A 18 inches
B Other

13 Fuselage Totally Destroyed
1 ☒ Yes *(Go to block 36)*
2 ☐ No
A Other

14 Cockpit Damage *(Multiple entry)*
1 ☐ Destroyed
2 ☐ Collapsed
3 ☐ Part collapsed
4 ☐ Distorted
5 ☐ Burnt
6 ☐ Intact
7 ☐ None
A Other

15 FWD Cabin Damage *(Multiple entry)*
1 ☐ Destroyed
2 ☐ Collapsed
3 ☐ Part collapsed
4 ☐ Distorted
5 ☐ Burnt
6 ☐ Intact
7 ☐ None
A Other

16 AFT Cabin Damage *(Multiple entry)*
1 ☐ Destroyed
2 ☐ Collapsed
3 ☐ Part collapsed
4 ☐ Distorted
5 ☐ Burnt
6 ☐ Intact
7 ☐ None
A Other

17 Fuselage Split
1 ☐ No *(Go to block 19)*
2 ☐ Longitudinal
3 ☐ Circumferential
A Other

18 Fuselage Split Behind Seat #
_____
A Other

19 Fuselage Collapse *(Estimated)*
1 ☐ None
A Horizontal _____ inches
B Vertical _____ inches
C Other

20 Fuselage Crush
1 ☐ None
A Horizontal _____ inches
B Vertical _____ inches
C Other

Approved Exit Data

Exit Location	A Type of Exit: 1 Door	2 Window	3 Hatch	B Other	C Operable: 1 Yes	2 No	D Other	E Fire Damage: 1 Yes	2 No	F Other	G Impact Damage: 1 Yes	2 No	H Other
21 Cockpit-Left													
22 Cockpit Right													
23 1L													
24 1R													
25 2L													
26 2R													
27 3L													
28 3R													
29 4L													
30 4R													
31 5L													
32 5R													
33 6L													
34 6R													

National Transportation Safety Board

FACTUAL REPORT
AVIATION

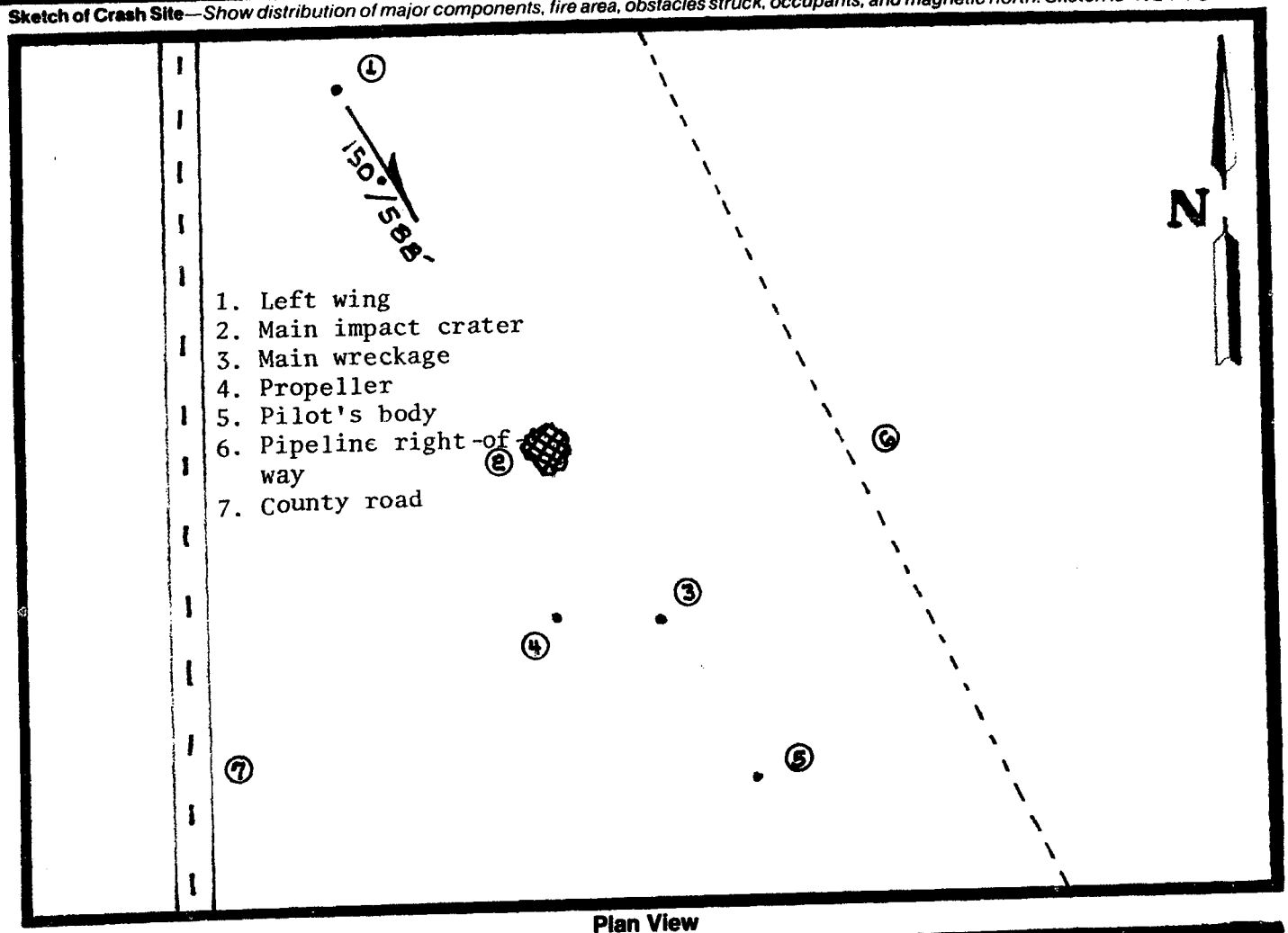
NTSB Accident/Incident Number

FTW87FA088

Supplement I Crash Kinematics (continued)

Crash Site Plan/Elevation

36 Sketch of Crash Site—*Show distribution of major components, fire area, obstacles struck, occupants, and magnetic north. Sketch is "NOT TO SCALE".*



Plan View

N/A

Elevation View

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB Accident/Incident Number

F T W 8 7 F A Ø 8 8

Supplement K—Occupant, Survival and Injury Information

1 Seat No.
A Ø1
B If Seat Unknown Enter Persons Name
C Other

2 Position
1 ☒ Pilot in command
2 ☐ Second pilot
3 ☐ Other crewmember
4 ☐ Passenger
A Other

For non-survivable accident, go to block 36

3 Age
A ___ Yrs
B Under 24 mos., enter months ___
C Other

4 Height
___ Inches
A Other

5 Weight
___ Lbs
A Other

6 Injury Index
1 ☐ None
2 ☐ Minor
3 ☐ Serious
4 ☐ Fatal

7 Condition Prior to Accident *(Multiple entry)*
1 ☐ Smoker
2 ☐ Language difficulty
3 ☐ Pre-existing disease
4 ☐ Prothesis
A Other

8 Physically Handicapped *(Multiple entry)*
1 ☐ No
2 ☐ Blind
3 ☐ Mobility impaired
4 ☐ Deaf
A Other

9 Seat Belt Adjustment
1 ☐ Not fastened
2 ☐ Loose
3 ☐ Snug
4 ☐ Tight
5 ☐ Fastened-Tightness Unknown
6 ☐ Not seated
7 ☐ Seat not equipped
A Other

10 Shoulder Harness Adjustment
1 ☐ Not fastened
2 ☐ Loose
3 ☐ Snug
4 ☐ Tight
5 ☐ Fastened-Tightness Unknown
6 ☐ Seat not equipped
A Other

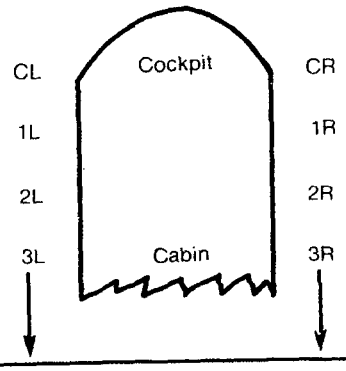
11 Knew Impact/Accident Coming
1 ☐ Yes
2 ☐ No
A Other

12 Braced for Impact
1 ☐ Yes
2 ☐ No
A Other

13 Direction of Movement at Impact *(Multiple entry)*
1 ☐ Forward
2 ☐ Rearward
3 ☐ Upward
4 ☐ Downward
5 ☐ Left
6 ☐ Right
A Other

14 Exit Used
1 ☐ Did not escape
2 ☐ Split in fuselage
A Exit number (use diagram)
B Other

Exit Diagram



Use following codes for overhead hatches

Cockpit 99

Cabin 88

Tailcone 77

15 Escape Hampered by *(Multiple entry)*
1 ☐ Not hampered
2 ☐ Smoke
3 ☐ Heat
4 ☐ Injuries
5 ☐ Trapped
6 ☐ Darkness
7 ☐ Debris
8 ☐ Disorientation
9 ☐ Difficulty Using Exit
A Specify ___
B Other

16 Briefed on Emergency Procedures *(Multiple entry)*
1 ☐ No
2 ☐ Before takeoff
3 ☐ Before impact/accident
A Other

17 Evacuation Aided by *(Multiple entry)*
1 ☐ Passenger
2 ☐ Crew
3 ☐ Bystander
4 ☐ CFR personnel
5 ☐ Unaided
A Other

18 Injured During Evacuation
1 ☐ Yes
2 ☐ No
A Other

Complete this section if oxygen was used.

21 Type of Equipment
1 ☐ Supplemental
2 ☐ Portable
A Other

22 Difficulty In Use
1 ☐ Yes
2 ☐ No
A Other

23 Type of Oxygen System
1 ☐ Solid state
2 ☐ Gaseous
A Specify ___
B Other

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number

F T W 8 7 F A Ø 8 8

Supplement K—Occupant, Survival and Injury Information (continued)

Complete this section for accidents involving fire. 24 ☐ No fire involved *(Go to block 29)*

25 Fire First Sighted *(Location)*
1 ☐ Inside aircraft
2 ☐ Outside aircraft
3 ☐ Both
A Other

26 Smoke Mask/Goggles Used *(Multiple entry)*
1 ☐ No
2 ☐ Yes
3 ☐ Both
4 ☐ Difficulty in use
A Other

27 Material of Clothes Worn *(Multiple entry)*
1 ☐ Synthetic
2 ☐ Nonsynthetic
3 ☐ Fire resistant
4 ☐ Mix-synthetic and nonsynthetic
A Other

28 Exposure to Heat/Fire *(Multiple entry)*
1 ☐ Head/face
2 ☐ Arm(s)
3 ☐ Hand(s)
4 ☐ Leg(s)
5 ☐ Torso
6 ☐ Feet
A Other

Complete this section for accidents involving ditching/water impact. 29 ☐ No water impact *(Go to block 36)*

Flotation Devices	A Available			C Used			E Familiar With Use			G Problems In Use			I Malfunctioned With Use			K Equipment Damaged		
	1 Yes	2 No	B Other	1 Yes	2 No	D Other	1 Yes	2 No	F Other	1 Yes	2 No	H Other	1 Yes	2 No	J Other	1 Yes	2 No	L Other
30 Liferaft																		
31 Vest-Inflatable																		
32 Vest-Non-Inflatable																		
33 Cushion																		

34 Time in Water
A ____ Hrs.
B ____ Mins. C Other

35 Rescued by
1 ☐ Boat
2 ☐ Airplane
3 ☐ Helicopter
4 ☐ None
A Other

Occupant Injuries—*Complete applicable parts for survivors and nonsurvivors.*

Items 36 thru 39 apply ONLY to flight crewmembers.

36 Medication Prescribed
1 ☐ No
A Yes *(Specify:* BANCAPS HC, PEN VK 200 MG*)*
B Other

37 Medication Being Taken
1 ☒ No
A Yes *(Specify: _____)*
B Other

38 Medication/Drugs Found
1 ☐ No
A Yes *(Specify:* BANCAPS HC, PEN VK 200 MG*)*
B Other

39 Pre-existing Disease Found at Autopsy
1 ☐ No autopsy performed
2 ☒ None reported
A Yes *Specify: _____*
B Other

Results of Toxicological Analyses—*Complete as applicable for survivors and nonsurvivors.*

40 Toxicology *(Multiple entry)*
1 ☐ Not ordered
2 ☐ Not ordered—performed
3 ☒ Ordered—performed
4 ☐ Ordered—not performed
5 ☐ Embalmed
6 ☐ Specimen not available/unsuitable for analysis
A Other

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB Accident/Incident Number

F T W 8 7 F A Ø 8 8

Supplement K—Occupant, Survival and Injury Information (continued)

Results of Toxicologial Analyses—*(Complete as applicable for survivors and nonsurvivors.) (continued)*

Substances	A Test Results: 1 Positive	2 Negative	B Other	C Level of Substances Found
41 Ethanol (Alcohol)		X		Mg %
42 CO (Carbon Monoxide)	X			1 % Saturation
43 hb (Hemoglobin)			Ø7	gm %
44 HCN (Hydrogen Cyanide)		X		Microgram/ml
45 Acidic and Neutral Drugs		X		
46 Basic Drugs		X		
47 Marijuana		X		
48 (Specify) _____				

List any additional toxicological substances discovered below.

A Substance Code	B Level of Substances Found	A Substance Code	B Level of Substances Found
49 Ø12	CAFFEINE 1.5 ug/ml	56	
50		57	
51		58	
52		59	
53		60	
54		61 (Specify)	
55		62 (Specify)	

Toxicological Substances/Codes

Acetaminophen	001	Cocaine	018	Imipramine	035	Menthol	052
Acetaldehyde	002	Codeine	019	Isopropanol	036	Morphine	053
Acetone	003	Desipramine	020	Ketamine	037	Medazepam	054
Amoxapine	004	Diazepam	021	Lidocaine	038	Nicotine	055
Amitriptyline	005	Dihydrocodeinone	022	Loxapine	047	Nortriptyline	056
Amobarbital	006	Diphenhydramine	023	Mecloqualone	039	Oxazepam	057
Amphetamine	007	Diphenylhydantoin	024	Meperidine	040	Pentazocine	058
Benzoylecgonine	008	Doxepin	025	Mephentermine	041	Phenobarbital	059
Brompheniramine	009	Desalkylflurazepam	026	Meprobamate	042	Procaine	060
Butalbital	010	Demoxapam	027	Methanol	043	Propoxyphene	061
Butabarbital	011	Ethchlorvynol	028	Methadone	044	Secobarbital	062
Caffene	012	Flunitrazepam	029	Methamphetamine	045	Thioridazine	063
Cannabinoids	013	Flurazepam	030	Methaqualone	046	Temazepam	064
Chlorazepate	014	Fluphenazine	031	Methylenedioxyam	048	Nordiazepam	065
Chlordiazepoxide	015	Glutethimide	032	Phetamine	049	Pentobarbital	066
Chlorphentermine	016	Haloperidol	033	Methylphenidate	050	Phencyclidine	067
Clonazepam	017	Hexobarbital	034	Methyprylon	051	Phendimetrazine	068
						Prazepam	069

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number

FTW87FA018

Supplement K—Occupant, Survival and Injury Information (continued)

63 ☒ *For multiple extreme traumatic injuries, check box, and go to next applicable supplement.*

Occupant Injury Coding Chart *(Complete for survivors and non survivors as applicable.)*

	A Body Region	B Aspect	C Lesion	D System/Organ	E A.I.S. Severity	F 6 Injury Source	G 7 Source of Data
64							
65							
66							
67							
68							
69							
70							
71							
72							
73							

Body Region - A

01 Head (Skull, scalp, ears)
02 Face (Forehead, nose, eyes, mouth)
03 Neck (Cervical spine, C1-C7)
04 Shoulder (Clavicle, scapula, joint)
05 Upper limb (Whole arm)
06 Arm (Upper)
07 Elbow
08 Forearm
09 Wrist
10 Hand—fingers
11 Chest (Anterior and posterior ribs)
12 Abdomen (Diaphragm and below)
13 Back (Thoracic spine T1-T12)
14 Back (Lumbar L1-L5)
15 Pelvis—hip
16 Lower limb (Whole leg)
17 Thigh (Femur)
18 Knee
19 Leg (Below knee)
20 Ankle
21 Foot—toes
22 Whole body
88 Injured, unknown region
99 Other

Aspect Of Injury - B

01 Right
02 Left
88 Injured aspect unknown
99 Other

Lesion - C

01 Laceration
02 Contusion
03 Abrasion
04 Fracture
05 Concussion
06 Avulsion
07 Rupture
08 Sprain
09 Dislocation
10 Crush
11 Amputation
12 Burn
13 Fracture and dislocation
14 Severence (Transection)
15 Strain
16 Detachment (Separation)
17 Perforation (Puncture)
88 Injured unknown lesion
99 Other

System/Organ - D

01 Skeletal
02 Vertebrae
03 Joints
04 Digestive
05 Liver
06 Nervous System
07 Brain
08 Spinal cord
09 Ears
10 Arteries veins
11 Heart
12 Spleen
13 Urogenital
14 Kidneys
15 Respiratory
16 Eye
17 Pulmonary/lungs
18 Airway
19 Muscles
20 Integumentary
21 Thyroid (Thyroid or other endocrine gland)
88 Injured, unknown system or organ
99 Other

Abbreviated Injury Scale - E

00 Not injured
01 Minor injury
02 Moderate injury
03 Serious injury (Not life-threatening)
04 Severe injury (Life-threatening survival probable)
05 Critical injury (Survival uncertain)
06 Maximum (untreatable)
07 Injured (Unknown severity)
88 Unknown if injured

Source of Data - G

Official
01 Autopsy records with or without hospital/medical records
02 Hospital/medical records
03 Emergency room records
04 Private or treating physicians

Unofficial
05 Lay coroner
06 E.M.S. personnel
07 Interviewee
08 Police
09 Other source

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB Accident/Incident Number

F T W 8 7 F A 0 8 8

Supplement K—Occupant, Survival and Injury Information (continued)

Injury Source List - F

01 Windshield
02 Windshield frame
03 Window
04 Window frame
05 Instrument panel
06 Side console
07 Center console
08 Control stick/cyclic stick
09 Collective
10 Control yoke/column
11 Throttle quadrant/levers
12 Rudder pedals
13 Ceiling
14 Sidewall
15 Floor
16 Fuselage framing/structure
17 Table
18 Seat
19 Seatback tray
20 Restraints—seatbelt/tiedown
21 Restraints—shoulder harness
22 Unsecured item(s) in cockpit
23 Unsecured item(s) in cabin
24 Other occupants
25 Ground/runway
26 Unsecured seat(s)
27 Outside object(s) entering aircraft
28 Galley item(s)
29 Food/beverage item(s)
30 Other interior objects
31 Other exterior objects
32 Evacuation slide/slide raft
33 Escape rope/tape
34 Escape inertia device
35 Ejected from aircraft
36 Propeller/rotor blades
37 Exterior aircraft surface
38 Engine
39 Wheel/tires
40 Ground vehicle
41 Toxic/noxious/irritant fumes
42 Fire/radiant heat
43 Flying glass
44 Door/hatches
45 Acceleration forces
46 Exposure
47 Glare Shield
48 Eyeglasses
88 Unknown
99 Other

74 Death Due To Fire/Smoke

1 ☐ Yes
2 ☒ No
A Other

75 Death Due To Drowning

1 ☐ Yes
2 ☒ No
A Other

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number

FTW87FA088

Supplement L—Seat, Restraint System and Fuselage Deformation

Seat Information

1 Seat Number
01
A Other

2 Seat Manufacturing Standard
1 [X] Type certificate *(Airframe manufacturer)*
2 [ ] Non-TSO
A TSO *(Specify)* _____
B Other

3 Seat Orientation
1 [X] Forward facing
2 [ ] Rearward facing
3 [ ] Side facing
A Other

4 Seat Unit
1 [ ] Fixed
2 [X] Adjustable
3 [ ] Swivel
A Other

5 Seat Type *(Multiple entry)*
1 [X] Cockpit crew
2 [ ] Flight attendant single jumpseat
3 [ ] Flight attendant double jumpseat
4 [ ] Folding stowable
5 [ ] Single passenger seat
6 [ ] 2 passenger seat unit
7 [ ] 3 passenger seat unit
8 [ ] Sofa/Bench
A Other

6 Seat Location at Time of Examination
1 [ ] Inside aircraft-attached
2 [ ] Inside aircraft-separated
3 [X] Outside aircraft
A Other

7 Total Seat Destruction *(Multiple entry)*
1 [X] Impact *(Go to block 30)*
2 [ ] Fire *(Go to block 30)*
A Other

8 Seat Anchored
1 [ ] Bulkhead/wall
2 [ ] Floor
A Other

9 Seat Primary Structure
1 [ ] Tube
2 [ ] Sheet metal
3 [ ] Composite
4 [ ] Wood
5 [ ] Metal Castings
A Other

10 Energy Absorbing Features
1 [ ] Yes
2 [ ] No
A Other

11 Evidence of Fire/Heat Damage *(Multiple entry)*
1 [ ] None
2 [ ] Cushions/covers
3 [ ] Structure
4 [ ] Restraints
A Other

Seat Installation/Damage/Displacement

12 Seat Impact Damage
1 [ ] None *(Omit 15-28 type impact damage)*

13 Seat Displacement
1 [ ] None *(Omit 15-28 direction of seat displacement)*

Seat Component *(Complete only pertinent items)*	A Installed: 1 No	2 Yes	3 Improper Installation	B Other	C Type Impact Damage *(Multiple entry)*: 1 None	2 Bent	3 Distorted/ Buckled	4 Collapsed	5 Partially Separated	6 Separated	D Other	E Direction of Seat Displacement *(Multiple entry)*: 1 None	2 Forward	3 Rearward	4 Left	5 Right	6 Up	7 Down	F Other
15 Pedestal																			
16 Enclosure																			
17 Back Frame																			
18 Seat Pan																			
19 Pan Frame																			
20 Legs																			
21 Leg Attach Fittings																			
22 Seat Attach Fittings																			
23 Structural Attach Fittings, Floor																			
24 Structural Attach Fittings, Wall																			
25 Seat Track																			
26 Arm Rest																			
27 Seat Back Tray																			
28 Head Restraint																			

Restraint System Information

30 [ ] **Totally Destroyed** *(Go to block 46)*

31 Restraint System Manufacturer
Piper
A Other

32 Restraint System TSO
1 [X] Yes
2 [ ] No
A Other

33 Restraint System Design
1 [ ] 2-point
2 [X] 3-point
3 [ ] 4-point
4 [ ] 5-point
A Other

34 Type Release/Buckle
1 [X] Metal to metal
2 [ ] Fabric pull thru
A Specify
B Other

National Transportation Safety Board

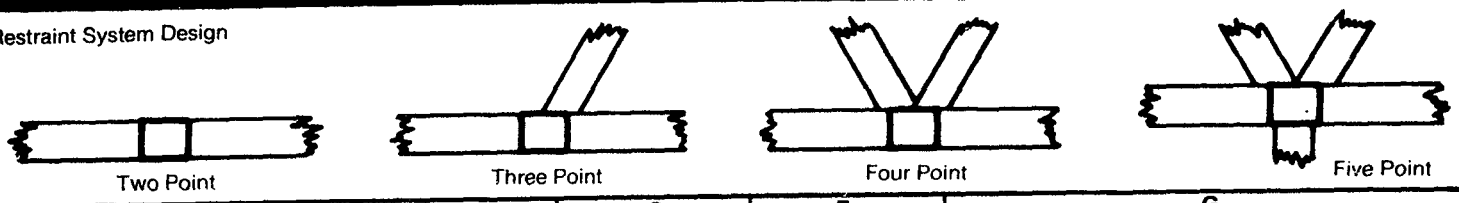
FACTUAL REPORT AVIATION

NTSB Accident/Incident Number

FTW87FA088

Supplement L—Seat, Restraint System and Fuselage Deformation (continued)

Restraint System Design



Component	A Installed 1 Yes	A Installed 2 No	A Installed B Other	C Fire Damage 1 Yes	C Fire Damage 2 No	C Fire Damage D Other	E Evidence of Use 1 Yes	E Evidence of Use 2 No	E Evidence of Use F Other	G Location of Anchor Points 1 Seat	2 Wall	3 Floor	4 Ceiling	5 Bulkhead	H Other
35 Lapbelt	X				X		X					X			
36 Shoulder Harness	X				X			X			X				
37 Inertia Reel		X													
38 Tiedown Strap		X													

Component	A 1 No Damage	B Webbing/Stitching 1 Destroyed	B 2 Partially Separated	B 3 Separated	C Restraint Attach Fittings 1 No Damage	C 2 Destroyed	C 3 Bent	C 4 Partially Separated	C 5 Separated	D Seat/Structure Attach Fittings 1 No Damage	D 2 Destroyed	D 3 Bent	D 4 Partially Separated	D 5 Separated
39 Lapbelt		X												
40 Shoulder Harness	X													

41 Other Damage—Release Buckle
1 ☐ Yes
2 ☒ No
A Other

42 Other Damage—Tie Down Strap
1 ☐ Yes
2 ☐ No
A Other

43 Other Damage—Inertia Reel
1 ☐ Yes
2 ☐ No
A Other

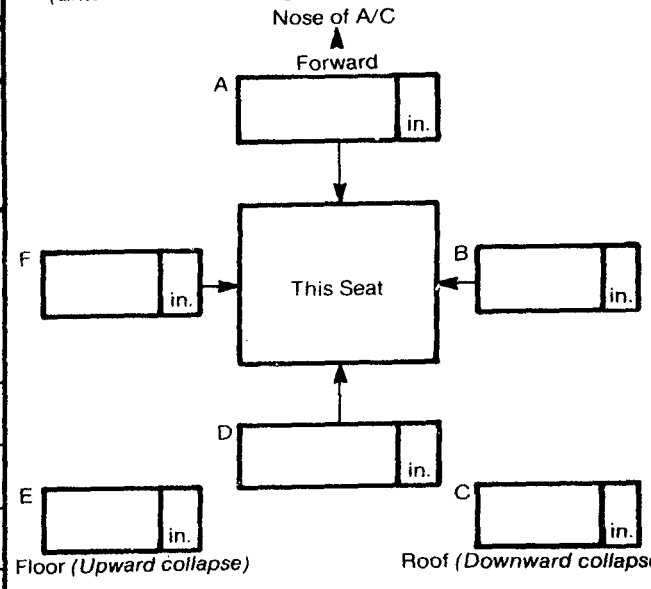
Fuselage Deformation Around This Seat

46 Fuselage Collapse Around This Seat
1 ☐ None
2 ☐ Collapse
3 ☒ Disintegrated/Incinerated
A Other

47 Interior Surface Damage To This Seat
1 ☒ Yes
2 ☐ No
A Other

Cabin/Interior Deformation Around This Seat *(Select codes from list below)*	A Direction of Deformation 1 Forward	2 Rearward	3 Left	4 Right	5 Up	6 Down	B Other
50 Code _____							
51 Code _____							
52 Code _____							
53 Code _____							

48 Fuselage Collapse Measurements Around This Seat
(Enter inches on drawing)



Note: Arrow (——→) shows direction of displacement

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB Accident/Incident Number

FIT W 8 1 7 F A 0 1 8 8

Supplement L. Seat, Restraint System and Fuselage Deformation (continued)

(Codes to be used in 50-53 above)

01 Windshield
02 Windshield frame
03 Window
04 Window frame
05 Instrument panel
06 Side console
07 Center console
08 Control stick/cyclic stick
09 Collective
10 Control yoke/column
11 Throttle quadrant/levers
12 Rudder pedals
13 Ceiling
14 Sidewall
15 Floor
16 Fuselage framing/structure
17 Table
18 Seat
19 Seatback tray
20 Restraints—seatbelt/tiedown
21 Restraints—shoulder harness
22 Unsecured item(s) in cockpit
23 Unsecured item(s) in cabin
24 Other occupants
25 Ground/runway
26 Unsecured seat(s)
27 Galley item(s)
28 Other interior objects
29 Door/hatches