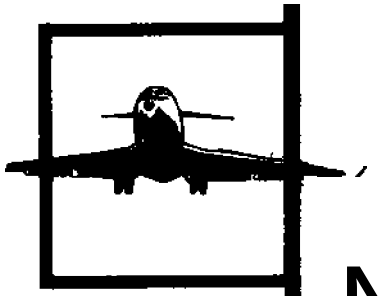

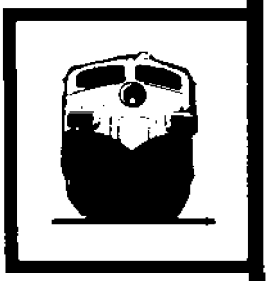

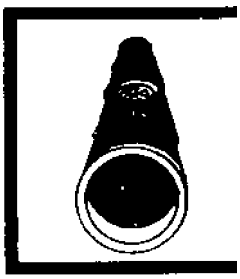

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

AIRCRAFT ACCIDENT REPORT

THURMAN L. MUNSON
CESSNA CITATION 501, N15NY
NEAR CANTON, OHIO
AUGUST 2,1979

NTSB-AAR-80-2

UNITED STATES GOVERNMENT

1. Report No. NTSB-AAR-80-2	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Aircraft Accident Report- Thurman L. Munson Cessna Citation 501, N15NY, Near Canton, Ohio, August 2, 1979		5. Report Date April 16, 1980 6. Performing Organization Code
7. Author(s)		8. Performing Organization Report No.
9. Performing Organization Name and Address National Transportation Safety Board Bureau of Accident Investigation Washington, D.C. 20594		10. Work Unit No. 2917 11. Contract or Grant No.
12. Sponsoring Agency Name and Address NATIONAL TRANSPORTATION SAFETY BOARD Washington, D.C. 20594		13. Type of Report and Period Covered Aircraft Accident Report August 2, 1979 14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

About 1602 e.d.t., on August 2, 1979, a Cessna Citation piloted by Mr. Thurman L. Munson crashed short of runway 19 at the Akron-Canton Airport near Canton, Ohio. The pilot was practicing touch-and-go landings during a local flight with two passengers aboard. The aircraft first touched down in a relatively level, clear area about 870 ft short of the runway. The aircraft slid through a small clump of trees, hit a large stump, and came to rest on a road adjacent to the airport boundary fence. Fire erupted immediately after the aircraft came to rest. The two passengers escaped from the wreckage; the pilot was killed.

The National Transportation Safety Board determines that the probable cause of the accident was the pilot's failure to recognize the need for, and to take action to maintain, sufficient airspeed to prevent a stall into the ground during an attempted landing. The pilot also failed to recognize the need for timely and sufficient power application to prevent the stall during an approach conducted inadvertently without flaps extended. Contributing to the pilot's inability to recognize the problem and to take proper action was his failure to use the appropriate checklist and his nonstandard pattern procedures which resulted in an abnormal approach profile.

17. Key Words	18. Distribution Statement
Cessna Citation 501; stall; multiengine aircraft; undershoot; wing flap position; airspeed control; power management; approach profile; standard procedures and practices; angle-of-attack system; turbojet engines; pitch attitude; general aviation; pilot training; checklist; survivability; shoulder harness; fire	This document is available to the public through the National Technical Information Service, Springfield, Virginia 22161

19. Security Classification (of this report)	20. Security Classification (of this page)	21. No. of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED	28	

this page intentionally left blank

CONTENTS

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

AIRCRAFT ACCIDENT REPORT

Adopted: April 16, 1980

THURMAN L. MUNSON
CESSNA CITATION 501, N15NY
NEAR CANTON, OHIO
AUGUST 2, 1979

SYNOPSIS

About 1602 e.d.t., on August 2, 1979, a Cessna Citation piloted by Mr. Thurman L. Munson crashed short of runway 19 at the Akron-Canton Airport near Canton, Ohio. The pilot was practicing touch-and-go landings during a local flight with two passengers aboard. The aircraft first touched down in a relatively level, clear area about 870 ft short of the runway. The aircraft slid through a small clump of trees, hit a large stump, and came to rest on a road adjacent to the airport boundary fence. Fire erupted immediately after the aircraft came to rest. The two passengers escaped from the wreckage; the pilot was killed.

The National Transportation Safety Board determines that the probable cause of the accident was the pilot's failure to recognize the need for, and to take action to maintain, sufficient airspeed to prevent a stall into the ground during an attempted landing. The pilot also failed to recognize the need for timely and sufficient power application to prevent the stall during an approach conducted inadvertently without flaps extended Contributing to the pilot's inability to recognize the problem and to take proper action was his failure to use the appropriate checklist and his nonstandard pattern procedures which resulted in an abnormal approach profile.

1. FACTUAL INFORMATION

1.1 History of the Flight

About 1430 e.d.t., 1/ on August 2, 1979, the pilot of N15NY, a Cessna CE-501 "Citation," invited two associates to accompany him on a local flight at Akron-Canton Airport near Canton, Ohio. Both associates of the pilot were certificated pilots; however, neither had flown in turbojet-type aircraft. One of them had been the pilot's flight instructor in the Beech aircraft model BE-60. He had flown with the pilot for about 100 to 150 hrs. He boarded N15NY and sat in the right front seat next to the pilot. The other associate boarded the aircraft and sat in an aft-facing passenger seat behind the right cockpit seat. The pilot closed the cabin entry door. The passengers were not briefed regarding the location of shoulder harnesses, the operation of emergency exits, or procedures to follow in an emergency. The passenger who was seated in the cabin said that he left his seatbelt fastened loosely so he could turn to his right and face partially forward to view the cockpit.

1/ All times herein are eastern daylight based on the 24-hour clock.

According to the passengers, the pilot turned on the electrical power and checked his fuel quantity, which was about 900 pounds per tank. The pilot then "referred to a little booklet" and calculated his reference speeds for landing approaches. He set the "bug" 2/ on his airspeed indicator at 93 kns. The passenger in the right cockpit seat then set the bug on the right side airspeed indicator at 93 kns.

The passengers said that they were not aware of the pilot's intentions for the flight until he requested and received clearance to remain in the traffic pattern for practice landings. The pilot used a headset and a microphone button located on his control yoke for radio transmissions. The pilot started the engines, checked the ATIS, 3/ and at 1536 was cleared to taxi to runway 23. The flight was cleared for takeoff on runway 23 at 1541:36. Three touch-and-go landings were conducted on runway 23 before an approach was flown to runway 19.

The following account of the sequence of events preceding the accident was supplied by the two passengers aboard N15NY and by other persons who witnessed the flight and the crash:

> The initial takeoff was normal and the aircraft was turned to enter a left traffic pattern for a touch-and-go landing on runway 23. Downwind airspeed was about 200 kns indicated airspeed (KIAS) for a short time and then the aircraft was slowed below the gear-down limit (174 KIAS).
>
> Altitude on the downwind leg was about 2,500 ft mean sea level 4/ (airport elevation was 1,217 ft). Power was reduced abeam midfield on downwind, the landing gear was lowered, and the approach flaps were extended. A normal touch-and-go landing was accomplished on runway 23. The flaps were raised to takeoff position and thrust was applied for takeoff.
>
> During the climbout, the landing gear and flaps were retracted, and then the pilot pulled the right throttle back to demonstrate the single-engine climb capability. The right throttle was then returned to normal thrust position and a left traffic pattern was flown. One passenger said that the aircraft was "as high as 3,000 ft" on downwind. The other passenger was not positive, but believed the altitude was about 2,800 ft.
>
> During the downwind leg of the second landing, the pilot advanced the throttles and demonstrated how rapidly the aircraft would accelerate. The passengers did not state what airspeed was reached during the acceleration, but they did recall that the pilot then used the speed brakes to reduce the

---

2/ Movable pointer which is set at the desired reference speed on the airspeed indicator.

3/ Automatic Terminal Information Service—recorded information regarding local weather and airport conditions.

4/ All altitudes herein are mean sea level unless otherwise specified.

airspeed below maximum gear-lowering speed (174 KIAS). The pilot then lowered the landing gear, extended approach flaps, and retracted the speed brakes. A second normal touch-and-go landing was made, and the aircraft was flown for a third left traffic pattern for runway 23.

After turning to the crosswind leg for the third pattern, the pilot invited the right seat passenger to take the control yoke and acquaint himself with the control responsiveness. The passenger turned the aircraft left to a downwind leg. The pilot then invited the passenger to fly a zero flap approach. The pilot mentioned that the aircraft would float considerably unless flaps were used during the landing. The passenger flew the aircraft at 170 KIAS on downwind leg. He said the pattern was considerably wider-than-normal to dissipate some altitude, but he did not recall what altitude was flown. He said the final approach was flat, and somewhat below the VASI. 5/

The passenger who was flying the aircraft said that the pilot did not recommend a final approach airspeed; however, he recalled that the speed flown was "considerably faster than the reference speed (bug) on the airspeed indicator." He said the pilot was handling the throttles and made a few power adjustments during the approach. The passenger flying the aircraft said he was only handling the control yoke and trim.

The landing touchdown was long (about midpoint of the runway) and preparation for takeoff was begun immediately. The passenger who was flying the aircraft said the aircraft suddenly floated into the air about 5 to 10 ft. He said he was surprised until he realized that the pilot had lowered the flaps to the takeoff position causing the aircraft to "balloon." The pilot applied takeoff thrust and took control of the aircraft.

During the fourth takeoff, the tower advised N15NY to enter a right pattern for runway 19 because of other traffic. A right downwind leg was entered at 3,500 ft and 200 KIAS. While on downwind, the pilot reduced the throttles to dissipate airspeed and altitude. The passengers recalled that the throttles were reduced to a point where the landing gear warning horn sounded and that the pilot silenced the horn. One passenger stated, ". . . I know that when we were at 3,500 ft, those throttles were pretty much all the way back."

At 1559:33, the tower controller advised N15NY to extend the downwind leg for about 1 mile, because of traffic landing on runway 19 and departure traffic on runway 23. At 1559:55, the controller advised N15NY to begin its base turn "anytime now." The aircraft was turned immediately onto base leg. The passengers reported that they did not recall the pilot using the speed brakes and that he did not lower the landing gear or extend the flaps on downwind.

5/ Visual Approach Slope Indicator--provides visual glide slope guidance to the pilot to assist in preventing undershoots and overshoots.

The passengers recalled that the turn to base leg was made with about 30° of bank and with the nose slightly low. One passenger said that about 1,000 ft of altitude was lsot in the base leg turn. The turn to final was estimated by the passengers to have been about 20° to 30° of bank with the nose still slightly low.

The passenger in the right seat stated that he noticed the VASI as the turn to final was begun, and the aircraft was just about on the desired glidepath He noticed that the landing gear had not been lowered so he said, "I don't think you want to land this airplane with the gear still up." The pilot then lowered the landing gear. The aircraft had now drifted slightly left of centerline for runway 19, and it had begun to settle below the VASI glidepath. The passenger in the right seat said he recalled that the altimeter indicated 1,700 ft when he advised the pilot about the landing gear. He said that when the aircraft went below the VASI glidepath, he cautioned the pilot about being below the VASI and about possible downdrafts near the approach end of runway 19. The passenger did not recall altimeter indications after the landing gear was lowered, because he was watching the VASI and using outside references. He said he recalled sensing that the aircraft was "settling in." He said he could "just feel it." He recalled saying to the pilot, "we're sinking."

At that point the pilot started to apply power. The aircraft was aligned with the runway centerline but was below the VASI glidepath and descending. The passenger in the cabin recalled that the power application was relatively slow because the pilot "sort of inched them (throttles) forward." The passenger in the right front seat said he noticed the angle-of-attack indicator was in the caution range (yellow). At that time, the sink rate was beginning to increase and power was being applied gradually.

The passenger in the cabin said he did not watch the VASI, but he could "sense" the sink rate was "pretty strong." He said, "I could see in his face (the pilot's) that he felt there was something wrong of course." He also said, "I sensed the airplane sinking and I could sense through the expression in Thurman's face that the aircraft was out of control."

Neither passenger could recall seeing a vertical speed indication regarding the descent rate while on base leg or on final approach. The passenger in the right front seat stated he was sure the airspeed was "nailed right on the bug" (93 KIAS) during the final approach.

The passengers said they never felt a sensation of acceleration from the power application by the pilot during the last portion of the approach. The passenger in the cabin said he felt the left wing drop slightly as they were sinking and he saw the pilot suddenly push the throttles "to the firewall," that is, full forward. The passenger in the right front seat recalled feeling slight airframe buffet just before impact. He said it was not pronounced--just a shudder before impact. The other passenger said he did not recall a shudder or buffet; rather he turned around and faced rearward in his seat, because he believed the aircraft was going to crash. He said he "kept waiting for that acceleration to pull us out of what I felt ... was pretty excessive sink rate."

The passenger in the right front seat said, "I was trying to convey to him (the pilot) my discomfort with the fact that we were getting a little bit low and that I was uncomfortable with the sink rate. . . . I didn't want to come out and say 'I don't like this approach; please add power.' I was trying to feed that information to him in that fashion because, again, I had no experience in this type of aircraft." He said the pilot seemed calm and not rushed in his activities.

Neither passenger saw the pilot use a checklist during the flight. One passenger recalled the pilot saying something during the flight such as, "You have to pay attention to what you're doing, because the aircraft will descend rapidly." The passenger said, "I remember him saying, 'You have to stay on top of it--pay attention.'"

Neither passenger recalled the pilot saying he was going to make a zero flap landing. The passenger in the right front seat said he just assumed the pilot was conducting a zero flap approach because he didn't follow the same sequence as before. Neither passenger saw the pilot attempt to lower the flaps during the last approach.

When the aircraft touched the ground, the passengers said they felt a series of bumps and then they came to a sudden halt. The passenger in the cabin said he thought they hit a "ditch or hill or something."

A passenger in an automobile traveling southeasterly on Interstate 77, 3,300 ft from the threshold of runway 19 and along the extended centerline of runway 19, stated that the aircraft crossed from left to right in front of the automobile. He first saw the aircraft to his left about 400 to 500 ft away. He then saw it about 150 to 200 ft directly in front of his automobile and 50 to 75 ft above the ground. He next saw it to his right, just skimming the trees and then disappearing from view. He then saw red flames and black smoke. The witness stated that the aircraft was in a gradual descent, extremely low, and barely clearing the tree tops. He said, "The aircraft was going very slowly, resembling the landing speed of a light small aircraft." He said he saw the right wing "wobbling" as it passed in front of his position

The controller working the local control position in the Akron-Canton Tower saw the aircraft only from the time it was on short final approach until it disappeared below the level of the approach end of the runway. He sounded the crash alarm. No other controllers reported seeing the aircraft during this approach.

The aircraft touched down about 870 ft short of the runway on slightly rising terrain at an elevation of about 1,160 ft (runway touchdown zone elevation is 1,217 ft). The aircraft rolled across rough terrain and struck a 2.5-ft-deep ditch where the nose gear separated from the aircraft. It continued sliding until it passed through a clump of small trees and struck a large stump. The aircraft spun around and came to rest on a road, about 270 ft from the initial touchdown point and about 600 ft from the runway threshold. A fire erupted immediately after the aircraft came to rest.

The aircraft crashed about 1602 during the hours of daylight. The coordinates of the accident site are 40°55'N and 81°27'W at an elevation of about 1,180 ft.

1.2 Injuries to Persons

Injuries	Crew	Passenger	Other
Fatal	1	0	0
Serious	0	2	0
Minor/None	0	0	0

1.3 Damage to Aircraft

The aircraft was destroyed by ground impact and postcrash fire.

1.4 Other Damage

A few small trees were destroyed. The asphalt surface of a roadway on which the aircraft came to rest was damaged by heat and fire.

1.5 Personnel Information

The pilot, who also owned N15NY, was trained and certificated in accordance with current regulations. (See appendix B.)

The pilot's logbook revealed that he began flight training on February 27, 1978, in a Cessna 150 aircraft. He continued flight training in single-engine Cessna aircraft until April 10, 1978, at which time he also began training in the Beech BE-60, "Duke," twin-engine aircraft. The pilot completed successfully his private pilot checkride on June 11, 1978, in a Cessna 172. His logbook showed that he had logged 25.0 hrs pilot-in-command and 65.2 hrs dual when his Private Pilot Certificate was issued. The pilot received his multiengine rating on June 15, 1978, in a BE-60 aircraft, He had logged 23.8 hrs in the BE-60 and had logged 97.2 hrs total flight time when he took his multiengine checkride.

On February 10, 1979, at a total logged flying time of 330 hrs, the pilot purchased and began flying a Beech E-90 "King Air." His logbook revealed that he flew this aircraft until July 6, 1979, when he purchased the Cessna Citation, N15NY. His total logged flying time on July 6 was about 480 hrs, which included 428 hrs of multiengine time. His total time was broken down into 165 hrs dual and 315 hrs pilot-in-command.

The pilot flew N15NY with a flight instructor for 10 flights before receiving his type-rating in the aircraft on July 17, 1979. He had logged 21.7 hrs and 24 landings in the aircraft before his checkride, which was 1.5 hrs long and included 8 landings. The checkride was flown in N488CC, another Cessna CE-501 Citation.

In the 16 days following the type-rating checkride, the pilot logged 10.6 hrs in the Citation (N15NY). He logged 4.1 hrs of this time as pilot-in-command, single pilot. The pilot's total logged flying time at the time of the accident was 516.2 hrs, 33.8 hrs of which were logged in the CE-501 model aircraft.

The passenger in the right front seat had been the pilot's flight instructor for a period of time in 1978. He had flown with the pilot in a Beech aircraft BE-60 "Duke" for about 100 to 150 hrs, during which time the pilot trained for and completed his instrument rating. The passenger was not rated in turbojet aircraft and had not flown previously in the Cessna Citation model aircraft. He was not trained or qualified to act as the pilot's instructor for the accident flight. According to his statement, he was a friend of the pilot and was aboard the aircraft solely as an observer.

The passenger in the cabin was also a certificated pilot. However, he was not rated in turbojet aircraft and had never flown in a Cessna Citation.

1.6 Aircraft Information

N15NY, a Cessna CE-501 Citation, serial No. 501-0110, was certificated, maintained, and equipped in accordance with current regulations. (See appendix C.) The CE-501 is a single-pilot version of the original Cessna Citation CE-500, which was certificated on September 9, 1971, with a minimum crew of a pilot and a copilot. The CE-501 was certificated on January 7, 1977.

1.7 Meteorological Information

The surface weather observation for the Akron-Canton Airport at 1556 on August 2, 1979, was as follows:

> Sky condition -- 3,000 ft above ground level, scattered clouds, estimated 4,000 feet a.g.l. broken clouds; visibility -- 10 miles; temperature -- 76°F; dewpoint -- 62°F; wind -- 280° at 9 kns; barometric pressure -- 29.97 inHg.

A special weather observation for Akron-Canton Airport taken at 1604 on August 2, 1979, was as follows:

> Sky condition -- 3,000 ft a.g.l. scattered clouds, 4,000 ft a.g.l. broken clouds, visibility -- 10 miles; temperature -- 77°F; dewpoint -- 63°F; wind -- 280° at 11 kns; barometric pressure -- 29.97 inHg.

1.8 Aids to Navigation

Not applicable.

1.9 Communications

There were no reported communications difficulties. The Akron-Canton Airport is served by a Federal Aviation Administration (FAA) control tower.

1.10 Airport Information

The Akron-Canton Airport, elevation 1,217 ft, consists of three hard-surface runways; runway 19 is the longest, 6,397 ft long by 150 ft wide. The

approach end of runway 19 had previously been extended toward the north by using fill dirt. The pierlike approach end of the runway is about 50 ft higher than the terrain immediately to the north of it.

Runway 19 is equipped with a two-bar VASI to assist pilots with maintaining a 3° glide slope during Visual flight rules (VFR) operations. When the aircraft is positioned on the glide slope, the bar light closest to the aircraft displays a white indication, while the bar light farthest from the aircraft displays a red indication. When the aircraft is positioned below the glide slope, both bars display a red indication. The VASI glide slope provides for a touchdown point about 1,000 ft from the runway threshold.

1.11 Flight Recorders

The aircraft was not equipped with a cockpit voice recorder or a flight data recorder, and neither recorder was required.

1.12 Wreckage and Impact Information

The aircraft first touched down about 870 ft from the threshold of runway 19. Marks in the foliage and dirt revealed that the aircraft first touched on its left main landing gear and then on its right main gear about 70 ft farther. The terrain was fairly level, open, and uncultivated. The aircraft rolled on its landing gear for about 150 ft from initial contact until it struck a 2.5-ft-deep trench where the nose gear separated from the aircraft. The aircraft continued for about 70 ft before it entered a stand of small trees. It passed through the trees and hit a large tree stump 5 ft in diameter and 4 ft high. The lower portion of the nose beneath the pilot's seat and the left wing root leading edge hit the stump, and the aircraft again became airborne for a short distance. It came to rest on Greenburg Road, which is located about 8 ft above the terrain on which the trees were located. When the aircraft hit the trees and stump, it rotated clockwise 180°. The crash path was oriented southerly along the extended centerline of runway 19.

The left wing root area and lower left side of the fuselage were extensively damaged by impact. The skin was buckled beneath the left windshield and the nose of the aircraft was crushed slightly downward and buckled aft about 5 ft. The right wing and the lower right side of the fuselage were damaged extensively by impact. The skin on the bottom of the fuselage was distorted and crushed upward slightly along the full length of the fuselage. Both wing fuel cells were opened during contact with the trees, and fuel stains were found on surrounding foliage. The right wing and the entire right side of the fuselage were damaged extensively by fire. The left side of the aircraft sustained moderate fire damage.

The empennage was extensively burned. The engines were burned away from their attachments and were found in the debris of the empennage.

Examination of the wreckage revealed that the flaps were up and the speed brakes were stowed at impact. Continuity of the flight control mechanisms was established with no evidence of preimpact malfunction or failure.

The cockpit interior showed little evidence of impact damage, except for the left side. The pilot's control yoke was broken in half just above the mid-column. The instrument panel was dented and pushed forward. The floor structure beneath the pilot's seat was disrupted. About 2 ft of the floor structure, including the pilot's left seat floor track, was disrupted, crushed aft, and buckled by impact from below. Although the right floor track for the pilot's seat was relatively undamaged, the seat had become detached from the floor track and was found loose in the cockpit.

The pilot's seat had sustained impact damage. The left front corner of the seat pan was bent downward about 4 in. The seat pan had contacted the seat base in this area. The seat base and other supporting structures were bent and twisted. The lap buckle was found fastened and the webbing near the left seat attach point was burned away. There was no evidence that the attach point for the shoulder harness lapbelt insert had been fastened to the lapbelt buckle. The inertia reel assembly for the pilot's single-strap diagonal shoulder harness was found with the webbing burned within the reel assembly housing. The inertia reel housing is mounted above and behind the pilot's left shoulder, and it is attached to the wall behind the pilot's seat. The right front seat was found firmly fastened to the floor with no impact damage.

The cabin was severely burned. The cabin seats were in place with no evidence of impact damage. The right emergency exit door was open, and the door was inside the cabin. The main cabin door on the left side was closed and jammed. The skin on the forward lower corner of the door was found bent and curled aft and the exterior door handle was missing.

1.13 Medical and Pathological Information

A postmortem examination of the pilot, performed by the Summit County Coroner's Office, revealed no evidence of preexisting pathology which would have impaired his ability to conduct the flight safely.

The autopsy revealed congestion and edema in the tracheobronchial tree, and the laryngeal airway contained considerable edematous fluid. There were flecks of carbonaceous material scattered throughout the edematous fluid. The autopsy also revealed a dislocation of the atlanto-occipital and atlanto-axial joints, where the cervical spine joins the lower back part of the head. Examination of the spinal cord revealed a "severe contusion, hemorrhage and necrosis of the cervical spinal cord." This injury was beneath the area of the dislocation. The lower aft portion of the brain (cerebellar tonsillar) was displaced downward from its normal position. The coroner concluded that the pilot died from "asphyxiation due to acute laryngeal edema and due to inhalation of superheated air and toxic substances."

The Summit County Forensic Toxicology Laboratory in Akron, Ohio, the Ohio State University Toxicology Laboratory in Columbus, Ohio, and the FAA Civil Aeromedical Institute Laboratory in Oklahoma City, Oklahoma, conducted toxicological examinations of the pilot. Levels of carbon monoxide and cyanide were insignificant. Findings for alcohol and drugs were negative.

The two passengers suffered second- and third-degree burns to exposed areas of their bodies--face, neck, and hands. They did not sustain serious impact injuries.

1.14 Fire

There was no evidence of in-flight fire. There were about 1,500 pounds of jet A-1 fuel aboard the aircraft when it crashed. All fuel cells were ruptured as the aircraft slid on the ground and when it hit the trees. A severe fire erupted when the aircraft came to rest. Several ignition sources were present--electrical, hot-engine components, and friction.

The left side of the aircraft was upwind from the smoke and fire, which was intense and concentrated on the right side of the fuselage. The passengers' only escape route was through the emergency exit on the right side of the cabin. When the emergency exit was opened, fire and smoke propagated rapidly into the cabin requiring both passengers to exit immediately.

Immediately after the accident, the Green Township Fire Department and the airport fire department were notified via the Tower "hot line." Units were on scene in 8 minutes and the fire was extinguished. The first firefighters on the scene reportedly saw someone with a crowbar or tire iron near the aircraft. It was not determined if the bar was used to attempt to open the entry door. One firefighter said he attempted to open the entry door from the outside and the handle reportedly came off in his hand with little effort.

1.15 Survival Aspects

Neither cockpit occupant wore his available shoulder harness. The passenger in the cabin seat did not have a shoulder harness available.

After the aircraft stopped, the passenger in the right cockpit seat said he unbuckled his lapbelt and attempted to extricate the pilot from his seat. He said the pilot was pinned between his seat and the instrument panel. He tried several times to pull the pilot out by his shoulders.

The passenger in the cabin unbuckled his lapbelt and attempted to open the left entry door. He said he rotated the handle from the locked position to the horizontal position (open) and back to the stowed position but the door would not open. He attempted to open the door two times without success. The other passenger then came aft and attempted to open the door. He said he kicked the door, but it would not open. By this time, black smoke was beginning to enter the cabin and the passenger, who had been riding in the cabin, looked out the right emergency door window and saw flames. He said he located the emergency exit handle and "cracked" the exit open. As flames began to enter the cabin, both passengers made a final attempt to extricate the pilot, but without success. The passenger from the cabin then returned to the emergency exit, opened it, and exited immediately. The passenger in the cockpit said he was still trying to pull the pilot out when the aircraft began to fill rapidly with smoke. He said when he turned around he could not see the emergency exit. He tried once more to extricate the pilot and then moved aft and went out the emergency exit.

Ground witnesses near the accident site said the fire propagation was rapid with heavy dense smoke. They said the heat was so severe that they could not approach the burning aircraft after they saw the two survivors run away.

1.16 Tests and Research

1.16.1 Powerplants

On August 14 and 15, 1979, Safety Board investigators examined both engines from N15NY at the manufacturer's facility--Pratt and Whitney Aircraft of Canada, Ltd., Lonqueuil, Quebec, Canada. The total time on each engine was 43.1 hrs; each engine had been operated through 45 flight cycles.

Both engines had been subjected to moderate impact damage and moderate to severe fire damage. The damage precluded functional tests of the fuel control and fuel pump assemblies from both engines. Disassembly and inspection of these components revealed no evidence of preimpact failure.

The fan blades were bent and twisted severely. Blade bending in both engine fan sections was opposite the direction of normal rotation. Small pieces of wood and wood ash deposits were found in both engines in various locations throughout the engine airflow areas. The disassembly and examination of both engines revealed no evidence of preimpact failure or malfunction.

1.16.2 Entry Door

Examination of the entry door revealed that a linkage tube was broken in the latch mechanism. The broken tube prevented two latching pins from retracting from the door frame when the handle was rotated to the open position. The door structure adjacent to the broken tube had a compression buckle, and the two latching pins were jammed in the door sill.

The broken linkage tube was examined at the Safety Board's metallurgical laboratory to determine the mode of failure. The examination revealed that the tube failed in tension overload and that the tube material met the manufacturer's strength specifications.

1.17 Additional Information

1.17.1 Aircraft Performance

The performance of N15NY during the final landing attempt was calculated using the following conditions:

Field elevation - 1,217 ft
Barometric pressure - 29.07 inHg
Pressure altitude - 1,170 ft
Temperature - 77° F
Density altitude - 2,700 ft
Aircraft gross weight - 8,750 pounds

The gross weight was estimated to be 8,750 pounds using the aircraft basic empty weight (6,741) plus estimated passenger weights (510) and the estimated weight of fuel onboard (1,500), minus the probable amount of fuel burned during the flight (300).

Using these data and the CE-501 Flight Manual Performance Charts, a normal landing configuration (full-flap) stall speed of 74 KIAS was calculated with aerodynamic buffet beginning at 79 KIAS. A reference speed (Vref) for this configuration would have been 95.5 KIAS, based on the charts.

Based on the above conditions and the Flight Manual Performance Charts, a no-flap stall speed of 82 KIAS was calculated with aerodynamic buffet beginning at 92 KIAS. Vref for the no-flap configuration was calculated to be 106.6 KIAS.

The CE-501 Flight Manual specifies that a no-flap approach must be conducted at the flaps-extended Vref speed + 20 kns, which would be 115.5 KIAS for the assumed conditions (Vref of 95.5 KIAS + 20 kns).

The Safety Board could not determine how the pilot calculated a Vref of 93 KIAS before takeoff. Although witnesses stated that he used the CE-501 checklist quick-reference chart for his calculation, 93 KIAS is not one of the speeds printed on the chart. The quick-reference chart shows the following weights and recommended Vref speeds:

V_{REF} (GEAR DOWN-FULLFLAPS)

Weight	7500		8500		9500		10000		10500		11000	11350
Speed	89	92	94	97	99	101	102	103	104	106	107	108

Using the chart, a Vref of 97 KIAS should have been selected for the fuel weight described by the passengers, if the pilot accurately estimated the aircraft gross weight.

1.17.2 Angle-of-Attack Indicator

A key performance instrument available to the pilot of N15NY was the angle-of-attack indicator and its associated displays. The angle-of-attack system derives its input from a sensor which detects the direction of airflow at the side of the fuselage. The system is totally independent of the pitot-static system and displays performance information (angle-of-attack) to the pilot in three ways. First, a three-color vertical display unit, mounted on the glareshield, shows an amber, green, and red light in descending order. This unit provides a "heads-up" source of information with respect to deviation from the approach reference speed. The correct reference speed is displayed as a green light.

The second angle-of-attack display is a fast-slow pointer located on the flight director, and the third display is an instrument located on the left upper portion of the instrument panel. The third display depicts "lift" information on a scale from zero (0) to one (1.0). Zero represents zero lift and 1.0 represents 100 percent lift, or stall. The display is valid for all flap positions.

An angle-of-attack indication of 0.6 indicates that the aircraft is operating at the maximum lift/drag ratio and equates to 1.3 x Vso 6/ or Vref. That indication is the maximum endurance reference and is also used for maximum angle of climb. A yellow area (caution) on the angle-of-attack indicator begins adjacent to the 0.6 index and continues toward the stall warning area. Flight in the caution area is less than 1.3 Vso (Vref) and is near the prestall buffet regime. Flight in the caution zone on the angle-of-attack indicator (less than lift/drag maximum) requires more power to sustain steady flight than is required at an indication of 0.6. Similarly, any increase in angle of attack during flight in the caution zone produces proportionately more drag than lift achieved--"the area of reverse command." Considerably more power is required to overcome the additional drag produced for the relatively small amount of lift gained.

1.17.3 Pilot Training

According to the staff of Flight Safety International (FSI) located at Wichita, Kansas, FSI was initially requested to provide an instructor pilot for pilot-service to fly with the new pilot/owner of N15NY. It was later requested that the pilot-service include instruction to prepare the pilot for a type-rating in the Citation. An instructor pilot employed by FSI was provided and instruction began on July 7, 1979.

According to the instructor, the entire FSI ground school curriculum was completed between July 7 and July 15, 1979. He said 4 to 6 hrs per day were devoted to ground training. The instructor stated that it was evident to him that the pilot had spent considerable time studying the aircraft before taking delivery of N15NY. This portion of the ground school training was completed in conjunction with flight training. The flight training was conducted during cross-country flights to Oakland, Seattle, Kansas City, and Wichita. Local training flights were made at Oakland and Seattle.

The flight training record completed by the pilot's instructor showed five flights for a total of 11.1 hrs flight time. He stated that additional training was conducted during cross-country flights.

On July 17, 1979, the pilot received 4 hrs in the Citation simulator at FSI. He reportedly conducted the simulator time as a single pilot. The instructor reported the pilot's knowledge and performance in the simulator as "above average." The instructor also stated that "from the onset to completion of training Mr. Munson displayed well above average skills and judgment as a pilot. He was very knowledgeable of the Operators Manual and the Flight Manual."

The pilot received his type-rating from an FAA-designated pilot examiner employed by FSI. He reportedly had no difficulty during the checkride. According to the records, the pilot was trained and certificated in accordance with provisions of 14 CFR 61.

6/ The stall speed or the minimum steady flight speed in the landing configuration.

According to flight instructors who had flown with the pilot and who had given him instruction for his various certificates and ratings, they considered the pilot above average in operation and knowledge of the aircraft they observed him fly.

1.17.4 Pattern Procedures

The FSI training material used for the pilot's training contains a diagram for recommended VFR pattern airspeeds, altitudes, and configuration. The recommended downwind airspeed was 150 KIAS at 1,500 ft a.g.l. with the flaps extended to "approach." The landing gear should be lowered opposite to the planned touchdown point. The recommended airspeed during base turn was Vref + 20 kns with approach flaps extended and landing gear down. Minimum altitude on base leg was 1,000 ft a.g.l. The recommended final approach airspeed was Vref to Vref + 10 kns and back to Vref once the landing is assured.

Regulation 14 CPR 91.70 specifies that a turbine-powered aircraft must be restricted to 200 KIAS maximum in the airport traffic area, providing that the operational requirements of the aircraft permit that speed.

Regulation 14 CFR 91.87 specifies that turbine-powered aircraft must maintain at least 1,500 ft a.g.l. entering the airport traffic area and while in the pattern until final descent for landing is required, at airports with an operating control tower.

1.17.5 Crew Seat Strength

The Citation crew seats were designed to comply with the strength requirements of 14 CFR 25.785. That rule specifies that the seats must withstand an ultimate inertial load of 4.5 g's downward, 9.0 g's forward, and 1.5 g's sideward, as set forth in 14 CFR 25.561. Cessna personnel stated that the seat was designed and tested to withstand these ultimate inertial loads. In fact, the seat was tested to failure at a combined resultant ultimate design load of 10.5 g's (9 gs forward, 3 g's sideward, and 4.5 g's downward); the sideward load was twice that required by the FAA so that the seats would meet more stringent foreign certification requirements. This test was conducted based on a 170-lb occupant and a 32-lb seat.

1.18 New Investigative Techniques

None.

2. ANALYSIS

The Accident

The pilot was properly certificated and had received the training prescribed by applicable regulations. There was no evidence of preexisting medical problems which could have affected the pilot's performance.

The aircraft was certificated, equipped, and maintained in accordance with applicable regulations. The aircraft gross weight and center of gravity were within prescribed limits. Meteorological conditions were not a factor in the accident. Although density altitude was higher than field elevation, it was not high enough to affect adversely the aircraft or engine performance to a point to be considered a factor in the accident.

Based on the evidence, the Safety Board's investigation concentrated on three possible areas of causation: (1) flap system or pitot-static system malfunction or failure, (2) engine malfunction or failure, and (3) pilot action or inaction.

Flap System or Pitot-Static System Malfunction or Failure

The Safety Board's investigation revealed no preimpact mechanical problems with the flap system. This finding is supported by passenger statements confirming that the pilot did not attempt to actuate the flap control switch to lower the flaps during the last landing attempt. Additionally, during the flight the pilot did not mention problems with the flap system nor did the passengers observe any difficulties with this system.

Impact and fire damage precluded a functional test of the pilot's airspeed indicating system, the most critical pitot-static instrument in this case. However, the Safety Board does not suspect a problem with this system for several reasons. Three successful takeoffs and landings were accomplished with no reported difficulties. If erroneous airspeed indications were a problem during the flight, the pilot and possibly the passengers would have likely sensed low airspeed cues, such as airframe buffet and flight control unresponsiveness. In fact, if erroneous airspeed indications were a problem, they would have been more noticeable during the earlier approaches and landings where the aircraft was slightly heavier and low airspeed problems would have been more pronounced.

The passengers' description of the aircraft performance during the last approach is consistent with that calculated from the aircraft performance charts. That is, the onset of aerodynamic buffet and the rapid sink rate in the configuration and at the airspeed being flown was normal and predictable.

Finally, the angle-of-attack indicator was observed to be in the caution zone during the last approach at 93 KIAS. Since the angle-of-attack indicator receives inputs for its display from a source totally independent of the pitot-static system and since the "caution" indication on the indicator is the proper reading for the airspeed and configuration being flown, the airspeed indicator obviously was showing the proper indication.

Therefore, the Safety Board concludes that neither the flap system nor the pitot-static system failed or malfunctioned. Additionally, the investigation revealed no other aircraft system or airframe problems which could have caused the accident.

Engine Malfunction or Failure

Disassembly and examination of the engines revealed no evidence of preimpact failure or malfunction. Additionally, both engines were found to be capable of normal operation and were developing considerable power at impact. Rotational damage to the engine fan assemblies and the presence of wood particles and burned wood residue throughout the engine interiors support this conclusion. Debris would not be distributed through the engine air passages if the engines were operating at low power. Passenger statements further support the conclusion that the engines were functioning properly before the crash. Apparently, the pilot did not advance the throttles full forward until just before impact. He gave no indication to the passengers that he was experiencing engine problems, and they did not recall sensing any visual or audible indications of engine malfunction.

Pilot Action or Inaction

This undershoot accident involved a high sink rate and a descent below the glidepath which continued unrecognized and unchecked until contact with the ground was unavoidable. Wing flap position, airspeed control, power management, the approach profile, and standard procedures and practices, all are important aspects in the cause of this accident. These aspects are dependent upon one another in effecting a safe, stabilized approach and landing.

The Safety Board could not determine positively whether the pilot inadvertently flew the last approach without flaps, or did so intentionally but at the wrong airspeed. The Safety Board believes that the pilot most likely forgot to lower the flaps. According to the passengers, the pilot held the selected "bug" airspeed, which suggests that he was monitoring the airspeed indicator. Moreover, the airspeed indicator is a primary performance instrument and is readily in view of the pilot. Further, it is the most important cue available and used during approach and landing. The flap handle and flap position indicator are not primary flight performance cues and are checked only during the "before landing" and "landing" checklists. According to the passengers, the pilot did not refer to a checklist during the flight. The passenger in the right front seat reminded the pilot to lower the landing gear, but he did not mention the flaps because he was not totally aware of the pilot's intentions and was not familiar with the proper airspeed to be flown. Consequently, an oversight was made and the pilot forgot to lower the flaps. He flew the approach at a normal (full-flap) approach speed, about 20 kns below that required for a no-flap approach. The aircraft entered a high sink rate and continued below the glidepath without adequate and timely corrective action by the pilot.

The 4-kn difference between the full-flap Vref speed (93 KIAS) selected by the pilot and the proper speed (97 KIAS) was not a major oversight. However, it does reflect adversely on the pilot's attention to detail while computing the aircraft gross weight and the proper Vref.

The Safety Board could not determine why the pilot did not monitor the angle-of-attack system, which obviously would have given him a "slow" indication. Since he had not flown other aircraft equipped with this system, he may not have been fully familiar with it, or may not have developed a habit of including it in his scan during approach and landing.

The pilot's management of power during the approach is also related to the cause of the accident. Passenger statements indicate that the pilot did not advance the throttles full forward until just before impact. The technique described by the passengers regarding the pilot's "inching the throttles forward" is typical of pilot technique in a propeller-driven aircraft, the type aircraft with which this pilot was more familiar. Power response in turbojet engines is generally less rapid than in propeller-driven aircraft engines, thus requiring the pilot to anticipate his power requirements with timely throttle application. Additionally, in propeller-driven aircraft, the increased air flow from the propeller(s) over the aircraft wings and control surfaces generally improves the aircraft performance. This does not occur in turbojet aircraft.

In addition, for turbojet engines, the greatest percentage of thrust available is gained in the top range of engine rpm. The power response in propeller-driven aircraft is more linear throughout the power range in relation to throttle position. Therefore, the pilot's action of "inching the throttles forward" would not have enabled him to gain appreciable added thrust until he reached the top range of engine rpm. In the accident situation, where considerable power was required to overcome the high descent rate and to avoid contacting the ground, rapid and full throttle movement was needed to attain maximum engine response. Although rapid throttle movement is not recommended as a routine practice in jet aircraft, it can be accomplished without engine damage if the fuel-control system is calibrated properly.

The pilot's throttle technique further compounded his situation because the aircraft was flying at an airspeed below the maximum lift/drag ratio. Flight in this manner is generally referred to as "the area of reverse command." In this condition, any attempt to arrest the rate of descent by increasing pitch attitude (angle of attack) will produce proportionately more drag than lift. Therefore, additional power, beyond that required to decrease the descent rate, would be required to overcome the added drag. The amount of power the pilot added during the last approach may have been sufficient for previous approaches flown at the proper airspeed for the configuration. In fact, he may have added the amount to which he was accustomed on previous occasions; however, that was not sufficient for the last approach. In order to maintain the "bug" speed he selected, altitude had to be sacrificed, and as a result the rapid descent rate continued. Rapid and full throttle advancement was the only alternative available to the pilot.

The Safety Board believes the pilot failed to apply sufficient power in a timely manner because he did not realize or sense that power was required. The pilot was probably bewildered by the unexpected response of the aircraft; the high sink rate and the different "feel" of control responsiveness at the low airspeed probably confused him. When he monitored his airspeed indicator, which he assumed was showing the "correct" airspeed for the conditions, the pilot probably became even more bewildered by the aircraft reaction. His bewilderment or concern was described by one of the passengers, who said he could "sense the problem" by the expression on the pilot's face. The pilot's lack of action regarding power management in a serious life-threatening situation confirms that he did not diagnose properly the problem confronting him and failed to take timely and effective action.

Another matter which contributed to the pilot's confusion during the last approach involves the manner in which he conducted the previous patterns. Normal practice and procedure dictate certain traffic pattern criteria, such as recommended airspeeds and altitudes and setting aircraft configuration at selected phases of the pattern. These criteria aid a pilot in establishing habit patterns during approaches and landings in order to fly in a consistent manner and to create a normal approach profile so that abnormal situations will be more recognizable.

The description of the accident flight, as related by the survivors and other witnesses, shows a general lack of adherence to "standard practice" regarding airspeed and altitude management on the part of the pilot. Also, he was not consistent in establishing the aircraft configuration. This failure to establish a normal flight profile set the stage for the pilot's problem when he was requested to fly a pattern to a different runway.

The first three approaches were in a left-hand traffic pattern which is easier to fly in aircraft with side-by-side cockpit arrangements because the pilot has a better view of the airport. In right-hand patterns, visibility to the runway from the left seat is restricted and hinders the pilot. The right-hand pattern to runway 19 was "nonstandard" to the pilot, who had not yet flown a "normal" flight profile for a left-hand pattern to runway 23. His erratic airspeed and altitude control and the extended downwind leg put him in an unfamiliar situation. Any habit pattern he may have developed regarding gear and flap lowering was broken. Even though his former instructor reminded him about the landing gear, the situation had developed to a stage where only positive action by the right-seat passenger or by the pilot could have prevented the accident.

In order to initiate the last approach, the pilot reduced power, silenced the gear warning horn, and lowered the nose. Once the descent was established and he was reminded about the landing gear, he lowered it, but the normal landing habit pattern had been broken. The added drag of the gear, the reduced power, and the reduced lift available without flaps extended, placed the aircraft in a dangerous situation. The pilot obviously did not recognize his plight because of previous nonstandard practices.

The Safety Board believes there are other reasons beyond the circumstances of the last approach which caused the pilot to forget to extend the flaps and to fail to recognize the need for rapid power application. General aviation flying is generally conducted under less stringent rules and procedures than commercial or corporate/executive operations. However, general aviation flying does have rules, procedures, and common practices which a pilot must follow in order to develop good habit patterns and to produce safe flight. The pilot of N15NY did not fully comply with these essentials during the accident flight.

First, the pilot allowed his right-seat passenger to make a no-flap approach and landing despite the fact that the pilot was not a qualified flight instructor and the right-seat passenger was not qualified in this type aircraft. Moreover, although a certificated pilot, the right-seat passenger had not met recency of experience requirements of 14 CFR 61.57, which requires three takeoffs and landings in the 90 days preceding the flight. Further, the pilot of N15NY did not brief the right-seat passenger regarding airspeeds associated with the

maneuver nor who would operate certain controls. The Safety Board does not believe the pilot's actions were prudent under any circumstances and reflect adversely on his judgment.

Second, although the pilot of N15NY was certificated to carry passengers, the carriage of passengers during practice landings can expose them to unnecessary risks, especially with a recently qualified pilot. The pilot was required by 14 CFR 91.199 to brief his passengers before takeoff on the location and usage of seatbelts and shoulder harnesses and on procedures to be followed in an emergency, including the location and means for opening the entry door and emergency exits. According to the passengers, he failed to do so.

Third, the pilot did not comply with generally accepted and required traffic pattern procedures. Besides the previously mentioned benefit of developing good habit patterns and a normal pattern profile, standard patterns also provide for proper spacing and separation from other traffic. This is beneficial to all aircraft in the pattern as well as to the tower controller. None of the patterns on the accident flight were flown at the "recommended" airspeeds or altitudes. The pilot of N15NY was certainly aware of standard pattern procedures from his previous flying experience, and especially since he had been trained recently in the CE-501 and had demonstrated his ability to fly standard patterns during a checkride.

Fourth, the pilot failed to use a checklist. The routine of lowering landing gear and flaps on downwind leg was followed on the first three approaches even though he did not use a checklist. However, these "natural" actions were not performed for the last approach because the habit pattern was broken. The habit pattern was broken by the changed landing pattern and a wider- and higher-than-normal base leg entry. The Safety Board believes that if the landing checklist had been followed by the pilot, the accident could have been prevented.

In summary, the Safety Board concludes that the pilot's conduct of the flight set the stage far oversight and confusion. His disregard for standard practices, procedures, and regulations created an atmosphere in which he could not recognize a worsening situation. Perhaps a more experienced pilot would have recognized the dangerous situation more readily and may have taken proper and timely action. However, the pilot had received more training than the minimum specified by the Federal Aviation Regulations. Also, he recently had been certified as competent in the aircraft, reportedly was well qualified, and had demonstrated "above average" skill. He certainly would not have been certificated and described as above average if he had flown the aircraft during training and his checkride in the manner described by the passengers for the accident flight. Therefore, the Safety Board concludes that the manner in which the pilot conducted this flight was the primary factor which precipitated the accident sequence, not his training and experience.

Survivability Aspects

The crashworthiness of the aircraft was a significant factor in the survival of the two passengers because a livable environment for the occupants was maintained throughout the crash sequence; there was no appreciable collapse of the

airframe in the occupiable areas. However, the floor structure beneath the pilot's seat was disrupted severely. The damage included the seat floor track and the floor and its substructure. This localized damage reduced the effectiveness of the pilot's restraint system and the seat–to–floor attachments, permitting him and his seat to pitch forward into the control yoke and instrument panel during the abrupt deceleration. The other occupants' restraint systems were not compromised.

Even though the pilot's seatbelt was fastened, it was ineffective because it was anchored to the seat structure rather than to airframe structure. When the seat became detached from the floor, the seatbelt was useless. This type installation is acceptable to the FAA as long as appropriate strength requirements of 14 CFR 25.785 are met.

The pilot and the right front seat passenger were not wearing their available shoulder harnesses. Thus, the pilot, as a required crewmember, was in noncompliance with 14 CFR 91.7. The Safety Board believes that had the pilot been wearing his harness, his injuries may not have been as severe. With the seat free from its floor attachments, longitudinal decelerative forces could not be transmitted through the seat structure into the floor. However, the shoulder harness, which was anchored to the aft cockpit wall, would have attenuated some of the decelerative force even though the shoulder harness might have been overloaded by the deceleration of the combined weight of the pilot and the seat. It is also possible that the single diagonal–strap shoulder harness would have acted as a pivot point about which the pilot and seat would have rotated. In this case, the pilot would have been thrown into the control column and surrounding structure producing injuries; however, the shoulder harness may have attenuated sufficient decelerative forces to have lessened the extent of the injuries.

The complex crash sequence, the number of unknowns, and the number of assumptions required precluded calculations of the probable magnitude of the crash forces using the equations of motion. The damage to the pilot's seat indicates that relatively high vertical g–forces were transmitted through the airframe structure to his seat. The impact damage to the pilot's control yoke and instrument panel was indicative of relatively high longitudinal g-forces. These forces were a result of the localized impact with the tree stump and were confined to the left front seat area of the aircraft.

Although the exact magnitude of the crash forces experienced by the pilot's seat could not be calculated, certain information can be derived from the known conditions. That is, in view of the manufacturer's combined loading test of the crew seats and the fact that the pilot's seat structure in the accident aircraft bent, but did not completely fail, the loads experienced by the pilot and seat were probably in the range of 3.5 g's downward and 8 g's forward. These inertial forces certainly are within the limits of human tolerance for a restrained occupant. The localized impingement of the tree trunk destroyed any load attenuation capability of the restraint system allowing the pilot to impact the aircraft structure. The damage to the control column and to the instrument panel is consistent with the level of g's believed to have been sustained by the pilot and his seat.

The pilot's injuries prevented him from extricating himself. Moreover, the passengers were unable to remove the pilot before the cockpit and cabin

environment became intolerable. Since the pilot's lapbelt buckle was found fastened after the accident and because of the nature of the fire damage to the lapbelt, the difficulty encountered by the passengers in attempting to pull the pilot out may be attributed to the restriction of the lapbelt and the additional weight of the seat. The pilot's injuries were the result of contact by his body and head with the control column and the instrument panel. The evidence indicates that the injuries to the pilot's head and neck were caused by the pilot's head striking the instrument panel while the neck was hyper-extended (aft). This caused the dislocation of the cervical vertebrae and consequent spinal cord damage.

Postcrash fire also was a major survivability factor. The two passengers had limited time to attempt to extricate the pilot and to escape. Their efforts were further complicated by the jammed main entry door on the left side of the fuselage where the fire and smoke initially were less severe. The main entry door would not open because of impact damage and a tube in the linkage of the door latch mechanism was broken, leaving two door latching pins engaged in the door sill. The pins were jammed because of the buckling in the door structure and the structure beneath the door.

Metallurgical examination of the failed linkage tube in the main entry door's latching mechanism revealed that it failed in tension overload and that the material met Cessna's strength specifications. Impact forces and resultant damage could not have generated sufficient tensile loads to fail the tube. The only way the tube could fail in tension is from an excessive force on the door handle in an attempt to open the door. The Safety Board could not determine whether the tube was broken as a result of the passengers' or rescuers' attempts to open the door.

3. CONCLUSIONS

3.1 Findings

1. The pilot was properly certificated and trained.
2. The aircraft was properly certificated, equipped, and maintained.
3. There was no evidence that aircraft structure, systems, or powerplants malfunctioned or failed.
4. The pilot did not comply with recommended or standard traffic pattern altitudes and airspeeds.
5. The pilot had to be reminded to lower the landing gear during the last landing attempt.
6. The pilot forgot to extend landing flaps during the last landing attempt.
7. The pilot did not use a checklist during the flight.

8. The aircraft was flown about 24 kns below the desired no-flap reference speed during the last final approach.

9. The pilot did not add sufficient power to arrest the descent rate.

10. Although a pilot, the right-seat passenger was not qualified to assist the pilot.

11. Neither the pilot nor the right-seat passenger was wearing the available shoulder harnesses.

12. Longitudinal and vertical crash loads were estimated to be 8 and 3.5 g's, respectively.

13. The pilot's restraint system was rendered ineffective by the localized damage to the seat track and supporting floor structure.

14. A severe postcrash fire erupted when fuel was spilled during the crash sequence.

15. The pilot sustained severe traumatic injuries from contact with the control column and instrument panel.

16. The pilot died from the effects of fire.

17. The two passengers sustained no serious impact injuries, but were burned severely during evacuation.

18. The main cabin door was jammed.

19. The two passengers were not familiar with the operation of the main door and the emergency exit and had not been briefed by the pilot before takeoff.

3.2 Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was the pilot's failure to recognize the need for, and to take action to maintain, sufficient airspeed to prevent a stall into the ground during an attempted landing. The pilot also failed to recognize the need for timely and sufficient power application to prevent the stall during an approach conducted inadvertently without flaps extended. Contributing to the pilot's inability to recognize the problem and to take proper action was his failure to use the appropriate checklist and his nonstandard pattern procedures which resulted in an abnormal approach profile.

4. Safety Recommendations

None.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JAMES B. KING
Chairman

/s/ ELWOOD T. DRIVER
Vice Chairman

/s/ PATRICIA A. GOLDMAN
Member

G.H. PATRICK BURSLEY, Member, did not participate.

FRANCIS H. McADAMS, Member, filed the following concurring and dissenting statement:

The majority concludes that the cause of the accident was the failure of the pilot to recognize the need for, and to take action to maintain, sufficient airspeed to prevent a stall, and the reason for the pilot's failure was the fact that he did not use the checklist and used nonstandard pattern procedures. This equates to 100 percent "pilot error," but the majority has made no attempt to determine why the pilot failed to take adequate action.

In my opinion, the Board should have cited as a contributing factor the fact that the pilot lacked sufficient flight experience in the aircraft, and further he may have lacked adequate basic training. The Citation is a high-performance aircraft and, although the pilot had the minimum number of hours (approximately 30 hours), I believe that with more experience in the aircraft he would have arrested the high sink rate and approach to stall by immediately adding thrust.

In addition, the Board report should have addressed the fact that all of the pilot's checks--private, multiengine, instrument, and type ratings--were given by designated examiners. It is interesting to note that during 1978 only 1 percent of private pilot certificates were issued by FAA inspectors; all of the remainder were by designated flight examiners. In this connection, the disapproval rate by designated flight examiners was 6 percent whereas for FAA inspectors it was 28 percent. By addressing this situation, the Board might have been able to recommend that the FAA review the procedures for designating examiners.

April 16, 1980

this page intentionally left blank

5. APPENDIXES

APPENDIX A

INVESTIGATION AND HEARING

1. Investigation

The Safety Board was notified of the accident about 1700 c.d.t. on August 2, 1979. Investigators from the Safety Board's Chicago Field Office and Washington, D.C. headquarters were sent to the scene. Two working groups—powerplants and human factors—were established to assist the investigator-in-charge.

Participants in the investigation were the Federal Aviation Administration, Cessna Aircraft Corporation, and Pratt & Whitney Division of United Technologies Corporation.

2. Public Hearing

No public hearing was held and no depositions were taken.

APPENDIX B

PILOT AND PASSENGER INFORMATION

Pilot

Thurman L. Munson, age 32, held a Second-class Medical Certificate issued February 1, 1979, with no limitations. He possessed a Private Pilot Certificate for Airplane Single-Engine Multiengine Land with an Airplane Instrument Rating. He received a type rating in the CE-501 on July 17, 1979, which satisfies the requirements of a Biennial Flight Review. Mr. Munson was a professional baseball player and was employed by the New York Yankees Baseball Team.

Right Front Seat Passenger

Mr. David L. Hall, age 32, held a First-class Medical Certificate issued April 24, 1979, with no limitations. He possessed an Airline Transport Pilot Rating for Airplane—single- and multiengine land, an Airplane Instrument Rating, and a Flight Instructor Certificate for Airplane-single- and multiengine land. He also held a Ground Instructor's Rating for advanced and instrument instruction. On his last medical certificate application, dated April 24, 1979, Mr. Hall listed 6,723 total flight hrs and 512 hrs in the previous 6 months. He had no flying time in the Cessna Citation model aircraft.

Cabin Passenger

Mr. Jerry D. Anderson, age 31, had a medical certificate pending. He held a Private Pilot Certificate for Airplane-single-engine land.

APPENDIX C

AIRCRAFT INFORMATION

The aircraft, a Cessna Citation Model 501, N15NY, serial No. 501-0110, was issued a Standard Certificate of Airworthiness on June 25, 1979. The pilot/owner took delivery of the aircraft on July 6, 1979. The aircraft had accumulated 43.1 hrs flight time since new.

The .engines were maintained in accordance with applicable regulations and procedures. Pratt and Whitney of Canada engines, model JT-15D-1A, were installed on N15NY. Serial No. PCE 77064 was installed in the left position and PCE 11067 was installed in the right position. The engine times since new (TSN) and cycles since new (CSN) were as follows:

	TSN	CSN
PCE 77064	43.1 hrs	45 hrs
PCE 77067	43.1 hrs	45 hrs