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AIRCRAFT ACCIDENT REPORT

COMMUTER AIRLINES, INC.
BEECHCRAFT C-45H [INFINITE II), N497DM
BROOME COUNTY AIRPORT
BINGHAMTON, NEW YORK
MARCH 22, 1970

ADOPTED: AUGUST 26, 1971

NATIONAL TRANSPORTATION SAFETY BOARD
Washington, D. C. 20591
REPORT NUMBER: NTSB-AAR-71-13

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16. Abstract

Commuter Airlines, Inc., Flight 502, a scheduled air taxi operation, crashed after a rejected takeoff from Runway 16 at the Broome County Airport, Binghamton, New York, on March 22, 1970, at approximately 1611 e.s.t. There were nine passengers and two flightcrew members on board the aircraft. The Captain and two passengers were fatally injured.

The Safety Board determines that the probable cause of this accident was the attempt of the pilot-in-command to take off with snow adhering to the airfoil surfaces. This snow caused a degradation of aircraft performance and loss of control following lift-off which required the captain to reject the takeoff beyond a point where a safe emergency landing could be effected within the confines of the runway.

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SYNOPSIS

Commuter Airlines, Inc., Flight 502, N497DM, a Beech C-45H, Dumod Conversion (Infinite II) crashed after a rejected takeoff from Runway 16 at the Broome County Airport, Binghamton, New York, on March 22, 1970, at approximately 1611 e.s.t.

There were nine passengers and two flight-crew members on board the aircraft. The captain and two passengers were fatally injured. The aircraft was substantially damaged by impact and subsequent ground fire.

Commute; Flight 502 was being operated as a regularly scheduled air taxi passenger flight from Binghamton to Washington, D.C., under a Civil Aeronautics Board (CAB) approved agreement which granted Eastern Air Lines a temporary suspension of service and established Commuter Airlines as the replacement service between these two points.

At the time of the flight's departure from the terminal ramp, the reported weather conditions were 300-foot ceiling, sky obscured, visibility one-half mile variable in moderate snow, visibility variable from one-quarter to three-quarters mile, with the temperature of 35°F.

The surviving copilot reported that shortly after lift-off, the left wing dropped sharply and the aircraft "mushed" from side to side before the captain was able to recover. The landing gear was then raised and the climb was resumed until the aircraft again banked steeply to the left. The aircraft was leveled off approximately 20 to 25 feet above the runway, at which point the captain rejected the takeoff and made a smooth wheels-up landing. The aircraft slid the remaining length of the runway, over an embankment, and into approach light structures for Runway 34.

Survivors of the accident reported that they had observed a thin layer of snow adhering to the upper surfaces of the wing prior to the aircraft's departure from the terminal ramp and just before the takeoff was commenced.

The National Transportation Safety Board determines that the probable cause of this accident was the attempt of the pilot-in-command to take off with snow adherine to the airfoil surfaces. This snow caused a degradation of aircraft performance and loss of control following lift-off which required the captain to reject the takeoff beyond a point where a safe emergency landing could be effected within the confines of the runway.

The Board refers to previous studies and recommendations made for the prevention of air taxi accidents and urges continued review of the actions that were taken as a result of those recommendations. The Board believes that a review of those recommendations and corrective actions may point to other areas where improvements may be required to enhance the safety of air taxi operations.

1. INVESTIGATION

1.1 History of the Flight

Commuter Airlines, Inc., Flight 502 of March 22, 1970, was a regularly scheduled air taxi flight from Broome County Airport, Binghamton, New York, nonstop to Washington National Airport, Washington, D.C. The flight was operating under a Civil Aeronautics Board (CAB) approved agreement[1] which granted Eastern Air Lines, Inc., a temporary suspension of service between Binghamton and Washington and established Commuter Airlines as the replacement service between these points.

The aircraft operated for this flight was a Beechcraft C-45H, Dumod conversion (Infinite II), N497DM.

At approximately 1540,[2] the aircraft was removed from the Commuter Airlines hangar at Broome County Airport and was then taxied by the captain to the passenger terminal gate position.[3]

At 1605, following the boarding of eight passengers, one nonrevenue company employee, and the pilot and copilot, Flight 502 was cleared to taxi to Runway 16. The Binghamton weather at this time was in part: Indefinite ceiling 300, sky obscured, visibility one-half mile, variable in snow, visibility variable one-quarter to three quarters mile, with the temperature 35°F.

The flight was issued its instrument flight rules (IFR) clearance to Washington National Airport and, at 1611, was cleared for takeoff with instructions to maintain runway heading for departure vectors.

Because of the reduced visibility in snow, the local controller did not see the aircraft during its takeoff run; howev he did detect the sound of engines, at which time he instructed the flight to contact departure control. This instruction was not acknowledged. He then queried the departure controller as to the status of the flight and was advised that neither radio nor radar contact had been established.

About this time, the tower was notified by telephone that the aircraft had been observed during takeoff and was apparently in trouble. Crash alarm procedures were then initiated by the tower controller.

The controller then contacted the airport safety officer, who at that time was conducting a routine inspection on Runway 16, and directed him to proceed down the runway to see if he could locate this aircraft.

Shortly thereafter, the safety officer reported that he had sighted a burning aircraft off the approach end of Runway 34 in the approach light structures and that he was proceeding in his vehicle to the scene of the accident.

He also stated that while he was parked on the taxiway adjacent to Runway 16 awaiting tower clearance to make his inspection, he observed N497DM begin its takeoff run, but because of the poor visibility he was only able to see the aircraft progress for approximately 150 yards before it disappeared from his view. He estimated that at this time approximately one-half inch of snow and slush had accumulated on the runway.

Two witnesses, who were in the vicinity of the airport terminal building, observed N497DM during the initial phase of the takeoff. One of these witnesses first saw the aircraft, just after it had become airborne, at an altitude of between 25 and 50 feet and approximately 2,000 feet from the departure end of the runway. At this point, it began sinking rapidly toward the runway, with the landing gear still in the down position. He estimated that the aircraft continued along, on, or near the runway for a distance of about 500 feet and then began to climb out again. At this point, the aircraft was lost from his view because of the poor visibility in falling snow. He also made the observation that at about 1530, a light snow had begun to fall and that at approximately 1545, it had

[1] CAB Order 69-12-39: Agreement 20174.

[2] All times herein are eastern standard, based on the 24-hour clock.

[3] On the day previous to this flight (March 21, 1970), N497DM had been fueled to capacity and placed inside the heated Commuter Hangar where it remained until approximately 1540 on March 22, 1970.

turned into a heavy snowfall which was accumulating on the ramp.

The other witness was a corporate pilot who had landed on Runway 16 approximately 10 minutes before the departure of N497DM. He was in the terminal building when he heard the noise of the aircraft as it was taking off and when he looked out he saw N497DM in a steep right bank just above the runway. He thought that the aircraft would catch a wing on the ground, but it leveled off and began climbing in a normal manner. At this point, the aircraft disappeared from his view.

He also reported that during his approach and landing at the airport, he had encountered heavy wet snow and during the approximate 5 minutes that it had taken to taxi from the runway to the terminal, approximately one-quarter of an inch of snow had accumulated on the upper surfaces of the aircraft.

Included among the eight survivors of the crash were the assigned copilot and another off-duty company pilot who was seated in the rear of the passenger compartment.

The assigned copilot stated that he arrived at the airport approximately 45 minutes before the flight's scheduled departure time and, after he reported to the company office, he went directly to the Commuter ticket counter at the terminal to attend to passenger check-in duties.

He did not see the captain until approximately 1600, at which time he (the captain) signaled him from the entrance that he was ready for passenger and baggage loading. At this point, the captain went to the Weather Bureau office for a briefing and the copilot walked to the aircraft to assist with passenger and baggage loading. He did not conduct an official walk around inspection of the aircraft, but did look it over as he proceeded to the baggage compartment. He stated that it was snowing moderately, "...wet and heavy...," and that a thin layer of snow had accumulated on the upper surfaces of the wings at this time. The copilot stated that he was not concerned about the snow on the wings, as he assumed it would blow off the wing surfaces during taxi-out or takeoff.

The aircraft was taxied from the ramp to a taxiway adjacent to Runway 16 where a complete engine runup and preflight check were conducted. All of the checklist items including the engines, propellers, flight controls, and wing deicer boots were found to be operating normally. The copilot stated that during the taxi-out to the runway, the snow had remained on the wings, and although he had difficulty seeing through the cockpit window because of snow that had accumulated thereon, he did observe movement of the deicer boots during this check. He described the takeoff run as being longer than usual due to the accumulation of slush and snow on the runway. Following lift-off and at an estimated altitude of between 75 and 100 feet, the left wing dropped to an approximate 30° to 45" angle of bank. The captain was able to raise the wing with aileron control, but the aircraft "mushed" from side to side before it leveled off at an altitude of between 10 to 20 feet above the runway. Following this, the captain retracted the landing gear and the aircraft again began to climb. At an altitude of between 75 to 100 feet the left wing again dropped off into an estimated 45" to 60° bank. The captain used full opposite aileron to raise the wing and after "mushing back and forth a couple of times," the aircraft once again leveled out approximately 20 feet above the runway. At this point, the captain cut the power by retarding the throttles and made a smooth wheels-up landing on the runway. The aircraft then skidded down the remainder of the runway, over the embankment, and out into the approach light structures.

The nonrevenue company copilot occupied the left rear seat in the passenger compartment. He stated that the takeoff run appeared to be normal, but that shortly after the lift-off, the aircraft banked sharply to the left then leveled off approximately 25 feet above the runway. The aircraft then resumed its climb to an altitude of about 40 feet above the runway, then banked sharply to the right, rocked back and forth a couple of times, then again leveled off approximately 25 feet above the runway. The aircraft then came back on the runway. During the maneuver, he had the impression that the aircraft was in an unusually high noseup attitude and that they would not be able to "make it off." He recalled that the engines sounded normal for the takeoff but did not remember the. power coming off prior to the runway contact.

He **also** stated that prior to the departure he had noticed that approximately one-quarter inch of snow had accumulated on the upper wing surfaces. He observed a few patches of snow blow off the wing during the takeoff run, but that the major portions of the wing remained covered with snow.

The surviving passengers gave essentially the same description of the sequence of events following the takeoff as the two copilots. Three of these passengers remembered seeing snow on the upper wing surface prior to the takeoff.

1.2 Injuries to Persons

Injuries	Crew	Passengers	Other
Fatal	1	2	0
Nonfatal	1	6	1 (non-revenue)
None	0	0	

Post-mortem pathological and toxicological examination of the captain revealed no evidence of disease or physical impairment that would have adversely affected the performance of duty.

1.3 Damage to Aircraft

The aircraft received substantial structural damage during the ground impact sequence. Major portions of the fuselage and both wings were consumed in the intense ground fire which followed the accident.

1.4 Other Damage

A number of wooden poles supporting the approach light assemblies for Runway 34 were broken or damaged.

1.5 Crew Information

The captain and copilot were certificated and qualified to condudt this flight. (For detailed information, see Appendix B.)

1.6 Aircraft Information

The aircraft, N497DM, was originally manufactured by Beech Aircraft in 1952 as a basic Beechcraft C-45H. It was modified in accordance with FAA-approved Supplemental Type Certificate as the Dumod (Infinite II) model aircraft and was issued a standard Airworthiness Certificate in November 1969.

The records showed that the aircraft was certificated and maintained in accordance with existing requirements. (For detailed information, see Appendix C.)

The gross weight of the aircraft at departure was computed to be 9,694.5 pounds. The allowable gross weight for takeoff is 10,200 pounds. The computed center of gravity (c.g.) was within the proper limitations.

1.7 Meteorological Information

The 1600 surface weather chart showed a low-pressure system centered near Chincoteague, Virginia, a cold front extending south-southwestward from the low-pressure center, a warm front extending east-southeastward from the low-pressure center, a quasi-stationary front extending west-southwestward from northern New Hampshire to western Lake Ontario then continuing northwestward to Lake Superior, and another low-pressure system centered over northeastern Ohio.

The surface weather observations at Binghamton for a period prior to and following the accident were in part as follows:

1547 - Special, indefinite ceiling 500 feet obscuration, visibility 3/4 mile, light snow, wind 100° 12 knots, altimeter setting 29.71 inches. Runway 34 visibility 5/16 mile.

1555 - Record special, indefinite ceiling **500** feet obscuration, visibility **1/2** mile variable, moderate snow, temperature **35°F.**, dew point **33°F.**, wind **110°, 12** knots, altimeter setting **29.71** inches, Runway **34** visibility **5/16** mile, visibility **1/4** variable to **3/4** mile.

1616 - Local, indefinite ceiling **300** feet obscuration, visibility **1/2** mile variable, moderate snow, temperature **34°F.**, dew point **33°F.**, wind **100° 10** knots, altimeter setting **29.69** inches, Runway **34** visibility **1/16** mile, visibility **1/4** variable to **3/4** mile (aircraft emergency).

The surface weather observation Form WBAN **10B** for Binghamton showed the following: very light snow began at **1420,** became light at **1450,** became moderate at **1552,** and continued moderate until after the accident, and that **2.1** inches of snow fell during the period from **1249** to **1840.**

A self-help weather briefing display was available at the Weather Bureau office at Binghamton (airport). Weather Service specialists at that facility observed the captain in the office studying the weather information shortly before the departure of the flight. At his request, he was furnished with the Binghamton **1555** weather observation.

1.8 Aids to Navigation

Aids to navigation were not involved in this accident.

1.9 Communications

There were no communications difficulties associated with this accident.

1.10 Aerodome and Ground Facilities

Runway **16/34** is **6,300** feet long and **150** feet wide and has a paved asphalt surface. It has a dirt overrun area extending southeast of the approach end of Runway **34** for a distance of **110** feet. The elevation of the approach end of Runway **16 is 1,629.5** feet m.s.l. The elevation of the approach end of Runway **34** is **1,566.5** feet m.s.l. Beyond the overrun, the terrain dropped off sharply to the elevation at the accident site of **1,492** feet m.s.l. There were two sets of wooden runway approach lights stanchions located along the extended runway centerline. The first set was approximately **170** feet from the end of the runway, the second was approximately **270** feet from the runway end. (See Attachment **1.)**

A Broome County Airport Field Report of an inspection conducted at approximately **1615** showed that all paved surfaces of the airport were covered with snow and slush and that the automobile braking action was fair.

1.11 Flight Recorders

Flight data and voice recorders were not required or installed in the aircraft.

1.12 Wreckage

The aircraft wreckage was located where it had come to rest against an electrical transformer unit serving the ILS approach lights system to Runway **34.** (See Attachment No. **1.)** This location is approximately **388** feet beyond the departure end of Runway **16** and approximately on the extended centerline of that runway. It is about **74** feet below the runway elevation, near the bottom of an embankment which dropped away steeply from the runway overrun.

Propeller slash marks were found on the surface of the runway, starting at a point approximately **738** feet from the departure end and continuing for about **490** feet along the approximate center of the runway. One tip of the left engine propeller was recovered near the end of the runway.

The aircraft's left wingtip impacted the first of two rows of wooden approach light poles approximately 12 feet below the level of the lights. These poles were 60 feet beyond the runway overrun. The aircraft then continued 100 feet farther into a line of seven approach light poles. The second and third poles were severed at a height approximately 21 feet from the ground level. The impact path continued for another 118 feet where the aircraft stopped, right side up, against a transformer tower.

The' fuselage, from the instrument panel to the baggage compartment, was partially consumed by postimpact ground fire. All seats were found in their respective positions with the exception of the forward right cabin seat (seat No. 2) which was located outside the fuselage. The empennage was intact but showed impact damage. Both wings were partially consumed by ground fire. The outboard section of left wing was separated from the aircraft and found at the base of the first row of approach lights.

The nose and main landing gear were housed within their respective wells in the retracted position.

The screwjack assemblies for the right and left flap units were found in the up position, compatible with a retracted flap condition.

There was no evidence of any preimpact failure or malfunction of the control system components. The elevator trim tab showed a 3" noseup position. The rudder trim tab showed a 5° nose-left condition.

Both engines were examined and were determined to have been capable of normal operation prior to impact.

All three propeller blade tips of the left engine were broken off approximately 1 foot from the tip end. One blade tip was recovered with the tip bent forward approximately 90°. The other two blades were bent in the forward direction.

The three propeller blade tips of the right engine were bent 90° in the forward direction.

All fuel system valves were recovered from the wreckage. Both main tank fuel valves were in the open position; the crossfeed valve and both auxiliary fuel tank valves were in the closed position.

The deicer distributor valve was separated from the aircraft structure and had been subjected to impact and ground fire damage. The valve was disassembled and found to have been in the closed position.

All of the cockpit instrumentation, radio, and navigational equipment were subjected to severe impact and ground fire damage which precluded testing for determination of their operational capabilities prior to impact.

1.13 Fire

An intense fire erupted within seconds following the final impact and consumed most of the fuselage, the entire right wing, and the center left wing area.

According to the surviving passengers, the fire broke out initially in the right wing areas and propagated quickly into, and throughout, the main cabin section. The fire was fed by aviation gasoline from the ruptured wing fuel tanks.

Because of the inaccessability of the crash site, the airport fire and rescue equipment had to proceed on the roads outside of the airport perimeter and did not arrive on the scene until approximately 8 minutes after the accident occurred. By this time, the intensity of the fire had subsided and the remaining fire was extinguished with water and foam. Volunteer fire departments from surrounding areas also responded to the crash alarm and assisted in the fire and rescue activities.

1.14 Survival Aspects

This was a survivable accident due to the minimal deceleration loads in the occupied areas.

The Dumod Conversion of the Beechcraft was designed to carry a crew of two and 13 passengers. The passenger compartment was configured with four seats forward of a center aisle obstruction through which the wing spar passed, seven seats aft of the spar housing, and a two-passenger divan at the rear of the cabin. A small step arrangement forward and aft of the spar box facilitated moving forward and aft of the cabin. An air-stair door comprised the only passenger and crew entry facility. It was located to the rear of the passenger compartment on the left side of the aircraft. There was one window emergency exit, located over the trailing edge of the right wing, approximately opposite the air-stair door.

Based on examination of the crash site as well as the description of the surviving passengers, the initial ground contact was relatively non-violent, with landing gear up and the wings almost level.

When the aircraft came to rest, all occupants except the passenger in seat No. 2 (forward right side of passenger cabin) were contained in their seats within the aircraft. The structure of the aircraft was broken open in the area of seat No. 2, and this surviving passenger was thrown clear of the wreckage, still strapped in his seat. Two other passengers used this opening to exit the aircraft.

The main cabin air-stair door popped open on impact and four passengers, all seated in the rear of the aircraft used this exit to escape the aircraft. The copilot exited the aircraft through the cockpit window which had broken out in the crash.

The seat belts were destroyed in the fire following the accident; however, decelerative forces did not cause any belt failures. Medical reports for the survivors showed that all had seat belt bruises.

The three fatalities were attributable to the postcrash fire.

1.15 Tests and Research

In view of the abnormal performance characteristics of the aircraft following lift-off, as described by the surviving copilot, passengers, and ground witnesses, the investigation included a review of several studies pertaining to the aerodynamic effects of airfoil icing.

Among the studies reviewed were those conducted by the National Advisory Committee on Aeronautics (NACA) relating to wind tunnel testing of airfoils under varying conditions of ice and frost formations.[4] The data derived from these tests show that significant increases in the drag coefficient result from accumulations of frost on an upper wing surface. In addition to the severe drag increases, shifts in the momentum wake (flow separation over the wing) were noted which indicated a loss of lift and possible stall condition. It was indicated that even at low angles of attack, such as would be presented at takeoff, flow separation and airfoil stalling characteristics were encountered. Therefore, it was pointed out that the possible hazard of stalling at takeoff under these conditions must be considered.

The effects of ice and frost on aerodynamic performance is detailed in the publication "Aerodynamics for Naval Aviators."[5]

It states in part:

"The effect of frost is perhaps more subtle than the effect of ice formation on the aerodynamic characteristics of the wing. The accumulation of a hard coat of frost on the wing upper surface will provide a surface texture of considerable roughness. While the basic shape and aerodynamic contour is unchanged, the increase in surface roughness increases skin friction and reduces the kinetic energy of the boundary layer. As a result, there will be an increase in drag but, of course, the magnitude of drag increase will not compare with the considerable increase due to a severe ice formation. The reduction of boundary layer kinetic energy will cause incipient stalling of the wing, i.e., separation will occur at angles of attack and lift coefficients lower than for the clean, smooth wing. While the reduction in $C_{L_{max}}$ (coefficient of lift) due to frost formation ordinarily is not as great as that due to ice formation, it is usually unexpected because it may be thought that large

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[4] Vernon H. Gray and Uwe H. von Glahn: Effect *of Ice and* Frost Formations *on* Drag *of* NACA *65-212* Airfoil for *Various Modes of Thermal Ice* Protection, National Advisory Committee for Aeronautics, 1953.

[5] H.H. Hurt, Jr., Aerodynamics *for Naval* Aviators, NAVWEPS 00-80T-80, U.S. Navy, 1960.

changes in the aerodynamic shape (such as due to ice) are necessaryto reduce $C_{L_{max}}$. However, the kinetic energy of the boundary layer is an important factor influencing separatiun of the airflow and this energy is reduced by an increase in surface roughness . . . .

"In no circumstances should a formation of ice or frost he allowed to remain on the airplane wing surfaces prior to takeoff. The undesirable effects of ice are obvious but, as previously mentioned, the effects of frost are more subtle. If a heavy coat of hard frost exists on the wing upper surface, a typical reduction in $C_{L_{max}}$ would cause a 5 to 10 percent increase in the airplane stall speed. Because of this magnitude of effect, the effect of frost on takeoff performance may not be realized until too late. The takeoff speed of an airplane is generally some speed **5** to **25** percent greater than the stall speed, hence the takeoff lift coefficient will be a value from 90 to 65 percent of $C_{L_{max}}$. Thus, it is possible that the airplane with frost cannot become airborne at the specified takeoff speed because of premature stalling. Even if the airplane with frost were to become airborne at the specified takeoff speed, the airplane could have insufficient margin of airspeed above stall and turbulence, gusts, and turning flight could produce incipient or complete stalling of the airplane.

"The increase in drag during a takeoff roll due to frost or ice is not considerable and there will not be any significant effect on the initial acceleration during takeoff. Thus, the effect of frost or ice will be most apparent during the latter portion of takeoff if the airplane is unable to become airborne or if insufficient margin above the stall speed prevents successful initial climb. In no circumstances should a formation of ice or frost be allowed to remain on the airplane wing surfaces prior to takeoff."

Another consideration in the abnormal flight characteristics associated with airframe icing in the takeoff regime is the ground effect influences on aircraft performance. In general, ground effect is an area of increased lift created by the ground surface in turning the induced flow from the wings of an aircraft flying near the surface, thus reducing induced drag and increasing lift.[6] Studies have shown that at a height above the ground equal to the wing span of **an** aircraft, the reduction in induced drag is only **1.4** percent, whereas at a height equal to one-tenth the span, the reduction in induced drag is **47.6** percent.[7] The wing span of the Beech **C-45H** is **47** feet **4** inches.

An aircraft leaving ground effect will require an increase in angle of attack to maintain the same lift coefficient. Thus, an aircraft with an accumulation of ice or snow on the airfoil may become airborne; however, it could be so close to stall speed at this point that **as** it reaches the area of reduced lift and increased induced drag, near the upper limits of ground effect, flight cannot be maintained.

The hazards of takeoff with ice and/or snow are recognized in the Federal Aviation Regulation (FAR) applicable to this operation. FAR **135.85** states:

"(a) No pilot may take off an aircraft that has—

(1) Frost, snow, or ice adhering to any rotor blade, propeller, windshield, or power plant installation, or to an airspeed, altimeter, rate of climb, or flight altitude instrument system;

(2) Snow or ice adhering to the wings, or stabilizing or control surfaces; or

(3) Any frost adhering to wings, or stabilizing or control surfaces, unless that frost has been polished to make it smooth.

* * * * *

1.16 Other Information

(a) Company Operational Precedures

The aircraft used for this flight was placed inside the Commuter Airlines hangar on the

[6] Frank Davis Adams. *Aeronautical* Dictionary, National Aeronautics and Space Administration, 1959.

[7] H.H. Hurt, Jr., Aerodynamics *for Naval* Aviators, NAVWEPS 00-SOT-80, U.S. Navy, 1960.

previous day and remained there until 20 minutes before the scheduled departure time of 1600 on March **22.** It was then pushed out of the hangar and taxied by the captain to the passenger terminal. According to Commuter maintenance personnel, the captain did not request the application of anti-icing fluid (glycol), and none was applied to the aircraft before departure.

Anti-icing/deicing fluid application equipment was available in the Commuter Airlines hangar.

There were no specific procedures or directives set forth in Company Manual of Operations pertaining to requirements for the application of anti-icing/deicing fluid. However, it was stated by company officials that the pilot ground training program included information concerning the operational hazards associated with ice and/or snow accumulation on an aircraft. It was explained that an assigned captain had complete dispatch responsibility for a flight and that this responsibility did include the determination as to whether aircraft deicing was necessary.

The preflight duties of the captain and co-pilots were set forth in the Company Manual of Operations, Chapter **3,** and are as follows:

D. Flight Crew Duties: Captain (Pilot in Command)

(1) Pre-flight Action: The Captain shall be on duty at the airport at least one hour prior to flight's scheduled departure time and during that interval he shall perform the following functions:

(a) Secure a weather briefing and conduct an analysis of the conditions as applicable to his flight. Pursuant thereto, he will determine whether or not the flight can be safely conducted as scheduled and what the required fuel, oil, anti- and deicing fluids will be. Check all notams, known traffic delays, etc., which may have a bearing on his flight

(b) Ascertain that a flight plan (IFR or VFR) is on file.

(c) Conduct a thorough pre-flight inspection of his aircraft.

(d) Supervise and assist as necessary whatever line support may be required to get his flight underway as scheduled. This shall include fluid servicing, pre-heating, towing, and ground power for starting.

(e) Position his aircraft so as to facilitate passenger loading.

(f) Determine the actual load as to passenger, baggage, cargo, and see that his aircraft is loaded within weight and balance limitations.

(g) Supervise and assist the actual loading of all baggage and cargo.

E. Flight Crew Duties: Co-Pilot (Second in Command)

(1) Pre-Flight Action: The Co-Pilot shall be on duty at the airport at least one hour prior to flight time. During this time he will assist the Captain in the execution of the pre-flight action as he may designate, and he will normally perform the following functions:

(a) Accompany the Captain during the weather briefing, analysis, and determination that the flight can be conducted in a safe manner as scheduled. When the Captain has completed the dispatch decisions he will normally proceed to the Operations counter and perform the following functions:

(i) Greet the passengers as they arrive, ticket them as required, weigh-in their baggage, check the reservations list, and enter the appropriate data on the flight operations sheet.

(ii) As soon as the Captain has completed his other pre-flight duties, forward to him all weights and other manifest data he needs to complete the flight manifest configuration.

(iii) When baggage and cargo loading have been completed, he will accompany the passengers to the designated gate or loading area. He will see that they take their seats as assigned from the passenger list, and that the safety belts are properly fastened. He shall see that all passenger and baggage doors are properly secured for flight.

(iv) Upon reaching his duty station the Co-Pilot will assist the Captain in any matter pursuant to the safe and expeditious conduct of the flight.

2. ANALYSIS AND CONCLUSIONS

2.1 Analysis

Examination of the aircraft structure components, systems, and powerplants disclosed no indication of any failure or malfunction prior to impact on the runway. The aircraft was modified, certificated, and maintained in accordance with applicable regulations. Both pilots were certificated and qualified for the operation involved.

Testimony from the copilot and surviving passengers confirmed that at the time of the flight's departure from the terminal ramp and at the time the takeoff was commenced, a thin layer of snow was adhering to the upper surfaces of the wings. The subsequent unusual performance of the aircraft following lift-off was classic of the expected flight performance demonstrated in various studies concerning the effects of airframe and airfoil icing in this operational regime. The causal area, therefore, primarily involves the operational decisions and actions of the crew in attempting a takeoff under the known conditions of snow adhering to the wing surfaces.

The investigation disclosed that the aircraft was fueled and placed in the Commuter hangar on the day prior to the accident and that it remained in the hangar until approximately 1540 on the day of the accident.

Weather reports and witness observations showed that at the time the aircraft was pushed out of the hangar, a snow of moderate intensity was falling on the airport and was, in fact, accumulating on the ramp and runway surfaces. The consistency of the snow was described by witnesses as being "wet and heavy." The air temperature at the time was 34" to 35°F.

Although glycol spray (anti-icing) equipment was available in the Commuter hangar, it was not used on this aircraft either before or after the aircraft departed from the hangar for the terminal. It was stated by Commuter officials that the decision as to whether to use the glycol rested with the captain. In their view, this decision is a judgment factor left to the captain's discretion and is based on his appraisal of the snow or ice hazard potential.

The copilot noticed the accumulation of snow on the upper wing surfaces prior to boarding the aircraft and again just before takeoff. He stated that he was not concerned with the snow because it was a very thin layer and he thought it would blow off either during the taxi or takeoff roll. Also, because the reported temperature was above freezing, he believed that the snow would not adhere to the wings.

Although there was no discussion between the captain and copilot regarding this situation, it may be assumed that the captain also noticed the snow accumulation on the wings and believed that it would not adhere to these surfaces or that it would not present a problem for the takeoff or flight.

The captain's records indicate that he was familiar with cold weather flying both as a pilot with Commuter, where cold weather operations are quite common, and through his experience while on active duty as a pilot with the Navy based in Minneapolis, Minnesota.

However, based on the fact that the snow did not blow off the wing surfaces except in small patches behind the engines, it is obvious that the assumption made by the copilot and probably by the captain was wrong.

Although the recorded temperature during this period was 35° F., the ambient temperature in the vicinity of the aircraft, after removal from the heated hangar, could have been substantially less, i.e., below 32° F. The aircraft was exposed to this temperature for approximately **31** minutes, during which time a moderate snowfall was reported. It is conceivable that, initially, the relatively warm metal of the airframe would cause the snow to melt upon contact thus forming a liquid film on the aerodynamic surfaces. This film would then freeze as the surface temperature stabilizes at the ambient temperature below 32° F., thus providing a surface to which snow would adhere. It is probable that the result would be a thin layer, translucent in appearance, such as that described by the copilot.

Unfortunately, the crew did not determine whether the snow was adhering to the wing surface either by brushing it by hand to test its characteristics prior to boarding, or by close observation during the taxi run.

It is well known that an airfoil even partially covered with ice, frost, or snow no longer retains the aerodynamic characteristics of a clean airfoil and that the precise characteristic of the affected airfoil are somewhat unpredictable.

NACA studies have confirmed that the adherence of even a light layer of ice or frost on a wing surface does, in fact, adversely affect the laminar flow over the wing and, thereby, results in higher stall speeds and lower stall angles of attack. The characteristics of snow adhering to an airfoil may be even more detrimental in that it could present a rougher surface texture than would normally be expected of frost or ice.

The weight, shape, and texture of the snow adhering to the wing could not be determined and, therefore, the extent of the aerodynamic penalties resulting from this accumulation could not be accurately assessed.

It was confirmed that lift-off occurred and a momentary rate of climb was established prior to the **loss** of control, which might seem to contradict the extent of the aerodynamic penalties resulting from the snow-covered airfoil during this takeoff. However, studies have indicated that the increased lift obtained from ground effect may permit an aircraft with an ice or snow-covered airfoil to become airborne and then subsequently be unable to maintain flight when entering the area of reduced lift upon leaving ground effect conditions. The insidious nature of this loss of control in the takeoff regime makes recognition and assessment of the situation difficult, inasmuch as control may be regained as the aircraft reenters the area of ground effect.

Thus, considering the facts of the accident, it is concluded by the Board that substantial penalties were imposed on the aerodynamic characteristics of the aircraft due to the snow-covered airfoil. These penalties, while not precluding the aircraft from becoming airborne and briefly establishing a rate of climb while in ground effect, resulted in a stall as the aircraft climbed out of the ground effect.

This accident was a clear demonstration of this phenomenon which, when it became evident to the pilot that control could not be maintained, left discontinuance of the takeoff as the only alternative.

It is obvious that under the circumstances, the aircraft should have been deiced prior to takeoff. Studies, actual experience, training, and the FAR's have long emphasized the hazards of takeoff with ice, snow, or frost adhering to the airfoils. Why the captain elected not to have the aircraft deiced, other than that he did not think it was needed, is difficult to explain. Good pilot judgment and sound operating procedures would have shown the advisability of airfoil deicing under the existing conditions.

Notwithstanding the matter of judgment on the part of the pilot in attempting to take off under these conditions, the Safety Board also takes a critical view of the company's management policies with respect to the operational dispatching functions. Although deicing equipment was available in the hangar, there were no written instructions/procedures for its implementation, nor was there any assigned supervisory responsibility to back up the captain in the many operational activities associated with a passenger flight of this type.

It was stated by company management that all dispatch functions and operational decisions relating to a flight, i.e., fuel load, weight and balance, assessment of weather conditions over the route, and even cancellation of a flight are the responsibility of the assigned captain. If there was any question on the part of the captain concerning any phase of the operation, he was expected to call upon the management level for assistance.

However, in view of the scheduled service replacement aspect of the passenger carrying operation being conducted by Commuter, it would seem reasonable to expect that management would have played a more direct role in verifying the effectiveness of company policy in actual operation and in ensuring that flightcrews were carrying out their duties in accordance with the established procedures and safe operating practices.

As was stated in a recently issued NTSB accident report[8] concerning another air taxi accident:

"The need for increased emphasis on managerial supervision over pilot-in-command responsibilities, particularly preflight responsibilities is made evident from a Safety Board study[13] of all air taxi accidents during the period from 1964 to 1968. The report stated in part:

'The pilot was cited as a cause or factor in 695 of the 995 Air Taxi accidents from 1964 to 1968 or 69.85 percent of all accidents. Within the broad causal area of 'pilot' are 60 detailed causal citations. The detailed cause-factor which was cited most often was 'inadequate preflight preparation and/or planning.' This category was cited 99 times, accounting for 10.6 percent of all 'pilot' causal citations. . . .'

"[13] Study of Air Taxi Accidents, A Statistical Summary and Analysis of a Special Segment of J.S. General Aviation 1964-1968, Report No. NTSB ASS-70-1."

In view of the foregoing, the Board concludes that the captain's decision to attempt a takeoff under the conditions of snow adhering to the airfoil surfaces was the basic cause of the accident. In addition, the Board believes that more effective managerial supervision over the carrier's flight operations may have provided the necessary deterrent or backup in the prevention of this accident.

2.2 Conclusions

(a) Findings

1. The company was authorized and certificated to engage in scheduled air taxi operations under the provisions of Part 135 of the Federal Aviation Regulations.

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[8] Aircraft Accident Report, Pilgrim Aviation and Airlines, Inc., De Havilland Turbo Prop DHC-6, N124DM, In Long Island Sound near Waterford, Connecticut, February 10, 1970, Report No. NTSB-AAR-71-1.

2. The aircraft was certificated and maintained in accordance with existing regulations.

3. The pilots were certificated and qualified for the flight.

4. The weight and balance for the aircraft were within authorized limits.

5. There were no malfunctions, or failures of the aircraft structure, systems, powerplants, or components.

6. The weather information provided to the flightcrew was adequate for flight planning.

7. Light snow was falling when the aircraft was taxied from the hangar to the passenger loading area, but the snow intensity increased to moderate by 1552 and varied from moderate to heavy until after the accident.

8. Anti-icing fluid was not applied to the aircraft either before or after it was removed from the hangar for this flight.

9. A thin accumulation of snow was adhering to the upper surfaces of the wings prior to the departure of the aircraft from the terminal and at the time of takeoff.

10. Shortly after lift-off, the left wing dropped and the pilot effected a recovery.

11. The aircraft again banked steeply to the left and, during the recovery, oscillated from side to side.

12. The pilot-in-command rejected the takeoff by retarding the throttles and making a wheels-up landing on the runway.

13. The landing gear and flaps were in the up position at impact.

14. The aircraft overran the confines of the runway, continued over an embankment and impacted the approach light structure for Runway 34.

(b) Probable Cause

The National Transportation Safety Board determines that the probable cause of this accident was the attempt of the pilot-in-command to take off with snow adhering to the airfoil surfaces. This snow caused a degradation of aircraft performance and loss of control following lift-off which required the captain to reject the takeoff beyond a point where a safe emergency landing could be effected within the confines of the runway.

3. RECOMMENDATIONS

Although the cause of this accident is primarily concerned with the judgment of the pilot-in-command in attempting a takeoff with the known hazard of a snow-covered airfoil, a similarity exists, in the area of managerial supervision over pilot-in-command responsibilities between this accident and another air taxi accident for which a National Transportation Safety Board aircraft accident report has recently been issued.** In the recommendations contained therein, the Safety Board took cognizance of the various studies and recommendations that have been made over the past few years with regard to safety in the air taxi industry. Of particular interest was the Board's recommendation of March 18, 1968, (see Attachment 2) in which all segments of the air taxi

** Aircraft Accident Report, Pilgram Aviation and Airlines, Inc., De Havilland Turbo Prop DHC-6, N124DM, in Long Island Sound near Waterford, Connecticut, February 10, 1970, Report No.: NTSB-AAR-71-1.

industry and the involved government agencies were called upon to analyze the problem areas and take expeditious action to improve safety in this operation. With reference to this recommendation and the ensuing activities resulting therefrom, the Board, in the Pilgrim Aviation and Airlines Accident Report, recommended that the air taxi industry and the FAA review the actions that had already been initiated with the hope that additional areas might be identified and corrective actions undertaken which would further improve the margin of safety in this operation.

In a letter to the Chairman from the Administrator dated April 15, 1971, the Administrator advised:

"...We concur with the recommendations contained in the report. With respect to these recommendations, we have reviewed the recommendations submitted by the Board on 14 March 1968 and 10 June 1970. A review of the actions we have directed toward improving safety in air taxi operations follows:

1. As you know, we have fully implemented a Systems Worthiness Analysis Program (SWAP)in all Federal Aviation Administration (FAA) regions. This program is providing increased inspection of air taxi operations. The special inspector teams in this program also serve to educate air taxi operators in all of the important safety aspects of their operations.

2. The higher safety standards, you remember, of Amendment 135-12 of Federal Aviation Regulation (FAR) Part 135, became effective on 1 April 1970, and provides for handling of air taxi safety operations in the same manner as other air carriers. We have organizationally established within the Operations Division of our Flight Standards Service, the Commuter and V/STOL Air Carrier Branch to serve the total air taxi program area.

We shall continue review of these recommendations and our actions taken with the view toward taking additional action where warranted."

In this case, the Board reaffirms the recommendations cited in the aforementioned report and recognizes the actions taken by the FAA to improve safety in this area. The Board believes that a continuing review of these programs and the implementation of corrective measures will serve to upgrade the overall standards of the air taxi operation.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD:

/s/ JOHN H. REED
Chairman

/s/ OSCAR M. LAUREL
Member

/s/ LOUIS M. THAYER
Member

/s/ ISABEL A. BURGESS
Member

Francis H. McAdams, Member, was absent, not voting.

INVESTIGATION AND HEARING

1. Investigation

The Safety Board received notification of this accident about 1630, March 22, 1970, from the Federal Aviation Administration's Eastern Region Communication Offices. Investigators from the Safety Board's New York and Washington offices proceeded to Broome County Airport, Binghamton, New York, where the investigation headquarters was established on March 23, 1970. Working groups were established for Operations, Weather, Air Traffic Control, Structures, Powerplants, Systems, Human Factors, and Maintenance Records. Parties to the Investigation included Commuter Airlines, Inc., and the Federal Aviation Administration. The on-scene investigation was completed on March 27, 1970.

2. Hearing

A public hearing was held at the Treadway Inn, Binghamton, New York, on June 17 and 18, 1970.

3. Preliminary Reports

A preliminary aircraft accident report summarizing the facts disclosed by the investigation was released by the Safety Board on May 28, 1970. A report summarizing the public hearing was issued on July 14, 1970.

CREW INFORMATION

Captain Millard E. Phillips, aged 42, held airline transport pilot certificate No. 1324480, with ratings: airplane multiengine land, commercial priviliges airplane single-engine land, rotorcraft helicopter Sikorsky S61, and instrument, His class I medical certificate was dated July 14, 1969.

Captain Phillips had a total flight time of 6,630 hours. He had a total of 106 flight hours in the Beech C-45H (Infinite II) aircraft, all of which were flown within the last 90 days preceding the accident. His total flight time within the last 90 days was 280.8 hours. He passed his last 6-month proficiency flight check on December 15, 1969. He had 36 hours off-duty time prior to commencing this flight.

First Officer David C. Martin, aged 25, held a commercial pilot certificate No. 1729792, with ratings: airplane single- and multiengine land and instruments. His class I medical certificate was dated March 3, 1969.

First Officer Martin had a total flight time of 688 hours, of which 350 were flown in the Beech C-45H (Infinite II) aircraft. His flight time in the last 90 days preceding the accident was 205 hours. He passed a proficiency check in the Beech D18S model aircraft on September 24,1969. He had 44 hours off-duty time prior to commencing this flight.

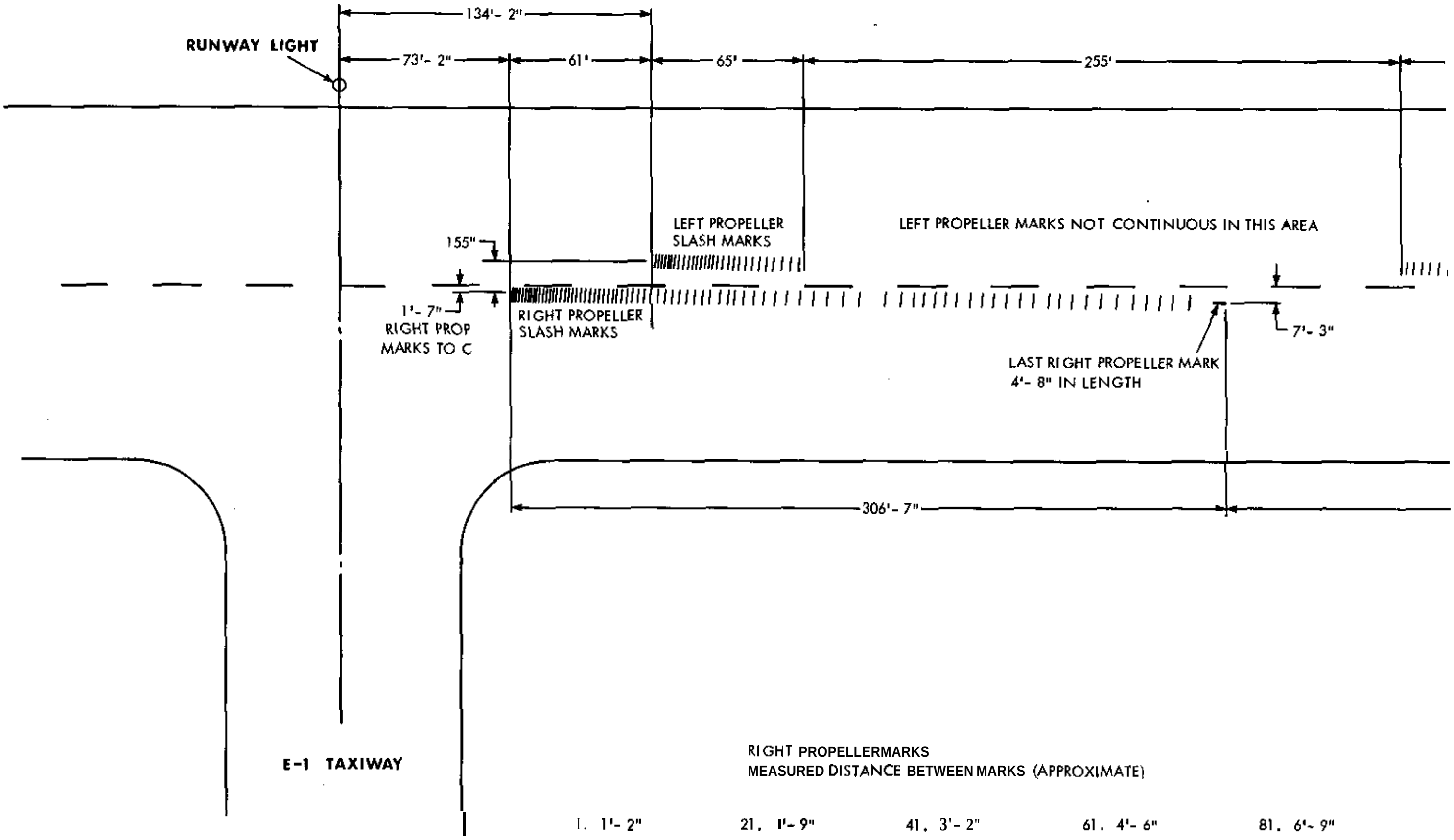
AIRCRAFT INFORMATION

N497DM was originally manufactured by Beech Aircraft Corporation as a Beech C-45H model and was delivered to the Air Force on April 13, 1954. In 1964, subsequent to its transfer of ownership from the Air Force, N497DM was initially inspected by the FAA in preparation for conversion to the Dumod Infinite II model aircraft. The modification was completed by Commuter Airlines on November 24, 1969, and a standard airworthiness certificate was issued for the aircraft by the FAA on that date.

The modification of the basic Beech C-45 was conducted under the FAA Supplemental Type Certification process and, in part, included the following: PAC-aero 10,200 kit for 10,200-pound-gross takeoff weight; wraparound windshield; Hartzell Propellers; Volpar Tri-Cycle Landing Gear; Dorsal and Ventral Fins; and 75-inch fuselage extension. The aircraft was equipped with two Pratt & Whitney, R985-AN-14B, engines.

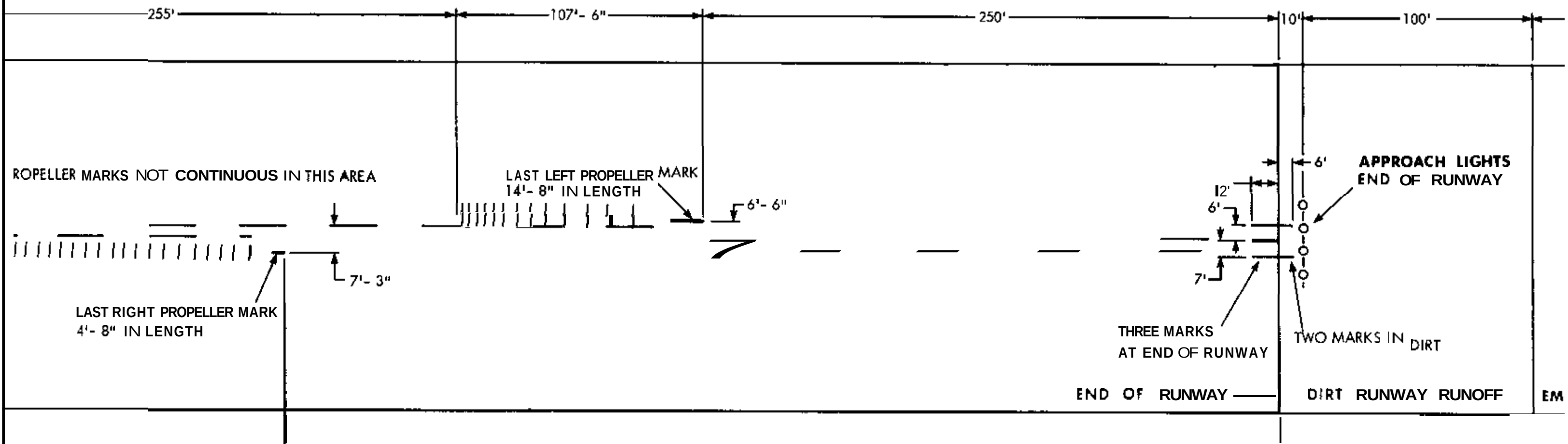
N497DM was introduced into service with a total time of 2554.20 hours. Subsequent required inspections were accomplished and all required Airworthness Directives were complied with and signed off by qualified personnel.

The aircraft had accumulated a total of 277 flight hours in service with Commuter Airlines for a total of 2831:20 hours since delivery from Beech Aircraft in April 1954.



RIGHT PROPELLERMARKS
MEASURED DISTANCE BETWEEN MARKS (APPROXIMATE)

1. 1'- 2"	21. 1'- 9"	41. 3'- 2"	61. 4'- 6"	81. 6'- 9"
2. 1'- 2½"	22. 1'- 7½"	42. 3'- 11"	62. 5'- 4"	82. 10'- 1"
3. 1'- 2½"	23. 1'- 7"	43 2'- 11"	63. 4'- 7"	83. 4'- 8" STRAIGHT LINE
4. 1'- 2½"	24. 1'- 10"	44. 3'- 6"	64. 4'- 11"	
5. 1'- 3"	25. 1'- 9½"	45. 3'- 10"	65. 5'- 10"	
6. 1'- 4½"	26. 1'- 10"	45 3'- 3"	66. 4'- 9"	
7. 1'- 1½"	27. 2'- 0"	47. 3'- 6"	67. 5'- 4"	
8. 1'- 4"	28. 1'- 10"	48. 4'- 1"	68. 5'- 10"	
9. 1'- 4½"	29. 2'- 0"	49. 3'- 7"	69. 5'- 1"	
10. 1'- 2½"	30. 2'- 6"	50. 4'- 4"	70. 5'- 8"	
11. 1'- 4½"	31. 1'- 10"	51. 5'- 0"	71. 5'- 10"	
12. 1'- 5"	32. 2'- 6"	52. 4'- 8"	72. 5'- 2"	
13. 1'- 3½"	33. 2'- 11"	53. 5'- 8"	73. 5'- 6"	
14. 1'- 6"	34. 2'- 3"	54. 6'- 4"	74. 5'- 11"	
IS. 1'- 5"	35. 2'- 9"	55. 6'- 2"	75. 5'- 7"	
16. 1'- 5½"	36. 3'- 2"	56. 7'- 3"	76. 6'- 7"	
17. 1'- 6"	37. 2'- 7"	57. 7'- 4"	77. 6'- 7"	
18. 1'- 8½"	38. 2'- 11"	58. 11'- 10"	78. 6'- 1"	
19. 1'- 6"	39. 3'- 6"	59. 5'- 6"	79. 6'- 1"	
m. 1'- 7"	40. 3'- 2"	60. 4'- 10"	80. 5'- 8"	



EEN MARKS (APPROXIMATE)

I'- 2.1	61. 4'- 6"	81. 6'- 9"
I'- 1 1"	62. 5'- 4"	82. 10'- 1"
I'- 11"	63. 4'- 7"	83. 4'- 8" STRAIGHT LINE
I'- 6"	64. 4'- 11"	
I'- 10"	65. 5'- 10"	
I'- 3"	66. 4'- 9"	
I'- 6"	67. 5'- 4"	
IC I"	68. 5'- 10"	
I'- 7.1	69. 5'- 1"	
I'- 4"	70. 5'- 8"	
5'- 0"	71. 5'- 10"	
I'- 8"	72. 5'- 2"	
5'- 8"	73. 5'- 6"	
5'- 4"	74. 5'- 11"	
5'- 2"	75. 5'- 7"	
'- 3"	76. 6'- 7"	
'- 4"	77 6'- 7"	
1'- 10"	78. 6'- 1"	
5'- 6"	79. 6'- 1"	
I'- 10"	80. 5'- 8"	

LEFT PROPELLER MARKS
MEASURED DISTANCE BETWEEN MARKS (APPROXIMATE)

1. 1'- 2"	21. 2'- 6"	41. 7'- 0"
2. 1'- 3"	22. 2'- 6"	42. 8'- 8"
3. 1'- 3"	23. 3'- 0"	43. 10'- 0"
4. 1'- 4"	24. 2'- 11"	44 9'- 8"
5. 1'- 3½"	25. 2'- 10"	45. 11'- 1"
6. 1'- 3½"	26. 3'- 3"	46 15'- 6"
7. 1'- 4½"	27. 3'- 6"	47. 14'- 8" STRAIGHT LINE
8. 1'- 4"	28. 3'- 8"	
9. 1'- 3½"	29. 3'- 10"	
10. 1'- 5"	30. 3'- 10"	
11. 1'- 4½"	31. 3'- 7"	
12. 1'- 4½"	32. NO PROPELLER MARKS FOR 225	
13. 1'- 5"	33. 3'- 0"	
14. 1'- 5½"	34. 3'- 1"	
15. 1'- 6"	35. 3'- 1"	
16. 1'- 7"	36. 3'- 5"	
17. 1'- 8"	37. 3'- 8	
18. 1'- 9"	38. 4'- 0"	
19. 1'- 10"	39. 4'- 10"	
20. 2'- 5"	40. 5'- 10"	

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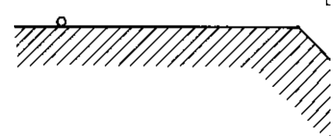

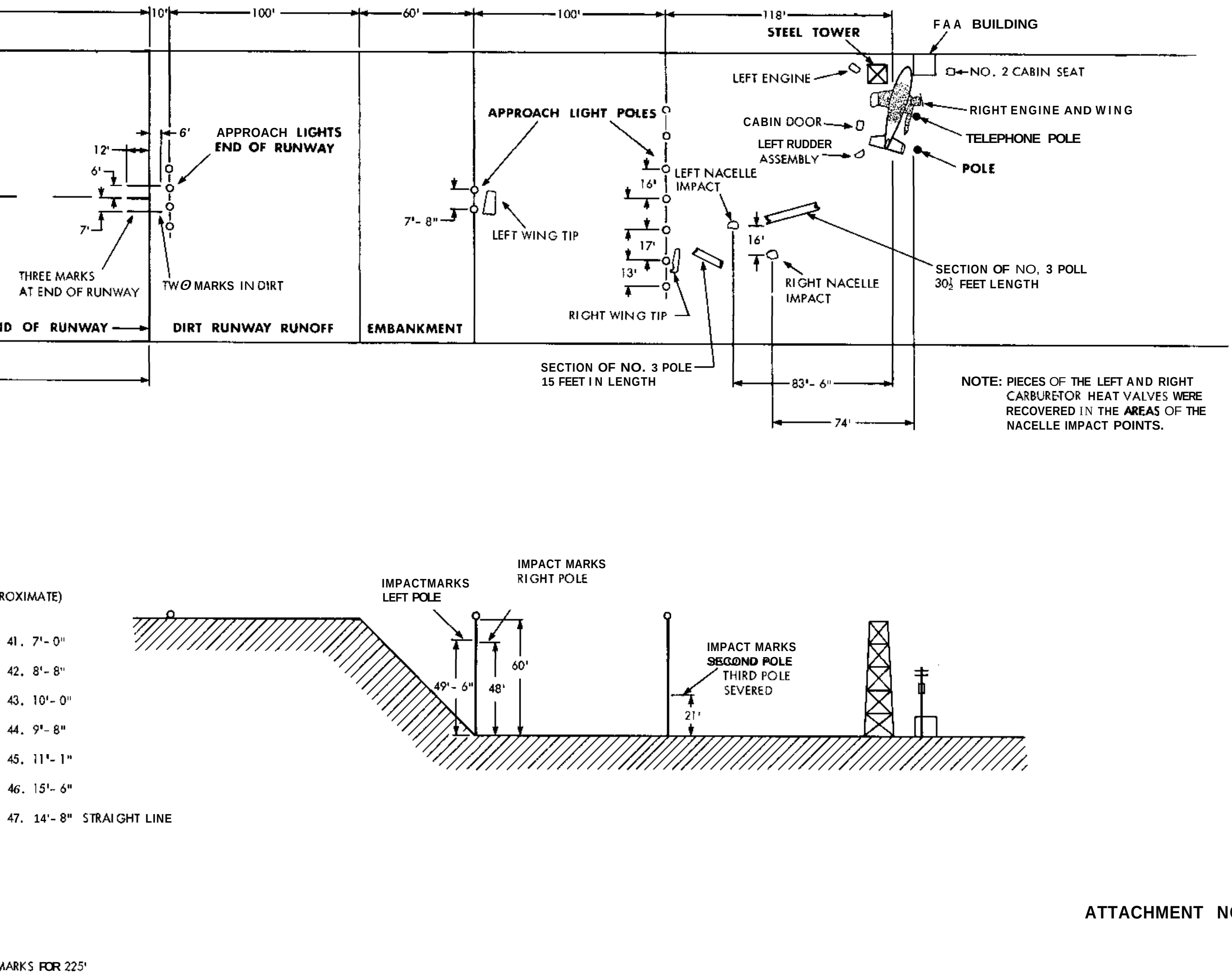

ATTACHMENT NO. 1

NATIONAL TRANSPORTATION SAFETY BOARD
Washington, D.C.

NYC 70A N103 RUNWAY MARKS & WRECKAGE DISTRIBUTION CHART

COMMUTER AIRLINES, INC. C-45-H
N497 DM BROOME COUNTY AIRPORT
BINGHAMPTON, NEW YORK
MARCH 22, 1970

NATIONAL TRANSPORTATION SAFETY BOARD
DEPARTMENT OF TRANSPORTATION
WASHINGTON, D.C. 20591

OFFICE OF
THE CHAIRMAN

March 14,1968

Honorable William F. McKee,
Administrator,
Federal Aviation Administration,
Department of Transportation,
Washington, D.C. 20590.

Dear General McKee:

The Safety Board has become increasingly aware in recent months of the very rapid expansion in the operations of the air-taxi operators, and within that group a similar burst of activity on the part of the scheduled air-taxi operators.

Also of interest to us, and in the same general area, is the rapidly expanding use of such operators by the Post Office Department in the contract carriage of mail.

A description of the nature and present scope of the operations of this group will serve as a background against which the safety of such operations, a matter of real concern to the Safety Board, can be appraised.

There are, as you know, more than 3800 air-taxi operators in the United States. As of October 1, 1967, scheduled air-taxi operators totalled 165, an increase of 42% over the 116 reported only eleven months before. Another indication of the rapid rate of growth of this segment of the industry can be gleaned from the fact that there were only 12 scheduled air-taxi operators four years ago, and that during the same period the number of aircraft utilized by them increased from 72 to 685.

Although this figure may not be entirely precise, it is our information that during the calendar year 1967 scheduled air-taxi operators carried over 3,000,000 passengers.

It is worthy of note that at least two certificated airlines have contracted with scheduled air-taxi operators to operate a segment of the certificated carriers' routes and that there are some 42 interline agreements between certificated airlines and scheduled air-taxi operators for the onward carriage of airline passengers.

In this connection, it is also worthy of note that in the contractual arrangements for the operation of route segments by air-taxi operators there are no affirmative references to the safety of such operations (other than requirements for insurance coverage imposed by the certificated carrier – and these could hardly be said to contribute to safety). Nor do the interline arrangements evidence concern as to safety by anything other than protection against airline liability through insurance.

The Post Office Department has, within the past year, become a very important contributor to the expansion of this segment of aviation through its contracts for the carriage of mail. Some indication of the rate of growth in this area can be gleaned from the fact that in 1966 the Post

Office Department paid air-taxi operators about $180,000 for carrying mail; in 1967 the amount was in the neighborhood of $3,500,000; and in 1968 the Post Office expects the figure to go as high as $8,000,000.

By the end of 1967 there were in the neighborhood of 80 mail routes being operated by some 35 air-taxi operators. The Post Office Department expects to have from 180 to 200 routes in operation by June 1968, presumably with a commensurate increase in the number of air-taxi operators involved.

In contrast to the contractual arrangements between air taxi operators and air carriers, the Post Office Department has imposed safety requirements in its contracts which go substantially beyond those presently required by the Federal Aviation Administration under Part 135 of the Federal Air Regulations, and they are intending to make such requirements more stringent almost immediately, since they are far from satisfied with the safety record of their contractors in recent months. (Four aircraft losses between November 25, 1967, and January 28, 1968, with attendant loss of mail and lives.)

By and large, it is our understanding that the contractual safety requirements imposed and to be imposed by the Post Office Department are intended to reach a level of safety in operations at least equal to what may come out of the next proposed modification of Part 135.

Certainly, such contractual requirements are far more stringent than are required of air-taxi operators generally, or of scheduled air-taxi operators in particular, by the existing Federal Air Regulations, and any substantial amendment in the existing Part 135 cannot be looked for (because of Rule Making requirements) for at least six months, and more probably a year.

The Board is well aware that the FAA has been addressing itself to this emerging problem with a high sense of its importance and urgency, and as we both know the Post Office Department has quite recently expressed concern about the safety of their contract operations in a series of meetings with both the FAA and the NTSB.

It is our understanding that the FAA is disposed to cooperate with the Post Office Department not only in advising with them as to the type of contractual safety provisions they might wisely impose, but also to assist in the implementation of the Post Office Department's program by some type of surveillance over the operators to see to it that the contractual obligations imposed upon them in the interest of safety are in fact being complied with. This we applaud.

But this brings **us** to the proposition that at this point the Post Office Department, with the help of the FAA, is imposing a higher level of safety regulation on air-taxi operators carrying mail than the Government imposes on the same, or other, air-taxi operators who are carrying *passengers* for hire.

Three million passengers carried for hire by scheduled air-taxi operators in 1967 is not only a respectable number, involving a dollar volume many times that of the $3,500,000 Post Office expenditure during the same year, but of much more significance from the standpoint of our present discussion, has involved a death and injury toll which cannot be viewed with anything approaching equanimity.

Preliminary figures indicate that there were some 84 deaths in air-taxi operations in 1967, of which 61 were passengers and 23 were crew. Figures for 1966 indicate a passenger fatality in air-taxi operations of 32, about one-half the level of 1967.

The area we are talking about is so new and so rapidly changing that comparative statistics are not worth much. However, the 1967 toll in absolute numbers is of sufficient magnitude to justify concern and affirmative action.

This rapid growth is being encouraged by the Federal Government, both by expanded authority through the Civil Aeronautics Board and the expanding contract operations of the Post Office Department. Then, too, the contracts between certificated carriers and air-taxi operators, as well as interline agreements between the two, would indicate a growing belief by at least some certificated airlines that the air-taxi operator fulfills a need. All in all, it can safely be assumed that the expansion is desirable and should be both encouraged and helped.

It is of concern to us that this record rate of growth, however desirable it may be, is being accompanied by a preoccupation with economic growth and very little, if any, attention is being paid to the safety obligation imposed by the equally rapid change in the role of this class of carrier. It seems clear that we cannot wait six months to a year for the evolution of a more modern regulatory scheme through the upgrading of Part 135.

In recent months, as the FAA has observed appreciable laxity in operating techniques of certificated carriers, it has acted promptly and sent teams in to review practices and to force an upgrading of them We are of the view that the technique could be used in the area under discussion, although admittedly the *assignment* would be radically different, as will be developed later.

In this connection, it might be observed that air-taxi operators, including scheduled air-taxi operators, are conceived of organizationally within the FAA as being essentially a part of general aviation. This was once true and may still be true for the bulk of air-taxi operators, but it is by no means true for scheduled air-taxi operators or those under contract with the Post Office Department. This would suggest that not only should these carriers be classified as air carriers, but should be treated as such both within the structure of FAA and, in the longer pull, from the standpoint of safety requirements.

Another analogy of possible use in FAA consideration of this problem is its Project 85 which, as recently as in September, 1967, was set up on a test basis to encourage accident prevention in general aviation. The essence of this proposal, as we read it, is to upgrade the operations involved not by surveillance but by helping and by teaching. It is suggested that if Project 85 were narrowed down so as initially to make its principles specifically (and solely) applicable to scheduled air-taxi operators and air-taxi operators under contract to the Post Office Department, the possibility for success of the venture would be substantially enhanced. Experience with this more limited group could provide valuable information as a prelude to expansion to other general aviation areas later, as resources permit.

It is also suggested that personnel presently assigned as air carrier inspectors (whose job it is, basically, to monitor highly sophisticated and, it can be assumed, highly effective operations related to safety) could effectively be utilized in implementing such a program. Certainly, 165 scheduled air-taxi operators and 35 or more air-taxi operators under contract with the Post Office Department (most of whom are within the 165) would be a manageable number for intensive effort, where 90,000 members of the general aviation fraternity might not be.

'Summing all this up, the Board is of the view that concerted and speedy action by both industry and government is required to adequately cope with the situation described. A suggested program follows:

I. By the Industry

A. Organized groups of scheduled air-taxi operators are urged to devote their energies to the safety of their operations to an extent more reasonably related to the amount presently being expended for the enhancement of their economic opportunities. For example, it would not seem either beyond the capabilities of these organizations or adverse to the intelligent self-interest of their members were they to institute programs devised to give expert guidance to operators in setting up operating rules and establishing desirable operating practices in areas involving safety (a large portion of accidents in this field are attributable to deficiencies in operations, i.e., inadequate maintenance, inadequate training, etc.).

B. Scheduled airlines are urged to take affirmative action commensurate with their responsibility for the safety of passengers being carried by scheduled air-taxi operators pursuant to interline agreements or specific contracts for the operation of route segments. Here, if the carriers are unwilling, for whatever reason, to assume affirmative responsibility for safe operations of air-taxi operators with whom they have either interline agreements or specific contracts to operate route segments, serious consideration should be given to having the CAB condition its approval of any such contractual arrangements on the existence of contractual undertakings by each air-taxi operator to comply with a set of safety rules comparable or at least equal to the then contractual arrangements between the Post Office and its air mail carriers.

II. By the Government

A. The Federal Aviation Administration should launch immediately a program addressed to the scheduled air-taxi operators and the operators under contract with the Post Office Department, which would involve not only surveillance of the conventional type, but also the teaching of this group how better to perform a basically common carriage operation, with emphasis on associated safety aspects. This program should include sending in FAA teams to review and accomplish the necessary upgrading of their safety practices; and

B. That the FAA place the safety supervision of scheduled air-taxi operators and Post Office contract operators organizationally under FAA staff associated with the handling of air carrier safety operations, and proceed promptly to establish safety programs and standards for them commensurate with their current and long-range status, activities, and importance in aviation.

Admittedly, the programs recommended herein for action by the Federal Aviation Administration, the air carriers, and the air-taxi operators, are beyond the scope of what the Administration and the industry have been either equipped or expected to do, and might not even be favorably received by the group of air-taxi operators such programs would be intended to help.

However, the need is real and immediate and it is **our** view that the situation will not wait either for "as usual" industry practices or for the ordinary regulatory process to catch up to it.

Sincerely,

/s/ Joseph J. O'Connell, Jr.
Chairman

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