

## CIVIL AERONAUTICS BOARD

## AIRCRAFT ACCIDENT REPORT

ADOPTED: December 29, 1964

RELEASED: January 5, 1965

SOUTH CENTRAL AIRLINES, INC.  
BEECH D18S, N2999  
GAINESVILLE MUNICIPAL AIRPORT  
GAINESVILLE, FLORIDA  
FEBRUARY 3, 1964

SYNOPSIS

A South Central Airlines, Inc., Beech D18S, crashed during takeoff from runway 6 at the Gainesville Municipal Airport, Gainesville, Florida, at 0800 e.s.t., February 3, 1964.

The aircraft was observed during takeoff with flaps down as it made a steep climb to approximately 200 feet from which it stalled and struck the departure end of runway 6. All ten persons aboard, including nine passengers and one crew member, received fatal injuries. The aircraft was destroyed by impact and subsequent fire.

The probable cause of this accident was the pilot's failure to properly load the aircraft, resulting in insufficient elevator effectiveness to reverse an unwanted pitching motion.

Investigation

A South Central Airlines, Inc., Beech D18S, N2999, crashed during takeoff from runway 6 at the Gainesville Municipal Airport, Gainesville, Florida, at 0800 e.s.t. <sup>1/</sup>, February 3, 1964. All ten persons aboard, including nine passengers and one crew member, received fatal injuries. The aircraft was destroyed by impact and subsequent fire.

South Central Airlines, Inc., is an air taxi operator certificated to operate under the provisions of Part 42a of the Civil Air Regulations. At the time of the accident, South Central Airlines operated scheduled service over routes within the State of Florida. Its principal business, operations, and maintenance base was at Ocala, Florida.

South Central Airlines Flight 510/3 was a scheduled air taxi flight from Ocala, to Tallahassee, with stops at Gainesville and Jacksonville, Florida. Prior to departing Ocala, N2999 was fueled to a capacity of 202 gallons and had 16 gallons of oil aboard. It departed the Jim Taylor Airport, Ocala, at approximately 0720, February 3, 1964, and arrived at the Gainesville Municipal Airport at 0733.

<sup>1/</sup> All times herein are eastern standard based on the 24-hour clock.

After landing at Gainesville, two passengers were transferred to N2999 from another South Central aircraft which had just landed with a fuel leak. The pilots of both aircraft assisted in the removal of the baggage of the two passengers and it was transferred to the nose baggage compartment of N2999.

A total of three bags were loaded in the nose baggage compartment and all remaining baggage was placed in the aft baggage compartment. No fueling of the aircraft was accomplished at Gainesville. No flight plan was filed, nor was one required.

After boarding seven more passengers for a total of nine, the pilot of N2999 contacted the Gainesville Flight Service Station <sup>2/</sup> by radio and said he was taxiing out for runway 6 for takeoff to Jacksonville. The Air Traffic Control Specialist answered and gave the pilot the wind direction as 050 degrees at 4 knots, favoring runway 6, no reported traffic, altimeter setting 30.20 and the Jacksonville 0700 sequence weather report. The pilot said, "Thanks, taxiing to runway 6." <sup>3/</sup>

The 0758 weather observation for Gainesville Municipal Airport was: Scattered clouds at 1,500 feet; estimated ceiling 6,000 feet; broken clouds; high overcast; visibility 12 miles; temperature 52°F.; wind from 050 degrees at 5 knots, altimeter setting 30.21.

The pilot of N2999 commenced takeoff at 0800. Witnesses who observed the takeoff stated the aircraft made a steep climb to an altitude of 200 feet with the flaps in the extended position. At this altitude, the aircraft appeared to stall and dive in a left-wing-down attitude to the departure end of runway 6. Several witnesses stated they heard the engines surging just before the aircraft stalled and struck the runway. Witnesses who observed the loading of the aircraft and its departure from the terminal area did not observe the position of the wing flaps at that time.

Initial impact was 79 feet from the departure end of runway 6 and ten feet to the left of the runway centerline. Runway 6 is an asphalt runway which is 150 feet wide and 5,027 feet in length. Fire followed impact. The left wing and engine separated from the aircraft at impact and the fuselage, right wing, right engine, and tail assembly bounced and slid approximately 100 feet and came to rest on fire with the nose on a magnetic heading of 220 degrees.

The South Central pilot who assisted in the loading of N2999 was one of the first persons to appear at the wreckage scene and attempted to open the rear compartment door. He was unable to do so because of intense heat and jamming of the door. He observed no signs of life from the occupants of the aircraft.

Both main landing gear slide tube saddles were found in the full forward (gear-up) position and the wing flap actuator screws were found extended 4-1/2 inches to the full flap position.

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<sup>2/</sup> There was no control tower at the Gainesville Municipal Airport but the Federal Aviation Agency did have a Flight Service Station located there.

<sup>3/</sup> See Attachment I.

The fuselage structure from the nose, including the cockpit instruments, through the passenger compartment was almost entirely consumed by fire. Flight controls were found intact. The elevator trim tab was found at the 18-degree (full nosedown) position, and the rudder trim was neutral. The flap control lever was found in the full down position. Normal flap position for takeoff is full up. The landing gear selector was found in the up position. Both fuel tank selector valves were found in intermediate positions and badly bent by impact forces. Both engines revealed they were capable of developing power prior to impact and failed to show any indication of failure or malfunction during flight. Both engines had been overhauled in early January 1964, and had accumulated approximately 40 hours since overhaul.

The fixed low-pitch stop position of the propellers is 13 degrees. Propeller slash marks, damage, the position of the domes, and pitch settings at impact indicated that both propellers were in the 20-23-degree position (flight range) at time of impact.

According to the applicable Federal Regulations, the pilot-in-command was responsible for proper loading of the aircraft. There was conflicting testimony as to whether the pilot computed the weight and balance on N2999 before departure from Gainesville. Company records revealed that ten pieces of luggage, weighing a total of 209 pounds, were placed aboard N2999. Three of these bags were placed in the nose baggage compartment. Remnants of seven suitcases as well as pieces of smaller luggage were recovered from the rear baggage area. However, due to fire, no positive weight determination could be made.

The pilot and all the passengers were identified and located as to their positions in the aircraft at time of impact. The weight of each passenger and an estimate of the baggage weight for each were obtained from the next-of-kin. The combined weight of the nine passengers was estimated to be 1,484 pounds. The takeoff weight was computed to be 9,402 pounds with a c.g.<sup>4/</sup> of 124.7 inches aft of datum.<sup>5/</sup> When the landing gear was retracted, the c.g. moved aft to 125.9 inches. The aft c.g. limit of this aircraft was 117.7 inches.

N2999 was originally manufactured by the Beech Aircraft Corporation as a Beech D18S certificated in accordance with FAA Aircraft Specifications.<sup>6/</sup> On September 29, 1962, Supplemental Type Certificate<sup>7/</sup> (STC) No. SA2-1246 was

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<sup>4/</sup> C.g. is the point on an airplane about which the weight is evenly distributed or balanced, measured in inches from a designated datum line. Loading of the aircraft must be such that the c.g. will be confined within the c.g. limits or the aircraft will not be capable of flight because of a lack of flight equilibrium.

<sup>5/</sup> See Attachment II.

<sup>6/</sup> FAA Spec. No. A-765 authorized a maximum gross weight for takeoff of 8,750 pounds and a c.g. range of 109.8 to 117.7 inches.

<sup>7/</sup> A certificate required by the FAA of anyone who alters an aeronautical product by introducing a major change in a previously approved type design and which is not so extensive as to require application for a new type certificate. The basic rules, policies, and procedures governing certificates are stated in Paragraphs 1.25 thru 1.28-1 of Civil Aeronautics Manual 1.

issued to Airline Training Incorporated (ATI), also known as Conrad International Corporation, Inc., which authorized the conversion of certain models of the Beech aircraft, approved an increase in the maximum gross takeoff weight to 10,200 pounds, and extended the aft c.g. limits to 120.5 inches. In December of 1963, ATI applied for FAA approval of an "economy version" of the Beech 18 which would allow a maximum gross takeoff weight of 9,360 pounds and extend the rear c.g. limit from 117.7 inches to 120.5 inches.<sup>8/</sup> The Federal Aviation Agency's Engineering and Manufacturing District Office (EMDO), at Miami, decided to treat this latter STC as an amendment to the original (SA 2-1246) rather than as a new STC. The Flight Manual Supplement for the "9,360" conversion was approved by the EMDO on January 10, 1964, to allow time for printing. Meanwhile, the EMDO was conducting conformity inspection of the ATI engineering drawings and flight tests at the ATI facility at Fort Lauderdale, Florida.

With the approved Flight Manual Supplement, and an STC number only, but without approval of the amended STC, the president of ATI contracted for modification of at least two aircraft of which one was N2999. These aircraft were modified in accordance with the unapproved application for an amended SRC. However, this modification was never approved by the FAA due to the absence of an elevator-down spring. Since the modification included the extension of the aft c.g. limits of the Beech D18S the down-spring was required in order that the control inputs during all regimes of flight would be in accordance with the certification requirements under Part 3, Civil Air Regulations. The installation or deletion of this spring does not affect elevator power or authority of the pilot but merely keeps the stick forces required by the pilot within a normal envelope of acceptable limits.

N2999 had eight passenger seats and two pilots' seats installed. The empty weight and c.g. as shown on the latest FAA Form 3379/ and the requirements of Part 3 <sup>10/</sup> of the Civil Air Regulations indicate that it was not possible to put a 170-pound passenger in each seat without exceeding the aft c.g. limit. Addition of any fuel to the aircraft then moved the c.g. further aft. It was not possible to operate N2999 with eight passengers unless ballast was carried in the nose compartment. There were no placards to warn of these dangerous loading restrictions, nor were any required by the provisions of Part 3 of the Civil Air Regulations.

The Form 337, submitted upon installation of the eight seats, was accepted by the FAA General Aviation District Office (GADO) in Miami, without any review to determine if the aircraft complied with the weight and balance provisions of

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<sup>8/</sup> The 9,360 conversion of the D-18 Beech includes high performance wing tips (SA 2-213); changing of the angle of incidence of the horizontal stabilizer and installing elevator gap seals (SA 2-383); stall strips, engine cooling ramps, carburetor ram air scoop and heat modifications (SA 2-1246); retracting tail wheel (SA 2-1230); tail bubble doors (SE 2-1261); and Airstair rear door (SA 2-566).

<sup>9/</sup> An application for approval by FAA, which must be executed in duplicate of each major repair and/or alteration made to an aircraft, airframe, powerplant, propeller, or appliance.

<sup>10/</sup> See Attachment III.

Part 3 of the Civil Air Regulations. Although computations were checked for accuracy, there was no check to determine the validity of the figures used as the basis for the computations. There was no review to see if the aircraft could operate with the eight seats occupied and still comply with the provisions of Part 3 of the Civil Air Regulations. Following review by the GADO, the Form 337 was forwarded to the FAA Central File in Oklahoma City, Oklahoma. According to the investigation and testimony at the hearing, this is the standard FAA practice in respect to processing of 337 Forms.

An aft baggage compartment was installed on the right side opposite the most rearward seat. This required the removal of the rear bulkhead at fuselage station 9. This compartment was limited to 276 pounds of baggage when the rear seat was not occupied. It was further limited to 106 pounds when the seat was occupied. The new empty c.g. of the 9,360 conversion was 114.53 inches. Placards were required in both the nose and the aft baggage compartments indicating their maximum load capacity. There was conflicting testimony as to whether these placards were installed.

South Central Airlines, Inc., received N2999 in late January as modified in accordance with the proposed 9,360 conversion and scheduled revenue flights were begun with the aircraft on January 29, 1964. An application for registration of N2999, dated January 30, 1964, was submitted to the FAA. The aircraft was flown in scheduled revenue service on January 30, 31, and February 1, and 2, 1964. Some of these flights were under maximum load conditions at or near the unapproved gross weight condition of 9,360 pounds.

A Federal Aviation Form 2417 11/ for the 9,360 conversion of N2999, indicates an approval date of January 10, 1964, for the amendment to STC SA 2-1246. However, the investigation revealed that the form was not approved and signed by the supervisor of the EMDO until February 24, 1964, and was delivered to ATI the following day. FAA personnel explained that back dating of STCs is a standard practice.

An airplane flight manual was required by Sec. 3.777 of the Civil Air Regulations to be aboard each aircraft over 6,000 pounds. Such manuals contain information which has an important bearing on safe operation, including weight and balance data. According to company personnel, there was an airplane flight manual aboard N2999 at the time of the accident. However, no evidence of this manual was found in the wreckage.

In any event, an identical copy of a Flight Manual alleged to have been in the aircraft did not contain information or charts about the seat locations or baggage compartments of this aircraft.

No evidence of a cockpit checklist was found in the wreckage. There was conflicting testimony as to whether a cockpit checklist was present in the aircraft prior to the accident. Company officials presented two checklists they stated were being used in their Twin Beech aircraft. Neither was applicable to this airplane.

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11/ FAA Form 2417 is an application for a Supplemental Type Certificate which is submitted in triplicate to the local FAA Flight Standards Inspector.

It was determined that the pilot of N2999 had been discharged from the U. S. Navy in 1954 on a 100 percent physical disability due to arthritis and deafness. The pilot's logbook indicated he had a total of 16,647 flying hours when hired by South Central in May 1963. He had accumulated approximately 150 flying hours in Twin Beech type aircraft since that time.

### Analysis

Atmospheric conditions and airport facilities were not factors in this accident.

Metallurgical examination of the impeller teeth of the right engine indicated that the failures were of the overload type and had occurred at impact due to the sudden stoppage of the engine. Both engines were capable of normal operation up to the time of impact.

Structural investigation showed no evidence of any failure or malfunction of the airframe prior to impact.

The pilot possessed the proper certificates required by the FAA for the operation involved. His commercial pilot's license and second-class medical certificate were current and he had flown 150 hours in D18S aircraft within recent months. His actual proficiency level in the aircraft could not be determined since no flight crew training or proficiency records were kept. There was no indication that the pilot's physical disability contributed to this accident. However, it is significant that the FAA medical certification program did not focus attention on the fact that a medical disability was indicated on one of the pilot's medical certificate application forms.

Some of the weights used in the Board's weight and balance computations are estimates. However, considering the sources of these estimates, the gross weight and c.g. derived from the computations are conservative and valid. These computations reveal that the aircraft was overloaded and excessively tail heavy. The aircraft exceeded the maximum allowable gross weight of the basic D18S specifications by 652 pounds and the rearward c.g. limit by 8.2 inches, gear retracted. The aircraft exceeded the proposed maximum gross weight of the 9,360 conversion by 42 pounds and the rearward c.g. limit by 5.4 inches, gear retracted.

When the c.g. of an airplane lies sufficiently forward of the neutral point,<sup>12/</sup> the airplane possesses a positive static longitudinal stability.<sup>13/</sup> As the c.g. is moved rearward beyond the rear limits, and beyond the neutral point, the aircraft will become unstable. If the c.g. is moved sufficiently rearward of the neutral stability point there may not be sufficient elevator effectiveness to reverse an unwanted pitching motion.

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<sup>12/</sup> That c.g. position at which the slope of the curve of pitching-moment coefficient versus angle of attack is equal to zero.

<sup>13/</sup> Positive static longitudinal stability occurs at any c.g. position at which the slope of the curve of pitching-moment coefficient versus angle of attack is negative. Negative static longitudinal stability occurs at c.g. position at which the slope of the curve of pitching-moment coefficient versus angle of attack is positive.

N2999 had been modified in accordance with a proposed STC to increase the maximum takeoff gross weight, extend the aft c.g. limit, and, in accordance with an FAA Form 337, modify the passenger compartment by installing eight seats and a baggage compartment. This STC had not been approved prior to the approval of the Flight Manual Supplement, nor at the time of the accident.

The approval did not occur until February 24, 1964. The practice of back-dating the STC opened the door to operation of an unairworthy aircraft.

The landing gear was up and flaps were in the full-down position at time of impact. The full-flap condition in this aircraft does two things. It moves the center of lift aft, causes a slower than normal lift-off speed and produces drag. However, the c.g. was so far aft of the aircraft's controllability limits that the effect of full flaps was negligible.

The full nosedown elevator trim position verifies the tail heavy loading of the aircraft at the time of the accident and indicates an attempt by the pilot to lower the nose by use of trim in addition to the use of the elevator.

The Board concludes that N2999 was loaded to a c.g. of plus 125.9 inches aft of datum with the landing gear retracted. The allowable rear c.g. limit of the proposed STC modification was only 120.5 inches, but in this aircraft, it was actually 117.7 inches due to the lack of the elevator-down spring. Takeoff appeared to be normal until gear retraction when uncontrolled maneuvers were observed which were typical of an aircraft which is unstable due to an excessive aft c.g. The out-of-c.g. condition, aggravated further by the rearward shift in center of gravity due to gear retraction, placed the aircraft outside its aerodynamic control parameter with insufficient elevator effectiveness to prevent an excessively nose-high attitude; this resulted in a low altitude stall shortly after takeoff from which recovery was not possible.

#### Probable Cause

The Board determines the probable cause of this accident was the pilot's failure to properly load the aircraft, resulting in insufficient elevator effectiveness to reverse an unwanted pitching motion.

#### Recommendations

As a result of this accident, the Board sent two letters of recommendation to the Administrator, Federal Aviation Agency. They were dated February 28, 1964, and May 8, 1964, and appear as attachments to this report. (See Attachments IV and V.)

BY THE CIVIL AERONAUTICS BOARD:

/s/ ALAN S. BOYD  
Chairman

/s/ ROBERT T. MURPHY  
Vice Chairman

/s/ CHAN GURNEY  
Member

/s/ G. JOSEPH MINETTI  
Member

/s/ WHITNEY GILLILLAND  
Member

## S U P P L E M E N T A L   D A T A

### Investigation

The Civil Aeronautics Board was notified of this accident shortly after its occurrence on February 3, 1964. An investigation was immediately initiated in accordance with the provisions of Title VII of the Federal Aviation Act of 1958, as amended. A public hearing was held at Gainesville, Florida, on March 24-26, 1964.

### Air Taxi Operator

South Central Airlines, Inc., holds Air Taxi Operator Certificate No. 8-SO-36 issued by the Federal Aviation Agency. It operates scheduled flights to approximately 26 airports within the State of Florida.

### Flight Personnel

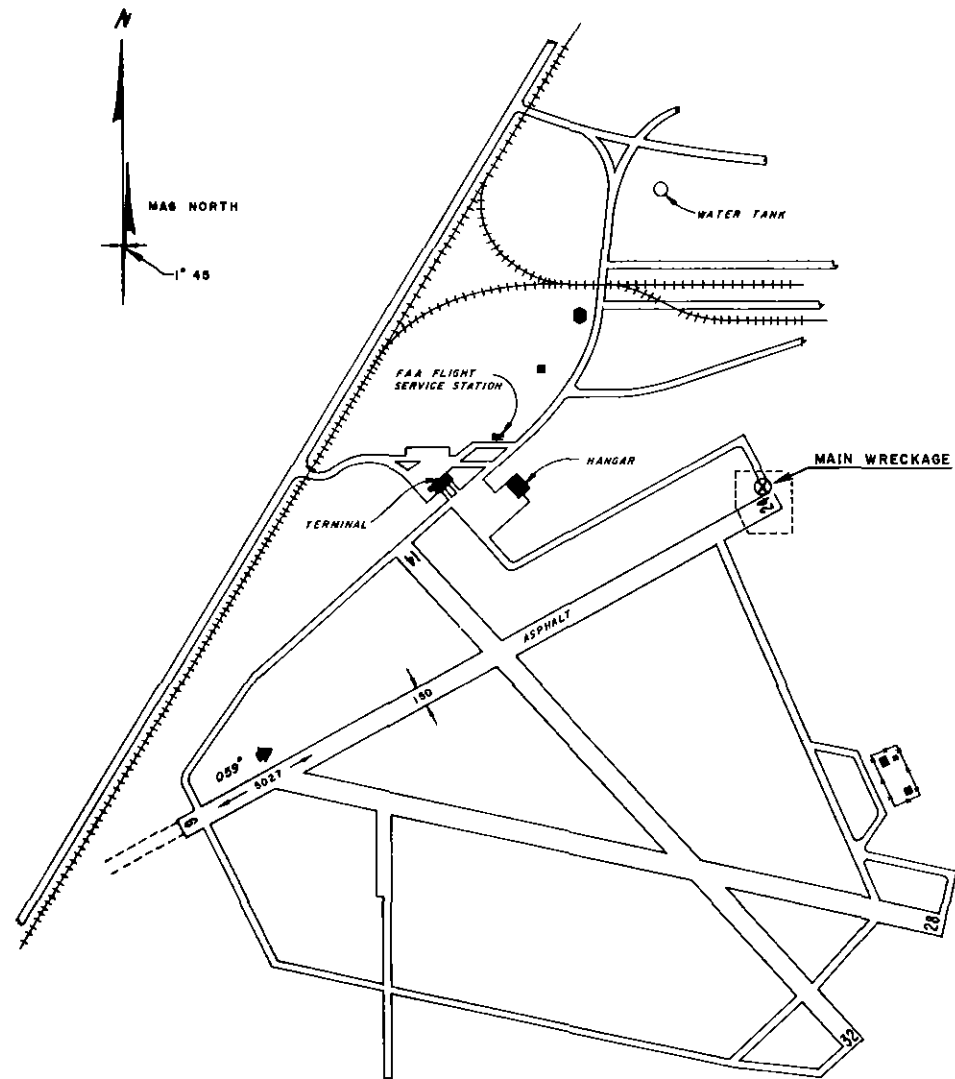
Homer Roger Lee Thompson, age 47, was first employed by South Central Airlines, Inc., on May 4, 1963, and had accumulated a total of 16,647 hours flight time of which 486 hours were in Twin-Beech type aircraft. He held currently effective FAA commercial pilot certificate No. 26930-40, airplane single and multiengine land with instrument and flight instructor rating. Records indicated he had been discharged from the U. S. Navy with a disability rating of 100 percent in November 1954. In October 1959, he was placed on the permanent disability retired list with a disability rating of 100 percent. His condition at that time was classified as arthritis due to trauma rated as severe limitation of motion of the lumbar spine, rheumatoid arthritis and slight impairment of auditory acuity. He held an FAA second-class medical certificate issued July 2, 1963, with the following limitations: "Holder shall possess correcting glasses for near vision while exercising the privileges of his airman certificate."

He satisfactorily passed a company flight check May 12, 1963, using a Piper Aztec (PA-23-250), and an FAA instrument check on May 17, 1963, using a Piper Aztec (PA-23-250).

### Aircraft

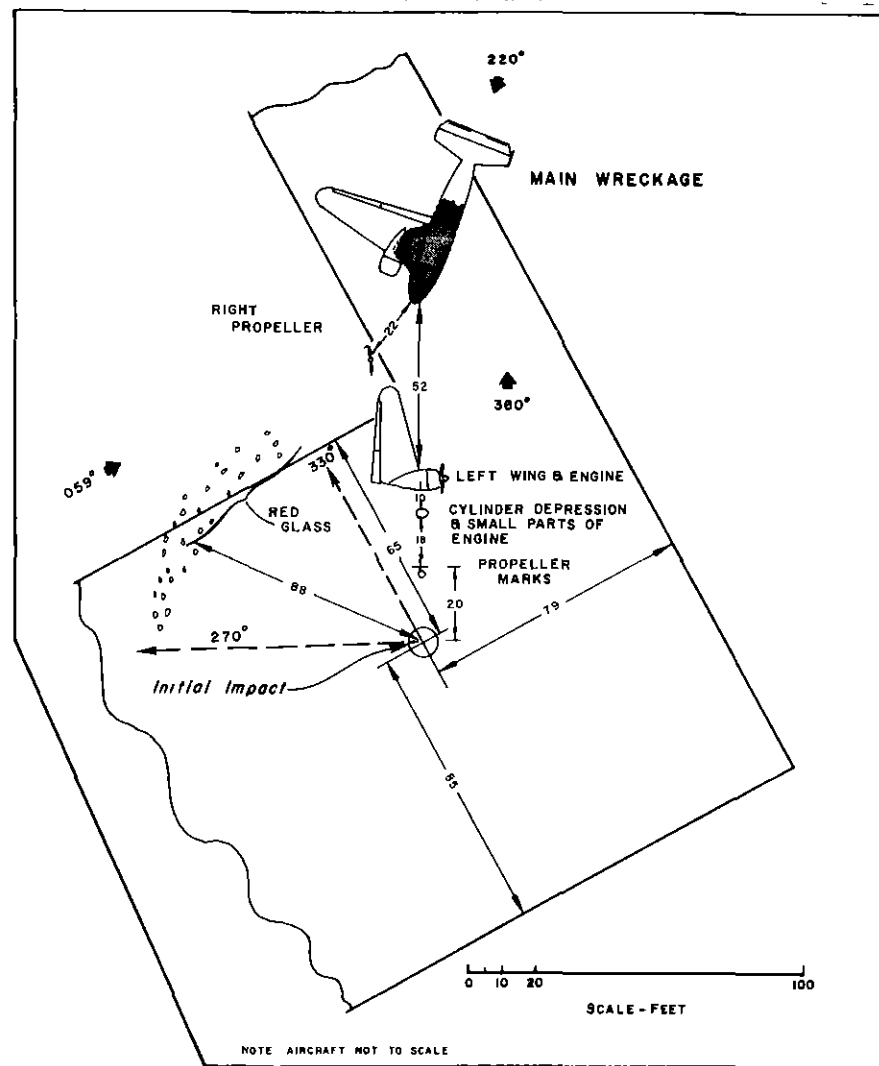
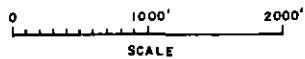
N2999 was originally sold by the manufacturer, Beech Aircraft Corporation, Wichita, Kansas, as a Beech D18S, N1823D, serial No. A-811. In 1953, the aircraft was reregistered by the then owner as N2999. At the time of the accident, it was equipped with two Pratt & Whitney model R 985-AN14B engines with Hamilton Standard model 22D30 propellers. The left engine, serial No. JP206311 was overhauled on January 8, 1964, with total time of 2,514:30 hours. The right engine serial No. JP227420 was overhauled on January 9, 1964, with total time of approximately 1,500 hours. The preflight inspection form of February 2, 1964, indicated N2999 had flown 33:19 hours since the last 100-hour inspection.





**GAINESVILLE MUNICIPAL AIRPORT**

ELEVATION 156 FEET



**CIVIL AERONAUTICS BOARD**

RUNWAY LAYOUT and WRECKAGE DISTRIBUTION CHART  
SOUTH CENTRAL AIRLINES — BEECHCRAFT D18S N2999  
GAINESVILLE, FLORIDA — FEBRUARY 3, 1964

ATTACHMENT II

	<u>Weight</u>	<u>Arm</u>	<u>Moment</u>
Aircraft empty weight	6,379.1	114.53	730,031.4
Oil, 13-1/2 gals. @ 7.4 lbs. per gal.	99.9	93.0	9,290.7
Fuel, 127 gals. front tanks @ 5.86 lbs. per gal. (Note: Full tanks minus 25 gals. burn-off on flight Ocala to Gainesville)	744.2	126.0	93,769.2
Fuel, rear tanks, 50 gals. @ 5.86 lbs. per gal.	293.0	155.0	45,415.0
Pilot	172.0	87.0	14,964.0
Passenger in copilot seat	135.0	87.0	11,745.0
Passenger No. 2	110.0	125.0	13,750.0
Passenger No. 3	169.0	124.0	20,956.0
Passenger No. 4	172.0	156.5	26,918.0
Passenger No. 5	180.0	153.0	27,540.0
Passenger No. 6	178.0	188.0	33,464.0
Passenger No. 7	150.0	182.5	27,375.0
Passenger No. 8	185.0	243.0	44,955.0
Passenger No. 9	205.0	212.0	43,460.0
Baggage, nose compartment	130.0	36.0	4,680.0
Baggage, aft compartment	100.0	243.0	24,300.0
Total takeoff weight & c.g.	<u>9,402.2</u>	<u>124.7</u>	<u>1,172,603.3</u>
Landing gear "UP" condition	9,402.2	125.9	1,184,603.3

### ATTACHMENT III

#### 3.74 MAXIMUM WEIGHT.

(a) The maximum weight shall not exceed any of the following:

- (1) The weight selected by the applicant.
- (2) The design weight for which the structure has been proven, except as provided in § 3.242 for multiengine airplanes. (Revised 3-13, August 25, 1955)
- (3) The maximum weight at which compliance with all of the applicable flight requirements has been demonstrated. (Revised 3-13, August 25, 1955)

(b) The maximum weight shall not be less than the weights under the loading conditions prescribed in subparagraphs (1) and (2) of this paragraph assuming that the weight of the occupants in each of the seats is 170 pounds for the normal category and 190 pounds for the utility and acrobatic categories, unless placarded otherwise. (Revised 3-13, August 25, 1955)

(1) All seats occupied, oil to full tank capacity, and at least a fuel supply for one-half hour operation at rated maximum continuous power. (Revised 3-13, August 25, 1955)

(2) Fuel and oil to full tank capacities, and minimum crew. (Revised 3-17, August 12, 1957)

#### 3.75 MINIMUM WEIGHT.

The minimum weight shall not exceed the sum of the weights of the following:

- (a) The empty weight as defined by § 3.73.
- (b) The minimum crew necessary to operate the airplane (170 pounds for each crew member).
- (c) Fuel and Oil quantities not greater than the minima specified in § 3.74 (b)(1). (Revised 3-2, August 12, 1957)

#### 3.76 CENTER OF GRAVITY POSITION.

If the center of gravity position under any possible loading condition between the maximum weight as specified in § 3.74 and the minimum weight as specified in 3.75 lies beyond (a) the extremes selected by the applicant, or (b) the extremes for which the structure has been proven, or (c) the extremes for which compliance with all functional requirements were demonstrated, loading instructions shall be provided in the Airplane Flight Manual as specified in §§ 3.777 - 3.780.

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ATTACHMENT IV

CIVIL AERONAUTICS BOARD  
Washington, D. C.

February 28, 1964

Mr. George S. Moore  
Director, Flight Standards Service  
Federal Aviation Agency  
Washington, D. C., 20553

Dear Mr. Moore:

During the course of our investigation of the accident involving a South Central Airlines Twin Beechcraft at Gainesville, Florida, on February 3, 1964, the Civil Air Regulations governing such operations were necessarily given very close scrutiny. This review brought to light the fact that Part 42a, under which this operation was being conducted, contains no provisions with respect to the following:

1. Flight time limitations.
2. Requirements for initial and recurrent training and proficiency checks as well as company records regarding same.
3. Definition of "flight deck" and conditions under which a passenger may be carried in the pilot's compartment.
4. Development, maintenance and approval of a company operations manual.

South Central Airlines is one of several air taxi operators operating under Part 42a of the Civil Air Regulations and employing large numbers of twin engine aircraft in extensive scheduled operations. In view of the scheduled nature of such operations and the relatively large numbers of passengers carried, it is our opinion that appropriate regulations covering matters such as those cited above should be promulgated at an early date in the interest of assuring an adequate level of safety.

Mr. George S. Moore (2)

It is recommended, therefore, that urgent consideration be given to the drafting of a new sub-part of the Federal Aviation Regulations governing air taxi operations such as those conducted by South Central Airlines. The operations to be affected would be those in which a certificate of public convenience and necessity was not involved.

Sincerely yours,

/s/ B. R. Allen  
for Leon H. Tanguay  
Director, Bureau of Safety

C O P Y

FEDERAL AVIATION AGENCY  
Washington, D. C. 20553

March 18, 1964

In Reply  
Refer To: FS-40

Mr. Leon H. Tanguay  
Director, Bureau of Safety  
Civil Aeronautics Board  
Washington, D. C. 20428

Dear Mr. Tanguay:

This is in response to your letter of February 28, 1964, reference: B-80-93, in which you made various recommendations for additional regulation of air taxi operators using twin-engine aircraft in extensive scheduled operations.

Your recommendations are most timely and appropriate.

As you know, the Agency has just adopted a separate part of the Federal Aviation Regulations (Part 135, enclosed) which will provide a new and effective regulatory base for the certification and operation of air taxis. This Part, while adequate for the vast majority of air taxi operations, may, however, need some more specific attention directed at the kind of problems you have highlighted.

To this end, we have already initiated a regulatory project, including necessary field studies. In addition to your recommendations, we are giving attention to such other matters as route and ramp checks, aircraft and equipment overhaul requirements.

Any specific information you may have substantiating the need for additional regulation of these and other aspects of the scheduled air taxi operations will be most helpful.

Sincerely yours,

George S. Moore  
Director  
Flight Standards Service

Enclosure

ATTACHMENT V

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CIVIL AERONAUTICS BOARD  
Washington, D. C.

In reply refer to: B-80-96

May 8, 1964

Mr. George S. Moore  
Director  
Flight Standards Service  
Federal Aviation Agency  
Washington, D. C. 20553

Dear Mr. Moore:

During our investigation and public hearing in connection with the accident of South Central Airlines' Beech D18-S, N2999, at Gainesville, Florida, February 3, 1964, several points were brought out concerning the issuance of Supplemental Type Certificates and the surveillance of their use.

The testimony and exhibits in this case show that STC SA2-1246 was issued to Airline Training Incorporated (also known as Conrad International Corporation) on September 20, 1962. This covered a conversion of certain models of the Beech 18 to raise the maximum gross weight to 10,200 pounds. In December 1963 ATI applied for approval of an "economy version" which would raise the gross weight to 9360 pounds. It was decided at the Miami EMDO to treat this as an amendment to SA2-1246 for administrative reasons instead of issuing a new STC. The Flight Manual Supplement for the 9360 conversion was approved by the EMDO on January 10, 1964, and ATI accepted this as approval of the modification. ATI contracted for modification of at least two aircraft, of which one was N2999, according to the amended STC as applied for, but not as it was later approved. (These aircraft were not equipped with the elevator downspring as required by the approved drawings.) The only approval at this point concerning the amended STC was of the Flight Manual Supplement.

Armed with the Flight Manual Supplement approval and an STC number, Mr. W. H. Conrad, president of ATI, in connection with contracting for the modification, made the following entry on a Form 337 (Exhibit 4-G, Docket SA 377):

Design data for Airline Training Inc. Supplemental Type Certificates is the property of Airline Training Inc. and may only be used with their permission. Permission is hereby granted for use of installation drawings, for Beechcraft D18S, Ser. No. A-811, N2999 only, per Supplemental Type Certificate as follows:

Mr. George S. Moore (2)

SA2-213 Wing Tips, in accordance with ATI Dwg. 12034A.  
SA2-383 Stabilizer Change, in accordance with ATI Dwg.  
2103H and 2104.  
Elevator Seal, in accordance with ATI Dwg. 2102D.  
SA2-1246 Increased Gross Weight to 9360 lbs. in accordance  
with Dwg. list 100-1.  
Stall Strips, in accordance with Dwg. 2202A, Sh.1  
and Report 70 rev. 9/12/62. Engine Cooling Ramps,  
in accordance with Dwg. 5318-50. Carb. Ram Air Scoop  
and Heat Mod. in accordance with Dwg. 12026C. Air-  
plane Flight Manual Supplement dated 1/10/64.  
SA2-1230 Extended Tail Wheel, in accordance with ATI Dwg.  
4500A and 4500-1.  
SA2-1261 Tail Wheel Bubble Doors in accordance with ATI Dwg.  
77 and Install. Instruc. #75

AIRLINE TRAINING, INC.

W. H. Conrad, President

Examination of STC Form FAA 2417 (Exhibit 4E, Docket SA 377) would lead one to believe that the amendment to STC SA2-1246 was approved on January 10, 1964, and, therefore, that N2999 was airworthy insofar as the Conrad 9360 conversion is concerned. Testimony at the hearing showed clearly that such was not the case. The supervisor of the Miami EMDO testified that the date on the form notwithstanding, it was not signed by him until February 24, 1964, and was delivered to ATI the following day.

We are of the opinion that the practices of amending existing STC's to include a different modification and of backdating the approvals opens the door to unscrupulous people, and to people who do not fully understand the procedures, to modify and sell or operate unairworthy aircraft. We do not wish to imply that STC's should never be amended. They should be, but only when the amendment is for such purpose as improvement of the existing approved modification or correction of data. The amending process, however, should not be used for an application for a different modification, particularly when there are changes in maximum weight, cg travel, performance or handling characteristics.

Also brought out at the hearing was the fact that under the present procedures, there is little or no control over "STC compatibility". The Beech D18-S offers an excellent example. There are well over one hundred STC's pertaining to this aircraft issued by your regional offices. Among these are:



Mr. George S. Moore (3)

SA1-161	Picture window installation, both sides.
SA3-278	Baggage compartment between bulkheads 10, 11 and 12 (Bulkhead webs removed).
SA3-343	Installation of one new rear window, right side.
SA2-19	Integral step door.
SA4-922	Left hand baggage door and compartment.

These modifications could be performed at different times by different organizations, and it would be very difficult, if at all possible, for the Authorized Inspector of the last such modification to determine if it is compatible with the earlier ones.

An FAA witness testified that it was the Authorized Inspector's responsibility to determine compatibility. We suggest that most authorized Inspectors are not equipped to do so by either training or access to STC data.

It is very unlikely that GADO personnel, upon receiving the Form 337, Major Repair and Alteration Form, would detect either incompatibility or an unapproved modification even though the entries reflected one or more STC numbers. Even reference to the Summary of Supplemental Type Certificates and Approved Replacement Parts would be of little value to the inspector because the Summary gives very little detailed information. Furthermore, there is a time lag of several months between STC approval and its publication in the Summary. STC SA2-1246 (unamended) was approved September 20, 1962, but did not appear in the Summary until Supplement No. 19 was published in November 1963. The amended STC SA2-1246 has not yet been listed.

It was also made evident by FAA witnesses at the hearing that the EMDO and Regional Engineering and Manufacturing would not, under normal circumstances, become aware that an unapproved modification has been incorporated on an aircraft. Since GADO inspectors check Forms 337 only for obvious errors such as weight and balance computations, there appears to be little control in the existing procedures.

In view of the above, we recommend that the FAA reexamine the entire STC program toward the goal of tightening the control over approval of Supplemental Type Certificates and surveillance of aircraft and component

Mr. George S. Moore (4)

modification. In this connection, you might consider the advisability of having the regional office which issued the original Type Certificate review or give the final approval of STC applications for the purpose of establishing compatibility with existing STC's.

Another point brought to light during the investigation into the weight and balance of N2999 was what we consider to be a deficiency in Part 3 of the Civil Air Regulations.

As you no doubt know N2999 was loaded to a cg aft of the neutral stability point and, therefore, was unstable. In fact, the cg would have been at or aft of that point even if the aircraft had been modified according to STC SA2-1246 as finally approved. Calculations show further that in loading the aircraft to conform to the conditions of Paragraph 3.74(b)(1) the cg would be aft of the rear limit, and additional fuel would move it further aft. It then becomes evident that the aircraft would meet the provisions of Paragraph 3.74 but be loaded to an inherently more dangerous condition than just being overweight.

As they now stand, the regulations provide a safeguard, in the form of a placard to warn the pilot, if the aircraft can be easily overloaded, but no such safeguard if it is easily loaded out of cg range. We do not believe that Paragraph 3.76 provides adequate protection in this regard.

We therefore, recommend that FAA consider an amendment to either Paragraph 3.74 or 3.76 which will require a placard if the cg falls outside the established limits when loaded according to Paragraph 3.74(b)(1).

Mr. McWhorter of our Miami office and Mr. Leak of our Engineering Division have the data collected during the accident investigation and can be made available for further discussion with your staff should you so desire.

Sincerely yours,

/s/ Leon H. Tanguay  
Director, Bureau of Safety

COPY

FEDERAL AVIATION AGENCY  
Washington, D. C. 20553

May 28, 1964

In Reply  
Refer To: FS-102

Mr. Leon H. Tanguay  
Director, Bureau of Safety  
Civil Aeronautics Board  
Washington, D. C. 20428

Dear Mr. Tanguay:

This will acknowledge your letter of May 8, 1964, reference B-80-96, regarding your investigation and public hearing in connection with the accident of South Central Airlines' Beech D18-S, N2999, at Gainesville, Florida, February 3, 1964.

Your recommendations that (1) the entire Supplemental Type Certificate program be re-examined toward the goal of tightening the control over approval and surveillance of aircraft and component modification and (2) an amendment to CAR 3 which will require a placard if the cg falls outside the established limits when loaded according to CAR 3.74(b)(1) are being studied and we will advise you further on these matters.

Sincerely yours,

/s/

George S. Moore  
Director  
Flight Standards Service