ADOPTED: 3/1/90

Log # 2077

National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: March 13, 1990
In reply refer to: A-90-20 and 21

Honorable James B. Busey
Administrator
Federal Aviation Administration
Washington, D.C. 20591

On May 24, 1988, a British Aircraft BAC-1-11, N1544, encountered severe weather turbulence as it descended through 13,000 feet during thunderstorm activity about 35 miles west of Orlando, Florida. Three seatbelts detached from their shackles during the turbulence; the three passengers in the seats were displaced and sustained minor injuries. A fourth passenger and two flight attendants also sustained minor injuries resulting from the turbulence. The flightcrew and 53 passengers were not injured. The airplane, operated by Braniff as flight 723 from Indianapolis, Indiana, to Orlando, sustained minor damage but landed at the Orlando airport without further incident.1/

The passenger seatbelts were typical of the type commonly used in air carrier, air taxi, and commercial airplanes. The seatbelt assembly comprised the standard release buckle, webbing, and an attachment fitting with a spring clip keeper at each end of the belt. The attachment fittings clip over shackles that are bolted to the seatframes.

During the Safety Board's investigation of the incident, investigators found that other seatbelts began to detach from seats after they forceably pulled on the belts. Investigators also learned that at least one air carrier had installed a modification on the seatbelts in its airplanes to correct the problem.

Using the facilities of the Civil Aeromedical Institute (CAMI), Federal Aviation Administration (FAA), Safety Board investigators and CAMI engineers conducted tests to identify ways that seatbelt attachment fittings could detach from the shackles bolted to seatframes. The tests revealed that when the bolt used to fasten the shackle to the seatframe is overtightened, the shackle cannot move vertically to self-center. The seatbelt end

1/ NTSB Field Accident Report MIA 881A177, Brief No. 5006 (attached).

fitting is thus prevented from centering on the shackle. Under this condition, the end fitting cannot align with the seat occupant, minimal side loads will force open the spring loaded keeper of the end fitting, and the end fitting will detach from the shackle.

On November 25, 1988, the FAA's Northwest Mountain Region reported the findings of the tests (attached) to FAA headquarters in Washington, D.C., and recommended that a general notice (GENOT) be issued to alert operators of the problem. Safety Board investigators were told that the Office of Flight Standards would be responsible for examining the report and, if warranted, for issuing appropriate corrective measures. Corrective measures have not been taken, and the Safety Board is concerned that operators may be unaware of this unsafe condition related to passenger seatbelts.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

> Issue a maintenance alert to principal maintenance inspectors to inspect seatbelt attachment shackles installed on passenger seats on air carrier, air taxi, and commercial airplanes to verify that the correct bolts are used to fasten the shackles to the seats, the bolts are torqued to the correct value, and the shackles are free to self-center after the correct torque has been applied to the bolts. (Class II, Priority Action) (A-90-20)
>
> Require principal maintenance inspectors to verify that air carrier, air taxi, and commercial operators have maintenance instructions for the proper installation of passenger seatbelt attachment shackles. (Class II, Priority Action) (A-90-21)

KOLSTAD, Chairman, COUGHLIN, Acting Vice Chairman, LAUBER and BURNETT, Members, concurred in these recommendations.

By: James L. Kolstad
Chairman

National Transportation Safety Board
Washington, D.C. 20594

Brief of Incident

File No. - 5006 5/24/88 ORLANDO,FL A/C Reg. No. N1544 Time (Lcl) - 1530 EDT

----Basic Information----

Type Operating Certificate-AIR CARRIER - FLAG/DOMESTIC
Name of Carrier -BRANIFF, INC.
Type of Operation -SCHEDULED,DOMESTIC,PASSENGER
Flight Conducted Under -14 CFR 121
Incident Occurred During -DESCENT

Aircraft Damage
MINOR
Fire
NONE

	Injuries			
	Fatal	Serious	Minor	None
Crew	0	0	2	2
Pass	0	0	4	53

----Aircraft Information----

Make/Model - BRITISH AIRCRAFT BAC-111-203
Landing Gear - TRICYCLE-RETRACTABLE
Max Gross Wt - 79000
No. of Seats - 72

Eng Make/Model - ROLLS ROYCE 506-14D
Number Engines - 2
Engine Type - TURBOJET
Rated Power - 10410 HP

ELT Installed/Activated - UNK/NR
Stall Warning System - YES

----Environment/Operations Information----

Weather Data
Wx Briefing - NWS
Method - IN PERSON
Completeness - FULL
Basic Weather - IMC
Wind Dir/Speed- 180/013 KTS
Visibility - 8.0 SM
Lowest Sky/Clouds - 3500 FT SCATTERED
Lowest Ceiling - 25000 FT BROKEN
Obstructions to Vision- NONE
Precipitation - NONE
Condition of Light - DAYLIGHT

Itinerary
Last Departure Point
INDIANAPOLIS,IN
Destination
ORLANDO,FL

ATC/Airspace
Type of Flight Plan - IFR
Type of Clearance - IFR
Type Apch/Lndg - NONE

Airport Proximity
OFF AIRPORT/STRIP

Airport Data
Runway Ident - N/A
Runway Lth/Wid - N/A
Runway Surface - N/A
Runway Status - N/A

----Personnel Information----

Pilot-In-Command
Certificate(s)/Rating(s)
ATP
ME LAND

Age - 45
Biennial Flight Review
Current - YES
Months Since - 1
Aircraft Type - BAC-111

Medical Certificate - VALID MEDICAL-NO WAIVERS/LIMIT

Flight Time (Hours)

Total	16000	Last 24 Hrs	6
Make/Model	5000	Last 30 Days	80
Instrument	UNK/NR	Last 90 Days	230
Multi-Eng	UNK/NR	Rotorcraft	0

Instrument Rating(s) - AIRPLANE

----Narrative----

THE FLT WAS DESCENDING THRU 13000 FT WHEN TURBULENCE WAS ENCOUNTERED. FOUR PASSENGERS AND TWO FLIGHT ATTENDENTS WERE INJURED. THE PASSENGERS WERE INJURED WHEN THEIR SEATBELTS' END FITTINGS DETACHED FROM THEIR SEATS' TIE-DOWN SHACKLES AND THE PASSENGERS STRUCK CABIN FURNISHINGS. TESTS DETERMINED THAT WHEN A SHACKLE'S ATTACHMENT BOLT WAS OVERTIGHTENED (AND THE SHACKLE WAS NOT FREE TO SELF-CENTER) A SEATBELT LOAD WOULD BEND THE KEEPER ON THE BELT'S END FITTING AND THE FITTING WOULD OPEN AND DETACH FROM THE SHACKLE.

Brief of Incident (Continued)

File No. - 5006 5/24/88 ORLANDO,FL A/C Reg. No. N1544 Time (Lcl) - 1530 EDT

Occurrence #1 IN FLIGHT ENCOUNTER WITH WEATHER
Phase of Operation DESCENT - NORMAL

Finding(s)
1. PASSENGER BRIEFING - ISSUED - PILOT IN COMMAND
2. WEATHER EVALUATION - PERFORMED - PILOT IN COMMAND
3. SEAT BELT SIGN - SELECTED - PILOT IN COMMAND

Occurrence #2 AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation DESCENT - NORMAL

Finding(s)
4. MISC EQPT/FURNISHINGS,SEAT BELT - DISCONNECTED
5. MAINTENANCE,ADJUSTMENT - IMPROPER - OTHER MAINTENANCE PSNL

----Probable Cause----

The National Transportation Safety Board determines that the Probable Cause(s) of this incident is/are finding(s) 4,5

National Transportation Safety Board
Washington, D.C. 20594

Brief of Accident

File No. - 757 4/15/89 WEST CHICAGO,IL A/C Reg. No. N93748 Time (Lcl) - 0851 EDT

----Basic Information----
Type Operating Certificate-ON-DEMAND AIR TAXI
Type of Operation -INSTRUCTIONAL
Flight Conducted Under -14 CFR 91
Accident Occurred During -APPROACH

Aircraft Damage
DESTROYED
Fire
NONE

	Injuries			
	Fatal	Serious	Minor	None
Crew	1	0	0	0
Pass	0	0	0	0

----Aircraft Information----
Make/Model - CESSNA 152
Landing Gear - TRICYCLE-FIXED
Max Gross Wt - 1670
No. of Seats - 2
Eng Make/Model - LYCOMING O-235-L2C
Number Engines - 1
Engine Type - RECIPROCATING-CARBURETOR
Rated Power - 110 HP
ELT Installed/Activated - YES-UNK/NR
Stall Warning System - YES

----Environment/Operations Information----
Weather Data
Wx Briefing - NO RECORD OF BRIEFING
Method - N/A
Completeness - N/A
Basic Weather - VMC
Wind Dir/Speed- 230/010 KTS
Visibility - 15.0 SM
Lowest Sky/Clouds - CLEAR
Lowest Ceiling - NONE
Obstructions to Vision- NONE
Precipitation - NONE
Condition of Light - DAYLIGHT

Itinerary
Last Departure Point
SAME AS ACC/INC
Destination
LOCAL

ATC/Airspace
Type of Flight Plan - NONE
Type of Clearance - NONE
Type Apch/Lndg - TRAFFIC PATTERN

Airport Proximity
ON AIRPORT

Airport Data
DUPAGE
Runway Ident - 28
Runway Lth/Wid - 4000/ 75
Runway Surface - ASPHALT
Runway Status - DRY

----Personnel Information----
Pilot-In-Command
Certificate(s)/Rating(s)
STUDENT

Age - 33
Biennial Flight Review
Current - N/A
Months Since - N/A
Aircraft Type - N/A

Medical Certificate - VALID MEDICAL-WAIVERS/LIMIT

Flight Time (Hours)			
Total -	33	Last 24 Hrs -	1
Make/Model-	32	Last 30 Days-	5
Instrument-	0	Last 90 Days-	12

Instrument Rating(s) - NONE

----Narrative----
STUDENT IN CESSNA 152 (N93748) WAS SEQUENCED TO LND BHND N97M AS BEECH 90 (N20) WAS AWAITING TKOF, AS N97M WAS LNDG, N20 WAS CLRD ON RWY TO HOLD & THE STUDENT WAS CLRD TO LND. 3Y SEC LTR, N20 WAS CLRD FOR TKOF. SHORTLY THEREAFTER, N93748 STALLED AND CRASHED APRX 580' SHORT OF THE RWY. WITNESSES SAID THE STUDENT FLEW FM A CLOSE BASE TO A SHORT FINAL APCH, THEN MADE 2 OR 3 STEEP S-TURNS AT LOW SPEED, AS IF TO GET MORE SEPN BHND N20. TOWER SUPVSR (CIC) OBSERVED INADQT SEPN BUT TOOK NO ACTION TO CORRECT IT. WITNESSES SAID N20 WAS HOLDING ON THE RWY WHEN THE STUDENT BEGAN S-TURNING. BFR TKOF, THE PLT OF N93748 TOLD GND CTL SHE WAS A STUDENT. THIS INFO WAS NOT PASSED TO LCL CTLRS. LCL CTLR WAS IN TRNG. NEITHER HE NOR HIS INSTRUCTOR KNEW THE PLT OF N93748 WAS A STUDENT. AIM RCMDD STUDENT ID ON INITIAL CALL TO RDO FAC. BUT, ATC HNDBK DIDN'T REQUIRE INFO TO BE FWDD. FLAPS WERE FND AT 10 DEG; STUDENT WAS TRND TO USE FULL FLAPS AND USE S-TURNS ON FINAL FOR SPACING, AND TO RAISE FLAPS FULL UP FOR GO-ARND; POH RCMDD 20 DEG OF FLAPS UNTIL SAFE SPEED WAS OBTAINED.

File No. - 757 4/15/89 WEST CHICAGO,IL A/C Reg. No. N93748 Time (Lcl) - 0851 EDT

Occurrence #1 LOSS OF CONTROL - IN FLIGHT
Phase of Operation APPROACH - VFR PATTERN - FINAL APPROACH

Finding(s)
1. CONTROL TOWER SERVICE - INADEQUATE - ATC PSNL(LCL/GND/CLNC)
2. VISUAL SEPARATION - INADEQUATE - ATC PSNL(LCL/GND/CLNC)
3. SUPERVISION - IMPROPER - ATC PERSONNEL(SUPERVISOR)
4. MANEUVER - IMPROPER - PILOT IN COMMAND
5. RAISING OF FLAPS - IMPROPER - PILOT IN COMMAND
6. IMPROPER TRAINING - FLIGHT INSTRUCTOR(ON GROUND)
7. LACK OF TOTAL EXPERIENCE - PILOT IN COMMAND
8. AIRSPEED - NOT MAINTAINED - PILOT IN COMMAND
9. STALL - INADVERTENT - PILOT IN COMMAND

Occurrence #2 IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation APPROACH

----Probable Cause----

The National Transportation Safety Board determines that the Probable Cause(s) of this accident was: IMPROPER INSTRUCTION BY THE STUDENT'S FLIGHT INSTRUCTOR REGARDING THE EXECUTION OF S-TURNS ON FINAL APPROACH TO INCREASE SPACING AND THE RETRACTION OF FLAPS FULLY WHEN EXECUTING A GO-AROUND AND THE FAILURE OF THE STUDENT PILOT TO MAINTAIN ADEQUATE FLYING SPEED WHILE MAKING STEEP S-TURNS ON FINAL APPROACH. CONTRIBUTING FACTORS WERE: INADEQUATE ATC CONTROL TOWER SERVICE AND TRAFFIC SEPARATION, IMPROPER SUPERVISION IN THE TOWER, AND INEXPERIENCE OF THE STUDENT PILOT.

IC 112

ACTION: Service Problems with Seat Belt Installations on Transport Airplanes

NOV 2 5 1988

Manager, Transport Airplane Directorate,
Aircraft Certification Service, ANM-100

Manager, Aircraft Maintenance Division, AFS-300
Manager, Aircraft Engineering Division, AIR-100

On May 24, 1988, a Braniff/Florida Express BAC 1-11 enroute from Indianapolis to Orlando was descending at 13,000 feet, passing through a thunderstorm, when it encountered turbulence. Three passengers were injured when their seat belts became detached from the seat frame. The Miami NTSB office has been investigating this incident, and the initial finding was that the detachment may not be an isolated case. We were told that the Miami FSDO was advised of the problem.

Personnel from the NTSB visited the Civil Aeromedical Institute (CAMI) to discuss the incident with CAMI engineers and better understand the problem. During the visit, they determined it was possible to duplicate the failure by overtightening the bolt attaching the shackle to the seat frame. If the bolt is too tight, the shackle cannot freely rotate, which in turn prevents the belt from properly aligning with the fitting. The belt fitting is not designed to take side loads.

Since this problem could be widespread throughout the fleet of transport airplanes, and since it would be difficult to determine which airplanes are affected, we recommend a GENOT be issued requiring all operators of transport category airplanes to inspect the seat belt attachments on all airplanes for freedom of movement of the shackle, which would allow self-alignment of the belt and fittings when loaded in the normal direction.

We suggest the following words for the GENOT:

"Inspect all air carrier passenger seat belt installations at their attachment to the seats for proper installation of the shackle. Several cases of overtorquing of the shackle bolt have been reported. In each case, overtorquing prevented the shackle from freely rotating, which in turn

prevented the belts from properly aligning with the fitting. Loss of the self-alignment feature of this connection may cause the belt hook keeper to distort under load allowing the hook to release from the shackle. Please forward information concerning any overtorqued shackle bolts that are discovered to ANM-100."

Original signed
Leroy A. Keith

Leroy A. Keith

ANM-112:IConnally:mmd:FTS446-2112
Revised 11/9/88
WP:f.\home\mmd\StBlts
cc:ANM-100L, ANM-100S
File: 8042-25.785