LOG 24166

National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: November 15, 1994
In reply refer to: A-94-177 through -180

Honorable David R. Hinson
Administrator
Federal Aviation Administration
Washington, D.C. 20591

On September 20, 1992, at 1815 central daylight time, a Cessna 152, N4591P, was destroyed when it crashed shortly after taking off from the Ottawa Airport, Ottawa, Illinois. According to witnesses at the airport, the airplane took off from runway 23 and performed a 180° turn as if to return to the airport. As the airplane appeared to line up with runway 05, it rolled to the right and descended vertically to the ground. One witness stated that the airplane was skidding sideways in a level flight attitude approximately 100 to 150 feet above ground level before it dove to the ground. Postaccident inspection of the wreckage by Safety Board investigators revealed a partial failure of the left magneto, which could have caused a rough running engine.

Safety Board investigators found that the airplane was equipped with a Bush Conversions, Inc. Short Takeoff and Landing (STOL) kit. The STOL kit had been approved for use on virtually all previously manufactured Cessna single-engine airplanes by the issuance of Supplemental Type Certificate (STC) SA1371SW on September 20, 1971. The STC was originally issued to an individual who later sold the STC to Bush Conversions. The Safety Board believes that the STOL kit may have adversely affected the airplane's stall characteristics and prevented a normal recovery from a stalled condition as the airplane was being maneuvered back to the airport.

The STOL kit on N4591P included a wing leading edge cuff and stall fence on each wing, affixed to the top of the wing, chordwise, in line with the aileron/flap juncture. The wing stall fence on the accident airplane measured 1.625 inches high at its trailing edge and maintained that height for approximately 70 percent of the fence's length, gradually tapering to the contour of the wing's leading edge.

According to STC SA1371SW, an airplane with the STOL kit installed must not be placed in a spin and must contain a placard prohibiting spins. Discussions with the Cessna Aircraft Company revealed that a similar Cessna single-engine airplane, with a leading edge cuff, similar in shape to the Bush Conversions cuff, was stall- and spin-tested to evaluate its performance at low speed. During this testing, conducted by Cessna around 1970, the airplane

could not be recovered from a spin without a spin chute. As a result, Cessna elected not to offer a STOL option for its single-engine airplanes.

A Federal Aviation Administration (FAA) test pilot who performed flight tests on the Bush Conversions STOL kit in 1971, for the purpose of evaluating whether the STC should be originally approved, reported to the Safety Board that the airplane he tested, a Cessna 150, displayed lateral instability when the wing fences were higher than the brackets mounting them to the wing. He also stated that the lateral instability was most noticeable when the airplane was stalled with the flaps extended and/or if the airplane was in a slip or skidding turn. The brackets, according to drawings on file with the FAA Aircraft Certification Office (ACO) in Wichita, Kansas, are 0.75 inches high. A review of the referenced flight test documents showed no definitive information regarding the height of the stall fence used during the flight test. FAA records show that the test pilot required the STC applicant to limit the height of the stall fences to a height equal to the mounting bracket height (0.75 inches) before STC approval was granted. The STC was amended in 1983, without further flight testing, to approve modification of the Cessna 152 airplane.

After the accident, Safety Board investigators found three additional Cessna 150 airplanes equipped with the Bush Conversions STOL kit and examined the height of the stall fences. The fences installed on these airplanes were found to be from 1.375 to 1.75 inches high, throughout approximately 70 percent of their length.

The available flight test documentation provided by the FAA Wichita ACO did not address the performance of the modified airplane during flight maneuvers such as side- and forward-slips. A Bush Conversions representative informed the Safety Board that the company no longer has the flight test documentation but had provided the information to the FAA.

According to Title 14 Code of Federal Regulations (CFR) Part 21.303, parts for type-certificated airplanes must be manufactured under the provisions of a Parts Manufacturer Approval (PMA) issued by the FAA. The FAA is required to ensure that the manufacturer meets all of the appropriate regulations before issuing the PMA.

Bush Conversions and its predecessors had been granted a PMA for producing STC SA1371SW kits; however, Safety Board investigators found that Bush Conversions had surrendered its PMA approximately 6 years before the accident. This was confirmed by the FAA's Manufacturing Inspection District Office (MIDO) in Wichita, Kansas. However, recent Bush Conversions advertising of the STOL kit states, "We manufacture and fabricate our STOL Kit per approved FAA-PMA-STC spec's." Although the advertising suggests that the kits are still in production, the owner of Bush Conversions stated that the company assembles and sells STOL kits for Cessna single-engine airplanes from its remaining PMA authorized stocks.

According to the Wichita ACO and MIDO, former holders of PMAs may continue to sell kits or parts as long as the kits or parts were manufactured before the surrender or revocation of the PMA. While the Safety Board has not found that parts were manufactured by

Bush Conversions subsequent to the surrender of its PMA, the Board is concerned that there is no requirement to serialize STC SA1371SW parts, and no inventory is required by the FAA when a PMA is surrendered or revoked. The MIDO personnel reported that the FAA has no authority to inspect or to inventory parts of a manufacturer who previously held, but no longer holds, a PMA. Thus, the FAA MIDO personnel reported that they had not been routinely performing such inspections to determine whether parts/kits were being manufactured without proper PMA authorization. The Safety Board is aware of the FAA Suspected Unapproved Parts (SUP) Program (FAA Order 8120.10), which describes the FAA's authority and the means by which inspections may be conducted of non-certificate holders if it is suspected that parts are being produced for installation on type certificated products. However, the Safety Board found the provisions of the SUP program were not well known by FAA Flight Standards inspectors and engineers. To better inform its inspector workforce, a memorandum to Flight Standards personnel was disseminated by the FAA Aircraft Certification Service on March 30, 1994.

Safety Board investigators attempted, through the STC holder, to locate other airplane owners who had installed the Bush Conversions STOL kit on their airplanes but found that there was no requirement for a former PMA organization to maintain sales records and that such records were not maintained by Bush Conversions. The Safety Board was also unable to obtain such information from FAA records. The three airplanes found that had the STOL kits installed were located through an airplane sales publication. The Safety Board is concerned that existing FAA rules do not provide a reliable means to identify and communicate with owners of STC-modified airplanes regarding matters of continuing airworthiness. FAA and corporate sales records have been shown to be inadequate for this purpose.

The Safety Board is concerned that Bush Conversions STOL kits manufactured for use on single-engine Cessna airplanes under STC SA1371SW may not have been manufactured to the requirements of the STC and that those airplanes not in compliance due to higher-than-authorized flow fences may have unsatisfactory lateral stability. Further, the Safety Board is concerned that the FAA does not appear to have a means by which to oversee the continuing distribution of parts or kits after the PMA certificate that originally authorized their manufacturing has been surrendered or revoked.

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

> Issue an airworthiness directive to require all owners of Cessna single-engine airplanes with the Supplemental Type Certificate (STC) SA1371SW Bush Conversions Short Takeoff and Landing (STOL) kit installed to determine the height of the STOL kit stall fences and, if they are not in compliance, to take action as necessary to bring the installation into compliance with the STC. (Class II, Priority Action)(A-94-177).

Implement recertification flight testing for the Bush Conversions Supplemental Type Certificate SA1371SW Short Takeoff and Landing kit, to determine compliance with the FAA requirements for stability and stalls. If the STC modification is proven to produce unsatisfactory flight characteristics, require removal of the SA1371SW STOL kits from all affected airplanes. (Class II, Priority Action)(A-94-178).

Amend 14 CFR Part 21 to require that adequate records will be retained by the Supplemental Type Certificate holder or provided to the FAA so that dissemination of airworthiness directives, service bulletins, and other information regarding continuing airworthiness concerns will be accomplished promptly and not become dependent on maintenance personnel discovering their applicability upon repetitive or annual maintenance inspections. (Class II, Priority Action)(A-94-179).

Determine if FAA air safety inspectors have adequate instructions and knowledge of the enforcement processes of the Suspected Unapproved Parts Program (FAA Order 8120.10) so that any aircraft part not adequately certified may be removed from service. (Class II, Priority Action)(A-94-180).

Chairman HALL, and Members HAMMERSCHMIDT and VOGT concurred in these recommendations. Member LAUBER did not concur.

By: Jim Hall
Chairman

National Tra: .ation Safety Board
Washi .n, D.C. 20594

Brief of Accident

File No. - 0831 9/20/92 OTTAWA,IL A/C Reg. No. N4591P Time (Lcl) - 1815 CDT

----Basic Information----

Type Operating Certificate-NONE (GENERAL AVIATION)
Type of Operation -PERSONAL
Flight Conducted Under -14 CFR 91
Accident Occurred During -CRUISE

Aircraft Damage
DESTROYED
Fire
NONE

	Fatal	Injuries Serious	Minor	None
Crew	1	0	0	0
Pass	0	1	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 - FSS
Method - TELEPHONE
Completeness - FULL
Basic Weather - VMC
Wind Dir/Speed- 130/014 KTS
Visibility - 2.500 SM
Lowest Sky/Clouds - 1500 FT SCATTERED
Lowest Ceiling - 5000 FT OVERCAST
Obstructions to Vision- UNK/NR
Precipitation - NONE
Condition of Light - DAYLIGHT

Itinerary
Last Departure Point
SAME AS ACC/INC
Destination
ST. LOUIS,MO

ATC/Airspace
Type of Flight Plan - IFR
Type of Clearance - NONE
Type Apch/Lndg - STRAIGHT-IN
FULL STOP

Airport Proximity
ON AIRPORT

Airport Data
OTTAWA
Runway Ident - 05
Runway Lth/Wid - 3125/ 50
Runway Surface - ASPHALT
Runway Status - DRY

----Personnel Information----

Pilot-In-Command
Certificate(s)/Rating(s)
COMMERCIAL
SE LAND

Age - 46
Biennial Flight Review
Current - YES
Months Since - 9
Aircraft Type - C152

Medical Certificate - VALID MEDICAL-NO WAIVERS/LIMIT

Flight Time (Hours)

Total	- 1876	Last 24 Hrs	- UNK/NR
Make/Model	- 1500	Last 30 Days	- 60
Instrument	- UNK/NR	Last 90 Days	- 150
Multi-Eng	- UNK/NR	Rotorcraft	- UNK/NR

Instrument Rating(s) - AIRPLANE

----Narrative----

SHORTLY AFTER TAKEOFF, THE AIRPLANE WAS OBSERVED TURNING AS IF TO RETURN FOR LANDING. A WITNESS REPORTED OBSERVING IT MANEUVERING TO LINE UP FOR A LANDING ON THE RUNWAY OPPOSITE ITS TAKEOFF RUNWAY. THE WITNESS STATED HE OBSERVED THE AIRPLANE WINGS LEVEL AND MOVING SIDEWAYS. THE AIRPLANE THEN STALLED AND SPUN TO THE GROUND. ON-SCENE INVESTIGATION REVEALED THAT THE LANDING FLAPS WERE FULLY EXTENDED. THE AIRPLANE WAS EQUIPPED WITH AN FAA-APPROVED SHORT TAKEOFF OR LANDING (STOL) WING MODIFICATION. THE HEIGHT OF THE WING FLOW FENCES WERE FOUND TO BE INCORRECT ACCORDING TO THE STC DRAWINGS. AN FAA TEST PILOT STATED THAT HE HAD REQUIRED THAT THE FLOW FENCES BE LOWERED DUE TO AERODYNAMIC INSTABILITIES WITH FENCES TOO HIGH. OTHER SIMILAR AIRPLANES WERE FOUND WITH THE WING FLOW FENCES TOO HIGH. INVESTIGATION INTO THE PILOT'S FLYING HABITS REVEALED THAT HE OFTEN PERFORMED WING'S LEVEL RUDDER TURNS. THE INVESTIGATION ALSO REVEALED A PARTIAL MAGNETO FAILURE WHICH WOULD HAVE RESULTED IN A PARTIAL LOSS OF ENGINE POWER.

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Occurrence #1 LOSS OF ENGINE POWER(PARTIAL) - MECH FAILURE/MALF
Phase of Operation TAKEOFF - INITIAL CLIMB

Finding(s)
1. IGNITION SYSTEM,MAGNETO - FAILURE,PARTIAL
2. IGNITION SYSTEM,IGNITION POINTS - BURNED
3. IGNITION SYSTEM,IGNITION HARNESS - FAILURE,PARTIAL

Occurrence #2 LOSS OF CONTROL - IN FLIGHT
Phase of Operation MANEUVERING - TURN TO LANDING AREA (EMERGENCY)

Finding(s)
4. PRECAUTIONARY LANDING - ATTEMPTED - PILOT IN COMMAND
5. AIRSPEED - NOT MAINTAINED - PILOT IN COMMAND
6. AIRCRAFT/EQUIPMENT,INADEQUATE DESIGN - MANUFACTURER
7. INADEQUATE CERTIFICATION/APPROVAL,MANUFACTURER - FAA(ORGANIZATION)
8. STALL/SPIN - INADVERTENT - PILOT IN COMMAND
9. REMEDIAL ACTION - NOT POSSIBLE - PILOT IN COMMAND

Occurrence #3 IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation DESCENT - UNCONTROLLED

----Probable Cause----

The National Transportation Safety Board determines that the Probable Cause(s) of this accident was:
PILOT DID NOT MAINTAIN A PROPER AIRSPEED WHICH LED TO AN INADVERTENT STALL/SPIN AT A LOW ALTITUDE WHERE THE PILOT COULD NOT PERFORM A RECOVERY.