



Log 2005

National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: May 10, 1988

In reply refer to: A-88-57 and -58

Honorable T. Allan McArtor
Administrator
Federal Aviation Administration
Washington, D.C. 20591

On April 17, 1987, a Ted Smith Aerostar 601P, N90518, sustained minor damage during an in-flight fire in the left engine. ^{1/} The engine was secured, and the twin-engine, six-passenger airplane landed safely. The airplane engines had been modified in accordance with Machen, Inc., Supplemental Type Certificate (STC) No. SA980NW to increase engine power.

Examination of the left engine revealed that the two clamps at the exhaust stack/waste gate connection were loose. The loose clamps allowed hot exhaust gases to escape onto the turbocharger oil supply hose, P/N CAA04S160, located nearby. The oil hose was wire-reinforced and protected by a fire sleeve, but it failed due to prolonged exposure to heat. Oil from the failed hose then contacted the hot exhaust stacks and turbocharger, resulting in an oil-fed fire. At the time of the accident, the failed oil supply hose had completed 422.3 hours since installation and 83.3 hours since the last annual 100-hour inspection.

A review of Federal Aviation Administration (FAA) service difficulty reports indicated other incidences of oil supply hose failures which were related to in-flight engine fires on Aerostar 601 airplanes with the Machen STC installation. In two other instances of in-flight engine fires on Machen-modified Aerostar 601 airplanes, the source of the fire could not be identified, but it was generally believed the fires originated in the accessory section.

Aerostar model airplanes are manufactured by Piper Aircraft Corporation (Piper). At present, 33 Piper Aerostar airplanes that incorporate the Machen STC installation remain in service.

In June 1987, Machen issued service bulletin (SB) 66-018 which recommended that operators inspect the exhaust system clamps and reroute the turbocharger oil hose. The Safety Board is aware that some operators have complied with the SB. However, to prevent further in-flight engine fires which could lead to loss of the airplane, the Safety Board believes that the FAA should issue an airworthiness directive which incorporates provisions of Machen SB 66-018.

^{1/} For more detailed information, read Field Accident Brief No. 5018 (attached).

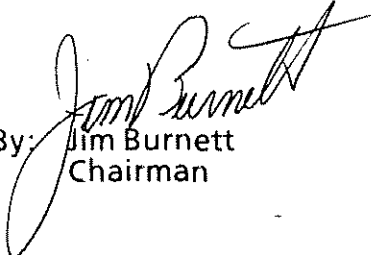
Besides Machen-modified Piper airplanes, other models of the Piper PA-60 airplanes also have experienced in-flight engine fires due to exhaust system leaks and misrouted oil supply hoses. Piper issued SB 761 dated April 18, 1983, SB 815 dated January 3, 1986, and SB 818 dated February 25, 1986, that address similar problems on PA-60-600, -601, -601P, -602P, and -700P model Aerostar airplanes.

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

Issue an airworthiness directive which would require compliance with Machen, Inc., Service Bulletin 66-018 regarding security of exhaust system clamps and placement of the turbocharger oil hose on all airplanes modified in accordance with Machen, Inc., Supplemental Type Certificate No. SA980NW. (Class II, Priority Action) (A-88-57)

Issue an airworthiness directive which would require compliance with Piper Service Bulletins 761, 815, and 818 regarding, respectively, exhaust system inspection, oil supply hose replacement, and hose clamping for unmodified Piper PA-60-600, -601, -601P, -602P, and -700P model Aerostar airplanes. (Class II, Priority Action) (A-88-58)

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

By: 
Jim Burnett
Chairman

Brief of Incident

File No. - 5018 4/17/87 LAS VEGAS,NV A/C Reg. No. N90518 Time (Lcl) - 1445 PDT

Basic Information-----
Type Operating Certificate-NONE (GENERAL AVIATION)

Type of Operation -PERSONAL
Flight Conducted Under -14 CFR 91
Incident Occurred During -CLIMB

Aircraft Damage
MINOR
Fire
IN FLIGHT
Fatal Serious Minor Injuries
0 0 0 None
0 0 0 1
Crew Pass
Pass 4

Aircraft Information-----

Make/Model - SMITH AEROSTAR 601P
Landing Gear - TRICYCLE-RETRACTABLE
Max Gross Wt - 6000
No. of Seats - 6

End Make/Model - LYCOMING L/TIO-540
Number Engines - 2
Engine Type - RECIP-FUEL INJECTED
Rated Power - 350 HP

Environment/Operations Information-----

Weather Data
Wx Briefing - UNK/NR
Method - UNK/NR
Completeness - UNK/NR
Basic Weather - VMC
Wind Dir/Speed- 220/013 KTS
Visibility - 40.0 SM
Lowest Sky/Clouds - 25000 FT THIN BKN
Lowest Ceiling - NONE
Obstructions to Vision- NONE
Precipitation - NONE
Condition of Light - DAYLIGHT

Itinerary
Last Departure Point
LAS VEGAS,NV
Destination
FRESNO,CA

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)/Ratings(s)
COMMERCIAL
SE LAND,ME LAND

Age - 59
Biennial Flight Review
Current - NO
Months Since - 25
Aircraft Type - UNK/NR

Medical Certificate - VALID MEDICAL-WAIVERS/LIMIT
Flight Time (Hours)
Total - 1800
Make/Model- 900
Instrument- UNK/NR
Multi-Eng - UNK/NR

Last 24 Hrs - UNK/NR
Last 30 Days- UNK/NR
Last 90 Days- 17
Rotorcraft - UNK/NR

Instrument Ratings(s) - AIRPLANE

Narrative-----

APRX 422 FLT HRS BFR THE FLT, THE SMITH AEROSTAR 601P WAS MODIFIED IAW MACHEN STC SA980NW, DRG LEVEL OFF AT 16,500' MSL, BLISTERING & DISCOLORATION WERE NOTED ON THE #1 ENG MACELLE, THE FLT SHUT DOWN & FEATHERED THE #1 ENG, THEN RETURNED TO THE DEPARTURE ARPT & LANDED WITHOUT FURTHER INCIDENT. AFTER LNDG, AN EXAM REVEALED AN IN-FLT FIRE HAD OCCURRED, WHICH RESULTED IN MINOR DMG OF THE ENG ACCESSORY SECTION. TWO EXHAUST CLAMPS WERE FOUND LOOSE AT THE EXHAUST STACK WASTE GATE CONNECTION. HOT GASES FROM THE LOOSE CONNECTION HAD ESCAPED & IMPINGED ON THE TURBOCHARGER OIL SUPPLY HOSE (MACHEN PN CA04S160). THE HOSE WAS WIRE REINFORCED & FIRE SLEEVED, BUT WAS LOCATED CLOSE TO THE EXHAUST STACK. THERE WAS EVIDENCE THAT IT HAD RUPTURED FROM PROLONGED EXPOSURE TO HEAT, ESCAPING OIL FROM THE HOSE CAME IN CONTACT WITH THE HOT EXHAUST STACK & TURBOCHARGER, WHICH RESULTED IN A FIRE.

Brief of Incident (Continued)

File No. - 5018 4/17/87 LAS VEGAS, NV A/C Reg. No. N90518 Time (LCL) - 1445 PDT

Occurrence #1 AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation CLIMB - TO CRUISE

Findings(s)

1. EXHAUST SYSTEM, CLAMP - LOOSE
2. EXHAUST SYSTEM - LEAK
3. LUBRICATING SYSTEM, OIL LINE - OVERTEMPERATURE
4. MAINTENANCE/MODIFICATION - INADEQUATE -
5. PROCEDURE INADEQUATE, CONDITION(S)/STEP(S) INSUFFICIENTLY DEFINED - PRODUCTION/DESIGN PSNL
6. LUBRICATING SYSTEM, OIL LINE - FAILURE, PARTIAL
7. FLUID, OIL - LEAK

Occurrence #2 FIRE
Phase of Operation CLIMB - TO CRUISE

Findings(s)

8. ENGINE ASSEMBLY, OTHER - FIRE
9. EMERGENCY PROCEDURE - PERFORMED -
10. PROPELLER FEATHERING - PERFORMED -
11. PRECAUTIONARY LANDING - PERFORMED -

-----Probable Cause-----

The National Transportation Safety Board determines that the Probable Cause(s) of this incident is/are finding(s) 1,2,3,4,6,7,8

Factor(s) relating to this incident is/are finding(s) 5