



National Transportation Safety Board

Washington, D.C. 20594
Safety Recommendation

LOG 2570

ADOPTED
12/7/95

AS-1

Date: DEC 21 1995

In reply refer to: A-95-148

FTW-95-IA 127

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

On February 21, 1995, an Israel Aircraft Industries (IAI) 1124 (Westwind I), N66JE, sustained substantial fire damage while parked at the Denver-Stapleton International Airport. The fire aboard the twin fan-jet occurred during a routine aircraft interior/cockpit preflight check and was caused by a faulty oxygen system.¹ Although nobody was injured in this event, the Safety Board is concerned that a recurrence of this kind, particularly in flight, could result in a catastrophic loss of life and property.

When the first officer turned on the airplane's main oxygen supply valve on the oxygen system pressure reducer-regulator assembly, he heard a loud hissing sound. A fire erupted above his right arm, and the cockpit was almost immediately engulfed in flames. However, he was able to duck under the fireball and evacuated the aircraft uninjured. The captain, who was outside the aircraft, observed flames coming through the aircraft's main entry door. The fire melted the oxygen regulator assembly, burned a hole in the right forward side wall of the aircraft, and caused substantial damage to the cabin interior before it was extinguished by ramp personnel.

Because of the fire damage, an effective examination of the oxygen system regulator assembly for function and leakage was not possible. However, the oxygen supply cylinder was removed and examined by IAI. The examination revealed that the cylinder contained deposits consisting of phthalates, hydrocarbons, fatty acids, and zinc bis (n,n-diethyldithiocarbamate), the latter being documented as a catalyst. The report prepared by IAI concluded that oil was present in the deposits found in the oxygen cylinder.

The United States distributor for IAI airplanes, Astra Jet Corporation, subsequently distributed an advisory to all of its operators concerning the fire that stated, in part:

¹For more detailed information, read Field Accident Brief 569 (attached).

Several known factors may have triggered the ignition. Atmospheric conditions existing at the time of the incident were conducive to high static charge build-up. Refueling of the aircraft had been completed only minutes before the incident. Refueling of an aircraft can create high static electrical potential. The preflighting crewmember's clothing included a leather jacket which, when rubbed across the aircraft's lamb-skin covered cockpit seatcovers may have generated a high potential static charge. As this was happening, he reached across the cockpit from the left side to grasp and open the oxygen valve.

During the brief period oxygen is being introduced at a high rate from a pressure source (storage bottle) to an area of "ambient" pressure, oxygen is momentarily in its most "unstable" condition. It is believed the presence of static electricity combined with oxygen fueled by the oil within the oxygen supply caused ignition of the unstable oxygen/fuel mixture within the regulator cavities of a force adequate to mechanically rupture a component of the regulator. The fire then was free to burn uninhibited in the atmosphere until the fuel source was exhausted.

A review of the oxygen cylinder's maintenance records indicated that it had been serviced by Tec-Air Services, Incorporated's (Tec-Air), East Northport, New York, repair station on November 30, 1990, and again at Tec-Air's Macon, Georgia, repair station on January 11, 1994. According to Tec-Air records, the service included removing the cylinder valve, inspecting and cleaning the cylinder's interior, testing the cylinder hydrostatically, cleaning and overhauling the cylinder valve, purging/recharging the cylinder, and checking for leakage.

The operator of N66JE, Professional Jet Management, reported that the oxygen cylinder in another of its corporate jet airplanes, a Hawker Siddeley 125-700A, had also been serviced by Tec-Air, but upon reinspection was found unserviceable because of internal corrosion.

In December 1994, the Federal Aviation Administration (FAA) inspected Tec-Air's East Northport facility, Repair Station No. MA1R315K, and found that Tec-Air had violated or failed to demonstrate compliance with 10 sections of the Federal Aviation Regulations relating to Parts 21, 43, and 145. The investigation cited numerous occasions on which Tec-Air had approved oxygen cylinder assemblies and aircraft fire extinguishers for return to service, including parts utilized on passenger-carrying aircraft under Part 121, when such equipment was unairworthy. Based on Tec-Air's inadequate record system, it could not be determined whether Tec-Air replaced parts as required during overhaul, utilized old parts, or changed the parts at all. Additionally, Tec-Air manufactured and/or altered oxygen hose assemblies without appropriate parts manufacturing approval and subsequently sold the parts under false pretenses, indicating that they were manufactured by another (authorized) manufacturer:

Based on the above information, the FAA concluded that other aircraft emergency equipment, including oxygen regulators, panels, valves, and masks, may also have been improperly overhauled or repaired before it was returned to service. On January 4, 1995, Tec-Air's East Northport, New York, repair station certificate was suspended under an emergency

order. On the same date, affiliated Tec-Air repair stations in Macon, Georgia, and in Kent, Washington, voluntarily surrendered their respective repair certificates.

Two Tec-Air executives recently pleaded guilty to five felony counts of providing substandard emergency equipment to a number of customers, including the Boeing Defense and Space Group, the agency that services the President's and Vice President's airplanes, Air Force One and Air Force Two. Testing conducted earlier this year by the Air Force disclosed that certain equipment serviced by Tec-Air, including oxygen supply cylinders, was unairworthy.

In February 1995, the FAA had referred to unairworthy emergency equipment in Advisory Circular (AC) No. 43-16, "General Aviation Airworthiness Alerts," recommending that appropriate action be taken to determine whether oxygen cylinders, oxygen hoses, and other components serviced by Tec-Air met all applicable airworthiness requirements. While the Safety Board agrees with the intent of this advisory, the appropriate remedial action is discretionary and may be misinterpreted or misconstrued as merely a perfunctory check. As a result, the Safety Board does not believe that the detailed service/inspection requirements necessary to ensure the continued airworthiness of such equipment, particularly oxygen supply cylinders and regulator assemblies, have been or will be complied with in all cases.

Contamination or corrosion of oxygen system supply cylinders and/or leakage of high-pressure oxygen in the cockpit pose extreme fire hazards. Moreover, the airworthiness of oxygen system components last serviced by Tec-Air can only be ascertained by a complete, detailed inspection. Such an inspection, where applicable, should be equivalent to the comprehensive inspection and service normally performed only at scheduled component removal times, e.g., inspection, cleaning, testing, and overhaul of oxygen supply cylinders and valves. Inspection of oxygen regulator assemblies must include a test for leakage.

Therefore, given the sudden and catastrophic nature of the oxygen leak at the oxygen system regulator assembly in N66JE, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Issue an airworthiness directive applicable to all emergency equipment last serviced by Tec-Air Services, Inc., including oxygen supply cylinders and oxygen system pressure reducer-regulator assemblies, requiring detailed inspection, testing, and servicing as necessary to ensure its continued airworthiness. (Class II, Priority Action) (A-95-148)

Chairman HALL, Vice Chairman FRANCIS, and Members HAMMERSCHMIDT and GOGLIA concurred in this recommendation.

by:


Jim Hall
Chairman

National Transportation Safety Board
Washington, D.C. 20594

Brief of Accident

FTW95LA127
FILE NO. 569 02/21/95 DENVER, CO AIRCRAFT REG. NO. N66JE TIME (LOCAL) - 08:45 MST

MAKE/MODEL - ISRAEL INDUSTRIES 1124
ENGINE MAKE/MODEL - GARRETT 731-3-1G
NUMBER OF ENGINES - 2
OPERATING CERTIFICATES - On-demand
TYPE OF FLIGHT OPERATION - Business
REGULATION FLIGHT CONDUCTED UNDER - 14 CFR 91

AIRCRAFT DAMAGE - Substantial
CREW
PASS
FATAL 0
SERIOUS 0
MINOR/NONE 2
0

AIRCRAFT DAMAGE - Substantial

CONDITION OF LIGHT - Daylight

WEATHER INFO SOURCE - Unk/Nr

BASIC WEATHER - Not reported
LOWEST CEILING - Unk/Nr
VISIBILITY - Unk/Nr
WIND DIR/SPEED - Unk/Nr
TEMPERATURE (F) - Unk/Nr
OBSTR TO VISION - None
PRECIPITATION - None

LAST DEPARTURE POINT - Same as Accident
DESTINATION - Local

AIRCRAFT PROXIMITY - On airport
AIRPORT NAME - STAPLETON INTERNATIONAL
RUNWAY IDENTIFICATION - Unk/Nr
RUNWAY LENGTH/WIDTH (Feet) - Unk/Nr
RUNWAY SURFACE - Unk/Nr
RUNWAY SURFACE CONDITION - Unk/Nr

PILOT-IN-COMMAND AGE - 50

CERTIFICATES/RATINGS
Commercial, Airline transport
Single-engine land, Multi-engine land
INSTRUMENT RATINGS
Airplane

FLIGHT TIME (Hours)
TOTAL ALL AIRCRAFT - 8200
LAST 90 DAYS - 70
TOTAL MAKE/MODEL - 1400
TOTAL INSTRUMENT TIME - 900

DURING PREFLIGHT OF THE AIRPLANE, THE FIRST OFFICER OPENED THE MAIN OXYGEN SUPPLY VALVE IN THE COCKPIT AND HEARD A LOUD HISSING SOUND. ALMOST IMMEDIATELY THEREAFTER, THE COCKPIT WAS ENGULFED IN FLAMES, BUT THE COPILOT WAS ABLE TO ESCAPE. HE EXITED THE AIRPLANE UNINJURED. THE FIRE MELTED THE OXYGEN SYSTEM PRESSURE REDUCER-REGULATOR ASSEMBLY, BURNED A HOLE IN THE RIGHT FORWARD SIDE WALL OF THE AIRPLANE, AND CAUSED SUBSTANTIAL DAMAGE TO THE CABIN INTERIOR BEFORE IT WAS EXTINGUISHED BY RAMP PERSONNEL. A LABORATORY ANALYSIS DISCLOSED THE PRESENCE OF OIL IN A "DEPOSIT" FOUND ON THE INTERIOR OF THE OXYGEN CYLINDER.

Brief of Accd (Continued)

FTW95-127
FILE NO. 569 02/21/95 DENVER, CO AIRCRAFT REG. NO. N660E TIME (LOCAL) - 08:45 MST

Occurrence# 1 FIRE
Phase of Operation STANDING - PRE-FLIGHT

- Findings
1. - MAINTENANCE, SERVICE OF AIRCRAFT - INADEQUATE - OTHER MAINTENANCE PERSONNEL
 2. - OXYGEN SYSTEM - LEAK
 3. - OXYGEN SYSTEM - FIRE
 4. - OXYGEN SYSTEM - CONTAMINATION

The National Transportation Safety Board determines that the Probable Cause(s) of this Accident was:
AN OXYGEN LEAK AT THE OXYGEN SYSTEM PRESSURE REDUCER-REGULATOR ASSEMBLY, RESULTING IN A CREW COMPARTMENT FIRE.