ASOS RESEARCH BRIEF

Research Request:

I am looking for aircraft accidents/incidents that occurred during the servicing of aircraft crew or passenger oxygen (fires,etc.).

Research Response:

The danger associated with servicing oxygen systems is extremely high if the proper precautions are not taken. The volatile nature of pure oxygen makes it highly flammable with the weakest of ignition sources. Elements such as hydrocarbons and moisture are typical sources of friction in oxygen systems. Only properly trained personnel must service oxygen to avoid hazards such as rapid servicing and contamination.

A search of the NASA ASRS, FAA AID (Accident/Incident Database), and NTSB databases produced the following sampling of oxygen-related servicing accidents.

ValuJet Flight 592

One of the most severe oxygen-related accidents occurred in May of 1996, with the crash of a DC-9 ValuJet aircraft. The aircraft experienced an in-flight fire from a chemical oxygen generator in the cargo compartment. Unfortunately, these chemical oxygen generators were not properly expended, nor were they identified as such by the vendor for ValuJet. The NTSB also stated ValuJet's failure to properly oversee the vendor's operations was a casual factor. The reason for the actual ignition of the fire was stated in the full NTSB report as: "The investigation further found that safety caps were not installed over the percussion caps that start a chemical reaction in the oxygen generators; lanyards for the retaining pins for the percussion caps' spring-loaded actuation mechanism were not secured on several generators; and the generators were not packaged adequately to prevent generators from striking the actuation mechanism or dislodging retaining pins on adjacent generators…the Safety Board concludes that the activation of one or more chemical oxygen generators in the forward cargo compartment of the airplane initiated the fire on ValuJet flight 592."


An oxygen canister

For access to the full report, visit: http://www.airdisaster.com/reports/ntsb/AAR97-06.pdf

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215-345-6782

EMS Helicopter

In the case of this accident, an explosion occurred while servicing medical oxygen. A Bell 206 EMS helicopter pilot was slowly opening a medical oxygen valve in the baggage compartment when the explosion occurred. The pilot was thrown from the helicopter and severely injured. The ATSB (Australian Transportation Safety Board) determined the explosion source was a high pressure hose between the oxygen regulator and oxygen pressure gauge. The ATSB stated the system was not adequately cleaned, used a poor quality adapter, and used a flexible hose that was not the best type to use for the system. The ATSB also stated there was a general lack of knowledge among flight crews on the proper use and dangers of oxygen.

For a full description of the accident, please contact us at: asos@aviationresearch.com

U.S. Navy P-3's

In 1998 and 2003 U.S. Navy P-3's experienced two oxygen-related fires while on the ground. Both aircraft were destroyed as a result of the fires. The cause of the fires was determined to either be due to compression heating or particle impact from an oxygen leak. A NASA research report on the accidents stated, "It was surmised that the fire started due to heat generated by an oxygen leak past a silicone check valve seal or possibly because of particle impact near the seat of one of the MCV assembly check valves. An additional analysis of fires in several check valve poppet seals from other aircraft is discussed. These burned poppet seals came from P-3 oxygen systems that had been serviced at the Naval Air Station in Jacksonville following standard fill procedures. It was concluded that these seal fires occurred due to the heat from compression heating, particle impact, or the heat generated by an oxygen leak past the silicone check valve seal. The fact that catastrophic fires did not occur in the case of each check valve seal fire was attributed to the protective nature of the aluminum oxide layer on the check valve poppets. To prevent future fires of this nature, the U.S. and Canadian fleets of P-3 aircraft have been retrofitted with MCV assemblies with an upgraded design and more burn-resistant materials."

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Israeli Aircraft Industries 1124

This particular accident occurred while the crew was testing the flow of oxygen in February 1995. A fire immediately ensued and luckily everyone was able to escape uninjured. It was revealed the oxygen cylinder was contaminated, thus causing the fire.

The NTSB synopsis stated:

> 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.

> The National Transportation Safety Board determines the probable cause(s) of this accident as follows:
> AN OXYGEN LEAK AT THE OXYGEN SYSTEM PRESSURE REDUCER-REGULATOR ASSEMBLY, RESULTING IN A CREW COMPARTMENT FIRE.

For a full description of this accident, please contact asos@aviationresearch.com

Following are a few more samples of oxygen servicing-related accidents from the FAA AID database.

ASIAS BRIEF REPORT

GENERAL INFORMATION

Data Source:	ACCIDENT AND INCIDENT DATABASE
Report Number:	20050726015549C
Local Date:	26-JUL-05
Local Time:	
City:	NEW ORLEANS
State:	LA
Airport Name:	LAKEFRONT
Event Type:	INCIDENT - AIR CARRIER
Mid Air Collision:	NOT A MIDAIR

AIRCRAFT INFORMATION

Aircraft Damage:	SUBSTANTIAL
Aircraft Make:	BEECH
Aircraft Model:	BE-65
Aircraft Series:	BE-65-A90
Airframe Hrs:	14682
Operator:	

NARRATIVE

(-23) AIRCRAFT CAUGHT FIRE WHILE THE **OXYGEN** CYLINDER WAS BEING SERVICED.

Detail

Primary Flight Type:	AIR TAXI (NON-SCHEDULED)
Secondary Flight Type:	UNKNOWN
Type of Operation:	AIR TAXI/COMMUTER
Registration Nbr:	801KM
Total Aboard:	
Fatalities:	0
Injuries:	0
Landing Gear:	
Aircraft Weight Class:	UNDER 12501 LBS
Engine Make:	PWA
Engine Model:	PT6*
Engine Group:	PT6

ASIAS BRIEF REPORT

GENERAL INFORMATION

Data Source:	ACCIDENT AND INCIDENT DATABASE
Report Number:	19930803035799G
Local Date:	03-AUG-93
Local Time:	
City:	KANSAS CITY
State:	MO
Airport Name:	CHARLES B. WHEELER DOWNTOWN
Event Type:	INCIDENT - GENERAL AVIATION
Mid Air Collision:	NOT A MIDAIR

AIRCRAFT INFORMATION

Aircraft Damage:	SUBSTANTIAL
Aircraft Make:	RAYTHEON
Aircraft Model:	BEECHJET 400
Aircraft Series:	
Airframe Hrs:	2086
Operator:	

NARRATIVE

OXYGEN BOTTLE PRESSURE REG SHUT OFF, VALVE FAILED. STARTED A FIRE.REMOVED FROM HANGAR. FIRE EXTINGUISHED.

Detail

Primary Flight Type:	EXECUTIVE
Secondary Flight Type:	UNKNOWN
Type of Operation:	GENERAL OPERATING RULES
Registration Nbr:	195KC
Total Aboard:	0
Fatalities:	0
Injuries:	0
Landing Gear:	RETRACT TRICYCLE
Aircraft Weight Class:	OVER 12500 LBS
Engine Make:	
Engine Model:	

Engine Group:	
Number of Engines:	2
Engine Type:	

Environmental/Operations Info

Primary Flight Conditions:	UNKNOWN
Secondary Flight Conditions:	WEATHER NOT A FACTOR
Wind Direction(deg):	
Wind Speed(mph):	
Visibility(mi.):	
Visibility Restrictions:	
Light Condition:	DAY
Flight Plan Filed:	NONE
Approach Type:	

Pilot In Command

Pilot Certificates:	
Pilot Rating:	
Pilot Qualification:	
Flight Time Total Hours:	
Total in Make/Model:	
Total in Last 90 days:	
Total in last 90 days Make/Model:	

END REPORT

ASIAS BRIEF REPORT

GENERAL INFORMATION

Data Source:	ACCIDENT AND INCIDENT DATABASE
Report Number:	20000725027869C
Local Date:	25-JUL-00
Local Time:	
City:	DENVER
State:	CO
Airport Name:	DENVER INTL
Event Type:	INCIDENT - AIR CARRIER
Mid Air Collision:	NOT A MIDAIR

AIRCRAFT INFORMATION

Aircraft Damage:	NONE
Aircraft Make:	BOEING
Aircraft Model:	757
Aircraft Series:	200
Airframe Hrs:	43603
Operator:	NORTHWEST AIRLINES

NARRATIVE

(-23)A NORTHWEST AIRLINES, INC. (NWA) BOEING B-757 AIRCRAFT N528US DURING FLIGHT #1224 ON JULY 17, 2000 FROM DENVER, CO TO DETROIT, MI, EXPERIENCED DEPRESSURIZATION AT APPROXIMATELY 36,000 FEET. THE CREW PERFORMED A RAPID DECSENT AND INITIATED A MANUAL **OXYGEN** MASK DROP, SUBSEQUENTLY AND TO DENVER WITHOUT FURTHER INCIDENT. UPON LANDING AT THE DENVER AIRPORT, THE PILOT INITIATED A LOG PAGE DOCUMENTING NUMBEROUS **OXYGEN** GENERATORS THAT DID NOT FUNCTION PROPERLY. APPARENTLY, ELEVEN **OXYGEN** GENERATORS HAD NOT ACTIVATE DURING THIS IN-FLIGHT PINS WERE INCORRECTLY INSTALLED IN THE GENERATOR FIRING MECHANISMS.

Detail

Primary Flight Type:	SCHEDULED AIR CARRIER
Secondary Flight Type:	PASSENGERS
Type of Operation:	AIR CARRIER/COMMERCIAL
Registration Nbr:	528US
Total Aboard:	

Fatalities:	
Injuries:	
Landing Gear:	RETRACT TRICYCLE
Aircraft Weight Class:	OVER 12500 LBS
Engine Make:	PWA
Engine Model:	PW2037
Engine Group:	2037
Number of Engines:	2
Engine Type:	F

Environmental/Operations Info

Primary Flight Conditions:	UNKNOWN
Secondary Flight Conditions:	WEATHER NOT A FACTOR
Wind Direction(deg):	
Wind Speed(mph):	
Visibility(mi.):	
Visibility Restrictions:	
Light Condition:	DAY
Flight Plan Filed:	INSTRUMENT FLIGHT RULES
Approach Type:	

Pilot In Command

Pilot Certificates:	
Pilot Rating:	
Pilot Qualification:	
Flight Time Total Hours:	
Total in Make/Model:	
Total in Last 90 days:	
Total in last 90 days Make/Model:	

END REPORT

Number of Engines:	2
Engine Type:	T

Environmental/Operations Info

Primary Flight Conditions:	UNKNOWN
Secondary Flight Conditions:	WEATHER NOT A FACTOR
Wind Direction(deg):	
Wind Speed(mph):	
Visibility(mi.):	
Visibility Restrictions:	
Light Condition:	DAY
Flight Plan Filed:	NONE
Approach Type:	

Pilot In Command

Pilot Certificates:	
Pilot Rating:	
Pilot Qualification:	
Flight Time Total Hours:	
Total in Make/Model:	
Total in Last 90 days:	
Total in last 90 days Make/Model:	

END REPORT