Occupational Risk Assessment for Aircrew in Fixed-Wing Transport Aircrafts

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Introduction

- Long-term exposure to high levels of Noise and to Volatile Organic Compound (VOC) present potential health risks
- Most researches for occupational risks assessment to aircrew were conducted in airliners and focused on cabin personnel exposure
- We examined exposure to noise and VOC in military fixed wing transport platforms in the Israeli Air Force

Fixed Wing Transport Aircrafts
Light Transport

Beech Super King Air 200 (Tzufit)

Instruction of Flight Cadets and Intelligence Missions

Beech Super King Air 200 (Kukia)

Intelligence Missions

Beech A36 Bonanza

Light Transport and Intelligence Missions

Fixed Wing Transport Aircrafts

Heavy Transport

C-130 Hercules

Transport of People and Heavy Equipment

Boeing 707

In-flight Refueling

Fixed Wing Transport Aircrafts
Heavy Transport

C-130J Super Hercules

Transport of People and Heavy Equipment

Gulfstream V

Observation, Reconnaissance and Intelligence mission

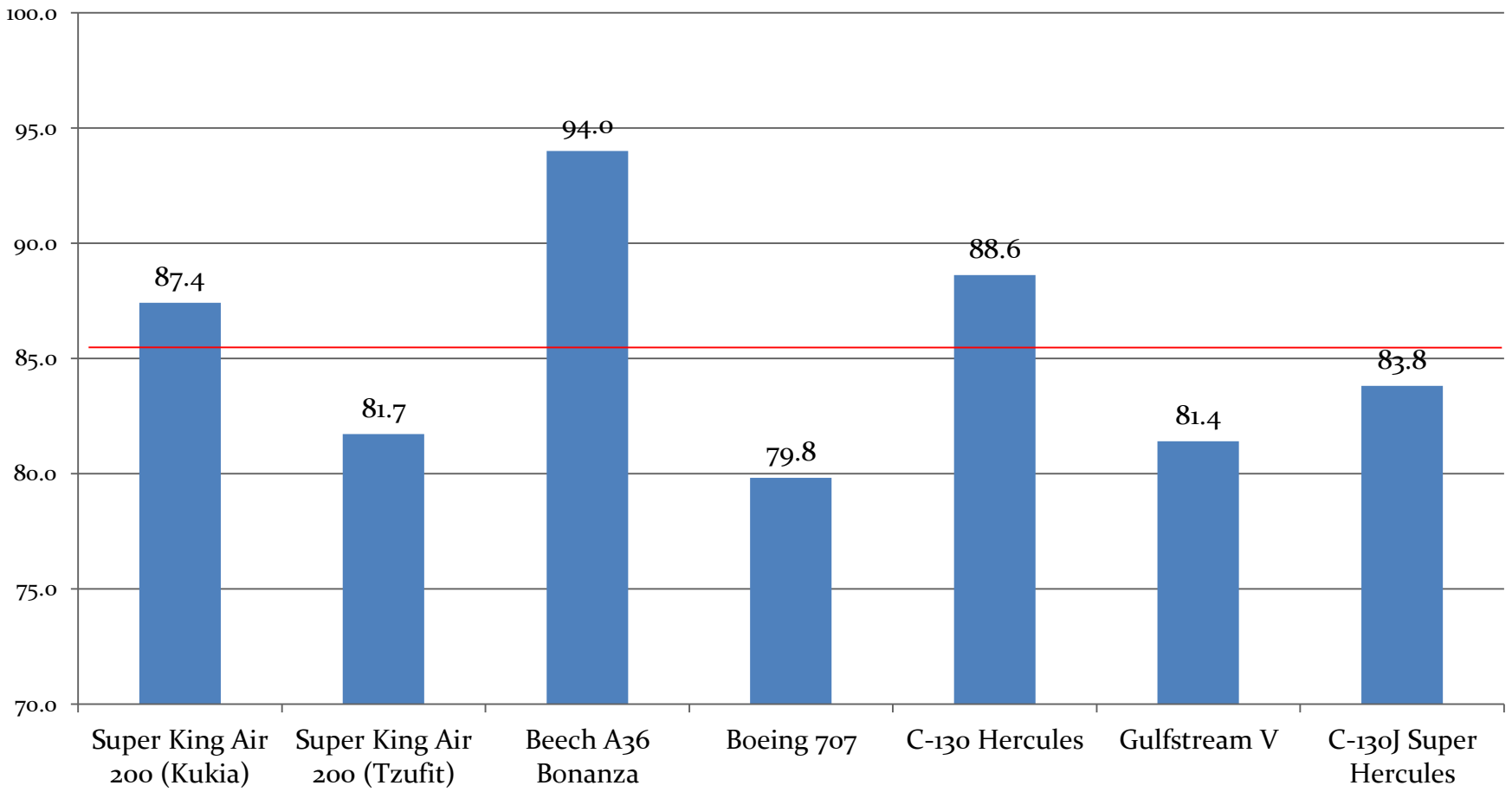
Noise Measurements

- We used validated and calibrated equipment
- We performed the measurements according to Israel's protocol for noise measurement
- We measured the noise levels in the cockpit and in the cabin (Where they are separated)
- The threshold for harmful noise, set by ACGIH, is 85 dB[A]

VOC Measurements

- Light transport
  - Usage of 100-130 Octane fuel
  - Sampling of Benzene, Toluene, Xylene
- Heavy transport
  - Usage of Jet fuel
  - Sampling of Benzene, Toluene, Xylene, n-Hexane and Kerosene
- Sampling points:
  - Light transport – Triplicates (due to inseparability of the cockpit and the cabin)
  - Heavy transport – Cockpit + 3 points in cabin
- Sampling methods:
  - Validated methods defined by NIOSH
  - Threshold values defined by ACGIH

Noise levels in the cockpit



Noise Levels in the Cabin
Heavy Transport

	Takeoff	In-Flight				Landing
Plane	Cabin Front	Cabin Back	Cabin Center	Cabin Front	Cockpit Entrance	Cabin Front
Boeing 707	-	85.1	88.5	83.1	-	-
C-130 Hercules	92.8	94.8	90.2	92.6	96.6	97.8
Gulfstream V	82.3	84.7	94.5	81.7	-	83.1
C-130J Super Hercules	84.3	94.4	90.6	96.1	90.9	-

VOC Concentration
Light Transport

	Xylene	Toluene	Benzene
Plane	Concentration (ppm)		
Super King Air 200 (Kukia)	<0.06	0.18	<0.04
Super King Air 200 (Tzufit)		<0.07	
Beech A36 Bonanza			
Threshold Level	100	50	0.5

VOC Concentration
Heavy Transport

		Concentration (ppm)				
Plane	Measurement Point	Kerosene (mg/m^3)	Hexane	Xylene	Toluene	Benzene
Boeing 707	Cockpit	<0.008	<0.004	<0.06	<0.07	<0.04
	Cabin Front	2.47				
	Cabin Center	<0.008				
	Cabin Back	3.41				
C-130 Hercules	All Points	<0.008				
Gulfstream V						
C-130J Super Hercules						
	Threshold Level	200	50	100	50	0.5

Conclusions

- Harmful noise levels in three airplane cockpits and in the cabin of all planes with a separation
- No harmful levels of VOC were found
- The measurements were conducted in one airplane of every platform, limiting the results power
- Harmful noise levels require attention, especially for pregnant aircrew concerning the fetus
- As a result of our research, aircraft cabin crew in the Israeli transport wing are defined as workers in harmful noise

Thank You