

SD Operations & Training -- Ground-Based



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Ground-Based SD Simulation



- Introduction
- Types of devices
 - Barany Chair
 - Vista Vertigon
 - Vertifuge
 - Gryolab
- Future devices



Introduction



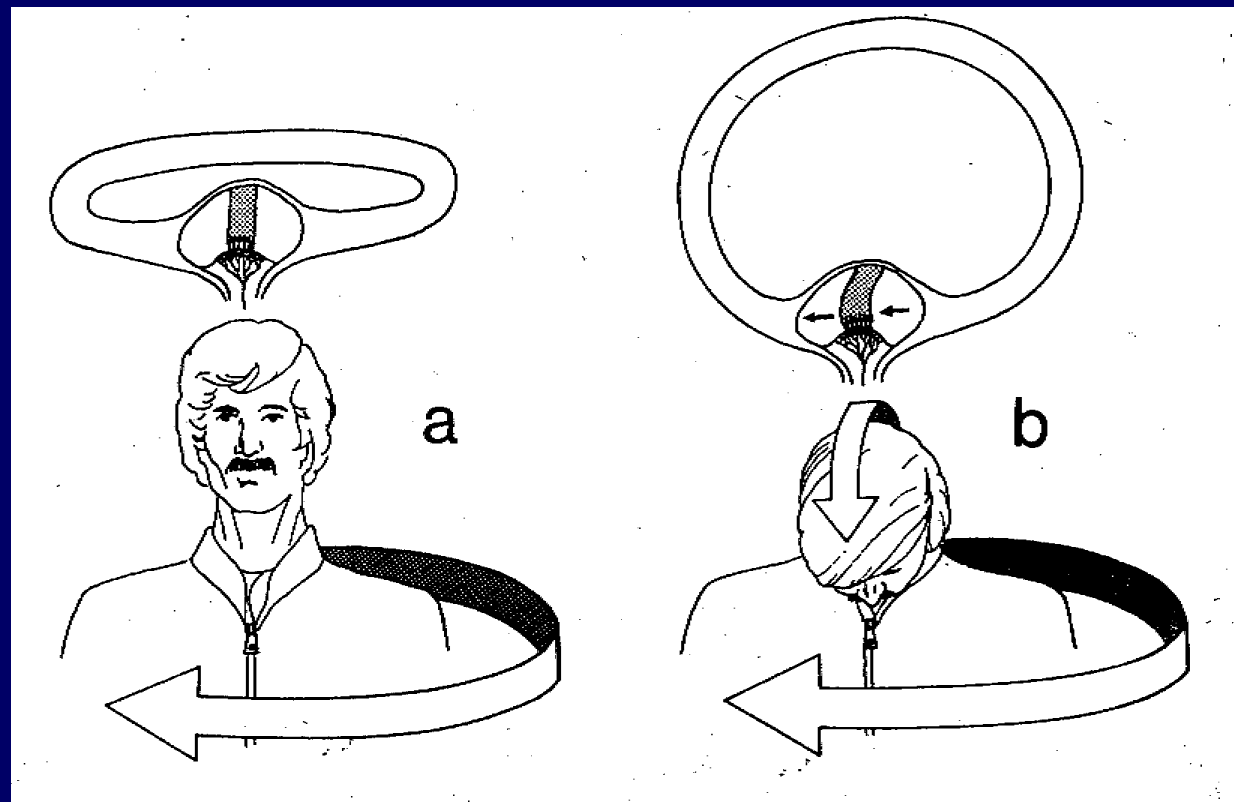
- **First generation SD device - Barany Chair**
- **2nd generation - Vertigon**
- **3rd generation - Vertifuge**
- **4th generation - Gyrolab**



SD Training Devices



- Barany Chair

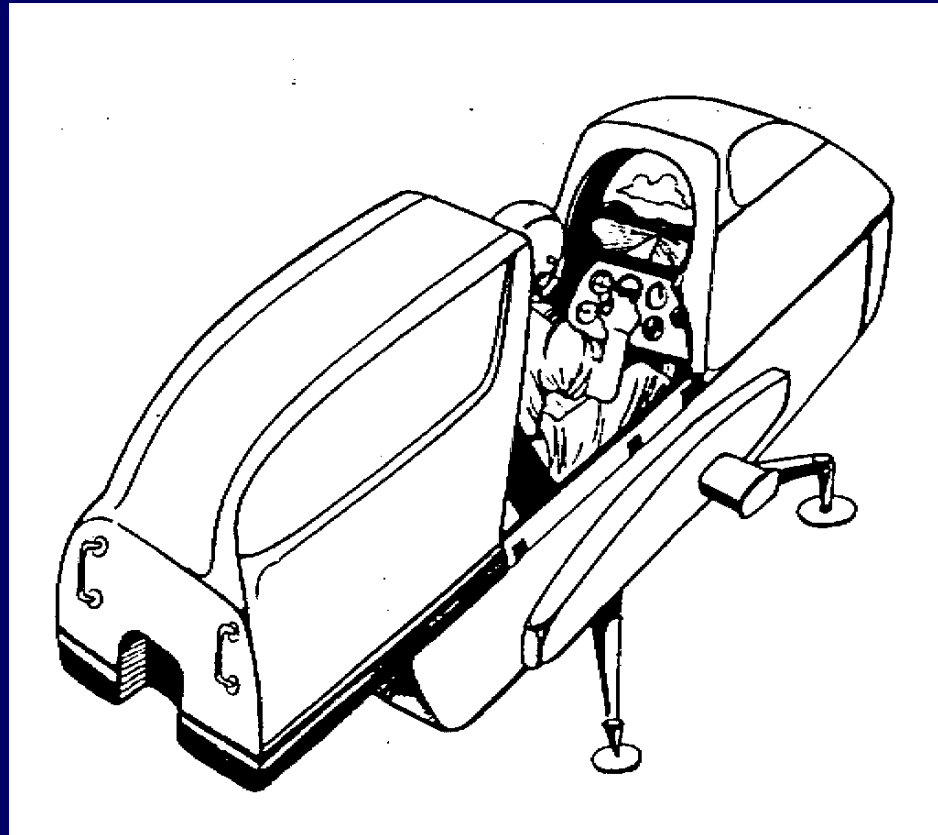




SD Devices, cont'd



- Vista Vertigon

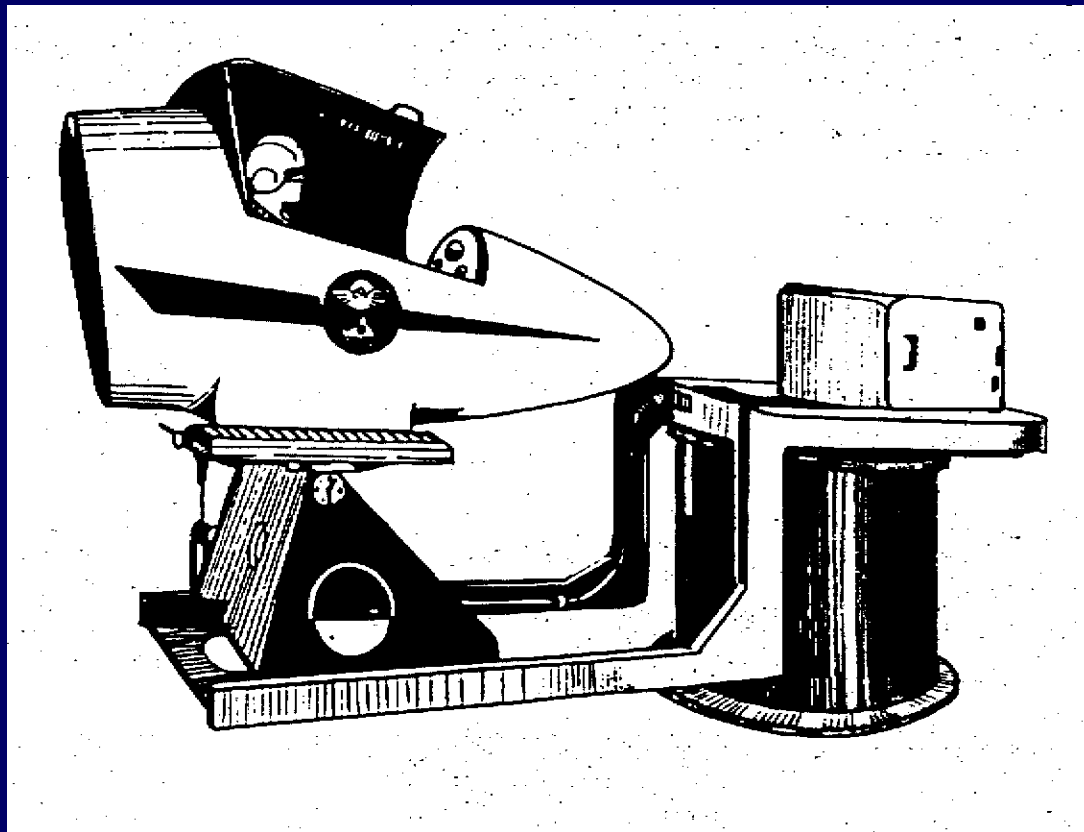




SD Devices, cont'd



- EMRO Vertifuge





SD Devices, cont'd



- Gryolab





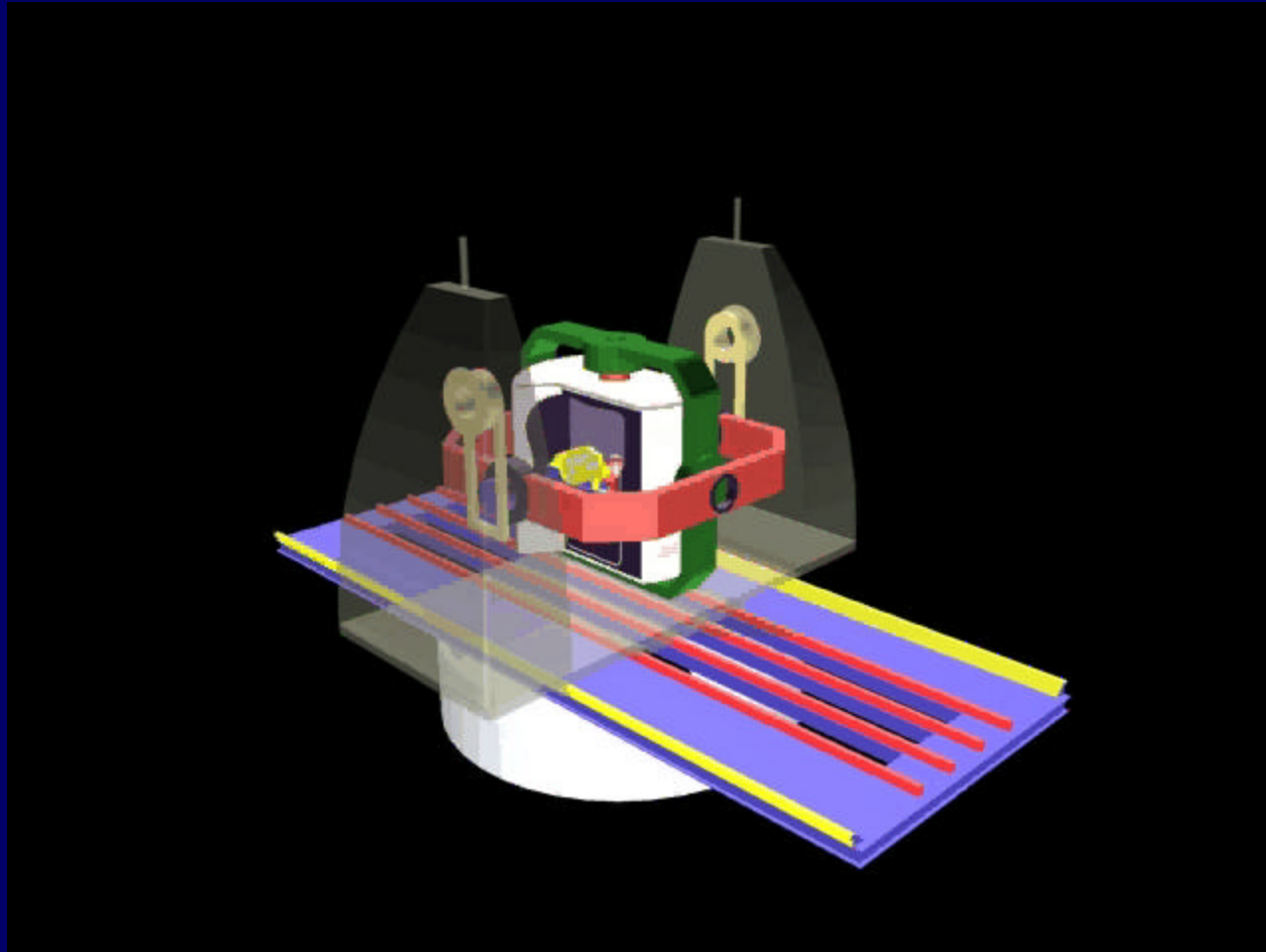
Future SD Devices



- **Some SD training will be performed in fixed-base flight simulators**
- **Limited motion based devices will be required to replicate G related illusions**
- **DESDEMONA offers potential but may be too costly to replicate**



DESDEMONA





Night Vision Training





Specifications for SD Trainer



- **Wide field-of-view visual simulation system (180 degs H X 180 degs V)**
- **Limited motion, with ability to generate up to 3 G**
- **Modern cockpit with controls and HUD**
- **Interfaces for NVGs and HMDs to use in the cockpit**



Future USAF Simulators





Future USAF Simulators





Future USAF Simulators





Generating Type I SD on Ground



- DES subject engaged in simulated flying task; given something else to do head down, cab is rolled or pitched, instruments follow
- Subject pursues lead aircraft into simulated clouds, Gx increased as throttle pulled back, subject backs off throttle and Gx, subject should experience pitch-down sensation



Generating SD cont'd



- Subject follows lead in 2 - 4G turn while looking up, left, should experience G-Excess Effect



Generating Type II SD on the Ground



- Leans
- Somatogyral Illusion
- Giant Hand



Conclusions



- **USAF currently has inadequate ground-based SD training**
- **Many Type I situations could be trained in the new, distributed trainer scenario**
- **Some illusions will require motion systems in order to generate the illusion**
- **Future USAF SD trainers should include ability to train use of NVGs and HMDs**