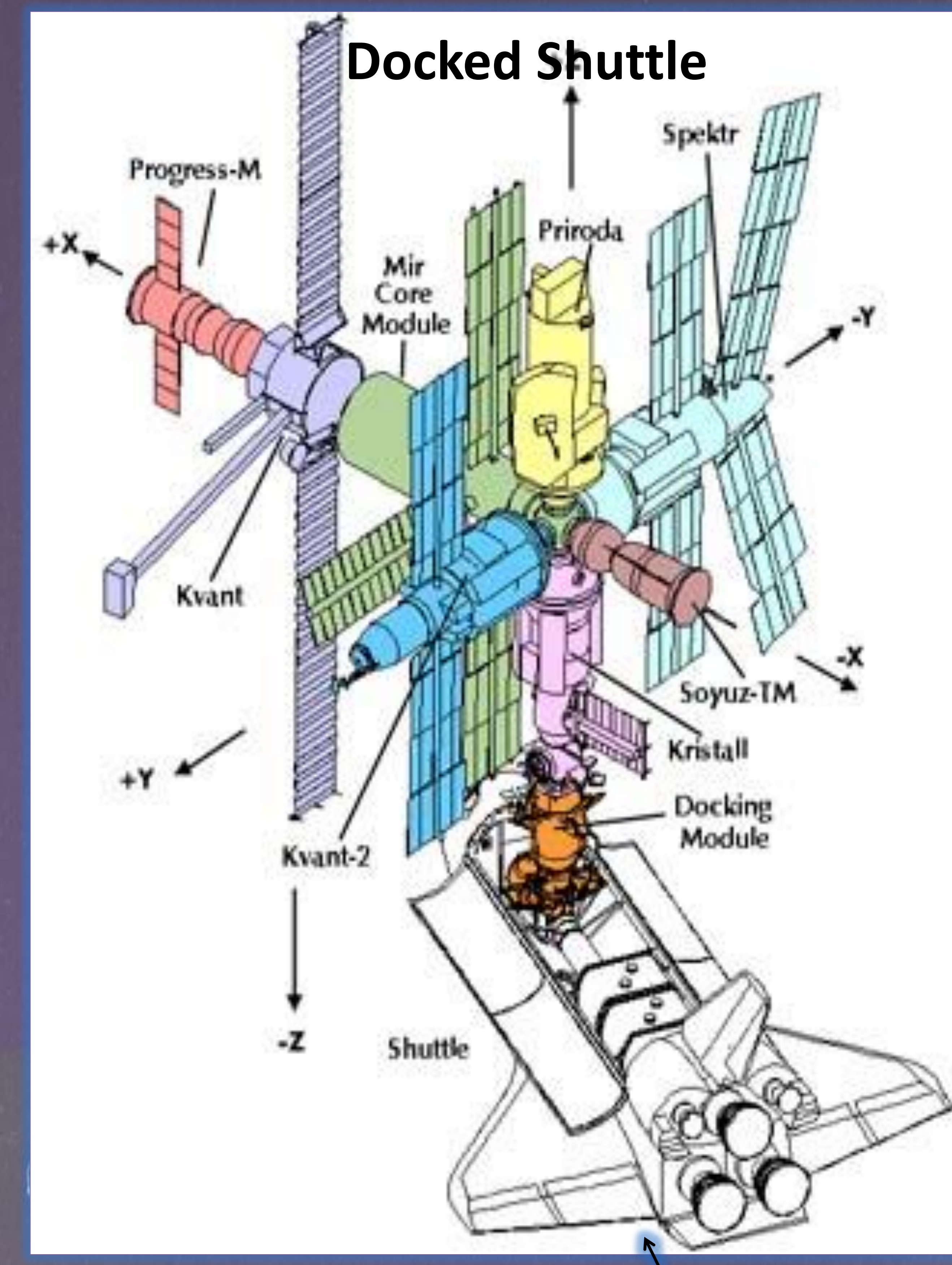
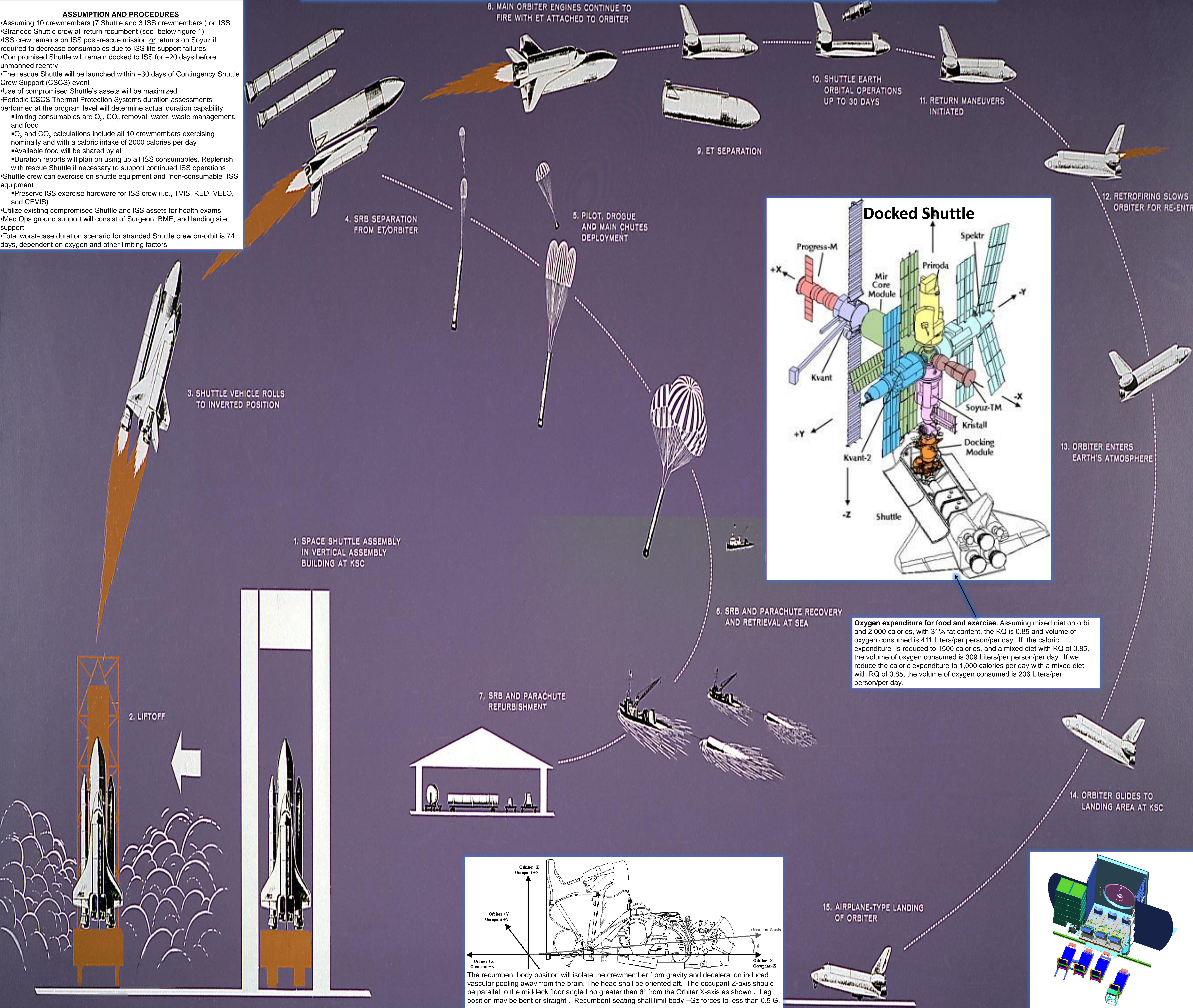


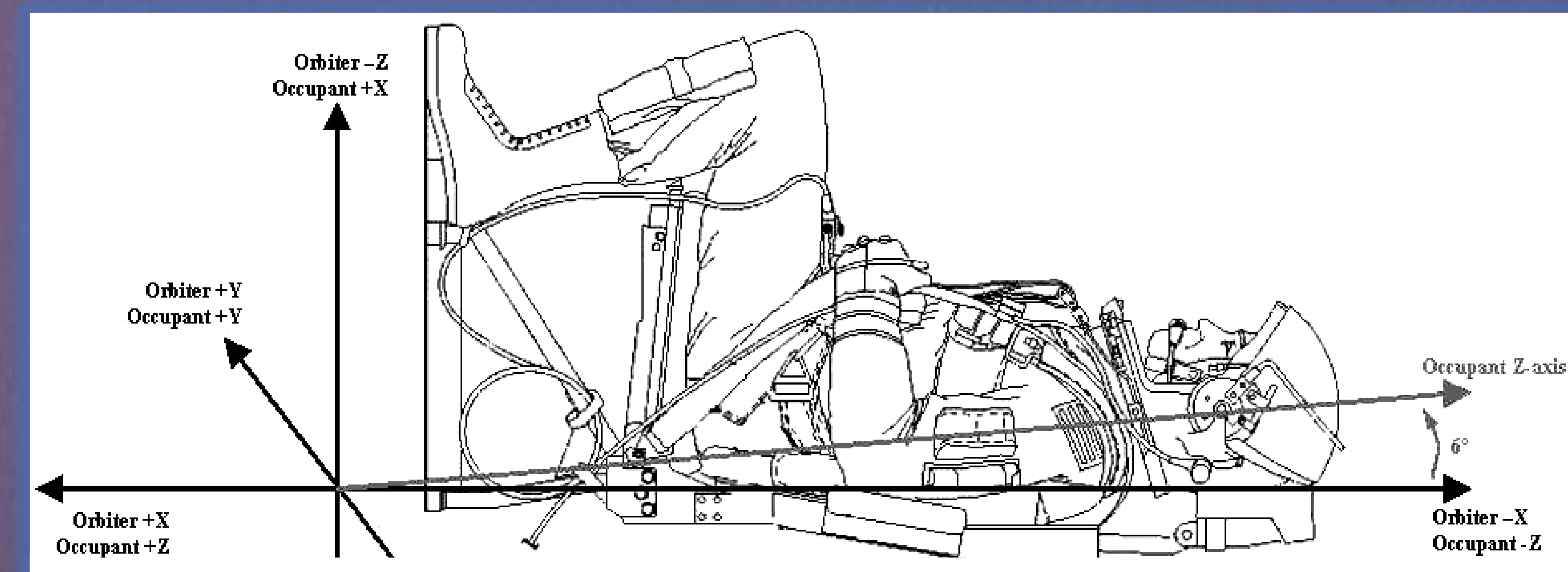
Operational and Medical Procedures for a declared Contingency Shuttle Crew Support (CSCS) Shuttle mission due to a failure that precludes a safe return

ASSUMPTION AND PROCEDURES

- Assuming 10 crewmembers (7 Shuttle and 3 ISS crewmembers) on ISS
- Stranded Shuttle crew all return recumbent (see below figure 1)
- ISS crew remains on ISS post-rescue mission or returns on Soyuz if required to decrease consumables due to ISS life support failures.
- Compromised Shuttle will remain docked to ISS for ~20 days before unmanned reentry
- The rescue Shuttle will be launched within ~30 days of Contingency Shuttle Crew Support (CSCS) event
- Use of compromised Shuttle's assets will be maximized
- Periodic CSCS Thermal Protection Systems duration assessments performed at the program level will determine actual duration capability
 - limiting consumables are O₂, CO₂ removal, water, waste management, and food
 - O₂ and CO₂ calculations include all 10 crewmembers exercising nominally and with a caloric intake of 2000 calories per day.
 - Available food will be shared by all
 - Duration reports will plan on using up all ISS consumables. Replenish with rescue Shuttle if necessary to support continued ISS operations
- Shuttle crew can exercise on shuttle equipment and "non-consumable" ISS equipment
 - Preserve ISS exercise hardware for ISS crew (i.e., TVIS, RED, VELO, and CEVIS)
- Utilize existing compromised Shuttle and ISS assets for health exams
- Med Ops ground support will consist of Surgeon, BME, and landing site support
- Total worst-case duration scenario for stranded Shuttle crew on-orbit is 74 days, dependent on oxygen and other limiting factors



Oxygen expenditure for food and exercise. Assuming mixed diet on orbit and 2,000 calories, with 31% fat content, the RQ is 0.85 and volume of oxygen consumed is 411 Liters/per person/per day. If the caloric expenditure is reduced to 1500 calories, and a mixed diet with RQ of 0.85, the volume of oxygen consumed is 309 Liters/per person/per day. If we reduce the caloric expenditure to 1,000 calories per day with a mixed diet with RQ of 0.85, the volume of oxygen consumed is 206 Liters/per person/per day.



The recumbent body position will isolate the crewmember from gravity and deceleration induced vascular pooling away from the brain. The head shall be oriented aft. The occupant Z-axis should be parallel to the middeck floor angled no greater than 6° from the Orbiter X-axis as shown. Leg position may be bent or straight. Recumbent seating shall limit body +Gz forces to less than 0.5 G.

