

The accident

Trainer Instruction:

Each team gets this text as an A4 print-out and get 10 Minutes time to read and to understand the context of the situation. Trainer(s) could also read the text as an introduction.

Apollo 13 lift-off occurred on the 11th of April 1970 at 13.13 Central US daylight time.

The spaceship was approximately 205,000 miles (330,000 km) from Earth on the journey to the Moon.^{[1][2]}

As in ^[6] Sy Liebergood from Mission control decide to request to the crew a stir of the hydrogen and oxygen tank prior to sleep to avoid an possible alarm he expected caused by an unprecise readings of the measurements. This stir up the mixture is needed to allow the mission control center a more precise tank quantity measurement.

Oxygen and hydrogen are mixed and react in the **three fuels** cells to provide electrical power to the service module.

Astronaut Haise acknowledged the request and switched the fans on.

Two minutes later - at 03:07:53 Coordinated Universal Time (UTC) (55:54:53 Ground Elapsed Time) - the astronauts heard a “pretty large bang”.

The first thoughts from the crew has been that a meteoroid might have struck the Lunar Module. Communications and telemetry to Earth were lost for a few seconds, until the system automatically corrected by switching antenna to wide-beam mode.^[3]

After the bang Swigert reported a "problem", which Lovell repeated and clarified as a "**main B bus undervolt**", a temporary loss of operating voltage. Oxygen tank **2 immediately read quantity zero**. Lovell reported looking out the window that the craft was venting "**a gas of some sort**" into space.

Immediately recognised impacts of the failure:

Oxygen tank 2 immediately read quantity zero. A few minutes later **fuel cell 1 and fuel cell 3** failed. The number 1 oxygen tank quantity gradually reduced readings slowly.

As fuel cells generate electrical power by combining hydrogen and oxygen, when oxygen tank 1 ran dry, the remaining fuel cell finally shut down, leaving the spacecraft on the Command Module's limited-duration battery power and water.

The Command Module (CM) **is required for re-entry during final stage of the mission**. If there is no power remaining, there is no possibility to communicate with Mission Control, navigate the command module or launch the parachutes.

For the LM (Lunar module) the power was calculated to last 15 hours during the time on the moon.

The LM consumables were intended for two people for a day and a half (during the Moon landing and exploration)

The LM was powered by silver zinc batteries. So electrical power and water (for cooling and drinking) were the most critical resources.

Overall oxygen was the least critical concern yet.

Now, with the accident - the simulation starts!