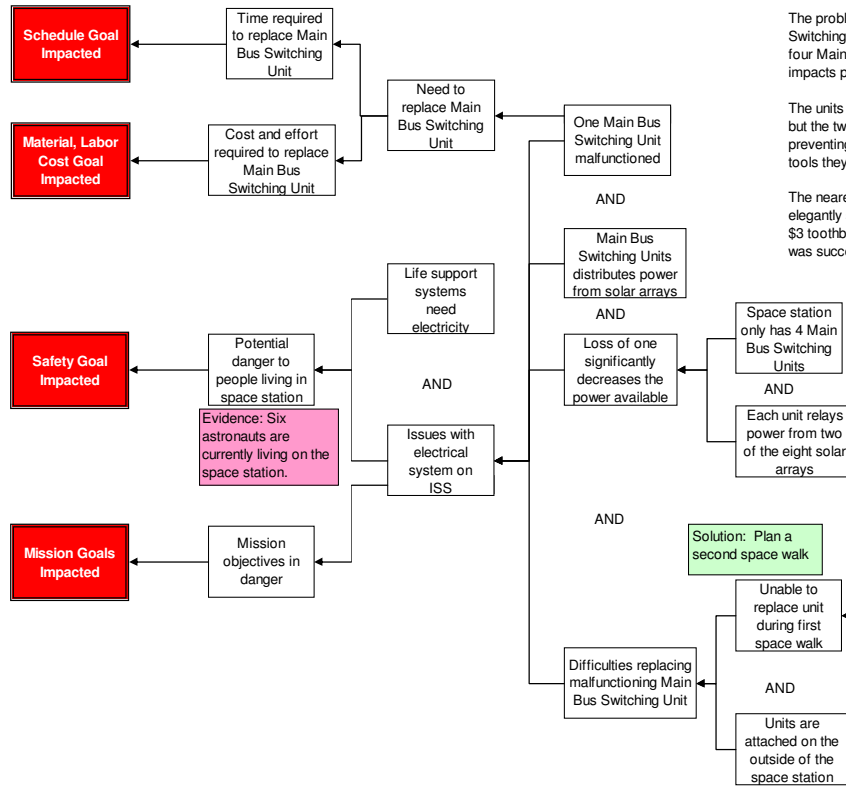


How a Toothbrush Helped Save the Space Station

September 5, 2012



Using ingenuity reminiscent of Apollo 13, the crew on the International Space Station (ISS) recently found a way to fix an ailing electrical system using handmade tools made with an allen wrench, a wire brush, a bolt and a toothbrush.

The problem was an issue with the electrical system on the space station. Astronauts needed to replace a failed Main Bus Switching Unit, a component that is responsible for collecting and distributing power from the solar arrays. The ISS has four Main Bus Switching Units and each serves two of the eight solar arrays so the loss of a one of the units significantly impacts power supply.

The units are located outside of the space station and the plan was to replace the malfunctioning unit during a spacewalk, but the two astronauts doing the work ran into a problem. An accumulation of metal shavings caused a bolt to stick, preventing installation of the new unit. The astronauts needed to find a way to remove the metal shavings, but none of the tools they had taken on the spacewalk could get the job done.

The nearest hardware store was over 200 miles of atmosphere away and the options were limited, but the crew found an elegantly simple solution to the problem. They created a cleaning tool out of items onboard the space station, including a \$3 toothbrush. An extra space walk was planned, the metal shavings were cleared and the new Main Bus Switching Unit was successful installed. A cheap toothbrush taped to a metal handle had helped fix a \$100 billion space station.



NASA photo of the toothbrush tool used to clean the metal shavings.

Cause Map
High Level

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Why?

Effect ← Cause

NOTE: Read the Cause Map from left to right with the phrase "Was Caused By" in place of