

Title:

Determining component probability using problem report data for ground systems used in manned space flight.

Abstract:

During the shuttle era NASA utilized a failure reporting system called the Problem Reporting and Corrective Action (PRACA) its purpose was to identify and track system non-conformance. The PRACA system over the years evolved from a relatively nominal way to identify system problems to a very complex tracking and report generating data base. The PRACA system became the primary method to categorize any and all anomalies from corrosion to catastrophic failure. The systems documented in the PRACA system range from flight hardware to ground or facility support equipment. While the PRACA system is complex, it does possess all the failure modes, times of occurrence, length of system delay, parts repaired or replaced, and corrective action performed. The difficulty is mining the data then to utilize that data in order to estimate component, Line Replaceable Unit (LRU), and system reliability analysis metrics.

In this paper, we identify a methodology to categorize qualitative data from the ground system PRACA data base for common ground or facility support equipment. Then utilizing a heuristic developed for review of the PRACA data determine what reports identify a credible failure. These data are then used to determine interarrival times to perform an estimation of a metric for repairable component or LRU reliability. This analysis is used to determine failure modes of the equipment, determine the probability of the component failure mode, and support various quantitative differing techniques for performing repairable system analysis. The result is that an effective and concise estimate of components used in manned space flight operations. The advantage is the components or LRU's are evaluated in the same environment and condition that occurs during the launch process.

Short description:

Using a heuristic to mine knowledge data from a complex data base of system and component non-conformance to develop repairable system metrics supporting ground operations analysis for manned space flight.

Biography:

Mark W. Monaghan received his Ph.D in Applied Decision Science from Walden University in 2008. Mark is a reliability engineer with SAIC at NASA KSC, FL. As a part of the KSC RMA team, Dr. Monaghan works with multiple engineering teams to evaluate and increase the operational and inherent availability of the systems. He is a senior member of Institute of Electrical and Electronic Engineers (IEEE) Industrial Application Society (IAS). He is also a member of American Institute of Aeronautics and Astronautics (AIAA) and the ASQ Reliability Societies.

Amanda M. Gillespie received her BS in Applied Mathematics from the Georgia Institute of Technology in 2000. Amanda is a reliability engineer with SAIC at NASA KSC, FL. As a part of the KSC RMA team, Amanda works with multiple engineering teams to evaluate and increase the operational and inherent availability of the systems. Amanda is a member of the American Society for Quality (ASQ) Reliability and Statistics Societies. Amanda received her ASQ Certified Reliability Engineer (CRE) certification in January 2011.