

SPACE SYSTEMS SYMPOSIUM (D1)
Innovative and Visionary Space Systems (1)

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‘BLACK BOX’ FOR SPACECRAFTS

Abstract

This paper proposes the concept and design of a ‘Black Box’ for spacecrafts / space systems. In the event of failure of a mission critical sub-system, or the complete failure of a spacecraft (including physical impact on spacecraft resulting in a total loss), the data of the events leading to the failure are very critical for analysis and is usually unavailable. The paper proposes a system level design of the stand-alone, light-weight and a survivable ‘black box’ unit that can be piggy-backed onto a spacecraft. The paper shall address the various sub-systems of the ‘black box’ that shall primarily consist of a network of sensors and actuators, a data recording and storage system, an independent power source, a command control unit, RF system , a GNSS based navigation system etc. The ‘black box’ shall have a system to record the various parameters continuously from a network of different sensors for a pre-determined period of time. The proposed ‘black box’ can be shall have a mechanism to separate in the event of a break-up of the host satellite due to debris impact, anti-satellite etc. The ‘black box’ can be considered as a ‘epiphytic’ Nano (or pico) satellite that shall be attached to a host satellite and detach itself to function as an independent satellite to provide the valuable information till the instant of impact.