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GENERIC FLIGHT TERMINATION ARCHITECTURE FOR LAUNCHERS- TAILORING THE
DESIGN BASED ON FLIGHT-PROVEN BUILDING BLOCKS

Abstract

Even when launched in the middle of an unpopulated area, Space launchers need to embark a Flight Termination System (FTS) at least to safeguard the integrity of the launch pad infrastructures and mitigate the related risks of damage on the ground. More importantly, when populated areas are at reach in the vicinity from the launch pad, danger zones need to be identified depending on the possible range of trajectories and proper design measures shall be taken to reduce the risks to the highest improbability. However, though being absolutely mandatory to authorize the flight, the flight termination function is not the one where launch system primes place their immediate focus when designing the launcher. In a first instance they prefer investing time and non-recurring efforts on more bankable functions enhancing the launcher's performance like propulsion or guidance...

This observation has led Pyroalliance working on an "as generic as possible" architecture that could be fitted to a large range of launchers without any non-recurring effort. The idea of such "Off-The-Shelf" architecture enables a rapid and cost-effective implementation and relieves the launch system prime from the burden of a specific design.

A Flight Termination System is made of a chain of components designed and assembled to operate a termination sequence. Simple options like pyrotechnic cutters or pyrotechnic valves can be relevant in specific cases where stopping the fuel circuit is deemed sufficient. In many situations however, more drastic options are requested by flight safety authorities and lead to the necessary destruction of the launcher. In such cases, the FTS solution is typically made of electro-pyro detonators, safe arms, pyrotechnic transfer lines and destruction charges. Pyroalliance has designed a generic FTS architecture that can then be customized and adapted to the specific launcher's specifications. For instance the overall dimensions as well as the nature of the structures to be severed to terminate the flight can be very heterogeneous. Based on the related requirements, the generic architecture is adapted by selecting the appropriate building blocks that will deliver the specific required performance.

In this paper, authors will present the complete picture and the detailed advantages of this generic Flight Termination architecture as well as all the backgrounds on which the proposed flight-proven building blocks rely.

Keywords: pyrotechnics, flight termination, linear shaped charge