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Development and Operational Applications of a Real-time Range Data Simulator

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ABSTRACT

Whenever a rocket is launched at any U.S. Space Launch Range, safety systems are in place to ensure that human life, health, and property are protected. These range safety systems rely on accurate knowledge of where flight vehicle debris would land in the event of a mishap. They must precisely process and display data from the rocket and ground sensors, and not react in an unpredictable manner to non-nominal or erroneous data.

ENSCO has developed the Real-time Instrumentation Simulation Environment (RISE) to evaluate and operationally certify real-time range safety critical systems at space launch facilities. Various RISE configurations thoroughly test range safety critical systems by simulating, injecting, and recording up to 40 simultaneous real-time links of nominal and non-nominal vehicle tracking data, including ground sensor outputs and full-rate telemetry data.

RISE simulators include options for the introduction of noise, data dropouts, quality defects, divergent trajectories, single or multiple source latencies, and numerous other data perturbations. By overlaying current timing in the data stream and computing and inserting checksums in real-time, RISE data is indistinguishable from operational mission data. With RISE, launch ranges have the ability to simulate a complete vehicle launch for both nominal and non-nominal conditions. Tests can be carefully controlled to validate range safety display systems, identify defects, or support training of operations personnel.

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