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Controlled Impact Demonstration (CID) Aircraft

In 1984 NASA Dryden Flight Research Center and the Federal Aviation Administration (FAA) teamed-up in a unique flight experiment called the Controlled Impact Demonstration (CID), to test the impact of a Boeing 720 aircraft using standard fuel with an additive designed to suppress fire. The additive FM-9, a high molecular-weight long chain polymer, when blended with Jet-A fuel had demonstrated the capability to inhibit ignition and flame propagation of the released fuel in simulated impact tests.

DFRC Photo #	Photo Date	Image Description
		Controlled Impact Demonstration (CID) Aircraft Photo Collection Contact Sheet
EC84-31672-A	December 1984	CID Aircraft in practice flight above target impact site with wing cutters
ECN-31803	December 1984	CID Aircraft slap-down
EC84-31805	December 1984	CID Aircraft pre-impact lakebed skid
EC84-31806	December 1984	CID Aircraft post-impact lakebed skid
ECN-31808	December 1984	CID Post-impact fireball
EC84-31809	December 1984	CID Post-impact fireball
ECN-28307	February 6, 1984	Controlled Impact Demonstration instrumented test dummies installed in plane

Additional Information

Antimisting kerosene (AMK) cannot be introduced directly into a gas turbine engine due to several possible problems such as clogging of filters. The AMK must be restored to almost Jet-A before being introduced into the engine for burning. This restoration is called "degradation" and was accomplished on the B-720 using a device called a "degrader". Each of the four Pratt & Whitney JT3C-7 engines had a "degrader" built and installed by General Electric (G.E) to break down and return the AMK to near Jet-A quality.

In addition to the AMK research the NASA Langley Research Center was involved in a structural loads measurement experiment which included having instrumented dummies filling the seats in the passenger compartment. Before the final flight on December 1, 1984, more than four years of effort passed trying to set-up final impact conditions considered survivable by the FAA. During those years while 14 flights with crews were flown the following major efforts were underway: NASA Dryden developed the remote piloting techniques necessary for the B-720 to fly as a drone aircraft; General Electric installed and tested four degraders (one on each engine); and the FAA refined AMK (blending, testing, and fueling a full size aircraft). The 14 flights had 9 takeoffs, 13 landings and around 69 approaches, to about 150 feet above the prepared crash site, under remote control. These flights were used to introduce AMK one step at a time into some of the fuel tanks and engines while monitoring the performance of the engines. On the final flight (No. 15) with no crew, all fuel tanks were filled with a total of 76,000 pounds of AMK and all engines ran from start-up to impact (the flight time was 9 minutes) on the modified Jet-A.

The CID impact was spectacular with a large fireball enveloping and burning the B-720 aircraft. From the standpoint of AMK the test was a major set-back, but for NASA Langley, the data collected on crashworthiness was deemed successful and just as important.

[CID movie gallery](#)

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