

Torture Rides the Desert Rails

by Jonathan Eberhart

For a fraction of a second 12 years ago, Col. John Stapp weighed 7,820 pounds. His brief excursion into the elephantine left him with, among other things, hemorrhaged retina, a colossal headache and a partial loss of vision which lasted for 12 weeks.

The infernal machine that had given him such a beating was no torture device from the fevered brain of a nameless enemy. Instead, it was a medical instrument which has since broadened its horizons to include diagnosis of the ills of everything from aircraft ejection seats to spacecraft nosecones.

In fact, a whole arsenal of U.S. Air Force equipment gets the treatment from the machine, a huge, rocket-driven sled that hurtles over the ground on rails, often running for miles or else—as in Stapp's experience—coming to a bone-jarring halt in seconds. In fact, the run that so battered Col. (alias Dr.) Stapp ended in the equivalent of hitting a brick wall at 120 miles per hour.

However, bringing a man to a sudden stop is nothing compared to pounding one nuclear super-missile with the shock wave from the explosion of another. This is a problem that faces the Air Force in the now-heated controversy over the U.S. anti-missile-missile program (or lack of it).

How well will defensive missiles work? The nuclear test ban prevents the Air Force from trying the real thing in the atmosphere, or even on the earth's surface, so it is turning to rocket sleds in hopes that they will at least allow reasonable simulation.

"This ban leaves a gap in our national testing concept," says an official Air Force briefing manual on rocket sleds. As a result, in order to find out the effects of a nuclear shock wave (such as might be made by a defensive missile's warhead) on a "reentry vehicle" (possibly an offensive missile's warhead), the Air Force plans to fire a Polaris missile nosecone down a test track while several tons of TNT are exploded off to one side. ("This is not as high as some of the people would like to go," the manual reads.)

Currently being tested on various sled tracks are a guidance system for the Minuteman missile, a nosecone for the Army's Lance missile, and a new kind of drogue parachute for the F-

104. The Apollo manned moon program will also have representatives hanging around next year as tests begin of the guidance system for the Lunar Excursion Module.

One of the most common test tasks for the sleds is to evaluate aircraft ejection seats, which must literally shoot a pilot clear of his plane in an emergency, even if he is in a tight spin or traveling faster than sound.

The F-111 supersonic fighter jettisons its entire cockpit, sealed like a Gemini spacecraft, instead of using regular ejection seats. It is still being "debugged" on a rocket sled. More conventional aircraft whose ejection systems have been sled-proven in the past include the F-104 Starfighter, now in use by 14 countries; the T-33 and Canadian CT-114 jet trainers; two delta wing jets, the F-102 and F-106; the OV-10A counterinsurgency aircraft; and the F-105 Thunderchief fighter-bomber.

Missiles face even hairier problems than aircraft, such as reentry heating, shock, vibration during launching, even dust in the atmosphere.

A number of missiles, guided and otherwise, including Minuteman, Pershing and Honest John, have all had components tested on one member or another of the rocket-sled armada that has grown into being since Stapp was called "the fastest man on earth."

Another weapon that received its baptism by sled was a cluster of tiny bombs called "bomblets," each one equipped with its own glide chute. Loaded into a pylon, the bomblets are released in midair to scatter like milkweed seeds. To see just how the bomblets would spread when released at different airspeeds, they were tested on sleds moving at speeds up to 675 miles per hour.

There are now well over 200 rocket sleds in the country, including a number of interchangeable subsections that make possible an infinite variety of bizarre-looking vehicles. Most are in New Mexico, their rails stretching all over the desert like an army of huge serpents from another world trying to capture Holloman Air Force Base.

The longest, named Atlas, runs out across the sands for almost seven miles. Opened in the summer of 1957, it had been in operation less than nine months when another victim almost doubled

Stapp's self-punishment "record." A tiny error in the way his body was oriented on the sled resulted in his being subjected to 83 times the force of gravity. At the peak of deceleration, a 170-pound man would have weighed more than seven tons. When he was lifted off the sled, the man (who later recovered fully) had no detectable blood pressure.

Most sled tests are now simply too fast—many have gone more than six times the speed of sound—to permit live subjects.

Instead, lifelike dummies have been made, capable of showing most of the injuries that can beset human beings. The joints, for example, can break very realistically and are covered with a pliable substance which, says the Air Force, "reacts to wind and blast very much like the flesh of a human being." The centers of gravity can even be adjusted to simulate either a fat or thin man. In each dummy's chest cavity resides not a beating heart but a telemetry system used to measure gravitational forces, as well as tumbling and rolling when the dummies are ejected during tests.

The fastest sled run ever made at Holloman was 4,738 miles per hour—more than six times the speed of sound. Yet the testers hope to produce the effects of speeds twice that high by firing projectiles through bags of freon, an inert gas some seven times as heavy as air.

Testing in the rain is vital for missile nosecones, since raindrops, though tiny, can strike a speeding projectile with brutal force. Since it practically never rains at Holloman, 6,000 feet of test track have been equipped with pipes to produce rain on demand.

Though they look like nothing more than peculiar railroad cars, and though their tracks would often be scorned by any but the most poverty-stricken streetcar, the rocket sleds are, in many ways, indispensable. They can do worthy imitations of brick walls, outer space, supersonic airstreams and occasionally even bad weather. From tiny ones, which amount to little more than firecracker-driven roller skates, to nine-ton giants driven by 10 Nike missile engines, they are among the most-needed tools of both air and space age pilots alike.