NASA Glenn Research Center—B-1 and B-3 Test Stands

**B-1**

The High Energy Rocket Engine Research Facility (B-1), which became operational in 1964, could be used to test engines up to 6000 pounds thrust for 6 minutes. A nearly clean sheet project bypassed the savings for the facility’s user, which produced the simulated altitude conditions for the facility. B-1 included cryogenic air intake, ambient gas routing, and large gaseous and cryogenic storage tanks. The facility was tested into Plum Brook Station's ROX acquisition system control computer and data system. It consisted of a two-stage engine that would be attached to a rocket motor for simulated launch conditions. The B-1 test stand was used for extensive studies of the Rocket Engine for Rocket Vehicle Application (NERVA) propulsion system in the mid-1960s. The tests conducted with B-1 would become the basis for the external input. The facility's design was to be used to simulate low-drag structural space environments.

**B-3**

The Nuclear Rocket Dynamics and Control Facility (B-3), which was initially conceived in 1966, was used to study thruster and flow systems for complete rocket systems. The rocket's controllable thrusters were used to simulate an actual launch, but the engines were not fired. Researchers conducted tests to study the effects of combustion phenomena pressure and flow dynamics on B-3's own gas and propellant delivery systems. The facility was used to test a 500,000-gallon liquid hydrogen system. It used B-3 to simulate a nuclear system and to simulate altitude conditions and was tested into Plum Brook Station's ROX acquisition system control computer and data system. The B-3 NERVA tests in 1966 and 1967 established the present nuclear propulsion, which included a liquid-hydrogen flow control, power-peak time delay, and The power-peak time delay. The test was conducted as a test of the rocket's overall system performance and the mechanical characteristics. B-3 conducted a number of tests in the early 1970s that led to the Titan IIIA rocket's final mission to Mars. Unlike previous B-3 nuclear tests, there were no tests conducted in the facility.

**B-1 and B-3 Test Stands**

View of the B-1 (left) and B-3 (right) test stands near the center of Plum Brook Station at Box Factory Road near its intersection with 30th Street. The stands were designed to test liquid hydrogen propellant flow systems in simulated altitude conditions.

A 1:4 scale model rocket engine is installed in the 175-ton test cell B-1 test stand. The engine was installed in the test cell during the first test run in 1964. The exhaust heat was absorbed by the adjacent building. The test stand was approximately 700 feet southeast of the nuclear reactor.

A researcher examines the instrumentation on the 11,000-ton nuclear engine in the B-3 test cell. The equipment was used to simulate the structural flow environments for the test stand. The equipment was designed to study the effects of the engine's flow systems, the nuclear reactor's flow systems, and the interaction between the two systems. The test stand was approximately 700 feet southwest of the nuclear reactor.

Part of the Center's Nuclear Breeder Reactor (NBR) is visible in the B-1 test cell on the left. The nuclear reactor was used to simulate the structural flow environments for the test stand. The interior walls of the test stand were painted white to allow greater visibility. The test stand was approximately 700 feet west of the nuclear reactor.

As a researcher monitors the B-3 test stand from the 800-foot test cell B-3, the control room. The control room was used to simulate the effects of the nuclear reactor's flow systems on the test stand's structural flow environments. The B-3 test stand was approximately 700 feet west of the B-3 test cell B-3.

PLUM BROOK STATION B COMPLEX

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