Project Pioneer: Bob Ansley

What would happen if we could look into the future? If Bob Ansley had told his grade-school classmates that someday he would have a hand in helping a man named Neil Armstrong set foot on the moon's surface and return safely to Earth, they probably would have laughed him off the playground.

Ansley, who is 81, can look back at his 32-year career as an engineer with AEDC and have the last laugh, but that's getting ahead of the story.

On Feb. 20, 1962, a bad case of the flu had Ansley at home, recuperating on the couch with the TV on for a special live broadcast. He watched, as millions around the world did that day, as John Glenn lifted off of the launch pad, becoming the first American to orbit the Earth.

Ansley had been working for a telephone company in North Carolina for 10 years as a lead plant engineer. He was responsible for bringing the company's sizeable headquarters and substations up to date with modern heating and air conditioning systems.

Initially, he had enjoyed the job – designing systems, monitoring the installation, doing the training on them and signing off on the work. It paid well, enough to raise a family and it even enabled him to fulfill a childhood dream of learning to fly an airplane in 1952.

However, once his work was successfully completed, he had been reassigned to be a service manager.

The new assignment was not a good fit for a man who enjoyed the complex problem solving engineering demanded.

"My responsibility was hiring, firing, disciplining and doing technical telephone business which I did not like," he said.

His brother, Sterling, had started working at AEDC in the early days before the center had evolved into the world-class array of complex flight simulation test facilities with its impressive infrastructure.

"I had always wanted to be in the aeronautical industry and I already had been talking to my brother at Arnold about a job," he said. "Sterling replied, 'Well if you want to get into the aeronautical business, the best place to come is to AEDC.'"

Something about being sick at home and watching the coverage of Glenn's flight was the final straw for Ansely. Before the year was out, he was working as a plant engineer in one of Arnold's flight simulation test facilities.

Ansley said he recalls a lot of excitement as AEDC geared up to enter the space race.

"When John Kennedy said we're going to the moon within a decade, it quickly became clear there weren't enough test facilities," he said.

Before Ansley arrived at AEDC, his older brother had been working as a design engineer under the direction of AEDC Fellow Dr. Bernard Goethert on a special project supporting what would become the Apollo program.

"Sterling was in charge of designing a complex test cell for the rocket engines that would power NASA's Lunar Module," Ansley recalled. "Known as the Lunar Excursion Module (LEM), it was the portion of the Apollo spacecraft to take two crew members to the surface of the moon and back to the parent spacecraft."

The test cell was called J-2A and it was designed to fit inside the J-2 test cell, which had originally been designed to test ram jet engines. The new test cell was designed and built specifically for the Apollo program.

"It was Dr. Goethert's idea to try and simulate space, which is 350,000 feet, where by all definitions, is the threshold of space," Ansley said. "This facility, J2-A, was a very complex test cell. It was designed to simulate that pressure level and as close to absolute zero as possible."

Ansley had only been on the job for a day or two when he got an unexpected surprise.

"I went to work one day and that same day I was assigned as plant engineer for this test at J2-A, in October of 1962," he said. "I walked in and they said you've got a test the next day. We were going to test the lunar vehicle's reaction control system. It had these little engines all over it to maneuver it – in quads of four, pointing in all four directions.

Six months later, Ansley was working as a project engineer with the team to conduct testing on all of the Lunar Lander's propulsion systems, including the ascent engine that would ultimately bring Neil Armstrong and Buzz Aldrin off the moon and back home.

"Within less than two years I had come from a telephone company to the space business," he said.

"Here I was doing a performance test on the engine that would get the men back off of the moon's surface, but all of the engineers here had been assembled from all over the country – it was a new industry."

He is also still amazed at the ingenuity it took to build the test cell dedicated to the Apollo project.

“They took J-2 test cell and made two test cells out of it,” he explained. “A rocket engine doesn’t require any air. So, they built a big bulkhead dividing the J-2 test cell and actually put the J-2A test cell inside that ducting and then they turned around and made J rocket test cell, J-2SP, which fired upstream and out through a nozzle.”

“So, we had J-2SP which was used for special projects and J-2A which was for ultra-high altitude testing. With J-2 they had to cut the large ducting in half with torches and lift it off and put the J-2A test cell inside it and then weld that ducting back on.”

Ansley vividly recalls the high tempo of testing and the pressure, both literally and figuratively, being exerted on everyone to get it right. When Ansley worked as a plant engineer supporting testing and then as a test project engineer, he shouldered significant responsibilities. He also had to tackle some serious challenges.

“As a plant engineer, it was my job to see that the tests were running properly,” he said. “When you cool something from atmospheric temperatures to minus 320 degrees, cracks form as the material shrinks and expands. So, after about two cycles after I came on board for this test, they were trying to pump J-2A down for the next test and it wouldn’t because the test cell’s walls had developed so many small cracks.”

The team managed to do one test and when they tried to run the next entry, J-2A wouldn’t go past 200,000 feet.

“NASA wanted to bring in the ascent and the descent engine and then a series of small RCS control engines, but we had to fix the test cell first,” Ansley said. “We had absolute top priority at AEDC to make it work. We were told to work around the clock until we fixed J-2A. It took us three weeks of practically non-stop work to get it repaired.”

The engineering science of the facility and the challenge of keeping it working properly intrigued Ansley.

“When you go to 350,000 feet there are so few molecules in the test cell that you can almost count them,” he said “And you can’t pump them out in the traditional manner – the pumps quit working and you actually have to freeze the molecules. To do that, you use a helium refrigeration system that followed the same basic cycle as an air conditioning system.

“That’s why my experience was applicable, except this was at much lower temperatures. I worked for six months in plant operations and we got the cell back into service where it would attain 350,000 feet on a regular basis.”

With each test, they were exploring new territory in another area as well.

“In those days no one knew much about the effects such a low temperature and pressure would have on materials going up in space,” Ansley explained. “We were finding out the materials we used at that specific temperature and pressure wouldn’t work up in space. J-2A was one of the most exotic test units in the world at the time.”

In 1969, the success of the Apollo 11 mission, with Neil Armstrong and Buzz Aldrin’s famous lunar landing, brought both a sense of relief and satisfaction to engineers with NASA, AEDC and elsewhere, who had all contributed their time and expertise to the program. However, before long, the space race seemed to end almost as quickly as it had begun, but Ansley still had a role to play in it.

“There were several other missions to the moon, including Apollo 13, where they had an explosion on board the spacecraft,” he said. “It took some on-the-spot engineering here and in the air, in order to figure out how to get those men back alive. They had lost their main engine. So, they had to improvise and use the descent engine which we had tested –as the way to slow down, orbit the Earth and return.”

As emphasis on the space program faded, other concerns took priority. Ansley said challenges arising during the Vietnam War and the continuing threat from the nation’s Cold War adversaries on the world stage were forcing the U.S. military to take notice.

As a U.S. Navy veteran serving in the Pacific Theater during World War II, Ansley knew first hand about the consequences of a nation playing catch up after being attacked without warning by an aggressive and determined adversary, Japan.

“The Kamikazes were killing so many people on our ships,” he recalled. “I was on a troop transport; we were the replacements. I was also stationed for awhile on the West coast at a naval shipyard, and every dock and every slip on the Pacific coast was filled with ships damaged by the Kamikazes.”

The first wake-up call to develop a new class of jet fighters occurred during the mid-1960s when U.S. Air Force intelligence got an unpleasant surprise. The Soviet Union was busy building a large fighter aircraft, the MiG-25 Foxbat.

Limitations with armaments carried by the F-4 Phantom II and U.S. Navy’s fighters translated to an imbalance in air combat capability between the two Cold War adversaries.

The Air Force came up with the first version of the F-15 Eagle as the U.S. space race was ending, and Ansley, whether he knew it or not, was waiting to begin ground testing of the Air Force’s new warfighter.

Bob Ansley, an engineer who spent 32 years at AEDC, looks at a photo of the General Electric F101 jet engine, the power plant for the B-1B Lancer bomber, being tested in the center's C-2 altitude development test cell.