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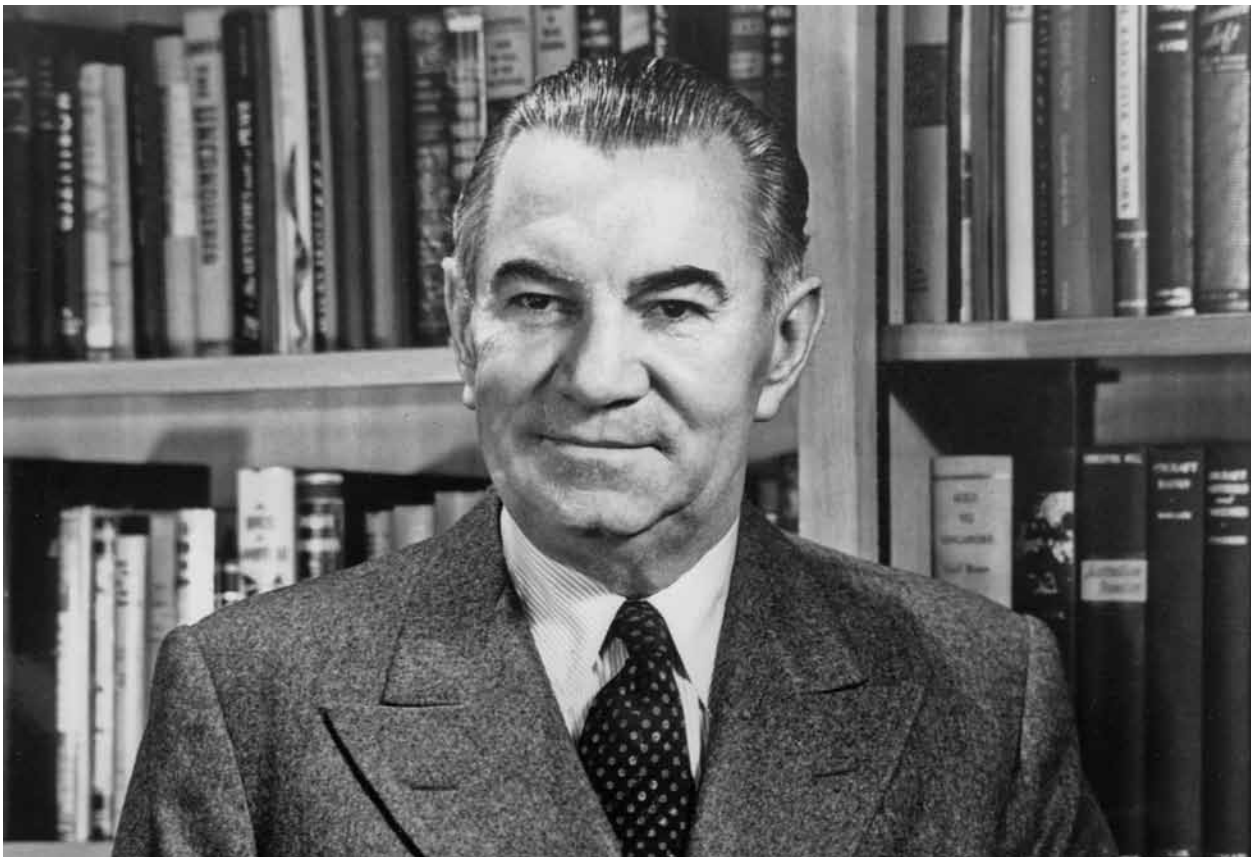
Prelude to the Bell Model 47

Larry D. Bell & Arthur M. Young



President of Bell Aircraft Corporation, Larry D. Bell.
CREDIT: Bell Helicopter

LAWRENCE (LARRY) D. BELL was born in Mentone, Indiana on April 5, 1894. By the time he was eighteen, Larry had become infatuated with flying as a vocation. Then in early 1912 he joined his brother, Grover, as a mechanic with a flying circus. Grover was killed in an airplane accident about half a year later, which really affected Larry. He quit the flying circus job, but stayed in aviation by obtaining a position as a foreman with the Glenn L. Martin Company airplane factory. Bell became manager of a new Martin aircraft plant constructed in Cleveland, Ohio. Things went well for him in Ohio, and by the early 1920s Larry Bell was vice president and general manager.

But Larry Bell decided he wanted to become a part owner in the company. Turned down by Glenn Martin, Larry quit his job at Martin and in January 1925 went to work for Consolidated Aircraft in Buffalo, New York. The company moved west

to California in 1935. Larry decided that he had the background to run his own aircraft business and remained in Buffalo. Starting Bell Aircraft Company there, he was able to convince two executives from Consolidated to go in with him. They were Ray Whitman and aeronautical engineer Robert (Bob) Woods.

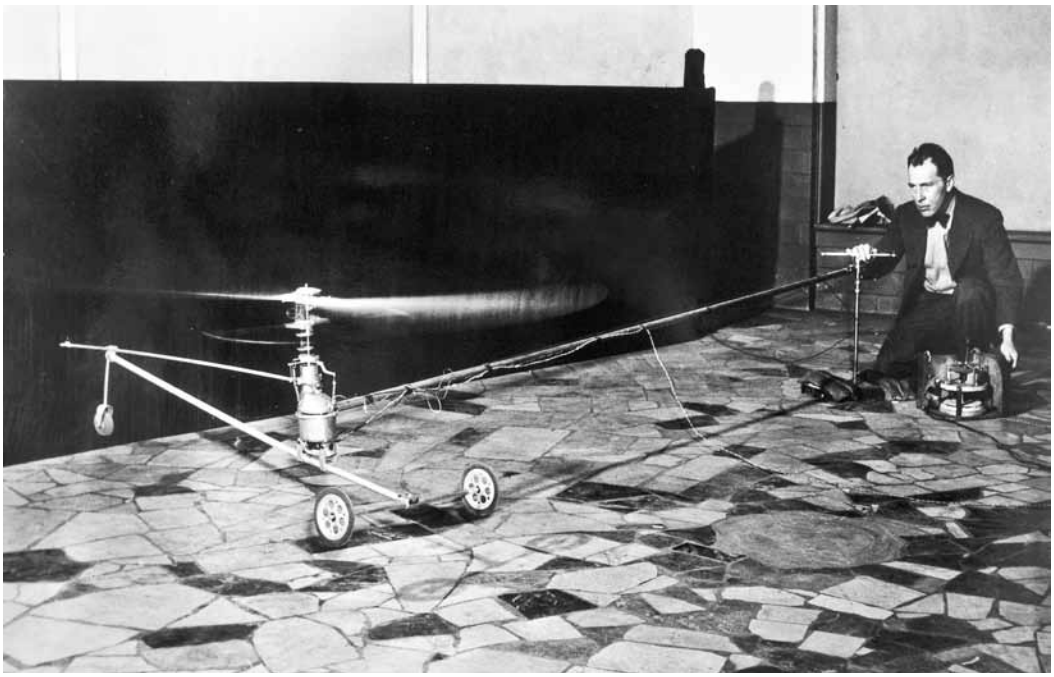
The little company began with only fifty-four employees and a working capital of $150,000. A year later, the company had grown to 643 employees and had a contract for building Navy aircraft parts. Bell's first airplane was the Airacuda, which was followed by the P-39 Airacobra. By 1940 Bell Aircraft had 4,300 employees, and that number increased to 11,000 by the time 1941 ended. Bell Aircraft Company's growth can be attributed to Larry Bell's superb salesmanship qualities and his vision for the future of aviation, plus the outstanding aircraft designs of Bob Woods. Larry Bell was a true trailblazer. By 1943 the company had swelled to over 47,000 employees.

Arthur Young tests one of his early models at his family farm in Pennsylvania.
CREDIT: Bell Helicopter/Jeff Evans and Ned Gilliand Collections

A distinguished inventor and metaphysical philosopher, Arthur (Art) M. Young was born in Philadelphia, Pennsylvania into a wealthy family. While growing up his interests lay in physics and mathematics. After graduation from Princeton University in 1927, Young gradually became interested in the field of helicopters and rotary wing research. Learning all that he was able to in the field of helicopters from libraries and by attending rotary wing-related lectures, Arthur settled into a course of personal research on the subject. He set out to solve the problem of the helicopter, which history shows had a long period of failures. This absorbed his efforts for almost twelve years.

Young set up a small aeronautical laboratory in a barn on the family estate in Radnor, Pennsylvania sometime around the early 1930s. There he began experiments with small models. Over the next few years Young was to build many models using rubber bands and electric motors. Many of them crashed; however, Arthur kept copious notes and records on his research. He constructed one model in 1937 using a twenty-one horsepower outboard motor as a source of power. That experiment also ended in failure. Undaunted, in 1938 Young moved to an old farm in Paoli, Pennsylvania, where another barn allowed him to carry on his model helicopter experiments using smaller vacuum cleaner motors for power.

Back in 1931 Young had called on his boyhood friend, Bartram "Bart" Kelley,



Another of many model helicopter flights carried out by Arthur Young. Young flew numerous models prior to giving a demonstration to Larry Bell.
CREDIT: Bell Helicopter/Jeff Evans and Ned Gilliand Collections

Arthur Young poses next to one his early model helicopters. Behind him at the extreme left in the photo is the Model 42, and two of the original Model 47 prototype helicopters.
CREDIT: Bell Helicopter/Jeff Evans and Ned Gilliand Collections

Arthur M. Young: Inventor of the Model 47.
CREDIT: Bell Helicopter

to join him as his apprentice and to help with his helicopter research project. Young and Kelley were to remain lifelong friends. Kelley eventually left to complete a physics degree from Harvard and ended up teaching mathematics in Massachusetts for six years.

Arthur had the opportunity to attend a rotary wing meeting where Igor Sikorsky was one of the principal speakers. Sikorsky was building an experimental helicopter at the time, the VS-300, which had a small tail rotor attached at the end of the fuselage to counteract the main rotor's torque. This concept intrigued Young and he felt that this was the way to proceed.

Continuing his experiments with helicopter models, Young concentrated on making hinged rotors and on attacking the stability problem. Over time he began to make substantial progress. He came upon the idea to construct a stabilizer bar system in order to improve the stability and steadiness of his models. "The bar was linked directly to the rotor so that the rotor plane was controlled independently of the mast. With the addition of this device, the model performed remarkably, showing great stability. In a few days I was flying the helicopter in the barn. I could even hover it motionless," explained Arthur Young in *They Filled the Skies*.

Young had solved a major stability problem. Although this was a big breakthrough for him, he still had to come up with some way to add remote controls for demonstration purposes. "This was solved by replacing the bar with a flywheel placed on the top of the mast. The rapidly turning flywheel tilted the rotor as the bar had previously done, and the flywheel could be tilted by the model operator on the ground by means of solenoids and electromagnets. This remote control system enabled Young to maneuver the model around the old barn's interior and even fly it out the door and back," related Bart Kelley in *They Filled the Skies*.

Arthur Young tried to interest numerous aviation companies in his helicopter model and the progress that he had achieved. However, he found there was little interest. Then Young received a breakthrough a friend, Doctor John Sharp. The doctor was visiting the Bell Aircraft Company in regard to a private matter, when he mentioned to one of the engineers that he had personally seen Young's remote control flying helicopter with its remarkable stability.

On September 3, 1941 Arthur arrived at the Bell Aircraft Company for his appointment and a demonstration of his helicopter model. Young put on a successful demonstration with the small helicopter to a group of engineers and followed it with a film he had made on the principles of stability. The film was about the different types of rotors that he had used in his flight tests, and it finished detailing the remote control model that Young had brought with him for the demonstration. President Larry Bell arrived and was introduced to Arthur. Both men hit it off, with Young taking to Larry Bell right from the start, and vice-versa.

Larry Bell liked what he saw, and envisioned the potential for a new industry involving rotary wing flight. Discussions began immediately with Arthur Young about joining the Bell Aircraft Company. On November 2, 1941 Young assigned his patents over to Bell, and an agreement was reached for Young to work for the company. Part of the deal included his friend Bart Kelley teaming up with Arthur to become his assistant. But on arriving at Bell on November 24, 1941, things began not to run smoothly right away. Young discovered that the $25,000 allotted in the budget was to make *drawings* of the new helicopter and not to *build* them. This was not what Young wanted to do. Finally the budget was changed to $250,000, and the building of two helicopters (a single-place to test stability, and a two-place) began so that Larry Bell could get his first ride.

Before operating funds were allotted, Larry Bell wanted see a demonstration regarding the safety of the helicopter when landing should the engine fail. Young got his flying model out again and was able to demonstrate the helicopter to Bell by touching down on the hangar floor without breaking an egg attached to it. Larry was very pleased. Monies

(Above) Model 30, Ship #2. From left to right: Bart Kelley, Larry D. Bell, Arthur Young, Floyd Carlson, two unidentified U.S. Military personnel, and Dave Foreman (manager of the Helicopter Division).
CREDIT: Bell Helicopter

(Left) Larry D. Bell (right) stands next to Harry S. Truman, vice president of the U.S.A., by Bell Model 30, Ship #1A.
CREDIT: Bell Helicopter/Jeff Evans and Ned Gilliand Collections

for operating expenses were quickly approved. Young and Kelley were finally ready to start looking at building the first helicopter. Arthur Young became the most significant single person and driving force behind the development of the Bell helicopter.

"The basic rotor system used on all Bell Helicopters was invented by Arthur Young of Philadelphia. Mr. Young is a true inventor and independent thinker. When Larry Bell persuaded him to carry on his experiments at the Bell Aircraft Corporation in 1941, he soon found that mixing the talents of an original mind with the more mundane routine of an Engineering Department had its problems.

"Young had written a report on some of his model tests in which force was measured with 'bathroom scales.' The technical writers were shocked at such informality. 'What would you say?' asked Young. 'Dynamometer,' the editor answered. Young duly complied, and the report was published, saying that the force had been measured with a 'bathroom dynamometer,'" recalled Bart Kelley in his report *Stories from the Childhood of the Bell Helicopter.*

Arthur Young (left) next to Bell Aircraft Chief Pilot Bob Stanley. This photo was taken prior to the first accident with Model 30, Ship #1.
CREDIT: Bell Helicopter