

# The GARDENVILLE Project



The iconic bubble-canopy Bell 47, the first helicopter certified for civilian use, was born in an abandoned car dealership

By Bruce Buckfelder

Snowy Buffalo, on the shores of Lake Erie in upstate New York, might seem an unlikely place for cutting-edge developments in vertical flight during the 1940s. At the time, however, Buffalo already had a significant history in the aviation business. Glenn Curtiss established his Curtiss Aeroplane and Motor Company there in 1916, merging with Wright Aeronautical in 1929 to form Curtiss-Wright, America's largest aviation company. Reuben Fleet's Consolidated Aircraft was also active in the city between the wars. Fleet's decision to move his operation to the West Coast in 1935 gave Vice President Larry Bell the opportunity to found his own firm, as well as the necessary space, personnel and tooling in Consolidated's old Buffalo facility. Within a few years, the outbreak of World War II and a chance meeting with an inventor made the fledgling manufacturer a major

player in the aviation industry. The payoff for what became known as the Gardenville Project would come on March 8, 1946, when the Bell Model 47 was certified as the first commercially licensed helicopter in the United States.

Before Bell became closely associated with rotary-wing aircraft, the company had enjoyed significant success with its fixed-wing airplanes. The P-39A Airacobra was in production before the U.S. entered WWII, with almost 10,000 rolling off the line by war's end. By the time work began on the Gardenville Project, Bell was test-flying the XP-59A, America's first jet fighter, and would soon produce the rocket-propelled X-1 that Chuck Yeager took through the sound barrier. Today both of those airplanes hang in the National Air and Space Museum's Milestones of Flight gallery.

The Gardenville Project has to be one of

the most overlooked stories in aviation. Even in its day, it received remarkably little attention considering the significance of what was achieved. Janet Harris of the West Seneca (N.Y.) Historical Society, a lifelong resident of the area, said, "I was never aware of the helicopter taking root practically in my backyard." The lack of attention might be attributed to the times—there was a war on, after all, and the Model 47 was initially envisioned for civilian use. The Gardenville shop operated from June 1942 to June 1945, when the Bell and Curtiss-Wright factories in Buffalo were producing tens of thousands of airplanes for the war effort. Bell Aircraft employment would rise from 1,170 in 1940 to more than 50,000 by 1944. Buffalo, then the nation's 14th largest city, boasted such a concentration of war-related industries that it was ranked third behind Detroit and San Francisco on the War Department's list of strategi-



Opposite: With Joe Mashman at the controls, a crew of Gardenville staffers hops a ride on the preproduction Bell Model 30, Ship 3, in November 1946. Inventor Arthur Young is standing, facing the camera.

Below: Floyd Carlson pilots Bell's Model 30, Ship 2, in May 1944 during a demonstration inside the 65th Regiment Armory in Buffalo, N.Y.







**Model 30, Ship 1, is prepared for a test flight. In June 1943, Ship 1 became the third helicopter to successfully fly untethered in the U.S.**

cally important cities. WWII created its own priorities, and building helicopters for the civilian market was not among them.

Inventor Arthur M. Young, the man behind the Bell 47, had trained as a mathematician rather than an engineer. Soon after graduating from Princeton in 1927, he devoted his attention to advancing the science of vertical flight. During the ensuing decade, he designed, built and tested rotary-wing models at his farm in Paoli, Pa.

In the late 1930s Young attended a series of Rotating Wing Aircraft meetings, where he met Igor Sikorsky and other pioneers in the field. In 1939 he managed to solve a major stability problem with the invention of the stabilizer bar, which consisted of two weights set at 90 degrees to the main rotor blades. The gyroscopic function of the bar effectively dampened out the effects of wind gusts, greatly increasing the machine's stability. Thanks to this breakthrough, Young gained enough control to maneuver and even hover his model inside his barn workshop. The breakthrough earned him the respect of his competitors and effectively made him a leader in the field. Named the "fly bar," his invention was granted one of the two patents Young earned.

But when the inventor set out to market his ideas, approaching private industry as well as the military, neither the Army nor Navy was interested. The one nibble he received, from Brewster Aircraft in Phila-

delphia, was lumbered with so many uncertainties that he decided not to pursue it. Young's break came when his friend John Sharpe, who knew Bell engineer Jack Strickler, visited the Bell plant and mentioned the inventor's work to Strickler, who relayed the recommendation to Larry Bell. That led to

Young demonstrating his model inside the Bell factory on September 3, 1941, flying it above assembly lines packed with P-39s.

Larry Bell was first and foremost a salesman. He envisioned a large postwar civilian market for aircraft of all descriptions—a not uncommon view at the time. If he could suc-



**Floyd Carlson sits at the controls of the rebuilt Ship 1, advised by Young (third from left).**



cesfully produce a helicopter, Bell believed, he would have an opportunity to corner a segment of the market that many of his competitors had never even considered pursuing.

Bell's visions of postwar markets aside, a major factor in his agreement with Young was that the two men liked each other. "I took a fancy to him right away," Young said years later. They struck a deal that included remarkably few conditions compared to today's voluminous contracts. Young agreed to assign to Bell any patents he held in exchange for funds to build two full-size helicopters. One would have two seats, so Bell could ride in it. (Bell stipulated this for all aircraft types produced by his company; he felt that he couldn't sell them if he hadn't flown in them.) Bell agreed to hire Young's longtime friend, Bartram Kelley, to assist the inventor.

Young and Kelley arrived at the Bell plant two weeks before the attack on Pearl Harbor propelled the U.S. into WWII. At first they eked out a cramped workspace between the existing assembly lines that was dubbed "gyro test." Given how busy the plant was, however, it wasn't long before they felt they were getting in the way. Young also came to believe that the corporate bureaucracy at the Bell factory

made it very difficult to accomplish anything.

Larry Bell, who had lost his brother Grover in an airplane crash in 1913, came up with one more condition before he would fully fund Young's project: The inventor had to demonstrate that his machine could fly safely. After Young successfully autorotated a model carrying a raw egg down from the plant's 30-foot-high ceiling, Bell released \$250,000 to get the helicopter project off the ground.

It almost stalled at the starting gate, however, once Young learned that the money was supposed to be spent on two dozen drafting tables and draftsmen. That was how his competitors, mainly Sikorsky and Frank Piasecki, were doing things at the time, but Young believed he would be farther ahead if he was allowed to experiment first, then made drawings of the parts that were successful—a view supported by his track record to that point.

After considering all his options, including giving up the project completely, Young contacted a real estate agent, who found an empty auto dealership about 10 miles east of Buffalo near the village of Gardenville. It had ample garage and office space, as well as some undeveloped land where the helicopters could be tested. With Bell's blessing, Young set up shop there in June 1942. His staff for the Gardenville Project—beginning at 15 and never exceeding 32—included test pilots, machinists and eventually one draftsman, although it would be a year before the first member with formal training in engineering, Charles Seibel, joined the group.



Carlson prepares to take Larry Bell for a spin in Ship 2, as Young looks on.

Just six months later, on a frigid December 18, 1942, the first full-size helicopter—Model 30, Ship 1, christened *Genevieve* by a secretary who smashed a bottle of champagne over its nose—was moved outside the shop for an engine run-up. Due to the cold, the 160-hp Franklin engine initially refused to start, but once additional battery power was provided it came to life. Young, although not a licensed pilot, successfully hovered the tethered craft a foot off the ground.

The program's first setback occurred while Bell executive and pilot Robert Stanley was flying Ship 1 just before the end of 1942. Pilot-induced oscillations threw Stanley upward into the rotor, and he was flung into a snowbank. Luckily his worst injury was a broken arm. He reluctantly called Bell afterward and reported, "I have delayed your helicopter a little." Ship 1's enclosed tail boom,

which broke off in the crash, would be replaced with a truss of welded steel tubing, a distinctive feature of the Model 47 throughout its production run.

Test pilot Floyd Carlson, a junior Bell employee assigned to the project after Stanley's incident, became an important member of the Gardenville team. Young later remarked that Carlson was the best test pilot they could have had—capable of flying the helicopters, but not so good that he masked design deficiencies. Carlson also contributed a fix for the vibration issues that had plagued early flights. His "Swedish yoke" (the name was a nod to his Scandinavian heritage) stiff-

ened the rotor mast and eliminated the vibrations. On June 26, 1943, he took the controls of Ship 1 during its first untethered flight, making it the third successful helicopter in America.

Once the team was flying on a regular basis, the Gardenville Project gained wider recognition. Carlson and second test pilot Joe Mashman spent time giving rides to visiting dignitaries, including competitor Igor Sikorsky. After the Russian-born designer allowed Young and Carlson to fly one of his own helicopters in return, they concluded that Sikorsky's bird took much more effort to fly, especially in a hover. The Gardenville team then knew they had a good product.

Other visitors included a group of Russian generals, in Buffalo to see the P-39s being built at Bell's main plant (most of which would be sent to the Soviet Union under Lend-Lease) and then Vice President Harry Truman. At one point Young narrowly avoided an international incident when he slapped the hand of a Russian general who had ignored repeated requests to stop flipping switches in the cockpit.

A feature article in a Buffalo newspaper helped raise the de facto veil of secrecy under which the Gardenville team had been working. Larry Bell, ever the salesman, decided that the helicopter must be demonstrated before the public if they hoped to sell any. In May 1944, Ship 2, with Carlson at the controls, became the first helicopter to make an



indoor flight in the Western Hemisphere (a feat accomplished in Germany six years earlier) before a crowd of Civil Air Patrol members and invited guests inside a Buffalo armory. Carlson kept the machine centered between the building's walls and 60-foot ceiling, even dipping its nose in a tribute to the CAP commander.

On the Fourth of July, Carlson demonstrated Ship 1 inside Buffalo's Civic Stadium before a crowd of 42,000 veterans, wartime production workers and guests. The grand finale came when he maneuvered the helicopter to position one of its wheels in Arthur Young's outstretched hand and held it there in a motionless hover.

In early 1945, two incidents showcased the Gardenville helicopters' utility, providing a morale boost for Bell employees and garnering the kind of publicity money can't buy. On January 15, Carlson participated in the first rotary-winged mercy mission after Bell test pilot Jack Woolams bailed out of an XP-59A. Woolams, who was injured in the mishap, made it to a farmhouse near Lockport, N.Y., but heavy snow prevented an ambulance from reaching him. Carlson flew Bell doctor Thomas Marriott to the scene, where he cared for Woolams—reportedly saving his life—until an ambulance finally arrived three hours later. The Marriott-Carlson Award, still given annually by the Association of Air Medical Services, is named for the doctor and pilot in that first rescue flight.

On March 14, Carlson set out on another rescue mission, flying to Lake Erie to pull two stranded fishermen off an ice floe. He had Ship 2's doors removed and calculated a fuel load that would allow him to pick up someone on the helicopter's skids without landing, which would have been impossible on the thin ice. Plucking the fishermen off the ice one at a time, he flew them to safety. Given that Ship 2 had logged only 12 hours' flying time at that point, Tom Harriman, another Gardenville team member, called it "the bravest thing I ever saw a father of three do."

The team built a third, unauthorized chopper, based on knowledge gained from Ships 1 and 2, after Young convinced Bell that it was necessary to continue their research. Ship 3 would essentially be the first production helicopter, unchanged as it went through certification except for the later addition of the iconic plastic bubble over the cockpit. It had a seat that would accommodate three and fea-



On March 14, 1945, Carlson rescued two fishermen from a Lake Erie ice floe using Ship 2.



The classic bubble-canopy version of the Model 47 served MASH units in the Korean War.



An H-13 (the Model 47's military designation) is tested at Bell's Fort Worth, Texas, plant.

tured the now industry-standard "rudder pedals" for control of the tail rotor, to make the machine more marketable to pilots.

Model 30, Ship 3, was renamed Model 47, and production was moved to Bell's Wheatfield plant, near Niagara Falls, in June 1945. Bell's development and demonstration pro-

grams continued after that, but the closing of the Gardenville shop effectively marked the end of an era. There have been very few programs like it—before or since.

The Civil Aeronautics Administration's chief pilot Raymond Malloy led the certification program, but before he could judge the



new machine he had to be taught how to fly it. Malloy decreed that the control forces were too stiff, and specified that the Model 47 must receive a major overhaul every 25 hours, a restriction that would eventually be lifted. Registration NC-1H was assigned on March 8, 1946, and the first Bell 47 was no longer an experimental aircraft.

The nod to begin production came two months later, when the CAA issued Bell a type certificate for the Model 47. At that point Larry Bell approached his corporate board and told them, "The only way we can sell the helicopter is to have the courage to build some." He requested an initial run of 500, expecting a lesser number to be approved. The board approved all 500. The Bell 47, in a variety of configurations, would remain in production for nearly 30 years.

Crop-duster, pipeline surveyor, traffic cop, news gatherer, law enforcement tool: These are just a few of the roles the Bell 47 has

since played around the world. Television star would also be added to that list with the 1957-60 series *Whirlybirds*. Its service in Korea was later immortalized by the film and TV show *M\*A\*S\*H*, which celebrated the medevac missions performed by chopper crews working with mobile Army surgical hospitals close to the battlefield. The value of quickly transporting wounded soldiers to hospitals during that conflict—and all the wars since then—cannot be exaggerated. An estimated 20,000 wounded were evacuated by helicopter in Korea alone.

The Bell 47 has even received recognition as a work of art. In 1984 a 47D was placed on permanent display in New York's Museum of Modern Art.

The type certificate earned in 1946 would remain in the possession of Bell Helicopter until 2010, when Scott's Helicopter Services acquired it. The Minnesota-based company provides support to the roughly 1,000 exam-

ples of the venerable craft that are still flying.

After the Gardenville Project came to an end, Arthur Young left Bell for academic pursuits in October 1947. Bartram Kelley retired from Bell Helicopter in 1974, at which point two-thirds of all the helicopters in the world were descendants of the three that had been built at Gardenville. The research facility in Gardenville was later transformed back into a Chrysler dealership, but several years ago it was replaced by a big-box drug store. Today many residents of the area are unaware of the important development work that took place in their community. But thanks to the Gardenville Project, there are very few people worldwide who have never seen a Bell 47. ✚

*Bruce Buckfelder writes from Kennesaw, Ga. Additional reading: The Bell Notes: A Journal From Physics to Metaphysics, by Arthur M. Young. For more information about Young, visit [arthuryoung.com](http://arthuryoung.com).*



## Young's Quest for Knowledge

It would be incorrect to say that Arthur Middleton Young invented the Bell 47 by accident, the way penicillin was discovered because of a stack of dirty dishes. But the helicopter was by no means the goal of his lifelong quest.

Born in Paris in 1905, Young was a Princeton-educated mathematician, philosopher and—above all—thinker, who early in life became focused on determining the "theory of process," an understanding of how things work. At 23 he decided he'd have a better chance of accomplishing his goal if he could focus on a specific project for 10 to 15 years. During a visit to the Library of Congress, he read Anton Flettner's description of a transatlantic boat powered by a rotating drum with small "windmills" at the edges. Theorizing that the same system might be used to power a vertical-flight aircraft, Young decided to develop a helicopter.

It is notable that Young was not an engineer, though he studied

### Young pilots Ship 1, the first incarnation of his brainchild.

everything he could find about vertical flight. He began his experiments by building small models, which allowed him to quickly try different methods and discard unsuccessful ones. This approach would serve him well when he later built larger machines.

Young stuck to his rapid-development methods, eschewing Larry Bell's plan to provide a gaggle of draftsmen. Once development began in Gardenville in 1942, "things really began to hum," the inventor later recalled. In March 1946, less than four years later, the Civil Aeronautics Administration certified the Bell 47.

In his journal, portions of which were published in 1979 as *The Bell Notes: A Journey From Physics to Metaphysics*, Young frequently noted his frustration with corporate bureaucracy and the differences of opinion that arose at Bell. He admitted that he intended to devote himself to the helicopter only "long enough to make it work." The differences between Young's and Bell's approaches were underscored in 1946, when the Model 42, which had initially been developed by the Bell engineering department using more traditional methods, was turned over to Young to fix. Even though the 42 never became a commercial success, Young felt that this vindicated his own approach. "The model 42 was an admission that the Gardenville method could achieve things that the 'system' could not," Young recorded in his journal.

Once the Model 47 was flying, Young was ready move on. "Now I want only to amaze myself; to retire and seek the esoteric for its own sake," he wrote. In 1952 he established the Foundation for the Study of Consciousness. In addition to publishing several books on philosophy, he became a poet and a painter. When Young died of cancer in 1995, he might not have left the exact mark he wanted on this earth, but countless people had benefited from his work. That's a legacy of which anyone could be proud. **B.B.**