

Beech Bonanza History, Part 1; 80-year Reign of the World's Longest Continuously-Produced Aircraft



by Richard Harris

This 1966 V35 (V35TC), N9456S, s/n D-8036, with optional turbocharged Continental 285-hp engine providing 230-mph cruise; top speed: 250-mph at 19,000 ft. (AAHS archives, Gerald Balzer collection)

The Beech Bonanza – a fast, 4-6 seat single-engine light plane, arguably the first fully modern light plane – is a marvel of aviation history. It is reputedly the longest continuously-built aircraft in the world.¹ First on the scene in 1947, it amazed the lightplane world with its advanced mix of modern features: sleek, all-metal (aluminum) hollow-shell (semi-monocoque) construction, retractable tricycle landing gear, variable-pitch propeller, 165-horsepower, flat-six engine, complete instrumentation for blind flying, and airliner speed for four people. It was made all the more distinctive by its unique V-shaped tail.²

It took the aviation community by storm. While most prewar lightplane makers – Piper, Aeronca, Taylorcraft, Luscombe, Stinson, Ryan, Fairchild, etc. – in the postwar recession shrank, collapsed, suspended operations, went out of business, sold out to others, abandoned the lightplane market, and/or transitioned into other industries, Beech slowly blossomed.³

Over the next seven-and-a-half decades, the Bonanza evolved into straight-tailed and 6-seat variants, acrobatic models, two-seat military trainers and drones, turbo-charged speedsters – plus various twin-engine derivatives even including a pressurized version.⁴

Since 1947, over 18,000 Bonanza variants, and 6,000 twin-engine derivatives, have been built and found service in nearly every country in the world, with most still airworthy today. Directly or indirectly, most of the legendary line of postwar, modern, all-metal, prop-powered Beechcraft designs can trace their origins, at least in part, to the Bonanza.⁵

Textron, as the new parent company, is shifting its focus to more modern, expensive, and profitable turboprops and jets. It has announced that production of this aviation icon will come to an end, as soon as the last outstanding orders are filled.⁶ It's

time to note the incomparable milestone, reflect on this historic aircraft, its origins and developments, its impact on aviation, and the forces that shaped it, sustained it, and brought it to this moment.

The Company

Beech Aircraft Co. was formed in 1932 by Walter Herschel Beech and his wife Olive Ann, with engineer Ted Wells. Walter's storied career, barnstormer-to-businessman, spanned the pioneering companies of the "Air Capital City," Wichita, Kansas: Laird/Swallow (America's first mass-produced "commercial" airplanes, under Matty Laird and Jake Moellendick), and Travel Air (formed with Clyde Cessna and Lloyd Stearman, America's highest-volume planemaker by 1929), and his own namesake Beech Aircraft Co., emerging in 1932 from the Depression-era ashes of Curtiss-Wright's 1929 acquisition of Travel Air.⁷

At the top of Beech were a handful of powerful decision-makers. Its legendary founder, Walter Beech, was in his later years crippled by a coma-inducing encephalitis in 1940. He increasingly handed most management responsibility to his wife and co-founder, Olive Ann. She was a shrewd, stern, disciplined businesswoman, who managed to wrangle \$63.5 million in government and bank loans (\$1,460 million in 2025 dollars⁸) to finance Beech's ten-fold expansion for war production. "She ran the place," workers have reported. Olive Ann, in turn, delegated much authority to trusted V.P. and General Manager Jack Gaty.⁹

But Walter made his presence felt, and frequently strolled throughout the vast Beech factory complex, especially the experimental and engineering offices, asking questions, and keeping staff on their toes. Later generations of practical

professors in business school would laud this as “MBWA” (Management By Walking Around). Though a quiet, stoic man at work, he could be emotional at times when addressing staff, often shedding tears. But he could also be blunt, often dismissing something dubious or disappointing as “no damn good.”¹⁰

Vice President and Chief Engineer Ted Wells, who had been with the Beeches since their days running Travel Air, had designed the company’s first and most iconic aircraft: the fast cabin-biplane Model 17, popularly nicknamed the “Staggerwing.” Wells would go on to design their big, twin-engine, semi-modern, cabin-monoplane, the Model 18 (colloquially: “Twin Beech”). He later led design of the AT-10, a wartime wooden substitute for the Twin Beech.¹¹

By September of 1944, Beech had turned out hundreds of Staggerwings as UC-43/GB-1&2 military shuttles, and thousands of Twin Beeches, and wooden substitutes, tweaked to serve the military as light transports (C-45, SNB, etc.), as pilot, bombardier and gunner trainers (e.g., AT-7, AT-10, AT-11), and in a variety of other roles (F-2, JRB, etc.). When work for trainers ran out, Beech built the wings for 1,635 Douglas A-26 Invader attack bombers being built in Tulsa, Okla., followed by an order for wing sections and tails for 1,400 Waco CG-4A invasion gliders.

During WWII, like many other small-plane manufacturers, Beech Aircraft Co. had suddenly exploded in size, to meet the massive, urgent demand for their aircraft in military operations. At the peak, over 14,000 “Beechcrafters,” in three continuous shifts, poured out a daily stream of planes and parts from their newly expanded 887,000-square-foot factory. By war’s end, Beech would build nearly 7,400 aircraft for the fight. From a 1939 staff of 660, and \$1.328,000 in sales, Beech sales in 1945 reportedly hit \$126,687,000 – nearly a hundred-fold increase. Beech was booming. But how long would war business last?¹²

Postwar Transition

In mid-1944, while the nation was deeply embroiled in the war, the War Department sent a self-contradictory memo to planemakers that urged them to begin planning for postwar (civilian) production – yet not while doing war work. The military double-talk was resolved by a Beech policy that all regular, paid employment was to be focused on war production, and anything else would be unpaid. Beech leadership began deliberating on what to produce when the war ended.¹³

The government, by 1945, was warning that it expected the warplane makers to lose all but 4% of their workforce when war production ended. Beech leadership, wildly grown through war-work, did not want to give up and return Beech to pre-war size. Immediate planning needed to happen.¹⁴

Management agreed that the Model 18 Twin Beech – a fairly luxurious, cabin-class, semi-modern aircraft, popular with corporations and feeder airlines – would be a continuing product after the war.¹⁵



The G17S Staggerwing would be the last of this line, represented here by the 1946 NC911, c/n B-12. (AAHS archives, AAHS-D000167)

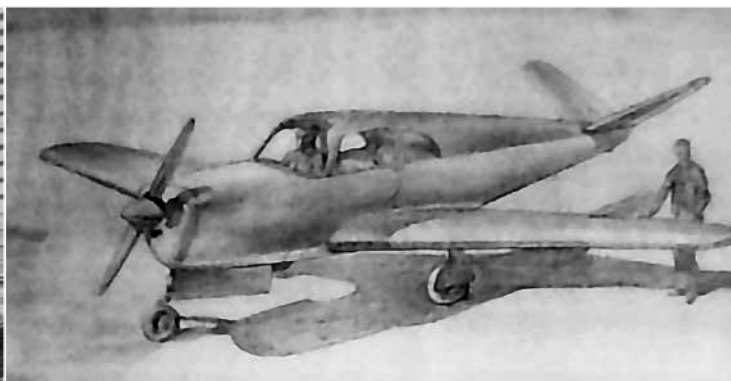
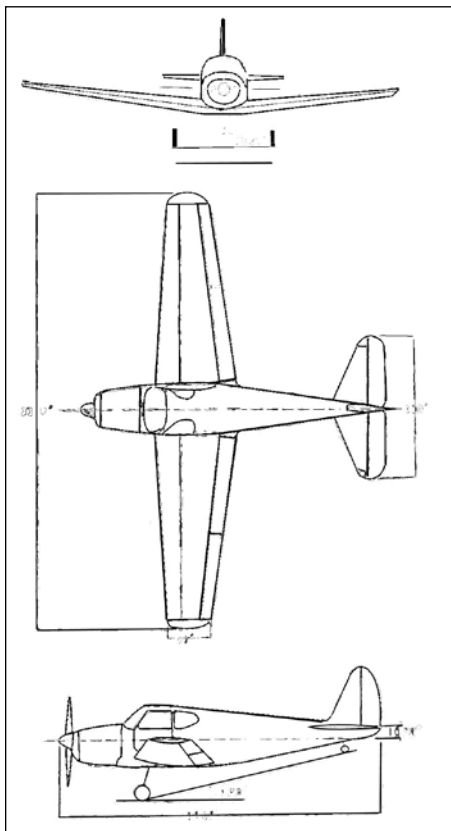
But the Model 17 “Staggerwing” was another matter. The heavy 5-seat, 160-212 mph biplane, framed in steel tubes and wood, wrapped in fabric skin, and pulled by a huge, draggy radial engine, had been designed and built purely with technology that was obsolete even before the war. It would surely face market resistance after the war. The plane was a complex, costly beast to build, and to be priced at a whopping \$29,000 postwar. Even after being tweaked to perfection, as the G17S, not more than 20 would be built after the war.¹⁵

Birth of the Bonanza^{21,33}

Rising-star engineer Ralph Harmon, since arriving at Beech in late 1939, had been grumbling about this issue, insisting that Beech needed to produce a smaller single-engine airplane.¹⁶ Before war’s end, management had come to the same conclusion, too. Assistant Chief Engineer for Design, Herb Rawdon (former designer of Travel Air’s historic Model R “Mystery Ship” racer¹⁷), was tasked with coming up with a suitable preliminary design. The 33rd Beech model study, it would be designated Model 33. Management decreed that it should be all-metal, with “two and seven-eighths” seating, to allow for ample baggage.¹⁸

In Summer 1944, in a rough drawing, boss Rawdon scribbled the outline of a light, low-wing, all-metal airplane tailwheel-type, with retractable landing gear, and side-by-side seating – specifying various physical dimensions. He specified a “flat” engine under a tight cowl, to minimize drag – specifically: the 4-cylinder, carbureted, Lycoming GO-290, geared to produce 160 horsepower.¹⁹

When drawn, Harmon noticed Rawdon’s vision looked rather like a warmed-over version of the prewar Globe Swift prototype – a similarly conceived plane described as a compact compromise between the Curtiss P-40 Warhawk and the tiny wooden Culver Cadet (which Walter Beech had a hand in bringing to Wichita, along with its designer Al Mooney). Beech and Texas-based Globe were acquainted. Globe built Beech AT-10s during the war, and Globe’s Swift prototype used a Beech-Roby variable-pitch propeller. The acrobatic Swift, with a bigger engine, would enjoy a brief niche popularity after the war, but fail to really grab the market.²⁰



LEFT - Resembling the pre-war Globe Swift, Herb Rawdon's concept of a two-seat, retractable-taildragger Model 33. (From Harmon's book).

CENTER - Bonanza creator Ralph Harmon (From Harmon's book)

RIGHT - Harmon's idea: Full 4-seater, retractable tricycle gear, V-tail. This drawing of it hooked Walter Beech, launching the Model 35. (From Harmon's book)

Harmon saw the proposed plane as a product of Rawdon's conferring with professional pilots, who rather liked old-fashioned taildraggers,

and disdained easy-to-fly aircraft (partly as a matter of their own job security). As a plywood mockup was developed, it worried Harmon. Steeply nose-high on the ground, visibility was limited. Landing gear was to retract into wheel wells that bulged under occupants' legs, forcing them forward uncomfortably. It wasn't "user-friendly."²¹

Harmon, now heading a team of 50 draftsmen, was tasked by Rawdon to create a drawing of the plane Rawdon envisaged. Harmon obliged – and chafed. It wasn't ideal for the anticipated customer: the *amateur*-pilot businessman (Beech's main pre-war customer), *not* the professional pilot.²²

"Conventional" (tailwheel) landing gear made for tricky handling on landing. With the main wheels ahead of the center of gravity, the plane was inherently unstable while landing and taxiing (rather like pushing a shopping cart backwards), with the plane wanting to "ground-loop" in a crosswind, or braking problem, or abrupt maneuver. It also led to porpoising on landings as the tailwheel settled, tilting the nose and wing back up towards the sky. Such "conventional" landing gear had the advantage of keeping the prop clear of rough ground, but improved fields were now plentiful, thanks to the war.²³

Tricycle landing gear had already been tried, pre-war, and found some use in the ERCO Ercoupe, though with problems brought on by the decision to make the nosewheel steerable. This led to complications indirectly leading to nosewheel-first landings that destabilized into ground loops; Ercoupes would produce statistical evidence of the problem. Harmon believed a non-steerable, free-castering nosewheel, steered by left-and-right braking, could solve the problem.²⁴

Determined to design a better plane, himself, Harmon decided the new plane should be "new, different, and above all,

better." It should "transport people from Point A to Point B with the least disruption of their normal environment." It would imitate the businessman's normal genteel living and working environments. It would be for the non-professional pilot.

June 1, 1944, Harmon was promoted to "Design Engineer," directly under Rawdon. His design rival was now his boss. He was now working on war work during normal hours, volunteering on the Model 33 after hours, and working on his own design after that. He started with a comfortable "passenger capsule," allowing upright seating, elbow room, and good visibility. It was a retractable, tricycle-gear, all-metal, light plane, with room for four people.

On a lunch break, as Harmon sketched design options, structures engineer Herb Kueck, a glider buff, tossed him a pre-war Polish aviation magazine describing a V-tail, telling Harmon "that's the kind of tail [for] your new plane." Harmon decided it met his specification of "new, different, and better."

But Harmon knew, from feeler discussions and experience with his boss, that Rawdon wouldn't accept his design. Walter Beech, in his plant tours, often stopped in the Preliminary Design Department, where Harmon worked, always showing interest in Harmon's drawing board. As Beech neared one day, Harmon put the drawing of his concept on the table. Beech took the bait, asking about it. Harmon said he thought it was what the company should build after the war.

After answering Mr. Beech's questions about the concept and tricycle gear, the boss said "By God, I think that's what we ought to build!," and walked off. An hour later, Engineering V.P. Ted Wells entered, asking about the "new airplane" Harmon was working on. After discussing merits of the design, Wells requested Harmon, with some of the Model 33 team, prepare a formal proposal, with numbers, for Wells to evaluate and show the Beech leadership (mainly Walter & Olive Ann, with VP/GM Jack Gaty). To Harmon's surprise, he was put in charge of a new "Model 35" program. Rawdon, still his boss, faded away from the project.

Beech Model 35^{21,33}

Harmon assembled a tiny clique to do the preliminary design work. In keeping with Beech policy and War Department demands, this non-government work during wartime was to be done in after-hours overtime, on an unpaid, volunteer basis. Five key people were initially tasked:

- Harmon: overall project; interior, landing gear.
- Jerry Gordon (Beech chief of aerodynamics): wings, surfaces
- Wison Erhart: wing structure
- Alex Odevseff: fuselage
- Noel "Roosh" Naidenoff: fuel system, engine support

Also invited was young Beech mathematician, Paul Miller, in an era when people, not gadgets, did the calculations. Miller reported the original group was sworn to secrecy, and operated without management looking over their shoulder. "Sometimes, you get more done that way," says Miller's daughter, and later co-worker, Gretchen. "Management can create distractions, worrying about what customers will want, or what production will cost."

As the team debated what to design, they anticipated a flood of two-seat trainers, from the likes of Piper, Aeronca, and others. They considered that Beech's reputation was built on providing good comfort, range and payload. A two-seater was quickly ruled out. A low-powered four-seater (three seats, realistically) was considered, to keep its price competitive. It was eventually ruled out, as well.

All agreed a full-size four-place plane was needed with baggage capacity and fuel for practical-length flights. It should be capable of flying in any reasonable weather, with necessary instruments and night-flying equipment. It should



Original instrument panel, complete with gyroscopic turn-and-bank indicator and radio. Throw-over control wheel aided comfort for the non-piloting person in front. Defying tradition, Harmon went for a bluegray panel to differentiate instruments and blend with the sky. There would be no black in the cabin.[Harmon] (AAHS archives, Gerald Balzer collection)

reach or pass then-current airliner speeds (the 180-mph DC-3). It should be a modern Staggerwing replacement.

Inevitably, the plane would be all-metal. They decided that looks mattered, so auto stylist Wayne Porter was brought in. For comfort, a Mercury auto was used to guide interior dimensions.

A cost survey indicated a market price of \$6-7,000. A quarter of the Staggerwings's postwar price. (In the end the first Bonanzas would actually sell for \$7,975).

Because of airplane size, visibility and propeller ground-clearance issues, the engine had to have a high thrust point, which dictated a flat or inverted in-line air-cooled engine. For propeller efficiency, they wanted the engine to deliver full power at, or below, a modest 2050 rpm, with the added benefit



Four seats, in automotive comfort, even for the ladies. Big door simplified entry and exit. Note exterior baggage hatch. Integral roll-cage structure protected occupants. Flush windshield cut drag. Big windows aided visibility and comfort. (Beech photo, AAHS archives, Gerald Balzer collection)



The 1st successful, fully modern light plane used modern semi-monocoque design: A hollow aluminum shell, reinforced with vertical formers and horizontal stringers for light-but-strong, durable construction. (author's photo)



The Beech AT-10 twin-engine trainer, modified with a V-tail, showed a 3-mph boost in speed, and no particular vices. (AAHS archives, Gerald Balzer collection)

of reduced noise. No adequate engine was yet on the market, so they asked if Lycoming and Continental would make them. Lycoming proposed a 290-cu.in. four-cylinder engine, turning at 3,000 rpm, but geared to turn the prop at 1925 rpm. Continental envisioned a hefty 475-cu.in. six-cylinder unit, directly driving the prop at 2050 rpm. Both agreed to produce 165 continuous horsepower.

A variable-pitch propeller would be needed to squeeze maximum power and efficiency from the engine. Only one make existed for light planes. Luckily, Beech had acquired the design from its inventor, Mr. Roby, and produced Beech-Roby props for the military's wartime light planes. The blades were wooden. To design optimum blades for the Model 35, local pioneer aviation engineer Walter Burnham, of Freedman Burnham Propeller Co., was called in.

All landing gear options were considered: tail-dragging and tricycle, fixed and retractable. Tricycle-gear was easier for inexperienced pilots. Fixed gear was simpler and cheaper to produce. But performance was essential to the objective, so they went with retractable tricycle gear, enclosing it completely within the plane. With the lower nose occupied by retracted nosewheel, inverted engines wouldn't fit, necessitating a flat engine.

Walter Beech wanted the postwar plane to be superlative, but especially in efficiency. Aerodynamicist Gordon developed a wind-tunnel that could fit one-fifth-scale models, with 10-foot wingspans. A 10-hp electric motor and prop were installed on the model for realism, to test how power affected flight. Math showed 160 mph possible; tests showed 165 mph. Two wing shapes were tried: NACA 23000 (as on the Twin Beech) and a slim, new "laminar-flow" wing similar to the latest fighters. At Bonanza speeds, they were almost equally efficient, but the 23000 was safer at low speeds. Both would be tested on flying prototypes. Leading edges would be smooth with flush rivets, adding 3 mph.

The V-tail combined horizontal and vertical stabilizers in a two-element V-shape, with "ruddervators" combining elevator and rudder functions. This promised to reduce weight and drag, compared to conventional tails. And it gave a distinctive appearance that would become the iconic symbol of the Bonanza.

The company had studied the V-tail when considering developing a high-speed aircraft. During the war they tested one on an AT-10 trainer; it added 3 mph. Wind tunnel tests showed it reduced drag on the new plane. Gordon calculated it added 5 mph. Harmon and Gordon also thought total weight could be less than an ordinary tail.

Weight mattered. Walter Beech had demanded the plane, fully equipped, carry four and baggage, with plenty of fuel. Naidenoff cut weight and conserved space by combining fluid system components. Harmon and Porter devised an advanced instrument panel, and found good, lightweight instruments for it. Erhart tweaked wing weight and performance.

Market study suggested annual sales of 2,000 to 4,000 planes. To meet that pace, Beech would use its ERCO automatic riveting machines, which could drive flush rivets cheaper than by hand. Wing and fuselage were designed to be assembled in segments, then mated. A piano hinge mated wing sections for easy assembly and field repair. Odevseff designed fuselage keel, cabin and tailcone to be constructed separately, then assembled in a jig.

Everything that could be made flush, or completely enclosed, was: landing gear (adding 6 mph), retractable boarding step, flap tracks, control surfaces internally balanced and hinged (3 mph), windshield joints (3 mph), flap gap doors (4 mph). The usual, draggy, fixed "gill" opening under the nose, for engine cooling, was replaced by cowl flaps adjustable as needed (6 mph).

For safety, "box" frames were formed into the cabin like a roll cage, with a long nose to soften impact, and a heavy keel to survive gear-up landings. Low-winged, 80% of the weight would be below or ahead of the cabin in a crash. Big windows, designed to open for ground ventilation, doubled as escape hatches. Shoulder belts were added to early planes, but when evidence showed nobody used them, they were dropped.

Five prototypes were built. Beyond government certification tests, two were used in ground testing equal to fatigue of 20,000 hours of flight. A wing-and-landing gear assembly was tested to the equivalent of 100,000 landings. Control surfaces got simulated engine vibrations and aerodynamic flutter. If things didn't survive design limits, designs were beefed-up.

Two prototypes were readied for flight. The laminar-flow wing with the Lycoming (Prototype #3), and the 23000-series wing with the Continental (Prototype #4). The Lycoming was flown first, by Vern Carstens, December 22, 1945. High-speed cruise was 10 mph faster than the wind-tunnel indicated: 175 mph on 165 horsepower! The 23000/Continental prototype yielded the same. Earlier delivery got the Continental engine the nod, and the 23000 wing was kept.

Continental was asked to design torsional vibration dampers for the engine, to reduce wear and maintenance. That delayed production, as competitors flooded the market. Preparing for thousands of sales, Beech opted for costly, precision, "Class A" tooling; a federal handout covered 75% of the cost. Flight testing and tweaking got underway, and in a maximum-speed dive test, Prototype #3 disintegrated, killing pilot Harry Reiter. The observer, Robert R. King, parachuted safely. Post-crash



Prototype #3, NX80150, with the laminar flow wing and Lycoming power. Believed to have been lost in flight testing due to a failure of the gear door during a dive. (Beech photo, AAHS archives, Gerald Balzer collection)

analysis determined the problem (landing gear doors sucked open), and it was solved. But the advance publicity heralding the Bonanza was now countered by adverse publicity casting doubt in the market. More flight testing and tweaking. Then came certification, March 25, 1947, followed by first deliveries.

Bonanza versus Navion

The Beech Model 35 Bonanza, and North American's (later Ryan's) competing Navion, were the first fully modern light planes, incorporating ALL the key features that would signal a clear break from the past among light aircraft:²⁵

- Aluminum-shell (semi-monocoque) construction (for weight-reduction, streamlining and durability).
- Cantilever wings (to cut drag)
- Retractable landing gear (to cut drag)
- Flat engine (cylinders placed in horizontally opposing rows, to cut drag & improve visibility, compared to radial engines)
- Variable-pitch propeller (for maximum performance in both cruise and climb)
- Tricycle landing gear (safer handling)
- Electric start (for safety and convenience)
- Cowl flaps (for reduced-drag engine-cooling)

In its approximate weight-and-power class, the Bonanza also had many firsts:³²

- Moved four people at 175 mph cruise
- Carried a full payload, fully equipped, for its maximum range
- Full equipment for day, night, and instrument flight as standard equipment
- Electrically retractable, tricycle landing gear,

completely enclosed in wing and nose.

- Flush riveting
- Automatically retracting boarding step
- Landing lights faired into the wing leading edge
- The radio's loop antenna faired within the tail, for drag reduction
- Throw-over control wheel, to maximize passenger space
- Significantly quieter-than-normal interior sound level in flight
- Luxury appointments comparable to the most expensive automobiles
- Baggage accessibility comparable to an automobile

The Navion was much cheaper (in price and quality), easier to fly, roomy, and had the cachet of superficial ties and resemblance to the vaunted North American P-51 Mustang. Alas, rather crudely developed, it reflected North American's purely military expertise (P-51, AT-6 trainer, B-25 bomber). But Beech knew the civilian businessman better, and the Bonanza's refinements showed it. The pricey Bonanza was slicker, sharper-looking, more refined, much faster (160-180mph, vs. Navion's 150-160 mph), had 750-mile range (vs. the Navion's 500 miles), and was more fully equipped with radio and instruments for cross-country and "blind flying."²⁶

In an era when owner-pilots were mostly married, and women wore skirts, climbing into the Navion, over the side, and into the cockpit under the sliding fighter-like canopy, was never possible in any discrete way for the lady -- no small matter, then. The Bonanza, with a boarding step and wing-level door that curved over the top, made entry comparatively easy and graceful for men and women alike. Once inside the Bonanza, comfort, accommodations and finish were superb. And Beech had a vast, global, dealer network.²⁷

Technology Comparison 1947 Light Planes

MANUFACTURER: MODEL:	#	CRUISE MPH typical	SEATS typical	POWER HORSEPOWER	VARIABLE-PITCH PROP	DRAG REDUCTION			SAFETY	
						FLAT ENGINE	ALUMINUM SHELL	CANTILEVER WINGS	RETRACTABLE GEAR	ELECTRIC START
Aeronca 7AC	85	graph	2 ii	65	-	✓	-	-	-	-
Aeronca 7BCM	92	graph	2 ii	85	-	✓	-	-	-	-
Aeronca 11CC	95	graph	2 ii	85	-	✓	-	-	-	✓
Beech G17S "Stag"	201	graph	5 iiiii	450	✓	-	-	-	✓	✓
Beech Bonanza	170	graph	4 iiiii	185	✓	✓	✓	✓	✓	✓
Bellanca 14-13	150	graph	3 iii	165	✓	✓	-	✓	✓	✓
Cessna 195	170	graph	5 iiiii	245	✓	-	✓	✓	-	✓
Cessna 120/140	105	graph	5 iiiii	85	-	✓	✓	-	-	✓
Culver V	125	graph	2 ii	85	✓	✓	-	✓	✓	✓
Erco Ercoupe	110	graph	2 ii	85	-	✓	✓	✓	-	✓
Fairchild F-24R-46	110	graph	4 iiiii	200	-	✓	-	-	-	✓
Funk B-85C	100	graph	2 ii	85	-	✓	-	-	-	✓
Globe/Temco Swift	140	graph	2 ii	125	-	✓	✓	✓	✓	✓
Luscombe 8A	95	graph	2 ii	65	-	✓	P	-	-	-
Luscombe 8F	120	graph	2 ii	90	-	✓	✓	-	-	✓
Mooney M-18 Mite	125	graph	1 i	65	-	✓	-	✓	✓	-
North American Navion	150	graph	4 iiiii	185	✓	✓	✓	✓	✓	✓
Piper Cub J-3	73	graph	2 ii	65	-	✓	-	-	-	-
Piper PA-11-90	100	graph	2 ii	90	-	✓	-	-	-	✓
Piper PA-12	100	graph	3 iii	108	-	✓	-	-	-	✓
Com.(Rearwin) 185	95	graph	2 ii	85	-	✓	-	-	-	✓
Republic Seabee	103	graph	4 iiiii	215	✓	✓	✓	-	✓	✓
Ryan Navion A	155	graph	4 iiiii	205	✓	✓	✓	✓	✓	✓
Stinson 108-2	125	graph	4 iiiii	150	-	✓	-	-	-	✓
Taylorcraft BC-12D	95	graph	2 ii	65	-	✓	-	-	-	-
Taylorcraft 19	115	graph	2 ii	100	-	✓	-	-	-	-

State of the art, 1947: The Bonanza and Navion, the first ALL-modern light planes, simply surpassed all 1947 competitors, except the pricey 17 "Staggerwing," and the Bonanza far surpassed the Navion.

In Production

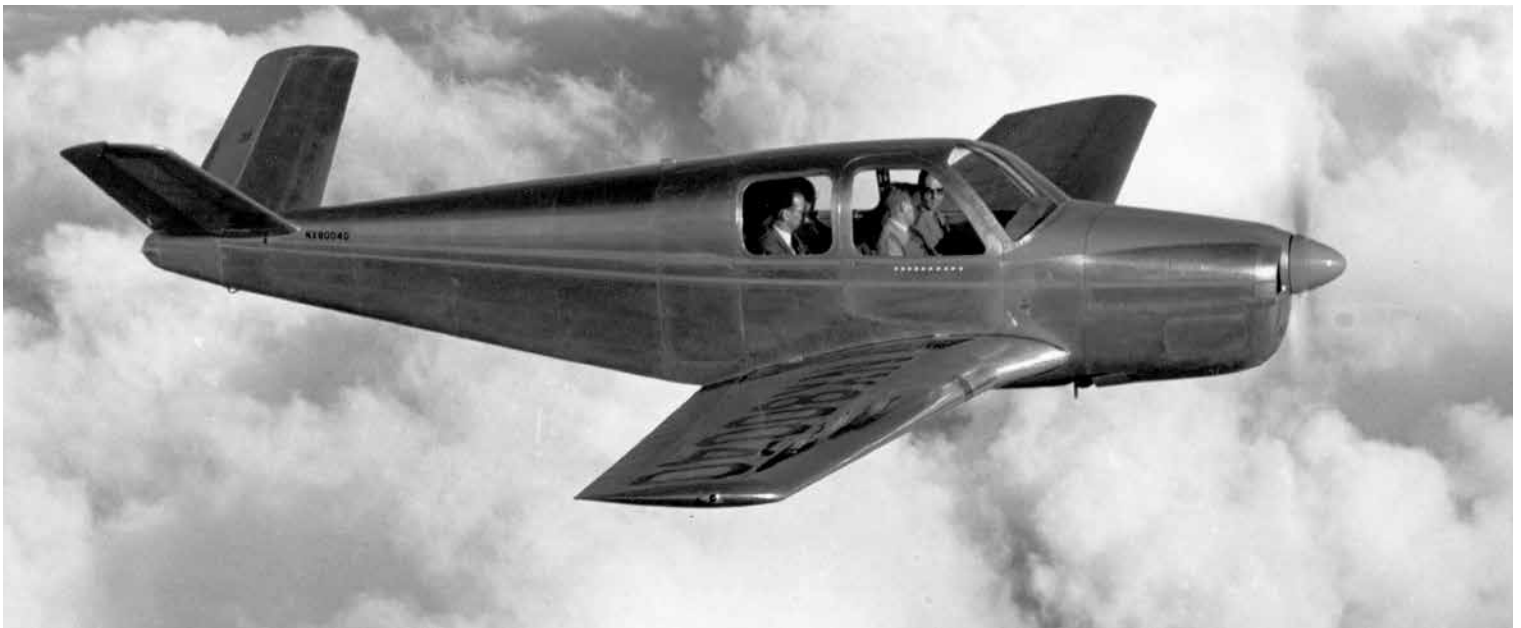
The Navion debuted first, in 1946, promptly selling 1,049 planes, starting at around \$4,750, before the design was sold in 1948-1949 to Ryan Aeronautical Corp. Ryan pumped out another 1,240 (largely to the military), before ending the line in 1951 (after 1960, various enterprises made brief minor revivals and variants of the design, but only a few hundred more Navions were produced).²⁸

The Bonanza debuted in early 1947 (first deliveries February 15), instantly outshining the Navion, and all others, at initial (rapidly inflating) pre-production price of \$7,000-7,975 (\$8,945 by 1947). They promptly garnered over 1,500 orders with some earnest money down, despite a lagging economy.²⁹ When North American's head, Dutch Kindelberger took his first ride in a Bonanza, he reportedly declared: "Gentlemen, we are out of the light plane business."³⁰

But it seemed that Harmon and company had erred in the Bonanza design. Wings started coming apart in flight, fatally. That gave the slower-but-sturdier Navion an edge in the market, while Beech worked out a better wing structure – released as



The North American / Ryan Navion, initially the Bonanza's main rival in technology and speed, was 9%-14% (15-25 mph) slower, and lacked the Bonanza's refinements. (AAHS archives, Gerald Balzer collection)



Continental powered Prototype #4, NX80040, prior to modifications for Bill Odom's world-record breaking flights. With extra tanks, he flew it 4,957 miles, non-stop. (Beech photo, AAHS archives, Gerald Balzer collection)

the Model A35 – and the wing failures stopped.³¹ As if to assure the public that the problems were solved, famed aerobatic pilot Bevo Howard flew an A35 in a thorough series of acrobatics, including loops and snap rolls, at the National Air Races in Cleveland. Despite a faltering market, buyers warmed to the improved A35, and Bonanza sales soon soared past the Navion, never to be outdone by it again.³¹ September 14, 1949, Central Airlines, Fort Worth, inaugurated its feeder service to 25 cities in four states with a fleet of 11 Model A35s.³³

Not all was sweetness and light, though. In concert with the national postwar recession, the general aviation market, which had boomed in 1946, lost half its sales in 1947, half again in 1948, and so on all the way down to a mere 3,000 sales, industry-wide, in 1951. It wasn't just national economics at play. The government unloaded its vast armada of now-pointless war-surplus light planes into the market, at a tenth of their original purchase price. Most lightplane makers were faced with shockingly cheap competition from the very planes they'd sold the government during the war. The market was literally awash in planes. For the small-plane makers, this was disaster. Many went out of the plane-making business, temporarily or permanently, or trickled out trivial sales, throughout the recession.³⁴

For the far-superior, revolutionary Beech Bonanza, and the roughly comparable-but-slower Navion, not so much. The government had little to compete with them. In an era before interstate highways and extensive airline service, the new "biz-birds" empowered owners' reach for business and pleasure. Those with the means to buy or borrow-to-buy, put their money in the advanced planes by the thousands. Beech, which had gone into debt developing and tooling-up for the Bonanza, soon found itself once again profitable.³⁵

The next few years brought Beech happiness. Extra tanks were added to Prototype #4, NX80040, for Bill Odom to attempt a non-stop flight from Hawaii to Teterboro, New Jersey, January

12, 1949. Weather over Reno blocked his flight, forcing him back to the coast. Even so, Odom set a world record for the Bonanza's class (2,204-3,858 lbs.) of 2,406.87 miles (Hawaii to Oakland, Calif.) in just over 22 hours, proving the Model 35 a capable cross-country transport. He tried again March 7-9. In 36 hours, 2 minutes, he made the 4,957 miles to Teterboro, setting the world non-stop distance record for all light planes, with the longest non-stop solo flight in world history, to that time. The "Waikiki Beech" became a Smithsonian treasure, 'til 1951, when Illinois Congressman Peter Mack, Jr. flew it around the world as "Friendship Flame" on a "goodwill flight," becoming the first to fly solo across the entire Pacific. (It's now in the National Air & Space Museum.)³⁶

The B35 model offered tweaks. Then the C35, with a bigger engine and weight needed an enlarged tail to manage it. It would turn out to be a fatal flaw, not recognized, nor fixed, for over a generation.³⁷

The superlative Bonanza, popular with businessmen and professionals – like doctors and lawyers – attracted buyers with sharp minds, strong egos, and lots of confidence and money. Good for business, but not always good in the cockpit. Some, it seemed, flew the airplane recklessly, even incompetently. The plane kept winding up in fatal accidents, often in adverse weather, and began to get the nickname "fork-tailed doctor-killer."³⁸

One of the flaws noticed was that often the tail came off before the plane hit the ground. Beech and federal officials, and leading advertising-funded aviation magazines, blamed it on the pilots failing to operate the plane safely, and flying it past its design speed limit (accidentally or intentionally), the results being the tail coming off. And it was cautioned that the planes' exceptional speed and streamlining could naturally lead to quick disaster if not flown properly. It would be decades before any other explanation was taken seriously.³⁹



Bonanza's sweet-spot in the market were the business professionals (farmers, doctors, sales representatives, etc.) who had a need for a fast, flexible transport that could compete with the airlines, or even provide service where they did not. Rugged Bonanza gear handled rough fields well. (Beech photo, AAHS archives, Gerald Balzer collection)

Competition Response

Meanwhile, the Bonanza reigned supreme in the general aviation world, among single-engine planes. Major rivals Piper and Cessna began expanding their lines beyond two-seat, tail-dragging, puddle-jumpers. Four-seaters like Piper's Pacer and tricycle-geared Tri-Pacer, and the Cessna 170 and tricycle-geared 172 emerged as incremental steps to capture some market share.⁴⁰ Over time, these and other general aviation manufacturers would try nibble away at the Bonanza's market share with high-performance planes of their own.

Piper

In 1957, Piper introduced its all-metal, cantilever-winged, retractable-geared competitor to the Bonanza: the PA-24 Comanche. It had a wider cabin, but the execs and professionals tended to be taller, fitting better in the high-ceiling Bonanza, which it was always a little faster for a given horsepower, despite the Comanche's superior range. The Comanche remained popular until a flood wiped out its factory, ending the line in 1972.⁴¹



Piper entered the market with the PA-24 Comanche, which was competitive with better range at slightly slower speeds. (From the author's collection)

Cessna vs. Beech

Cessna developed its retractable, tricycle-geared, 4-seat 210, in 1959. Roomy, and heavy-hauling in later six-seat models, it handled high altitudes superbly, at 190-200 mph. But the Bonanza was a bit faster. Still, during its production run, until 1986, the 210, especially in its turbo-charged variant, outsold the Bonanza, according to former *Flying Magazine* editor Richard Collins.⁴²

Beech fought back in 1966 by turbocharging the V35 series into the 250-mph-max (224 cruise) V35TC / V35A-TC / V35B-TC, able to leap tall clouds, at least up to the 24,000-foot limit for pilots and passengers in an unpressurized cabin, breathing supplemental oxygen through masks. Only about 130 sold between 1968 and 1970.⁴³

In the 1970s, Cessna also tried tucking the feet on its svelte 4-seat 177 Cardinal. The retractable-geared 177RG / Cardinal RG, realistically cruising 160 mph, was much slower and less capable than the Bonanza, and troubled with landing gear issues (like the 210), but a comfortable, "affordable" substitute.⁴⁴



Early Cessna 210 wings were strut-braced. (here a 1967 210F, N1860F). Later models eliminated struts. (AAHS archives, AAHS-S037129)

Then Cessna started retracting feet on the popular 182 and 172, yielding the mildly popular 182RG and the slow, lightweight 172RG (used almost exclusively by flight schools for advanced training).

Ballooning product-liability lawsuits, though, caused Cessna to abandon piston-prop planes altogether in 1986, not resuming any of them until after passage of liability limits in the General Aviation Revitalization Act of 1994. Even then, it only resurrected the company's three lowest-risk/reward planes: the ultra-popular 172, 182 and 206. The 210 and RG models were gone.⁴⁵

Bellanca



The Bellanca Viking and Super Viking was an extension of existing construction methods (tubing and wood) and needed extra horsepower to compete with the Bonanza. (AAHS archive, AAHS-D104540)

Bellanca's beefy, old-fashioned, wood-winged, steel-tube-frame, fabric-skinned 14-series retractables, and later 17-series, were comfortable and capable 3-4-seaters, given enough horsepower and avgas, but lacked the sophisticated, modernistic elegance and durability that the biz/pros appreciated, and needed extra power to match the Bonanza.⁴⁶

Mooney

Mooney Aircraft, was originally established in Beech's hometown by Al Mooney, chief engineer for Culver Aircraft (a maker of tiny retractable-geared two-seaters, which Walter



Al Mooney created the M20 as seen in this M20A, N8177E, using mostly tube and wood similar to the Bellanca. Bonanza creator Ralph Harmon was hired to fix the resulting problems. (AAHS archives, AAHS-S025476)

Beech had helped bring to Wichita). In a postwar breakup with Culver, Mooney developed his own single-seat retractable that ran on a tiny engine, to lively speeds. But when Mooney tried to expand his line to include a four-seat retractable, he couldn't get local support. So he moved the company to Kerrville, Texas, where his M20 design blossomed into a compact, lightweight, slower, cheaper, more-efficient competitor to the Bonanza.⁴⁷

Mooney crafted his original M20 much like the Bellanca: wood wing and fuselage sheeting and steel-tube frames, with bits of sheet metal – relying heavily on wood in the structure. Early M20s began to come apart in flight. Mooney, himself, left the company for a job at Lockheed, in Georgia. The Mooney Aircraft Co., ironically, hired Bonanza-designer Ralph Harmon to come and fix the Mooney problem, which he largely did by replacing most of the Mooney wood with metal. The planes stopped coming apart, and developed a pretty average safety record.⁴⁸

The result was a line of compact speedsters that would survive up to the present. Though not as fast and powerful as the Bonanza, nor as roomy and heavy-hauling, they were much more affordable and efficient. But they tended to draw a different kind of owner-pilot. Bonanza still had its exec's and pro's.⁴⁹

Bonanza Derivatives

Beech, ever sensitive to market pressures, began to develop derivatives of the Bonanza in response to the competition's attempt to siphon away potential buyers.

Beech 33 Debonair/Bonanza

In 1960, to meet the challenge of the cheaper planes, Beech offered a stripped-down, no-frills version of the Bonanza, the 225-horsepower Model 33 Debonair, and gave it a conventional tail in place of the Bonanza's iconic V-shaped, status-symbol. But as time went by, under market pressures, the "Debbie's" features grew to match the "real" Bonanza. The 1966 C33A Debonair got the 35-series Bonanza's big 285-horse engine. In 1968, Beech gave up the pretense that the lines were substantially different. They renamed the Debonair "Bonanza,"



Though not designed for sustained, inverted flight, the acrobatic E33B and E33C could legally slow-roll, snap-roll, loop, and more – a rarity among fast, 4-seat, travelers. (Beech photo, AAHS archives, Gerald Balzer collection)

American Aviation Historical Society Journal, Winter 2025



The more modern panel of a 1977 V35B. A rack of circuit breakers hints at the expanding equipment list. The main holdover from the past: the throwover control wheel. But engine, flap and landing gear controls remained under the center pivot and/or in non-standard positions and shapes, leading to accidents.[NTSB/80]] (AAHS archives, Gerald Balzer collection)

as well. By 1969, the F33A was, except for the tail, identical to the V35. Along the way, lower-powered (225 horse) variants continued alongside the 285-horse variants, and acrobatic versions of both sizes were developed as the E33B and C.⁵⁰

Six-Seaters

In the 1960s, Cessna was turning out a popular fixed-gear, six-seater, the Model 205, then 206, capable of hauling six full-sized adults in relative comfort, with baggage.⁵¹ They stole from Beech the buyers looking for that capacity.⁵² Piper's Bonanza-competing fast-retractable, PA-24 Comanche was stretching to a similar six-seat accommodation, and Cessna's big, fast 210 Centurion wasn't far behind.⁵³



Whether an aerial conference room for 4 (and 2 up front), or hauling bulky cargo, the Model 36, with Bonanza style and speed, challenged the popular 6-seaters of Cessna and Piper. (AAHS archives, Gerald Balzer collection)

Six-seat planes were a problem for the V-tailed Bonanza. It was limited by design to four adult-size seats, but with a big luggage compartment behind the rear row of seats. Beech elected to stretch the 1964 Model S35 Bonanza by 19 inches, and start squeezing additional optional seats, one or two, into the luggage area. A 285-horsepower engine replaced the previous 260. But weight-and-balance limits, and space limitations, made it less-than-ideal to put full-size adults in the back seats. In fact, even risky.⁵⁴

A true six-seat Bonanza was needed. In 1968, designers took a four-seat E33A, and split the cabin from the keel, moving the aft bulkhead back 19 inches (as had already been done with the V-tailed S35) and moved the cabin and engine 10 inches forward, away from the overloaded tail to improve balance. Now the Bonanza could comfortably seat six full-



A36 Bonanza, available with or without turbocharging, finally provided truly safe, roomy capacity for six full-sized adults, and baggage, with Bonanza speed and style. (Beech photo, AAHS Archives)



V35B: 4+1 seating, 285 hp, 198 mph cruise; Pinnacle of V-tail Bonanzas (except for its turbo variant). This 10,000th Bonanza, c/n D-10000, built February 9, 1977, flew a nationwide tour celebrating the Model 35's 30-year dominance of the high performance, single-engine market.[EBS;B/T] (Beech photo, AAHS archives, Gerald Balzer collection)

size (170-pound) adults, and stay safely in balance. Big double doors aft opened to a roomy “club seating” arrangement, where the aft four seats were in facing pairs (middle row facing backwards, back row facing forward). This created an aerial “conference room” environment, complete with small folding table. The result became the Model 36 Bonanza – a stretched V35B (basically the last-of-the-line of the V-tailed birds), but with a conventional tail.⁵⁵

As on the Cessna 206 (which Beech engineers had examined in advance⁵⁶), the 36's double doors made it a great cargo-hauler, too. Now buyers could have the capacity and comfort of a Cessna or Piper six-seater, with the speed and panache of a Bonanza. Buyers promptly flocked to the plane. Beech's expected hefty sales of a utilitarian 36 to fixed-base operators for air taxi and cargo operations failed to materialize. Most such FBOs were already dealers for rival Cessna or Piper, and using those planes, instead. That left Beech looking for the personal pilot, so the 36 was trimmed up into the plush A36.⁵⁷

The A36 gradually became the dominant version of the Bonanza. By 1977, it accounted for half of all Bonanza sales.⁵⁸ The turbocharged, 300-horsepower A36TC appeared in 1979, pushing speeds towards 245 mph (229 cruise), and a longer-winged version, with bigger tanks, the B36TC, appeared in 1981, stretching range to 1,133 miles. In 1984, the normally aspirated A36 also grew to 300 horsepower, pulling it to 212mph (202 cruise). These versions remained the Bonanza line until the mid-2020s.⁵⁹

Accidental Discovery

After decades blaming Bonanzas' exceptionally high in-flight breakups on poor piloting, in February 1980, Beech was confronted with an extensively detailed investigative report in *Aviation Consumer* magazine, alleging design flaws in the Model 35-series' V-tails. The article claimed these flaws might have contributed to hundreds of fatal Bonanza in-flight-

breakup crashes. It added that the FAA and its predecessor, the CAA, had known, but not pressured Beech to fix the problem. The article described how, in severe turbulence, the unsupported leading edge of the V-tail could twist, leading to complete failure of the tail, at normal speeds. They cited crash statistics showing that the conventional-tailed Model 33 had very few in-flight airframe-failure accidents, while the V-tailed 35-series had over 200.⁶⁰

Beech firmly denied the allegations, again putting the blame squarely on pilot errors, suggesting pilot-induced over-speeds did the damage. Leading general aviation magazines which, unlike *Aviation Consumer*, carried Beech advertising, leaped to Beech's defense.⁶¹ (Former *Flying* editor Richard Collins, at the helm of *Air Facts*, repeated defense of the Bonanza in 2014.)⁶² But

the allegations devastated the market for the 35-series planes, compared to the 33-series. In 1982, after the V-tail's 35th birthday, Beech discontinued the Model 35 series. Bonanza modifier Mike Smith began offering reinforcement kits to existing 35-owners to address the issue, and they sold quickly, despite Beech's insistence that they were unnecessary.⁶³

As the crashes were all fatal, no pilot testimony could validate *Aviation Consumer's* claims. In 1983, a Model 35 was shaken by wake turbulence from a Boeing 727 jetliner near Tucson, twisting the tail just as *Aviation Consumer* had warned, but the twisted tail remained intact long enough to make it to a safe landing, and examination. In 1984-85, new FAA administrator Donald Engen commissioned research on the issue, leading to an airworthiness directive (AD) to modify the tail, supported by a Beech fix and service bulletin. But Beech never resumed production of the V-tailed Bonanzas.⁶⁴

Final Versions

The straight-tailed four-seat 33-series and six-seat 36-series remained popular. The 33s continued in production until the last F33As were discontinued in 1994.⁶⁵ The 36, in various forms, soldiered on. A 2006 panel makeover with Garmin glass-panel instruments and avionics turned the A36 into the final model, the G36.⁶⁶

In all, over 18,000 Bonanzas, in various forms, and over 6,000 of its twin-engined Baron derivatives, had been produced by November of 2025. That's when Beech's latest parent company, Textron Aviation, increasingly focused on far-more-expensive turbine aircraft, announced it would end the Bonanza and Baron lines. Just one month short of 80 years since the Bonanza's first flight, and nearly 79 years since first delivery – the longest continuous production run of any aircraft in world history. And so, too, with that, ends the 93-year reign of piston-powered Beechcrafts.⁶⁷ ➔



B36TC, the ultimate Bonanza: 300 hp, 245 mph top speed at 19,000 feet. 230 cruise at 25,000. Extended wings hold fuel for 1,133 miles at 196mph. Full-fuel payload: 878 lbs;[B/T;D/B] (Beech photo, AAHS archives, Gerald Balzer collection)

[To Be Continued]

[Editor's Note: This article focuses on the general aviation single-engine models of the Bonanzas. Twin-engine (Barons, etc.) and military variants will be covered in future parts]

About the Author

Richard Harris, a licensed aeronautics instructor and former aviation industry journalist, once worked for Beech in a loft above the Bonanza/Baron factory floor, and for Wichita's Learjet and Cessna factories, and a Piper dealer, in various roles -- marketing, administration, accounting, technical writing, engineering coordination, production planning and customer support -- and lived next door to the Beech factory for a decade.

End Notes

1. Farney, 88-89; Rowe 142; A&S-H
2. NASM, Constant
3. S/T; A/P; A/A; Killion; Wright, 213; Underwood, 76; Swick, Ch. 11-14; Farney; McDaniel, Ch. 15-17
4. P/B; Clarke; Ellis
5. McMillin, B/G; P/B; McDaniel; NASM; Rowe 172; FAA/R
6. McMillin, Moore, Wilder
7. Bissonette; P/T; McDaniel, Ch. 1-3; Farney, 53]
8. bls.gov; indiana.edu
9. Farney, 73-9; Harmon, 141; McDaniel, 13, 28; author's conversations with former Beech workers
10. Harmon, 120-121; author's conversations with former Beech workers
11. P/T, 122-3; P/B, 5, 12, 19, 30; McDaniel, 41; Harmon, 26
12. Harmon, Ch. 8-9; Farney, Ch. 7; McDaniel, 28-71; Bissonette, Ch. 17; P/B
13. Harmon, 141-4; McDaniel, Ch. 12
14. Harmon; McDaniel Ch. 13
15. Harmon 142; Killion; McDaniel, 67; P/B, 6, 18
16. Harmon, 142

17. P/M, P/T, Ch. 7; Bissonette, Ch. 17
18. Harmon, 142-3; B/B
19. *Ibid.*, 142
20. Aerofiles.com; Baxter; Killion; NASM/G; Swift Museum; B/B
21. Harmon
22. *Ibid.*
23. *Ibid.*
24. Clarke, 469-70; Harmon, 145; Killion
25. NASM/B; MoF; Harmon; B/B
26. Garrison; S/T; B/B; S/W; Ethell; Collins
27. S/T; Harmon; S/W 210-214; Ethell 2; Collins; A&S-N; McDaniel, 87
28. Ethell, Collins; Garrison; Harmon
29. McDaniels, Ch. 14-15, Collins; Farney, 88-89; P/B; S/T
30. Garrison
31. Ellis, 235-6
32. B/B; S/T
33. B/B
34. S/T; A/P; A/A; B/B; Killion
35. S/T; Killion; McDaniel, 89
36. B/T; McDaniel, 90-94; A&S-Y; NASM/B -
37. Ellis, 235-43; AC/V
38. D/PC; Collins, S/W; Stahl; P&P
39. Ellis, 235-43; AC/V; Collins; M/B
40. P/C; A/P; Ethell; Ellis; Clarke
41. A/P; D/PC; UAG2; Ethell; Ellis; Clarke; Collins; AC/B
42. Collins; Ethell; Clarke; Ellis; Christy; AC/B
43. P/B; Ellis, 236; Clarke, 274-5; D/B
44. Christy, Ellis, Clarke, Collins)
45. Rodengen; 196-206; Ellis; Clarke Beech never stopped Bonanza production. Farney 88-89
46. Collins; Ethell
47. Collins; Rowe, ch. 6; Baxter; AC/B
48. Baxter, Clarke, UAG2, NTSB/79
49. Collins; D/C; Ellis Ch. 11; Baxter; AC/B
50. B/T, 50; Ellis; D/B
51. Ethell; Clarke; Ellis
52. B/T

53. Ethell; Clarke; Ellis
54. P/B; B/T
55. B/T, 30; P/E; P/B; Clarke; Ellis; Ethell
56. Thompson
57. P/E
58. B/T, 30; P/B; Clarke; Ellis; Ethell
59. B/T
60. AC/V; Ellis; Constant
61. Flying, May 1980; AOPA Pilot, Jan.1981
62. Collins
63. Ellis; Constant
64. Ellis; Constant
65. Goyer
66. McClellan
67. McMillin, Moore; Wilder; Farney,88-89; Rowe,142; A&S/H

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