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MARCH 2024 \$3.95 US

VOLUME 28 NUMBER 3



Let 'Em Eat Steak.
Beechcraft's T-Bone

EDITOR

Lance Phillips
lance@twinandturbine.com

EDITORIAL OFFICE

2779 Aero Park Drive
 Traverse City, MI 49686
 Phone: (231) 946-7770

PUBLISHER

Dave Moore

PRESIDENT

Dave Moore

PRODUCTION MANAGER

Mike Revard

PUBLICATIONS DIRECTOR

Jake Smith

GRAPHIC DESIGNER

Marci Moon

TWIN & TURBINE WEBSITE

www.twinandturbine.com

ADVERTISING

Jenna Reid
 816-699-8634
Jenna.Reid@VPDCS.com

ADVERTISING COORDINATOR

Betsy Beaudoin
 1-800-773-7798
betsybeaudoin@villagepress.com

GENERAL AVIATION

ADVERTISING INFORMATION

Aviation.Publications@VPDCS.com

SUBSCRIBER SERVICES

Rhonda Kelly
 Jessica Meek
 Jamie Wilson
 P.O. Box 968
 Traverse City, MI 49685
 1-800-447-7367

To change mailing address,
 email rhonda.kelly@vpdcs.com

Twin & Turbine (ISSN 1092-6402), USPS 24432 is published monthly by Village Press, Inc. with advertising offices located at 2779 Aero Park Drive, Traverse City, Michigan 49686. Telephone (231) 946-3712. Printed in the United States of America. All rights reserved. Copyright 2016, Village Press, Inc. Periodical Postage Paid at Traverse City, MI.

SUBSCRIPTIONS: *Twin & Turbine* is distributed at no charge to all registered owners of cabin-class aircraft. The mailing list is updated monthly. All others may subscribe by writing to: *Twin & Turbine*, P.O. Box 968, Traverse City, MI 49685, or by calling 1-800-447-7367. Rates for the United States and its possessions follow: one year \$15.00; two years \$29.00. Canadian subscriptions are one year \$24.00; two years \$46.00, including GST tax. Overseas subscriptions are one year \$52.00; two years \$99.00, U.S. funds. Single copies \$6.50.

ADVERTISING: Advertising in *Twin & Turbine* does not necessarily imply endorsement. Queries, questions, and requests for media kits should be directed to the Advertising Director, *Twin & Turbine*, P.O. Box 968, Traverse City, Michigan 49685. Telephone 1-800-773-7798. Website: www.twinandturbine.com.

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POSTMASTER: Send address changes and inquiries to Twin & Turbine, Village Press, Inc., P.O. Box 968, Traverse City, MI 49685.

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Orcas Island, Washington.
 Courtesy of Dwight Barton

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Twin Bonanza design bridges the gap between development of the Bonanza and the bigger twins, the Queen Air and King Air C90



Let 'Em Eat Steak: Beechcraft's T-Bone

by **Matthew McDaniel**

Once upon a time, there was no Beechcraft Royalty Series. The King Air, Queen Air, Duke, and Duchess didn't yet exist. The Beech Model 17 Staggerwing design dated to the early 1930's; however, even its timeless art-deco lines and luxury after WWII could no longer offset its complex and labor-intensive wood, tube, and fabric construction. Instead, Beechcraft pursued newer technologies, flying their Model 35 Bonanza within months of the war's conclusion. By 1947, it was in production and enjoying brisk sales. While building and operating was far more economical, the V-35 lacked the Staggerwing's plush cabin space and speed. But, the pre-war, tail-dragging, thirsty-twin-radial Beech 18 was a leap most buyers couldn't afford. Thus, with BE-17 production ended, Beechcraft's product line had a very sizable gap between the ahead-of-its-time V-Tail Bonanza and the much larger (and older) BE-18. So, late in 1949, the Model 50 Twin Bonanza first flew.



The unique and clean cockpit

The Army wanted a plane that could take off with a pilot and five troopers, clear a 40-foot obstruction in 1,700 feet, operating from a runway contaminated with sand and loose rocks. Beech proved their Model 50 could do just that. Immediately after, they crashed it (stalling at 50 feet AGL on the return landing). All six occupants walked away. Such crash-worthiness impressed the Army and effectively sealed the deal. Because the Korean War was ramping up, initial production was almost all to satisfy military demands, and 99 L-23s were delivered before consistent civilian sales began in 1953. A few initial buyers were Whirlpool, Lockheed, Outboard Marine, Marathon Oil, the U.S. Atomic Energy Commission, and Lufthansa Airlines (for pilot training). By the time production ceased in 1963, just shy of 1,000 Twin Bonanzas had been built, with about 200 going to the military as L-23/U-8 Seminole.

Big and Innovative

The Twin Bo (affectionately nicknamed the “T-Bone”) was certainly not just a Bonanza with two engines. While it did have limited parts commonalities with the Model 35, the twin was massive in comparison. One entire wing of a Bonanza became the outer wing panel on a T-Bone. The BE-35 flaps became the outer flaps of the T-Bone’s segmented 4-flap design. The fuselage sides, roof, door, windshields, and windows of a BE-35 became the BE-50’s upper-forward cabin (when widened by a foot). With the added wing center section and widened fuselage, the wingspan of the

twin would grow to a dozen feet longer than that of the single-engine Bonanza. The Twin Bo’s original cabin configuration was two 3-abreast bench seats with a cargo area behind. The aft baggage door was large enough to slide a 50-gallon drum through, and the baggage area would hold two of them! Oddly, the co-pilot position was in the center because the T-Bone retained the BE-35’s throw-over yoke and rudder pedal position, putting the co-pilot controls on the centerline of the wider twin.

Innovative safety features were incorporated into the BE-50, as well. It was the first production aircraft certified with shoulder harnesses. Certification in the Utility Category gave it an airframe G-load limit of 4.4 Gs, translating into a 14% increase in maximum turbulence penetration speed. The design is very crash-worthy, too. Almost 70% of the airframe’s mass is forward of and below the occupants, and engine and fuel cells are outboard of the cabin. The bench seats were anchored to the forward and aft spars, respectively. When retracted, all tires remained slightly exposed. In a gear-up landing, the tires would still be the main point of contact, and differential braking remained available, too. In addition to the main entry door (over the wing or rear airstair), there were two large emergency egress windows.

Variations

The initial civilian model was simply the 50. As with previous Beech designs, the Twin Bo’s designations would add

a prefix letter (B50, C50, etc.) to denote significant changes. These were usually major engine upgrades or gross weight increases. An added suffix letter (D50A, D50B, etc.) signified minor changes, like the entry steps and doors, seating configuration, and other refinements.

The initial production Model 50 used geared Lycoming GO-435 engines of 260hp, turning two-bladed wooden propellers. Only 13 were built before Beech introduced improved versions. The B50 added a third side window. The C50 and D50 upgraded engine horsepower to 275 and 295, respectively, with Lycoming GO-480 engines. Subsequent D-models would incorporate better boarding steps, then a right-rear airstair door. The E50 got 340-hp, supercharged, GSO-480 engines. The F50 introduced fuel injection via the IGSO-480 (also 340hp). Variations on that engine would carry the T-Bone through its final production version, the J50.

Interior configurations would also vary widely. Eventually, the benches could be exchanged for two individual seats. The right-front seat slides to the center to allow the use of the center-mounted co-pilot controls. With the introduction of a third row of seating, many layouts became available, still forward of the aft baggage door or airstair door, as equipped. Four seats in a club configuration would have been the most passenger-friendly by today's standards. A left-side divan with seating for three, facing sideways, could be combined with second and third-row right-hand seat(s). The aircraft could be certified for up to eight occupants in the highest density configurations. With fewer

seats, refreshment centers, foldable work tables, and even a flushable potty were options on later models.

Ed's Swords

Like so many great designs in aviation, the Twin Bonanza generated many after-market modifications. Extended range fuel-cells, instrument panel reconfigurations, extended baggage compartments, a slimmer nose cone allowing the installation of a radar unit, gross weight increases, and a single-piece "speed-sloped" windshield are just a few of the approved mods.

However, famed designer and engineer Ed Swearingen developed the most extensive and comprehensive modifications. His initial "Excalibur" models were re-engined with Lycoming IGSO-540's (380 hp). New doors fully enclosed the gear when retracted. The significant power increase and equally significant drag decrease, coupled with other performance-enhancing mods, made Swearingen's T-Bones the ultimate versions. All were customized to the buyer's desires and incorporated various mods. Thus, no two were exactly alike. His final iteration replaced the bulky geared engines with direct-drive, 8-cylinder Lycoming IO-720s, developing 400 hp each. The bulbous production cowlings (originally designed to house geared Franklin engines) were replaced with streamlined cowls. Marketed as the "Excalibur 800," a cruise speed of 245 mph was claimed (though 220 mph economy cruise was more realistic). An estimated 44 T-Bone airframes underwent Excalibur conversion.



Above Eastsound, Washington

PHOTO COURTESY OF DWIGHT BARTON.



PHOTO COURTESY OF DWIGHT BARTON.

Beautiful views around Washington State

Swearingen would go on to develop the Merlin line of business turboprops, initially using BE-50 parts. Twin Bonanza center sections, landing gear, empennages, and other components were incorporated into the early Merlin design and production. Between 1964 and 1970, Swearingen used about 118 Twin Bonanza airframes and unused Beechcraft production parts for his Merlin IIA and IIB production.

Flying The T-Bone

As with most vintage aircraft, Twin Bo owners consider themselves caretakers of the few dozen examples actively flying. Some current caretakers even help to ensure that BE-50s find suitable homes via word of mouth alone. Thus, most sell off-market. One new owner is Brett Zefting, who makes his living as a Lear 45 Captain and an A&P/IA. Yet, he also retains a passion for old airplanes as a pilot and mechanic. He and his young family have enjoyed various single-engine aircraft for many years. But, with a third child on the way, it was time to move beyond 4-seaters. He felt the Twin Bo fit the bill perfectly and recently acquired N28EC, a 1960 D50C.

Upon Brett's invitation, I climbed through the cavernous airstair door, walked down the center aisle, and settled into the pilot's seat. Having your co-pilot or instructor climb in, slide their seat to the center, and cozy up next to you is almost comical. Nonetheless, that's what the T-Bone requires for both pilots to access the controls. The panel and interior feel spacious and uncluttered. The left-side panel



Departing Orcas Island

fuel controls are similar to modern King Airs. The throw-over yoke, trim wheels, and piano-key switches are pure vintage V-tail Bonanza.

The only thing that feels foreign is the non-standard arrangement of the power quadrant. Beech put the throttles in the center and prop controls to the left, opposite of Piper and Cessna piston twins. However, with geared engines to manage, the arrangement is quite handy. Big power adjustments are made with the prop controls first, then throttles, to ensure the engines remain “loaded.” It is important to keep the engines turning the props, not vice-versa (which can cause mechanical “backlash” and damage to the 77:120-ratio gearboxes). Ground-idle RPMs of 1,200+ are recommended for the same reason. Engine starts were straightforward, and taxiing the big twin was easy. The steering system uses direct linkage to the nosewheel, and any need for differential power is limited to the tightest of turns only.

Normal takeoffs are accomplished using flaps up and full power, achieved at 3,400 engine RPM. Noise is far less than you might imagine, thanks to prop RPM being 36% slower. The TwinBo's big wing will want to fly slightly before the 90 mph Vmc (minimum control speed or the lower redline).



Author Matt McDaniel in the left seat, and owner Brett Zefting in the right

So, immediately after liftoff, climb should be shallowed to allow speed to quickly build above Vmc and toward the 110 mph Vyse (best rate of climb single engine speed or blue line). This will allow sufficient control and the best climb performance should one engine decide to go silent. For even shorter takeoff distances, half-flaps are used and retracted once speed is safe and obstacles cleared.

The first power reduction is a big one. Pull the prop controls to reduce engines below the 3,100 RPM caution range, keeping the engines loaded. Manifold pressure can then be reduced accordingly. The big girl climbs out easily, far lighter on the controls than her size would imply. Pilot workload is very low compared to most piston twins. The T-Bone's pressure carburetors are altitude-compensating, meaning mixtures don't require adjustments during climb. The big cowlings lack cowl flaps to fiddle with, and there is no pressurization to monitor.

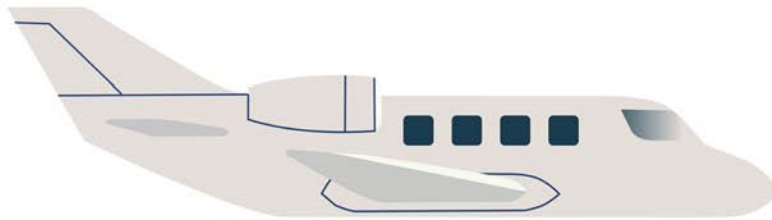
Twin engine maneuvers are a pleasure to fly. The airplane goes exactly where you point it. It displays no bad characteristics in steep turns or slow flight, and control harmony is excellent. The manual trim wheels are centrally located below the power quadrant, but I would not call them convenient. Beechcraft's big throw-over yoke mechanism is in the way of anything below or behind it, which the trim wheels are. A bit of working around it is required, but it's manageable. Single engine handling proved docile, all the way down to Vmc. Granted, with just Zefting and myself aboard, we were well below maximum gross weight and well forward of the aft C.G. limit. Thus, even with the



PHOTO COURTESY OF DWIGHT BARTON.



Owner Brett Zefting on the air stair



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critical engine at zero-thrust, at speeds near V_{mc} , plenty of rudder remained available. This was the case even with the operating engine producing enough power to sustain 200-300 FPM climb rates. Admittedly, that was something well below full power. Low ceilings prevented us from exploring V_{mc} manners all the way down to directional control loss.

Typical economy cruise in Zefting's normally aspirated, 295 hp Model-D50C is 160-165 mph TAS at 10,000 feet and 30 gph. Keeping the engines loaded while descending will cause speeds to rise, requiring some pilot planning to slow enough to extend flaps and gear on schedule. Maximum gear and flaps speeds (V_{lo} & V_{fe}) are 150 mph. In the pattern and on an instrument approach, the BE-50 is rock solid and responsive to power adjustments. Zefting invited me to fly a visual approach into Seattle Paine Field's (PAE) Runway 16L (their smaller runway, at only 3,004' x 75'). Flying the extended final right at or slightly above blue line (110) and slowing to 100-105 crossing the fence, with gusty crosswinds and only 10 knots of headwind component, we could have easily stopped within half the runway (1,500 feet). We rolled past the midpoint taxiway, seeing no need for heavy braking to prove a point already made.

After a short field takeoff from 16L (equally impressive), we quickly went IMC on the return to Boeing Field (BFI). There, I shot an ILS with a stiff crosswind aloft in a steady rain. The Twin Bo is so well-behaved and predictable that the resulting landing (only my second in the plane) was quite ego-stroking. More credit goes to Beech's design than to this novice T-Bone pilot at the controls.

Seven Decade Legacy

The Twin Bonanza legacy is an impressive one. While relatively few of them remain, its offspring are still everywhere. The BE-50 morphed into the BE-65 Queen Air, which got a bigger fuselage and tail. Next came the King Air, with turboprop engines and pressurization. Swearingen's Merlin line, which began production using major components of existing T-Bones, eventually grew into the Merlin III and then Metroliner regional airliners (both popular today as cargo haulers). The gear supporting the Twin Bo, then the Queen Air and the Merlin II, is the same system seen underneath King Air 90 models still in production until 2021 (72 years after it first flew on the prototype BE-50). 

Matthew McDaniel is a Master & Gold Seal CFII, ATP, MEI, AGI, & IGI and Platinum CSIP. In 34 years of flying, he has logged nearly 22,000 hours total and over 5,900 hours of instruction given. As owner of Progressive Aviation Services, LLC (www.progaviation.com), he has specialized in Technically Advanced Aircraft and Glass Cockpit instruction since 2001. McDaniel is also a Boeing 737-series Captain for an international airline, holds eight turbine aircraft type ratings, and has flown over 135 aircraft types. Matt is one of less than 15 instructors worldwide to have earned the Master CFI designation for 11 consecutive two-year terms. He can be reached at matt@progaviation.com or 414-339-4990.



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