BEECH B36TC BONANZA

One thing leads to another

BY EDWARD G. TRIPP

continued

B36TC

The two aircraft used to take the air-to-air photography that accompanies this article are both Beech Model 36 Bonanzas. There is a 14-year difference in age, and more than 2,000 units were processed down the production line between the times the two aircraft were built.

The photographic platform aircraft is one of the first Model 36 Bonanzas built, serial number 22. It is in the fleet of United Beechcraft, a dealer in Wichita. The subject aircraft, N36TC, is the first production B36TC. Curiously, its registration is the same as the pre-production A36TC we flew and photographed three years ago (see "First Look: Beech Turbo Bonanza," May 1979 *Pilot*, p. 59). Beech has quite a few registration numbers that remain with the factory when an aircraft is sold.

More than years and serial numbers separate the two. For while there have been no dramatic developments to the basic airframe and powerplant with which the long-fuselage Bonanza started life, there have been a number of product improvements.

The two most significant were introduced in 1979: an extended baggage bay behind the fifth and sixth seats, and the availability of a turbosupercharged model.

The B36TC is the most visibly changed aircraft in the 36 line. The aircraft's wingspan has been increased by four feet four inches (from 33 feet 6 inches to 37 feet 10 inches). More immediately obvious than the increased wingspan are the leading-edge devices: wedge-shaped vortex generators located in a line toward the outer end of the ailerons.

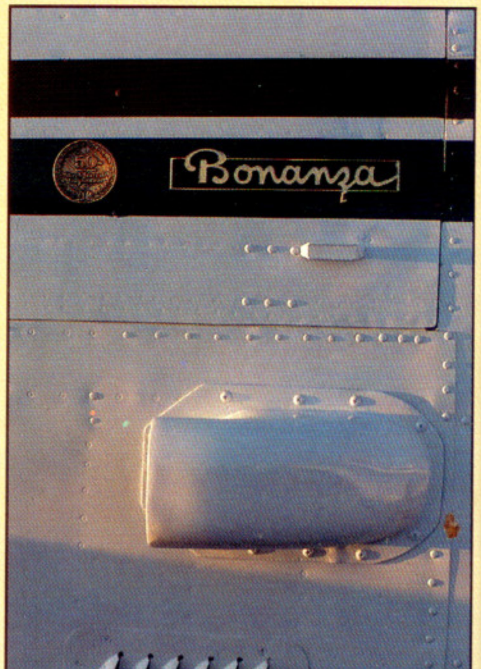
These appendages are the result of one thing leading to another. The one thing—or first thing—was the company's reaction to owners' complaints that the A36TC was a bit short on range/endurance, even with the optional 80 gallon (74 usable) fuel capacity. The decision was made to increase fuel capacity by extending the wing. A bladder tank, with a 14-gallon capacity, is carried in the leading edge of each wing, outboard of the main, 40-gallon bladders. The tanks are interconnected, and they are filled through a single point.

The B36TC has the same spar and carry-through structure as the Model 58 Baron. (The two aircraft have the same basic fuselage.)

The new Turbo Bonanza has a maximum takeoff weight of 3,850 pounds and a basic useful load of 1,528 pounds, increases of 200 and 140 pounds, respectively, over the A36TC model.

So, in search of increased range, the aircraft has become quite different from its predecessor. Beefier. And those odd shapes on the wing—one guy called them diving platforms; another, wire cutters; a third, just plain cockamamie.

The devices result from attempts to eliminate unacceptable spin characteristics at aft CG loading. These vortex generators are designed to maintain attached flow over the outboard portion of the wing and the ailerons at low speed and high angles of attack. They improve roll stability and help



Vortex generators keep air flowing over the ailerons at the stall.

the aircraft resist the tendency to roll off on a wing at or just after the stall. They also improve aileron effectiveness in a stall and provide more positive, faster, spin recovery.

Any aircraft with a fair spread between its top and stall speeds presents engineers with conflicting aerodynamic requirements. The frequently different aerodynamic needs for high and low speed control, plus the basic requirement that an aircraft have characteristics that do not present operational difficulties for pilots of average skill, have resulted in an interesting variety of devices, or resolutions. On most general aviation aircraft, the devices are employed to provide acceptable handling characteristics at or near stall.

Stall strips are the most frequently seen devices: usually small angular shapes attached somewhere on the leading edge. That *somewhere* is very critical, particularly on highly efficient airfoils. The primary purpose of these is to control the way in which the wing stalls or the point along the wing that stalls first.

A variety of inboard cuffs are also fairly common solutions. The V35 Bonanza has an unusual and complex cuff on the wing's leading edge at the juncture with the fuselage.

The Cessna T303 has a unique set of flow-control devices located at the outboard and inboard junctures of the engine nacelle and the fuselage (see "The Cessna T303 Crusader," February *Pilot*, p. 68).

There has been some experimentation with different airfoil shapes at different points along the wing.

Leading edge cuffs, or drooped leading edges, principally developed by and for Robertson Aircraft, have proven so successful on certain Cessna products that the company incorporated mild cuffs on several of its single-engine aircraft a few years ago.

I have flown quite a few aircraft with supposedly nasty stall and stall/spin characteristics that were quite well mannered so long as they were flown carefully down near the stall. I also have flown quite a few airplanes that had supposedly mild manners in slow flight but that departed violently because they were rigged improperly. My reaction to all, however, typically has been that one normally does not fly them that slowly.

That is not correct and not the proper attitude, as stall/spin accident statistics show. Pilots do stall aircraft at low altitudes and never recover. Whether these are the result of the pilots' lack of proficiency, panic or gross neglect or the result of an undesirable characteristic of the aircraft, we will never know—in most cases.

For more than a decade, the National Aeronautics and Space Administration has been running programs to study the stall/spin characteristics of general aviation aircraft and for basic aerodynamic research dealing with the problem. Considerable work has been done on the effect of leading-edge designs and leading-edge devices that has advanced the knowledge and proposed some solutions.

NASA currently is conducting wind-tunnel tests on the Beech-developed wedges. Beech engineers experimented with a variety of devices and shapes. Some were smoothly faired to the leading edge of the wing. A series of more than 400 spin tests were conducted, during which the company concluded that the hard-edged wedges had the best effect and that it was the side of the device that generated the desired vortex.

Apparently, both Beech and the Federal Aviation Administration are satisfied with the result. While in Wichita to evaluate the Turbo Bonanza, I did not have the opportunity to try the spin entry and recovery manners of the aircraft. However, I did spend a good part of our time with the aircraft in slow flight during which all of my attention was focused outside the cockpit.

Later, I did a series of stalls in a variety of configurations and power settings, including a stretch-the-glide during a turn in landing configura-

continued

tion. My first impression is that the Turbo Bonanza is well mannered, gives plenty of warning, displays no tricks and recovers fast.

Of course, I did not aggravate the airplane in the stall beyond a couple of secondary stalls. In other words, I did not put the airplane in the worst-case condition for which vortex generators were designed. That will have to be saved for later flights.

By midmorning, the air was quite turbulent. This is a condition in which the delightfully responsive and well-harmonized controls of the Bonanza and Baron series show the trade-off in sensitivity and a lot of thrashing around. The B36TC handled the bumping and flailing well. I flew with and without the yaw damper engaged; it is worth the additional cost.

Although one pilot who has a lot of time in 36s and who has flown the B36TC told me that the roll response of the new model is slower than that

of other Bonanzas, I could not detect any shortcoming as a result of the wing extension. And I doubt that many other Bonanza pilots would. For instance, during the photo mission I did a series of Dutch roll maneuvers. The airplane's reaction was quick, crisp and very predictable.

The same pilot also said that the B36TC had a higher tendency to float during the landing flare than other Bonanzas. Again, my reaction was that the difference is not readily apparent to the average pilot.

During an approach and landing at the Beech field, for instance, there was a strong westerly wind with strong gusts (not an unusual condition and one that is compounded by turbulent flow over the buildings that line the landing area). We were landing to the south. There was a fair amount of traffic that required us to make an even tighter pattern than the standard tight, low one. There was also a bit of wind shear. The aircraft

B36TC

Power controls under a view-blocking control column spoil what otherwise is a well-organized cockpit.

was manageable throughout. In fact, the corrections were practically instinctual, with no conscious effort, which is to the credit of the Turbo Bonanza since I had not flown a 30-series Beech for a year.

Perhaps a confession is in order. I like Bonanzas and Barons. I like the way they fly, despite the high work load they typically produce in turbulent air. I like the feel of sitting in them and flying them. I like the visibility. And, for the most part, I like the way the cockpit is organized.

My two biggest objections about the Bonanza family remain the way the control column blocks a quick view of many instruments and controls, particularly if the dual-yoke arrangement is installed, and the nonstandard arrangement of the power controls. Sure enough, I grabbed the wrong one several times.

Beech is still in a damned if they do and damned if they don't situation on

this one. Pilots who fly nothing but, like them the way they are. Pilots who fly a variety of aircraft or who are new to the unconventional placement consider it a potential, or actual, problem. I vote with the latter.

The Bonanzas always have been comparatively expensive aircraft; the 36 has been the most expensive of the line. The B36TC ups the ante even more. The A36TC we flew three years ago had a retail price of $154,970. The current base price of the B36TC is $151,350, and N36TC's list price is $252,331. That is about what the first King Airs cost (then, the Turbo Bonanza is competitive in performance with them).

N36TC is the factory demonstrator. Typically, it is loaded. But there is not any piece of equipment I would leave off if I were buying one: electrically heated propeller and 100-amp alternator; 76-cubic-foot oxygen system; club seating with writing desk and telephone; standby generator; flight director with yaw damper; a weather-detection system—a Ryan Stormscope (the leading edge fuel cells along the span make it impossible to install wing-mounted radar).

Of the $100,981 of options that N36TC has installed, which add 278 pounds to the basic empty weight, $79,140 is for electronics, including the telephone.

Does it make sense to buy a nonpressurized single for such a price? Well, by April 1, 25 customers had voted with their checkbooks. They have bought what can arguably be called the king of the singles; certainly the King Air of the singles. □

B36TC

Control response and harmony are delightful. In turbulence, however, a yaw damper helps.

BONANZA B36TC

Base price	$151,350
Price as tested	$252,331
AOPA Pilot Operations/Equipment Category*:	IFR
Specifications	
Powerplant	Teledyne Continental TSIO-520-UB, 300 hp @ 2,700 rpm/36 in Hg
Recommended TBO	1,600 hr
Propeller	McCauley 3-blade, constant speed, 78 in
Length	27 ft 6 in
Height	8 ft 5 in
Wingspan	37 ft 10 in
Wing area	186.59 sq ft
Wing loading	20.72 lb/sq ft
Power loading	12.89 lb/hp
Seats	6
Cabin length	12 ft 7 in
Cabin width	3 ft 6 in
Cabin height	4 ft 2 in
Empty weight	2,338 lb
Empty weight, as tested	2,616 lb
Max ramp weight	3,866 lb
Useful load	1,528 lb
Useful load, as tested	1,250 lb
Payload w/full fuel	916 lb
Payload w/full fuel, as tested	638 lb
Max takeoff weight	3,850 lb
Max landing weight	3,850 lb
Fuel capacity, std	648 lb (612 lb usable) 108 gal (102 gal usable)
Oil capacity	12 qt
Baggage capacity	70 lb, 10 cu ft
Performance	
Takeoff distance (ground roll)	1,180 ft
Takeoff distance (over 50-ft obst)	2,400 ft (est)
Max demonstrated crosswind component	17 kt
Rate of climb, sea level @ 112 KIAS (recommended climb speed)	1,050 fpm
Max level speed, 22,000 ft	213 kt
Max level speed, sea level	176.3 kt
Cruise speed/Range w/45-min rsv, std fuel (fuel consumption)	
@ 2,400 rpm, 31 in Hg, best economy	
10,000 ft	178 kt/867 nm (108.6 pph/18.1 gph)
20,000 ft	193 kt/930 nm (104.4 pph/17.4 gph)
@ 2,400 rpm, 29 in Hg, best economy	
10,000 ft	173 kt/906 nm (100.8 pph/16.8 gph)
20,000 ft	189 kt/960 nm (98.4 pph/16.4 gph)
@ 2,300 rpm, 28 in Hg, best economy	
10,000 ft	167 kt/962 nm (91.2 pph/15.2 gph)
20,000 ft	182 kt/1,008 nm (88.8 pph/14.8 gph)
Max operating altitude	25,000 ft
Landing distance (over 50-ft obst)	1,700 ft
Landing distance (ground roll)	990 ft
Limiting and Recommended Airspeeds	
Vx (Best angle of climb)	77 KIAS
Vy (Best rate of climb)	100 KIAS
Va (Design maneuvering)	141 KIAS
Vfe (Max flap extended)	
Approach—15°	154 KIAS
Full—30°	125 KIAS
Vle (Max gear extended)	154 KIAS
Vlo (Max gear operating)	154 KIAS
Vno (Max structural cruising)	168 KIAS
Vne (Never exceed)	206 KIAS
Vr (Rotation)	70 KIAS
V_{S1} (Stall clean)	67 KIAS
V_{SO} (Stall in landing configuration)	59 KIAS

All specifications are based on manufacturer's calculations. All performance figures are based on standard day, standard atmosphere, at sea level and gross weight, unless otherwise noted.

**Operations/Equipment Category is defined on page 93 of this issue.*