G36 Bonanza

Brought to you AOPA FINANCE

Gimme a G

5

October 1, 2006 | By Thomas A. Horne

The Garminized Bonanza

For many pilots, the venerable Beechcraft Bonanza represents the ultimate piston single. From its first appearance in 1947 as a smallish, all-metal four-seater with a distinctive, futuristic-looking V-tail, the airplane has been a leader in style, speed, handling qualities, and sales.

Over the years, the Bonanza has grown in size, engine power, and model designations, always preserving its well-earned niche. Bigger than competing Mooneys, faster than competing Pipers, with great fit and finish and plush, tasteful interiors, it seems that the Bonanza's designers have simply gotten it right from day one.

This is not to say that the Bonanza has been trouble free. The same slipperiness and light control forces that give Bonanzas their famed speed and handling characteristics also could lead to high-speed, loss-of-control accidents if a pilot was inattentive or not proficient. And there have been many such accidents over the years.

In-flight structural failure was another issue. The signature V-tail design was discarded in 1982 after accident investigations determined that the V-tail wasn't strong enough to handle the high airloads associated with pullouts from high-speed unusual attitudes. Aftermarket tail-spar mods took care of this problem, but for the Beech Aircraft Co. the damage was done. It didn't want the liability exposure, and abruptly ended the V-tail's otherwise-successful 35-year production run.

In recent years, Raytheon Aircraft Co. has been building just one variant of the Bonanza — the straight-tail, 300-horsepower, six-seat model A36. This is the heavier, more stable of the Bonanza designs, and its higher elevator forces make it more

difficult for ham-handed pilots to overstress the airplane during a high-airspeed pullout. A36s have been selling at a rate of approximately 70 airplanes per year, and at fairly steep prices — another Bonanza hallmark. Average retail prices ranged from $386,000 in 2000 to $626,000 in 2003.

Late last year, Raytheon made a big change to the A36, one that amounts to a significant upgrade in the airplane's capability, safety, utility, and value. In a much-anticipated move, A36s were given the two-display Garmin G1000 avionics suite as standard equipment, and were made the launch airplanes for Garmin's new GFC 700 integrated autopilot/flight control system. To commemorate this turn of events, the A36 was redesignated the G36 — the G representing the Garmin panel. The Bonanza's twin-engine stablemate — the Beechcraft B58 Baron — also has received the same Garmin treatment, and been renamed the G58 Baron.

Panel power

Raytheon's choice of the G1000 was a smart move. It represents general aviation's latest glass-cockpit avionics technology, and brings business-jet-like functions previously unavailable to light piston singles and twins. Much has been written about the G1000, but a quick review of its architecture is in order. First off, the G1000 uses an integrated air-data computer to generate true airspeed, vertical speed, and altitude computations, as well as an AHRS (attitude heading and reference system) for computations of roll, pitch, yaw, and acceleration. This solid-state equipment sends its data to the display screens, where airspeed and altitude are depicted on vertical tapes, and navigation information (heading and track) is plotted with reference to selected courses as called up on the G1000's integrated GPS and dual-VHF receivers.

The G1000 also incorporates VHF nav/com transceivers, a Mode S transponder capable of plotting traffic information via the traffic information system (TIS) service, terrain proximity warnings via a Class B terrain awareness warning system (TAWS) capability, and datalink weather sensors using the XM WX Satellite weather service.

Recent Job Postings

CFI's REQUIRED
Taean, Other / Non-US -
Hanseo University

Airplane Mechanic & Instructor
Taean, NA -
M.I. Air Corporation

Senior Graphic Designer
Knoxville, TN -
Cirrus Aircraft Corporation

Flying Club Flight Instructor
Duluth, MN -
Cirrus Aircraft Corporation

Factory Flight Instructor
Knoxville, TN -

L-3 Communications' SkyWatch traffic advisory system is an option, as is a Stormscope WX-500 lightning-detection unit.

All of this is portrayed on the G1000's two large high-resolution, sunlight-readable display screens. Soft keys along the base of the display bezels let you call up the functions mentioned above, and more. The G1000's GEA 71 engine/airframe interface unit, for example, sends data from engine and other aircraft system monitors to the multifunction display (MFD). This provides lean-find and lean-assist data for setting power using exhaust gas temperature, plus cylinder head temperatures, manifold pressure, propeller rpm, alternator status, fuel and oil pressure, and oil temperature information.

Should one of the screens fail, a reversionary function can be used to create a composite display blending the information from the dead screen with the imagery on the operating screen.

It all adds up to a huge amount of information set before the pilot, and manipulating it without fumbling or distraction takes training. Raytheon provides it as part of a four- to five-day initial training course included as part of the G36's $667,000 base price.

Flying the GFC 700

As if the G1000 weren't enough, the GFC 700 boosts the airplane into full-automation mode. The unit, general aviation's latest flight-control system for piston-powered and light-jet airplanes, was designed from scratch to work with the G1000, and includes flight-control servos also designed and built by Garmin. The unit is operated using a small cluster of 11 buttons at the left edge of the G1000's multifunction display.

Only one of the buttons may seem unfamiliar, the one labeled FLC. This stands for "flight level change," and pressing FLC (commonly pronounced "filch") activates an airspeed hold mode that can be used to command climbs or descents at a constant airspeed. Let's go on a hypothetical flight to see how this and the GFC 700's other modes can be used to simplify pilot workloads and fly more precisely.

Just prior to takeoff, a good practice is to set the G1000's heading bug to the runway heading, then press the GFC 700's HDG button so that the flight director's command bars direct you to that heading. Dial in your initial target altitude using the G1000's altitude preselect function, then press the G36's go-around button on the left side of the throttle lever. Now the command bars jump to the correct 7-degree nose-up pitch attitude for the initial climb.

After takeoff, pitch the airplane up to meet the command bars and begin the climb to your preselected altitude. Once at a safe altitude, you can press the AP button to turn on the autopilot; now the GFC 700 is flying the airplane. When you turn on the autopilot it will go to its default mode, which is to maintain the existing attitude and vertical speed.

During the climb, you can press YD to engage the yaw damper. As your target altitude approaches, the command bars pitch down to meet it, and then the airplane automatically levels off. Across the top of the primary flight display, on the flight-control status bar, you'll see HDG, AP, YD, and ALT highlighted in green — which indicates the modes in use.

For any subsequent climbs or descents you can use either the FLC or VS (vertical speed) keys. Press FLC, and then you can push the Nose Up or Nose Dn keys to manage airspeed in the climb or descent. Each press of the button increases or

decreases airspeed by 1 knot. Or you can simply add or reduce power and the airplane will climb or descend at the existing airspeed. In VS mode, each press of these buttons increases or decreases vertical-speed rates by 100 fpm.

The rest of the GFC 700's modes — Nav and APCH — are fairly intuitive. They're used to track en route and instrument approach courses. Lateral and vertical intercepts are smooth, as long as intercept angles or airspeeds aren't excessive. To protect against overspeeds, the GFC 700 will automatically increase the airplane's pitch as the G1000's purple airspeed-trend vector reaches 190 KIAS (the G36's redline is 205 KIAS). As airspeed slows below 185 KIAS, overspeed protection is cancelled; now it's up to the pilot to slow the airplane.

Systems insights

Although the G1000 and GFC 700 make the G36 a wonderful airplane for instrument flying, other features add even more value. For example, the G36's "Special Edition" 300-horsepower Teledyne Continental IO-550 engine. Offered since 2000, the Special Edition engine has connecting rods and pistons balanced to within 2 to 3 grams for smoother operation and less wear. Earlier engines were balanced within 20 grams. The engine carries a 36-month or 1,000-hour (whichever comes first) warranty.

It's worth mentioning that G36s have no vacuum systems. Instead, two alternators and a split electrical bus power the ship's many electrical components, and provide an element of redundancy to the G1000 and GFC 700. Backing up the alternators are two full-size batteries.

Alternator number 1, capable of delivering 100 ampere-hours of power, is the main power source. It feeds bus one and drives the entire ship, including the electrically actuated landing gear. Lose this alternator and you'll have to shed lots of electrical load, and will probably have to manually crank down the landing gear when the time comes. Battery one, a 10-ampere-hour unit, is the main battery backup for the entire airplane, and also is used for starting.

Alternator number 2, at a 20-amp rating, feeds bus two, which is primarily the avionics bus. If this alternator conks out, bus two automatically ties to bus one and the Garmins remain powered. Battery two powers only bus two. In the unlikely event of a complete electrical failure, you'll have to rely on the batteries to help you land at the nearest airport — and fly solely by reference to the standby pitot-static instruments for guidance if those two main batteries become exhausted. Even then, there's one more battery to help you out. The standby attitude indicator is electrically powered by its own internal battery, which should last "approximately one hour," according to the pilot's operating handbook.

Apart from the electrical system and the massive Garmin avionics package, the G36's systems closely resemble those on previous A36s. Raytheon reports that most customers opt for the $6,255 electrothermal propeller deice system, and the $18,135 (65-pound) air-conditioning system is popular with customers from warmer climes.

Creature comforts

Besides their 176-knot maximum cruise speeds and great control feel, Bonanzas have always been known for comfort. Most pilots and passengers find their interiors to be well-proportioned and well-suited for long cross-country flights. The G36 continues this tradition, thanks to some recent upgrades.

Noise reduction was one area that received attention. G36s have new cabin door seals

that help keep out wind noise, and more soundproofing has been added to the interior sidewalls and flooring. G36 propellers also are dynamically balanced, which reduces vibrations and helps cut fatigue. A new seat foam is now being used for better lumbar support, and a smoke-gray window tint treatment reduces glare and ultraviolet rays.

On top of all this, passengers can select their XM Satellite Radio stations via a remote controller on the cabin sidewall at the left aft-facing seat (the seat behind the pilot's).

Take all these ergonomic pluses, add avionics worthy of a new business jet, and you've got a recipe for the Bonanza's continued success. After all, among the new crop of very light jets, Cessna's Citation Mustang, Diamond's D-Jet, and Embraer's Phenom 100 will all have G1000 cockpits.

The Garmins should go a long way toward expanding on the in-flight feeling of confidence that Bonanza pilots always enjoyed.

E-mail the author at tom.horne@aopa.org.

Links to additional information about Beech Bonanzas and Barons may be found on AOPA Online.

What's New at Raytheon?

What's new at Raytheon? In a word, plenty. In the past year, Raytheon Aircraft Co. has introduced eight new designs. These include: the Beechcraft T-6B Texan military trainer, a weaponized, glass-cockpit version of the previous T-6A; the Beechcraft Premier IA, an improved version of the original Premier I business twinjet; the Hawker 800XPi, with its new Collins Pro Line 21 panel; the Hawker 850, which features winglets; a 16,500-pound maximum gross takeoff weight, heavyweight King Air 350 — that's 1,500 pounds more than the previous 350s; the new King Air C90GT, with better runway performance and faster cruise speeds than the previous C90B models; and the new G36 Bonanza and G58 Baron. As of July 2006, with 166 aircraft sold and billings worth more than $728.39 million, Raytheon is on track for what promises to be one of its best sales years in recent history. Its customer support network has been improved, its fractional-ownership program — Flight Options — is healthy, and its defense-related business (the T-6B and militarized variants of the Beechcraft 1900) continues strong. But the fact is that the Raytheon Co. — Raytheon Aircraft Co.'s parent — is looking for ways to sell Raytheon Aircraft. The sales price? At one time there was a reported $4 billion asking price; now that figure seems to have slipped by half. "The big unknown is the Hawker Horizon," says Richard Aboulafia, vice president of analysis for the Teal Group, an aerospace consulting firm. "Because of the delays in its certification, and the risks associated with those delays, it's difficult to value the company. And then you have to ask yourself, 'Who would buy it?' Not another first-tier aircraft manufacturer, I'd suspect. It would more likely be an asset management firm that would seek to turn the company around, or in some way reposition it." Either way, Aboulafia thinks Raytheon Aircraft will remain as it is for the near future. "We'll have a clearer picture once the Horizon is certified," he said. — *TAH*

Spec Sheet

Beechcraft G36 Bonanza

Base price: $667,000

Average equipped price: $691,390

Specifications

Powerplant	Teledyne Continental IO-550-B, 300-hp
Recommended TBO	1,700 hr
Propeller	Hartzell 3-blade, 80-in diameter, constant-speed
Length	27 ft 6 in
Height	8 ft 7 in
Wingspan	33 ft 6 in
Wing area	181 sq ft
Wing loading	20.2 lb/sq ft
Power loading	12.2 lb/hp
Seats	6
Standard empty weight	2,530 lb
Maximum ramp weight	3,663 lb
Maximum gross takeoff weight	3,650 lb
Maximum useful load	1,133 lb
Maximum payload w/full fuel	689 lb
Fuel capacity	80 gal (74 gal usable)
Baggage capacity (with six seats)	270 lb, 47 cu ft

Performance

Takeoff distance, ground roll, flaps approach	1,000 ft
Takeoff distance over 50-ft obstacle, flaps approach	1,913 ft
Takeoff distance, ground roll, flaps up	1,250 ft
Takeoff distance over 50-ft obstacle, flaps up	2,130 ft max
Demonstrated crosswind component	17 kt
Rate of climb, sea level	1,230 fpm
Cruise speed/range w/45-min rsv (fuel consumption)	174 kt/714 nm (15.7 gph)
@ High-speed, 8,000 ft, 20-deg rich of peak EGT	163 kt/758 nm (13.3 gph)

@ Normal speed, 10,000 ft, 20-deg rich of peak EGT	
Service ceiling	18,500 ft
Landing distance over 50-ft obstacle	1,500 ft
Landing distance, ground roll	950 ft
Limiting and Recommended Airspeeds	
V_X (best angle of climb)	84 KIAS
V_Y (best rate of climb)	100 KIAS
V_A (design maneuvering)	141 KIAS
V_{FE} (max flap extended), full flaps	124 KIAS
V_{FE} (max flap extended), approach flaps	154 KIAS
V_{LE} (max gear extended)	154 KIAS
V_{LO} (max gear operating)	154 KIAS
Extend	154 KIAS
Retract	
V_{NO} (max structural cruising)	167 KIAS
V_{NE} (never exceed)	205 KIAS
V_R (rotation), flaps up	73 KIAS
V_R (rotation), flaps approach	67 KIAS
V_{S1} (stall, clean)	68 KIAS
V_{SO} (stall, in landing configuration)	61 KIAS

For more information, contact Raytheon Aircraft Company, 10511 East Central, Wichita, Kansas 67206; telephone 316/676-5034; fax 316/676-4819; Web site.

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

Thomas A. Horne | AOPA Pilot Editor at Large, AOPA

AOPA Pilot Editor at Large Tom Horne has worked at AOPA since the early 1980s. He