Sierra

Upward mobility for the single-minded

BY MARY F. SILITCH

Beech Aircraft's Sierra, like most general aviation aircraft produced today, gradually evolved from a design two decades old. It is an outgrowth of the Beech Model 23 Musketeer, which was introduced in 1963 to provide Beech with an entry-level airplane. The Musketeer line was dolled up in the early 1970s to aid in marketing the aircraft that would, ideally, entice the pilot with Beech Aircraft Company products from a start in the trainer (the Sport, later replaced by the now-suspended Skipper), to the

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basic fixed-gear airplane (the Sundowner) to the retractable, cross-country airplane (the Sierra).

After the Sierra, moving up meant the Bonanza, Beech's smallest aircraft at the time the Musketeer was introduced, and then on to the larger twins.

(The Duchess, a light twin added to the lightplane line in the late 1970s, serves as the twin-engine training craft.)

To help lure the would-be pilot, Beech also set up the Beech Aero Center network, starting with the 1972 model year, when the image of the lightplane line was bolstered by dropping the Musketeer name and sprucing up the aircraft. Flight training in Beech Aero Center aircraft, with rentals available through affiliated Beech Aero Clubs, was instituted to help start off new pilots on the right brand-loyalty track. The franchised Centers included sales and service departments.

The Sierra fits into the training program because it qualifies as a complex aircraft, in which commercial students must spend 10 hours of their training. It also serves as a rental aircraft for club members.

The Sierra does not fit into the competitive marketplace quite as neatly. The current model, the C34R, has the 200-hp IO-360 Lycoming engine, as do the Piper Arrow IV and the Mooney 201. (Another close competitor, the Cessna 172RG Cutlass, has the carbureted 180-hp O-360 engine.) New, the Sierra is the most expensive aircraft of the group; its base price is $68,500, while the base price of the Arrow is $66,180, the Mooney is $65,775, and the Cutlass is $59,350.

The Sierra also is the slowest of the quartet. The 201's fabled aerodynamic cleanup has pushed its cruise speed a good 30 knots ahead of the rest, but the Sierra lags only a few knots behind the Arrow and the Cutlass. Despite its reputation for being slow (helped, no doubt, by early book figures that the airplane's performance did not duplicate), the Sierra manages a respectable cruise of just less than 140 knots true.

The Cutlass, with the 180-hp engine, and the Mooney tie with the Sierra in a fuel consumption of 10 gph; but the Arrow comes in with a higher figure of 13 gph. The Sierra has the highest stall speed—60 knots with gear and flaps down. It also has the highest payload (713 pounds), beating the closest competitor, the Cutlass, by 18 pounds.

The Sierra is a solid, comfortable airplane that is pleasant to fly, and there are a number of lesser aesthetic and intangible qualities that might sway a prospective purchaser or renter.

Price, these days, is an important consideration, so I will tackle that first to get sticker shock out of the way. The 1982 Sierra that I flew for this report, basically equipped for IFR, listed at $103,987. In the used market, of course, the Sierra price tag falls to more agreeable levels. Shopping around for a used Sierra can produce a number of reasonably priced older models—even a 1980 one for $52,000. Older Model 24Rs can range down in the mid-$20,000 bracket. (The accompanying box, "Sierra Milestones," p. 76, can serve as a guide to the relatively few changes between models.) Having a brand-new fresh airplane may be more important to some pilots than a $100,000 price tag.

What does the purchaser get for the price, new or used? A lot of pilots would start the list with "Beech quality," for the company's overall reputation embraces the light-aircraft line. There is a solidity and sturdiness to the Sierra. The standard airplane empty is about 100 pounds heavier than the Arrow and the Mooney, but it looks even heftier. The cabin doors—one on each side of the fuselage—close tightly with a reassuring snugness that adds to the solid feeling. The aircraft is stressed to six Gs (the aerobatic version of the Sundowner requires only the addition of two strakes on the tail and no extra beefing up to tackle loops and rolls).

The dual wing spar structure consists of a rear spar of conventional stamped aluminum and a forward spar of stronger extruded aluminum. The gear, made from magnesium casting and alu-

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Placing the wing so far aft provides a good view down from the front.


Beechcraft
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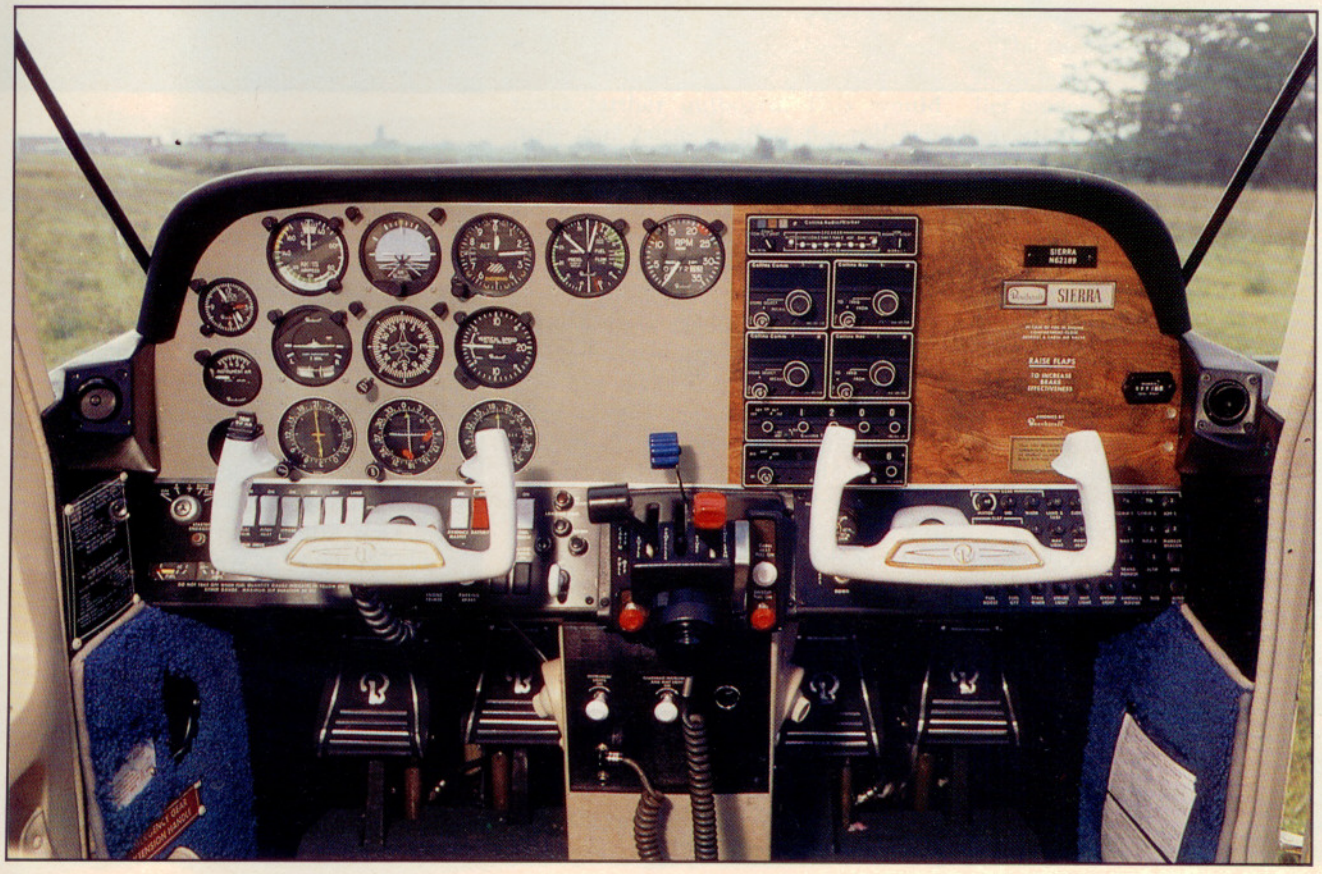
SIERRA
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SIERRA
RAISE FLAPS
TO INCREASE
BRAKE
EFFECTIVENESS

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minum forgings, is attached directly to the spar, which contributes to the strength of the structure, according to a Beech spokesman.

When Beech introduced the Musketeer in the early 1960s, the use of bonded honeycomb structure in a lightplane was unusual. The forward half of the laminar-flow wing is aluminum and honeycomb bonded with epoxy resin (the back half is flush riveted). Beech had used honeycomb technology extensively in its aerospace work.

The Sierra is a large aircraft, with a high stance. The cabin is larger than that of the Mooney and the Arrow.

With solidity and size come comfort. Pilots from five feet three inches to six feet three inches tall have remarked about its spaciousness for larger pilots yet accessibility for shorter operators. I am tall and like the roominess, the headroom and the width of the cabin (two inches wider than a Baron's). In spite of the spaciousness, however, the control wheel is placed a little low on the panel, and I tended to get my knees in the way more than I usually do in the competition.

The firm foam rubber seats are far more comfortable to me than others in the single category. A 20-hour trip in a Piper Archer aggravated an old back strain, while a similar jaunt in the Sierra failed to produce any discomfort.

The inertial reel shoulder harness and lap belt are not binding, but neither are they as sturdy as an automobile restraint. The harness and belt arrangement is standard equipment for all seats, including the optional fifth and sixth seats.

The second row of seats, available in bench arrangement (standard) or two separate seats (optional), is roomy if not as comfortable as the front. The wing spar runs under the seat, so a ledge protrudes into the floor space available for back-seat passengers. The pilot and copilot gain the advantage in this arrangement, however, as the placement of the wing so far aft allows a good view down from the front seats, an unusual bonus for a low-wing aircraft.

Visibility forward and to the sides is equally good. Having had a bit of time in the whole line, including the Duchess, I was used to the slightly nose-down attitude to which transitioning pilots might take a while to adjust.

The view within the cabin adds to the pilot's comfort as well. The panel is laid out well, with the basic T arrangement of essential flight instruments in front of the pilot.

Fuel gauges are to the bottom left of the panel. The ignition switch is just above the gauge, so key rings or tags hide the gauge for the left tank.

The stabilator trim control is located between the two front seats, and an optional electric trim is available for the

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There is spaciousness for the larger pilots yet accessibility for shorter operators.

control wheel. The operation of the mechanism is slow.

Gear and flap switches are conventionally placed: reach to the left of the power quadrant for the gear and to the right for the flaps, if the aircraft has the optional electric flaps. If it has the standard manual flaps, the handle is located on the floor. The manual flaps, interestingly, have 15-, 25- and 35-degree detents (and require a muscle that I do not use often to haul in the 35-degree position). The electric flaps have 10- and 20-degree indications (and a green radial marked for 15 degrees, which is used for takeoff). There are, however, no detents, so the pilot must glance over to see when the right selection has been made. If the switch is not returned to Off, or neutral, the flaps keep going. Once full flaps have been lowered, the motor does stop; a limit switch automatically shuts off power. A preselect system for the electric flaps, such as that on the larger Cessnas, would be a good idea.

The landing gear system, similar to that on the Duchess, is straightforward. Since the basic Musketeer aircraft had inboard fuel tanks (and small ones at that), there was no room for the gear to retract inward. Beech elected to pull the gear outward, rather than move the tanks farther outboard. This would make fuel burn-off affect the roll axis more. The nosewheel, which is different from the Duchess's reversed Bonanza nose gear, pivots 90 degrees to the right before retracting.

Retraction is slow—it takes 10 seconds. Put the gear switch Up on takeoff and there is a long wait for the in-transit red light to go out, indicating the wheels are all up. Gear extension speed is 135 knots indicated.

The Duchess has oleo struts for shock absorption; the Sierra's rubber disks, or doughnuts, like the Mooney's, provide a bouncier ride. A landing at a well-tended grass strip demonstrated the spring in the Sierra's system quite well.

The gear is retracted by an electrically driven hydraulic pump. Hydraulic pressure holds it in place, and when the gear switch is moved to the Down position, hydraulic pressure is relieved and the gear extends.

Emergency extension is simple. There is a valve on the floor between the pilot's feet that need only be turned 90 degrees with a special emergency extension wrench for the gear to drop. The wrench, stored by the pilot's left foot, is handy for opening the vault-like fuel-tank caps and for draining the sumps—but be careful not to lose it.

The fuel-selector valve also is on the floor, between the two front seats. Earlier models had nothing to prevent inadvertent turning to the Off position,

but newer models have a stop on the guardrail that "minimizes the possibility" of accidental shutoff. The feature is available as a retrofit on the earlier models and is a worthwhile addition to the used Sierra.

There are no definite detents to signal the right placement of the selector.

The Sierra, like the Mooney and the Arrow, is not a "throw everything in and go" airplane. Weight and balance is an important consideration, especially if the aircraft has the optional fifth and sixth seats. This adds 38 pounds to the weight of the aircraft; then there is the loading to figure out.

While plotting out the weight and balance for my Sierra flights, I discovered that it was possible to carry six FAA-standard 170-pound people if the fuel load were limited to the just-legal 45-minute reserve. Or, you could squeeze in six 100-pound people and carry full fuel.

For a family with more than two small children, the third row of seats might make sense; in a rental aircraft, it is an invitation to careless loading.

The loading envelope is narrow, and with the wing and fuel tanks behind the front seats, careful figuring is in order. On one of my flights, with full fuel, 395 pounds of pilot and copilot and 60 pounds of baggage, we just had room for a 94-pound passenger in the second row of seats.

After an initial difficulty starting the engine, I found that treating it as a hot

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start each time, regardless of whether or not the engine had been run recently (even though the weather was moderate), produced an instant start. The hot-start procedure calls for open throttle and mixture at idle cutoff until the engine fires. When the engine was actually cold, a short shot of boost pump while cranking the ignition was all that was needed.

Ken Johnson, customer service representative at Lycoming, said that the fuel injection engine has a tendency to overboost or overprime and that this procedure works best anytime the temperature is warm. Crack the throttle, turn over the engine with mixture in idle cutoff and bring in the mixture as the engine starts.

After an engine is warmed and is shut down, there is a possibility of fuel vapor in the line getting hotter; the only way to cool it down is to run fuel through. So the technique is to be cautious, use the boost pump (normally not used in hot starts) to clear the fuel line, then proceed with the hot-start procedure. An open throttle provides the air to help clear the lines.

Another problem in starting, not exclusive to the Sierra, is the possibility that the starter may remain engaged after the engine fires. Beech has added a starter-engaged warning light next to the magneto switch to alert the pilot. It is illuminated anytime electrical power is being supplied to the starter. If the starter remains engaged, it will be damaged and there will be a loss of electrical power. Aircraft built before serial number MC-731 do not have a warning light; it is necessary to monitor the ammeter to make sure the starter is not engaged after start-up. This technique also should be used if the warning light is inoperative.

Although the Sierra has the same engine as the Arrow and the 201, there are minor differences in the three versions of the basic engine. The Mooney's IO-360-A1B6D has a dual Bendix magneto in one unit, while the Beech A1B6 and Arrow C1C6 engines have two individual magnetos; the Arrow C1C6 has a 14-degree injector adapter and a rear air inlet.

Speed may not be the Sierra's forte, but the brand-new one I flew performed consistently better than what the book called for, and this was with two chunky Beech fiftieth anniversary gold medallions glued to either side of the cowling, which should have slowed it down if anything.

On one test run, at 4,500 feet, with a temperature of 17°C, 24 inches of manifold pressure and 2,500 rpm produced a true airspeed of 135 knots (book figure was 133).

Later, at 5,000 feet, 10°C, 2,600 pounds, 24 inches manifold pressure and 2,400 rpm, true airspeed was 140 knots.

On most of the trip, I ran at 140 knots true at 75-percent power. Since

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the engine had less than 50 hours when I started out, I did not run any checks at lower power settings. Fuel consumption averaged 10.3 gph.

Although the Sierra does not carry the reputation of being a hot ship to land, it is not an easy-landing airplane. (I find the Mooney, which does have the hot reputation, easier.) In the Sierra, the pilot may tend to flare too high, and it is difficult to get the feel of the airplane. The landing difficulties show up in the accident reports. Hard landings and ground loops (yes, ground loops) are problem areas, according to National Transportation Safety Board statistics. (Stall/spin accident rates, for the whole Beech light-single line, were high also.)

A couple of circuits of practice landings will have the pilot who usually greases it on proficient in the Sierra as

MILESTONES

Why would Beech Aircraft change the perfectly good names of proven designs? Marketing, of course. A change in Beech's marketing stance on the three Musketeers—the Sport III, the Super and the Custom II—switched the aircraft from the business/utility market to the trainer/renter market. It split the trio (calling them the Sport, the Sundowner and the Sierra) and established Beech Aero franchises, fixed-base operations designed to broaden Beech sales and service by reaching more of the public. Beech was not very successful in capturing more of the trainer market until it produced the Skipper; however, the Sierra and Sundowner have become well-known as transition airplanes.

Developed from the Model 23, the three Beechcraft went through very different growth patterns for one to be a primary trainer and the other two to be progressively more sophisticated transition aircraft.

1961 • The Beech Model 23 Musketeer was first flown; it had a 160-hp Lycoming O-320-D2B engine.

1962 • The Model 23 was introduced to the public.

1964 • The Model A23 Musketeer had a different engine—the 165-hp Continental IO-346-A, a four-cylinder derivative of the IO-520. It was the only aircraft to use the engine.

1966 • The Model 19 Musketeer Sport III, a 150-hp trainer, was introduced with the Super A23-24, the fixed-gear, 200-hp fuel-injected predecessor of the Sierra, joining the standard 165-hp A23 Custom III.

1968 • The B23 Musketeer was introduced with a 180-hp Lycoming O-360-A2G to replace the A23's IO-346-A.

1970 • The C23 and the B19 were introduced with higher gross weights. The Super R A24R retractable, the true predecessor of the Sierra, was announced. It had the Super's IO-360-A2B engine, a wider fuselage, a single cockpit door and no baggage door. It cruised at 140 knots, Beech said, and was known affectionately as Super Mouse.

1971 • The Super R was given a second cockpit door and a baggage door on the left side.

1972 • The Musketeer gave way to new names. The Musketeer Sport became the Sport B19, the Musketeer Custom became the Sundowner C23, and the Musketeer Super R became the Sierra A24R. The Musketeer Super was discontinued.

1974 • The Sierra B24R was recertified with a new engine—the Continental IO-360-A1B6. It also was given a Hartzell propeller, a new instrument panel, quadrant engine controls, a larger baggage door and an improved cowling. Cruise was listed as 131 knots.

1975 • Soundproofing was added to the Sierra model.

1977 • The Sierra 200 B24R became the C24R. Aerodynamic cleanups included reducing the gaps at the hinges of the aileron system, wheel-well fairings were added to reduce drag. A two-inch-larger propeller added more thrust, and there was a five-gallon increase in usable fuel capacity.

1981 • The C24R series, after serial number MC-674, switched to a 28-volt electrical system. (The older aircraft had a 14-volt system.) □

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well. I landed at a couple of 1,800-foot strips with ease. Keep the approach speed at 70 knots to prevent it from floating too much and keep a bit of power for last-minute maneuverings.

The Sierra handles well in the air. Although aileron control is slightly stiff, it is not heavy; neither is the stabilator. On the whole, handling is sprightly, but one should not expect a baby Bonanza; the Sierra does not have the same crisp handling. It does not handle too well in turbulent air; a takeoff from a short strip in extremely gusty conditions had the aircraft wallowing through the climb to more stable air. I did my initial instrument training in an early Musketeer, however, and found it relatively stable.

Stalls provide a definite, but gentle, break, but the high stall speed (60 knots dirty) should be kept in mind. Altitude loss was minimal.

The solid aircraft has had few serious maintenance problems, but there are a scattering of airworthiness directives on the engine and accessories. An inspection for cracks and other structural damage to the forward wing-attach-point brackets was required for some early models—A24, A24R and B24R—in 1973, and replacement of the flap control weld assembly was required in 1978 for certain A24Rs, B24Rs and C24Rs. Piston pins were the subject of a 1973 directive on the IO-360, and a new oil pump was required on early-1970s models. Oil pumps were the subjects of the most recent airworthiness directive.

Traditionally, about half of the Sierra production run has gone to Aero Centers and the rest to individual owners. Aero Centers generally keep the aircraft for two years before putting them on the market. Carrying a used-aircraft price tag that is generally lower than that of an equivalent used Mooney or Arrow, the Sierra becomes a more attractive purchase for those who like the Beech quality and the aircraft's comfort and manageability but do not like the price of a new model. □

Sierra

BEECH SIERRA C24R

Base price $68,500
Price as tested $103,000
AOPA Pilot Operations/Equipment Category*: IFR

Specifications

Powerplant	Lycoming IO-360-A1B6, 200 hp, fuel injected, 4-cylinder
Propeller	Hartzell constant-speed, 2-blade, 76 in dia
Length	25 ft 9 in
Height	8 ft 1 in
Wingspan	32 ft 9 in
Wing area	146.4 sq ft
Wing loading	18.8 lb/sq ft
Power loading	13.8 lb/hp
Seats	4-6
Cabin length	7 ft 11 in
Cabin width	3 ft 8 in
Cabin height	4 ft
Empty weight	1,720 lb
Empty weight, as tested	1,865.1 lb
Gross weight	2,758 lb
Useful load	1,038 lb
Useful load, as tested	882.9 lb
Payload w/full fuel	694.8 lb
Payload w/full fuel, as tested	539.7 lb
Max takeoff weight	2,750 lb
Max landing weight	2,750 lb
Fuel capacity	358.8 lb (343.2 lb usable) 59.8 gal (57.2 gal usable)
Oil capacity	8 qt
Baggage capacity	270 lb, 19.5 cu ft

Performance

Takeoff distance, ground roll	1,100 ft
Takeoff distance over 50-ft obst	1,600 ft
Max demonstrated crosswind component	17 kt
Rate of climb, sea level	950 fpm
Max level speed, sea level	168 kt
Cruise speed/Range w/45-min rsv, std fuel, 2,600 lb (fuel consumption)	
@ 75% power, best economy	
5,000 ft	131 kt/630 nm (61 pph/10.2 gph)
8,000 ft	135 kt/640 nm (61 pph/10.2 gph)
@ 65% power, best economy	
5,000 ft	123 kt/654 nm (54 pph/9 gph)
8,000 ft	125 kt/664 nm (54 pph/9 gph)
@ 55% power, best economy	
5,000 ft	112 kt/680 nm (48 pph/8 gph)
8,000 ft	114 kt/682 nm (48 pph/8 gph)
Service ceiling	15,385 ft
Absolute ceiling	17,430 ft
Landing distance over 50-ft obst	1,450 ft
Landing distance, ground roll	850 ft

Limiting and Recommended Airspeeds

Vx (Best angle of climb)	71 KIAS
Vy (Best rate of climb)	85 KIAS
Va (Design maneuvering)	125 KIAS
Vfe (Max flap extended)	96 KIAS
Vle (Max gear extended)	135 KIAS
Vlo (Max gear operating)	135 KIAS
Vno (Max structural cruising)	143 KIAS
Vne (Never exceed)	193 KIAS
Vr (Rotation)	66 KIAS
Vs1 (Stall clean)	65 KIAS
Vso (Stall in landing configuration)	60 KIAS

*All specifications are based on manufacturer's calculations. All performance figures are based on standard day, standard atmosphere, at sea level, unless otherwise noted. *Operations/Equipment Category is defined in June 1982 Pilot, p. 93 and reflects this aircraft's maximum potential.*