





LEARJET 31

THE VIEW FROM FL510

*Flying the friendliest
and most capable
Learjet yet*

BY RICHARD L. COLLINS

There is, at least in the eyes of most beholders, no more pure a jet airplane than a Learjet. Since Bill Lear first put a mock-up of it on display at the Reading (Pennsylvania) Air Show in 1962, 27 years ago—with word that it would be built both in Europe (never done) and in Wichita—to today, the airplane has always had a mystique. The public equates Learjet with business jet. Not too many folks remember that the original was based on a Swiss fighter and that the original company was the

PHOTOGRAPHY BY MIKE FIZER





Swiss-American Aviation Corporation, but for some reason, a lot of people remember that the original Learjet Model 23 had a less than happy safety record. The result has been generations of "Lear Fear," with many grizzled old aviators telling their bosses "anything but a Learjet." The reason was always because these guys felt they couldn't handle such a hot ship. That is all over now. The Learjet is probably the world's most tweaked jet, with, in the new Model 31, handling qualities that are exemplary.

Some things remain. The cabin is a relatively small circle, dubbed by some in jest as "Bill Lear's executive mailing tube." But once you are in and seated, it is as good as a 747. Learjet has, over the years, experimented with different interiors to make the cabin appear larger, but the main success was in the Model 55, which has a bigger body. The basic Lear is, and always will be, an ultimate use of flying space. If you want to dance in the aisles aloft, this isn't it. But if you want to ride comfortably to the destination, it is fine.

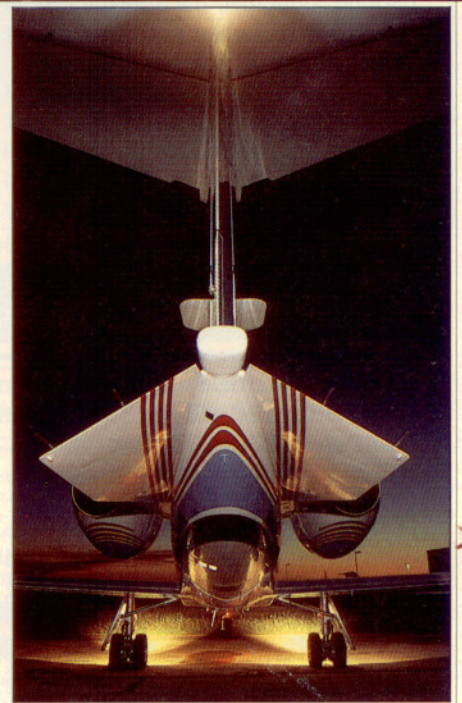
The instrument panel is in the pointed end of the airplane, a little farther forward than some, and it is not expansive. But it will still hold a five-tube EFIS and all the other good things, even though the console between the pilot seats has moved ever-farther aft to make room for the latest in electronics. (The original Learjet had no console, and folks managed to get where they were going in them and still do.) The result is that the front seats are not the easiest in the world to mount. The visibility out of the front, though, is expansive. You actually can't see the nose of the aircraft from the pilot's seat.

What doesn't remain is the basic nature of the original Learjet. The Model 23 gave every appearance of being a nickel rocket. It was a combination of a humongous amount of power mated to a small and light airframe, with systems that were not the easiest in the world to manage, and with handling qualities that were demanding. This gave the airplane the reputation that many still have in mind today. But everything has changed. Try this: formation flying for pictures with a Cessna 210 at 9,500 feet, indicating 135 knots, flaps up, airplane clean, handling qualities fine. The new 31 in this condition was as responsive as a light twin, and the angle-of-attack indicator was comfortably in the green,

even though we had a couple of hours of fuel and three people on board. A Model 23 would have been out of control.

The Model 31 is, though it has a name and elements from the original, an entirely new airplane. It is a good example of how you can create a new airplane without starting with an absolutely clean sheet of paper. You might say that it is a combination of all the good engineering things that Learjet has done in the last dozen or more years. It took root in the Learjet Model 28 and 29, developed more than 10 years ago. Those had the stretched body that came to earlier Learjets with the advent of the 25; they had the old General Electric CJ610 straight turbojets (the 31 has Garrett TFE731s), and they were the first Learjets certified to 51,000 feet. (The only 28/29 difference was in the 29 having more fuel.)

I flew a Model 31 to Flight Level 510. It was the first business jet that I managed to get up that high since flying a 28



10 years ago. I have flown others that were certified to that altitude, but only the 28 and 31 managed to make the magic number. The significant thing about the ascent in the 31 was that we still had enough fuel to fly for a couple of hours after reaching FL510. The useful part of such capability is that the jet stream core winds start to abate in the mid to high 40s in the wintertime, and where airplanes that are relegated to FL350 have to break ground



and fly into a strong wind when westbound, the airplanes that can go substantially higher (FL470 and FL510 are westbound altitudes) enjoy much lighter winds, though they do have to climb through the gale. The ultimate example of how this works is on Concorde; she flies the Atlantic at a block altitude of FL480 to FL600, drifting higher as fuel is burned. I have seen more than 100 knots on the nose of that aircraft in the high 20s, drifting off to very little headwind above FL480. Flying times east and westbound are relatively close to the same because of the aircraft's ability to climb above strong winds. The fact that a Learjet 31 can launch from a 3,236-foot runway, meeting all Transport category rules, at gross weight, with maximum fuel and four passengers, climb unrestricted to FL470—where it will cruise 445 knots—and go as many as 1,840 nautical miles (with VFR reserves) is hard to beat. After flying awhile and burning some fuel, the airplane can go on up to FL510, where even the meanest winter wind will abate.

When preflighting the airplane, a lot of things that have contributed to better handling qualities are evident. The wings are adorned with little triangles and fences and other devices that really work. And then there are those "delta fins" aft that do wonders at slow speeds without adding a lot of drag at high speeds. In fact, the 31 is certified without a stick pusher; it only needs a stick-shaker to warn of an impending stall. Flying at the low end, the controls are quite effective, and the aerodynamic stall is tame. Flying at the higher end, you can blow the 31's high-speed warning horn (in level flight, all you have to do to do this is leave the power forward at the lower altitudes) without feeling any change in controllability. In fact, the certified 31 has a maximum airspeed limit of 300 knots or Mach 0.78, whereas

a version of the aircraft that will be entered in the Air Force Tanker Transport Training System competition has been flown to 350 knots indicated.

Aside from making sure the airplane is ready to fly, the main benefit of the preflight is enjoying the look of the 31. It is often said that an airplane looks best as originally designed, and indeed, the original Model 23 Learjet was and is a beautiful shape. But the 31, with the long and slender fuselage and the long wings with winglets, is as or more beautiful than the original. Everything about it just looks right.

Inside, the pre-start check list and starting procedures are as simple as in a light twin. A lot of attention was paid to

"switchology" in the 31, and the result is an airplane that is easy to configure for whatever you want to do. It is not certified for single-pilot operation, so there are functions that are handled from both front seats.

Nose steering is power steering, enabled in one of two ways. A button on the console turns it on until it is disabled, or a red, spring-loaded button on the wheel activates the power steering as long as it is depressed. For taxi, turn it on.

For takeoff, press the button on the wheel and hold it down until the pilot not flying gives word that airspeed is adequate for the rudder to be effective. As is true on many high-performance aircraft, getting used to ground handling is a major technique item. The brakes are powerful, and the steering is sensitive.

I have always thought that the takeoff is the most satisfying maneuver in any airplane, and in a Learjet 31, this is especially so. The speeds are not that high. Rotation at an average weight is 114 knots, only 44 knots higher than in a 210 or Bonanza. But that has to be put into context. On the hot, above-standard-temperature day in Wichita that I flew the 31, the balanced field length was 3,350 feet. That meant we could accelerate to the 109-knot decision speed and stop, all within that 3,350 feet if an engine failed before 109. If an engine failed at or above that speed, the takeoff could be continued. That is a lot of accelerating and stopping, or continuing, in a relatively short distance. Brisk performance.

In a Learjet departure, you do have to run through all the legal FAA-prescribed speed limits in advance. Two hundred on the knots until clear of the airport traffic area, 250 until above 10,000 feet. The power levers on the airplane are alive with thrust, and it can be worked both ways. Push to go, pull to slow. One of my mentors, the late Claud Holbert of Little Rock, Arkansas, bought a Learjet once. At the time, he was well into the Social Security age, and when asked if the airplane wasn't a handful for him, he replied that when the airplane started outrunning him, he slowed it to Baron speeds. Get used to pulling off a lot of power in a 31, and you can fly tight patterns and level at altitudes without making the soda cans in the back go ballistic.

Learjet 31/Extended Range

Base price: \$3,850,000

	Specifications
Powerplants	two Garrett TFE731-2-3B turbofans, 3,500 lb thrust ea
Length	48.66 ft
Height	12.25 ft
Wingspan	43.75 ft
Wing area	264.5 sq ft
Wing loading	63.32 lb/sq ft
Power loading	2.39 lb/lb thrust
Seats	10
Cabin length	20.6 ft
Cabin width	4.91 ft
Cabin height	4.33 ft
Empty weight	9,953 lb
Max ramp weight	16,750 lb
Useful load	6,797 lb
Max takeoff weight	16,500 lb
Max landing weight	15,300 lb
Zero fuel weight	12,600 lb
Fuel capacity, std	695 gal
	4,653 lb
Baggage capacity	30 cu ft

Performance

Takeoff balanced field length, standard conditions	3,236 ft
High-speed cruise	445 kts
Max operating altitude	51,000 ft
Landing distance	2,767 ft
<i>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.</i>	

Steep turns, stalls, and maneuvering to stay in the Boot Hill area that is used for flight tests out of Wichita were all enjoyable. And I am sure that Allen Goodwin, Learjet flight department captain, knew that I knew the diversions were all to burn off some weight before we asked for FL510. Finally, the magic moment arrived. The altitude was requested and granted, and up we went.

Is the sky bluer? Can you see the curvature of the earth? Is the airplane twitchy, in a coffin corner with no margin between stall speed and Mach limit? The answers are yes, yes, and no. It might take some imagination to see a curve in the horizon, even on a sparkling day, and you might have to admit to slight colorblindness to get the sky a lot bluer, but the gentle handling qualities of the airplane at FL510 need no excuses. There is plenty of margin, and you certainly don't feel like you are balancing a broom on your hand or that you have an airplane at a limit of its envelope.

Time to descend, power to flight idle, airspeed on maximum, spoilers out in a bit (though they do cause a pronounced rumble), and from 65 miles out and 51,000 feet, hit a normal pattern altitude at Wichita.

The reference speed for approach was 112 knots, and in three touch and goes, we included about everything except a deployment of the drag chute that would be called for only on a marginal-length runway where wheel braking would be in question because of ice or standing water.

An engine cut after takeoff required some push on the appropriate rudder, but controllability was good, and the climb performance was marvelous. The asymmetric power was easy to handle on flare and landing as well. A short-field landing, with the approach speed nailed on V_{ref} , with maximum braking after touchdown (this aircraft didn't have reversers, which are optional), and with a 10 knot cross-headwind, resulted in a turnoff 2,100 feet down the runway.

Perhaps the most impressive thing about the flight was the elapsed time on the clock. We had done a lot of things, not the least of which was getting up to FL510 with enough fuel to fly awhile, and the elapsed time of the flight was 1 hour 33 minutes. Fast, smooth, quiet, powerful, with excellent airfield performance—it is hard not to like all the Learjets, but it is easy to say that the 31 is the friendliest and most capable yet. □