

The Learjets 35 and 36

There appears to be enough new in them to cause excitement and enough old to inspire confidence.

B/CA Staff Report

The enviable position for a jet manufacturer to be in, since turbine buyers tend to be progressive thinkers and conservative buyers, is to have the newest airplane in the fleet with the longest service history. As much as we all like to ooh and aah over a brand new machine, progress in the acceptance of business aviation has tended to come in a new/old package.

If that historical precedent holds, the Gates Learjets 35 and 36 should do well. They are not new, but they are totally unlike their predecessors.

The 35 and 36 are identical airplanes except that the 36 carries 1,260 pounds more fuel in the fuselage tank. (The additional tank area, rather than weight, cuts the passenger cabin to a maximum of six and baggage.) That's why Lear refers to them as the Model 35/36 rather than the 35 and 36. Due to the long-leggedness of the airplanes they've been called the Continental 35 and Intercontinental 36. The 35 will fly Los Angeles to New York nonstop with IFR reserves (but probably not New York to Los Angeles because of prevailing headwinds) and the 36 will go Bangor to Shannon or San Francisco to Honolulu with careful planning.

The reason for the long-leggedness, and the major difference of the 35/36 from the models 25B and 25C is in the engines, and even they are a new arrangement of existing pieces. The low pressure compressor is taken from Garrett's 660-series APU used on the 747, the high-pressure impeller is scaled from one used in the TPE 331 and T76 engines, and the turbine components are from the APU used in DC-10s. They put out 18.6 percent more thrust at sea level than the GE CJ610s used on the 25, and nine percent more thrust at 40,000 feet. But they consume 39.6 percent less fuel at takeoff thrust; 23.8 percent less at cruise. This combination should make the 35 and 36 much less costly to operate than a 25B or C and it will give them one of the best single engine angles of climb of any of the jets.

And, of course, the TFE 731 meets FAR 36 noise requirements and is a much cleaner running powerplant than the GE was.

The more important plus of the engine change, from the utilitarian point of view, is that the decreased fuel consumption increases the range of the airplanes about 40 percent. On the same amount of fuel the 35 has a range of 2,630 nm against 1,621 for the Model 2513; the 36 goes 3,146 nm to 1,861 for the 25C.

In addition to doing more work on less kerosene, the Garrett TFE 731s are 11 inches larger in diameter (to accommodate the 2.82 bypass-ratio fan) and weigh almost twice as much as the engines they replace (747 pounds to 392).

This last is particularly significant because the additional 710 pounds aft gave Lear's engineers a cg problem that precluded a simple reengining of the standard Model 25, as the original plan intended. To overcome the problem, they've added 13.25 inches to the fuselage ahead of the wing leading edge. As well as putting the crew on a longer arm to bring the cg within the envelope, this created more cabin room and, hurray, the crew gets some of it. The pilot and copilot seats have three inches more fore and aft travel.

While we're in the cockpit we should note that the panel has been cleaned up, regrouped and made considerably prettier. Also, notice in the pictures that the lower console is now double wide. This creates room for one or dual INS control heads, which are necessary in these Lear's since either of them has the range to pop over to Europe and on down into Africa or the Orient.

The engineers have effectively picked up another foot of cabin room by switching to a narrower, people-sized cabin door in place of the old cargo-width entrance. (But the cargo door is still optionally available.) This creates room for a big-airplane-type refreshment cabinet at the forward end of the passenger compartment on the left side.

Although Lear is saying the 35 and 36 have eight- and six-passenger cabins respectively, the arrangements they're showing are really seven and four for practical purposes. The 35 has a bench-style rear seat (which could accommodate three small bodies), four forward facing chairs and a side-facing potty/jump seat opposite the door.

The 36, because the normal behind-the-aft seat baggage area is taken up by the larger fuselage tank, has a second luggage area opposite the door under which a slide-out potty is stowed. Its passenger compartment has the bench seat and two individual chairs arranged in club configuration.

We suspect that a large number of Model 35 customers will opt for a combination of the two interiors. That forward luggage area makes a convenient arrangement for short hops when not much luggage space is needed beyond some place to throw briefcases. On long trips, with six passengers plus crew on board, the extra baggage space will often be needed to hold all the two-suiters and hanging bags.

Since the airplanes won't be certificated until mid-summer next year, not much can be said about flight characteristics. Bob Berry, Lear's engineering test pilot and director of product assurance, says the program calls for the airplanes to have the same performance and handling characteristics of the Model 25. So, because the 35 and 36 are 2,000 pounds heavier than the 25, wing area had to be added to retain the hoped-for performance. This was done with a two-foot extension on each tip.

It's amusing to speculate on the problems this much have given the engineers. The leading edge of the standard wing sweeps back at a 13-degree angle to a straight trailing edge. Had they continued the sweep they would have run out of wing-tip chord and structure upon which to mound the tip tanks, or they would have had to move the tanks back, thus aggravating the cg problem. This probably explains why the extensions are constant chord. The leading edge now sweeps back to the extensions, then breaks forward and parallels the trailing edge.

At one time they were flying the airplane with fences at the break in the leading edge, but Berry says flight test proved they weren't needed so they've been removed. The characteristic Learjet vortex generators forward of the ailerons are still in place, however.

Moving the tip tanks out undoubtedly added inertia and so, to increase lateral control without heavying up the feel, spoilers are now used for additional roll command.

Berry reports that all of this worked well from the first flight except for a "nuisance buffet" which has since been corrected by extending the chord of the nacelle pylons aft. The prototype airplane has been flown approaching 200 hours on more than 100 flights and Gates is confident the mid-1974 certification date will be made.

First deliveries will be made immediately following certification. Gates officials say 32 delivery positions are taken (with \$100,000 deposits) and that the initial production rate will be 2.5 per month. They will not talk price yet (although, if 32 have in fact been sold, it's obvious they're telling prospects) except to say it'll be in the \$1.3 million to \$1.5 million range.

The company is careful to emphasize that the 35 and 36 are additions to the line and not replacements for the 24D, 25B and 25C. An acoustical kit is being developed for those earlier airplanes and they will remain in production. B/CA