Cessna 310R TURBO

Appealing yet demanding.

BY EDWARD G. TRIPP

continued

310R TURBO

The impression from the pilot's seat is high, wide and handsome, even with the nacelles and tip tanks.

The first 310 I saw has to have been one of the very first, because it was during the late summer of 1954, sitting on the ramp in Omaha. The formal introduction was later that year. It was a very advanced airplane for the time. It was sleek. It looked very fast. It was, according to Cessna, the company's first *business* twin.

Its long gear put the cabin high off the ground, and the man behind the yoke was definitely above the crowd. It had appeal. Very *macho*.

I never did get to meet the pilot, although later, when I learned more about the 310, I would daydream about Dwayne Wallace flying the company's latest creation around the country, sampling its behavior and people's reactions to it. Perhaps I had just missed meeting him.

More than anything else, though, I wanted to fly one of those some day. Sky King was flying one long before I got a crack at it. In fact, it was to be six years before I even rode in one, and another six on top of that before I made it to the left seat.

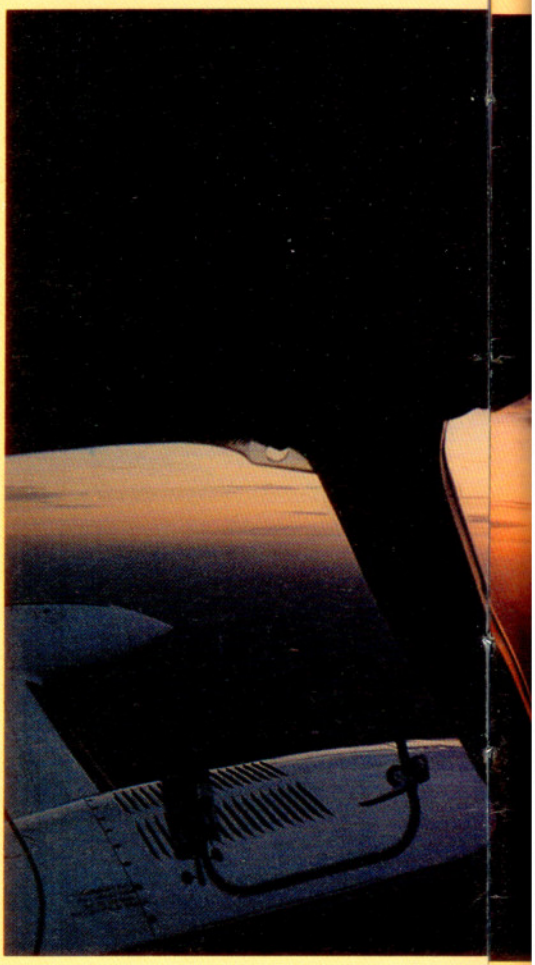
By then the 310 had been developed into a bigger airplane with more powerful engines and more capability. There was a sister, turbosupercharged model, the 320 Skyknight, which was a pioneering concept in a lot of ways.

By then, the 310's reputation also had developed. It was definitely a pilot's airplane—meaning, not easy to fly. Ground handling was a bit clumsy. The tall, stiff gear made squeaky-smooth landings rare but satisfying. A reasonably good landing was what we called an arrival: plonk, kerplunk. It had a lot of dutch roll tendency. As a matter of fact, it wasn't a tendency; it did it. Pilots new to the airplane and that characteristic could get behind in a hurry, aggravating the 310 into some alarming gyrations and excursions, particularly in approach configuration.

Part of this resulted from the relatively short fuselage. A lot came from those big tip tanks, which happen to be the mains. (A lot of line boys still think they are auxiliary tanks, and 310 pilots must make certain not to say fill the mains and go for coffee. More than once the aux tanks, which are in the wing, have gotten filled instead.) There is a lot of leverage out there, which really gets down to work in unstable air.

There were a lot of pitch changes with configuration changes, and pilots familiar with the characteristic anticipated it with large elevator trim input. Pilots who were not familiar with it found another reason for the airplane to get away from them.

A good checkout with an experienced 310 pilot was a necessity with



earlier versions of the aircraft, if one were to safely utilize the capability it offered (and still does offer). It is still to be highly recommended, despite the fact that many of the worse handling vices of the 310 have been modified. It is still a challenging—at times demanding—airplane to fly. It still gives pilots a sense of accomplishment to fly it reasonably well. It is still an airplane to approach with respect and one that will reward complacency or a lack of proficiency with nasty surprises.

It takes a lot of looking to see the 1955 Cessna 310 hiding behind the current model, the 310R. A lot of development and change has taken place in the 25 years that separate them. (Although the R model was first introduced in 1975, only minor changes have been made since then.)

The series has gone through a steady process of improvement, refinement and cosmetic changes. For many years, the 310 stayed a bit ahead of the times and the competition, maintaining the image of an innovative product, which it certainly was when it was introduced. More than 5,100 310s have been produced.

The 320 Skyknight was eliminated in 1969, replaced by the Turbo 310. By then the tail had been swept (1960); the tip tanks elongated, swept and canted (1962); the picture window added to the side of the fuselage (1966); the ailerons modified to improve response (1966); and a one-piece windshield (1967) fitted.

In 1969 a modified nose gear, which greatly improved ground handling, a ventral fin and an extended tail cone to improve yaw or dutch roll characteristics were added. With the introduction of the R model in 1975, which featured an extended nose and a power increase from 260-hp to 285-hp for the normally aspirated version and a gross weight of 5,500 pounds, the only remaining difference between the two versions is turbosupercharging.

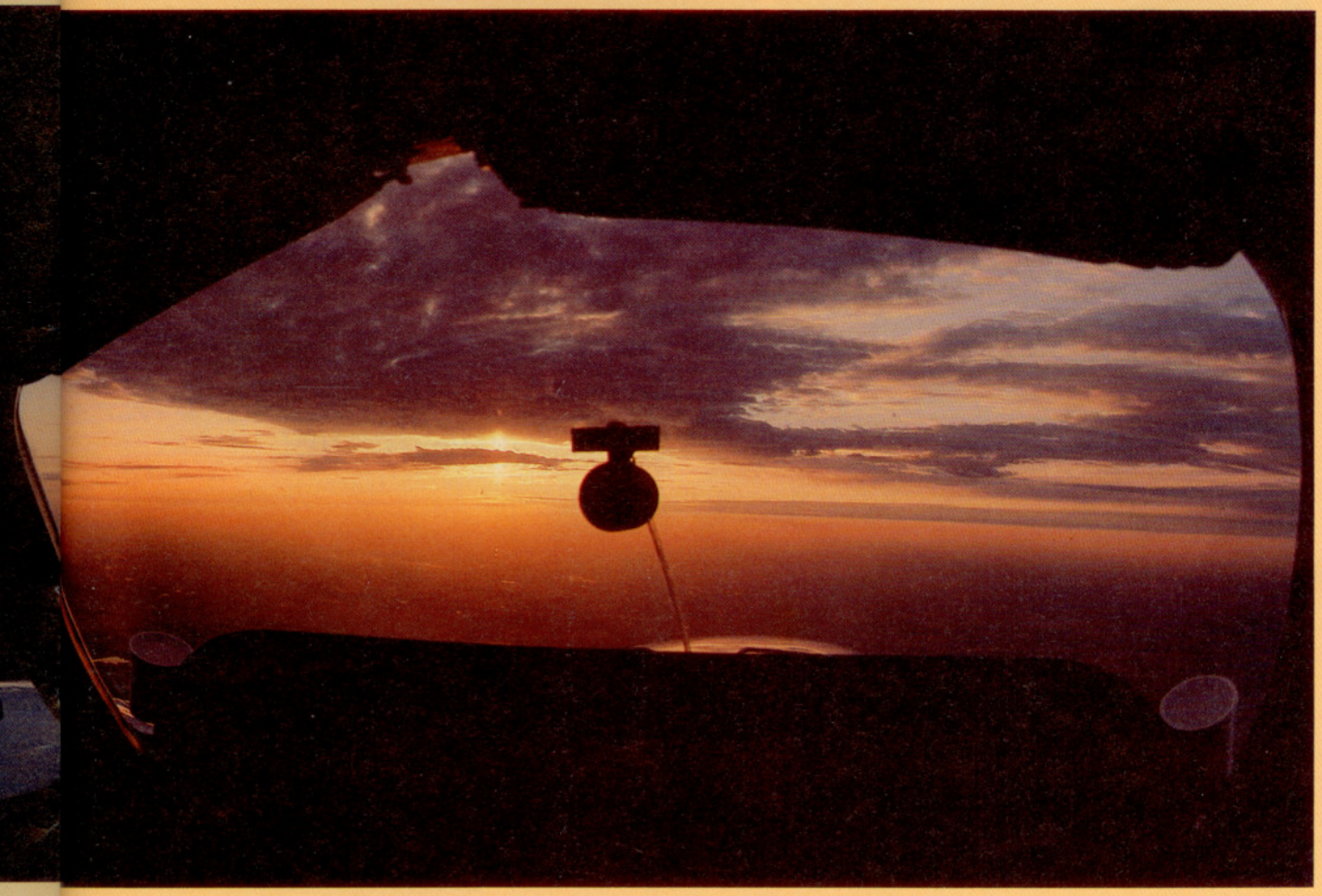
Development emphasis at Cessna has turned from the 310 series to the jets, the 400 series twins and the higher performance singles. When the company started converting to wet, tip-tank-free wings on the 400s, there was speculation that the 310 would receive the same treatment.

Now, with the conversion of the light twin Model 303 Clipper from a simple, small twin to a turbocharged, 250-hp cabin twin, quite a few observers think the 310 has reached the end of its development and, possibly, the end of its production.

I have been flying a 1978 Turbo 310R, N5087C, which is representative of the version. It has the factory-installed option package of avionics, including a coupled autopilot with pitch command and altitude hold, and basic necessities that make a 310 a 310 II. It is equipped with pneumatic wing and tail deicing boots, electric propeller deicing and alcohol windshield deicing, which provides protection should icing conditions be encountered unexpectedly.

The list price of the Turbo 310R II in 1978 was $167,750. The additional options on 87C, including a yaw damper and left wing locker fuel tank, make the original list price $195,107 and raise the empty weight an additional 233 pounds, to 3,956. The same model for 1980 is $188,850 without the options. More sophisticated avionics and radar would raise this to about $225,000.

The result of the development of the Turbo 310 is a very capable, highly flexible airplane that is relatively demanding. It requires com-



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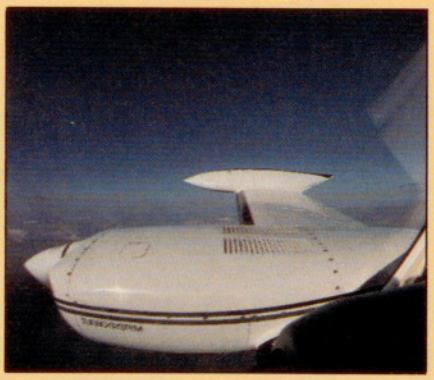
plete familiarity with its complex systems, careful flight planning and loading to balance range, speed and payload considerations, and constant alertness on the part of the pilot. It is an airplane in which a copilot who is well-briefed would be a great help during high workload conditions; but the panel design largely precludes a helping hand, because it is designed as a single pilot system.

Careful fuel calculations are necessary when any kind of a cabin load is to be carried. Total fuel capacity for 87C is 183 gallons; 50 in each main, 31.5 in each auxiliary and 20 in the single wing locker. A full load of fuel, 1,098 pounds, leaves 481 pounds of payload. Maximum ramp weight is 5,535 pounds; maximum takeoff weight is 5,500 and maximum landing weight is 5,400. If one wants to consider payload over range, the zero fuel weight of 5,015 pounds has to be considered. That means a maximum cabin and baggage load of 1,059 pounds. Adding the maximum allowable 520 pounds of fuel, which must all be in the main tanks since only the mains can be used during anything but level flight, will enable an endurance of approximately two hours at the standard 65 percent power setting used in this airplane, plus a 45-minute reserve. This provides a still-air cruising radius of 370 nautical miles at 10,000 feet.



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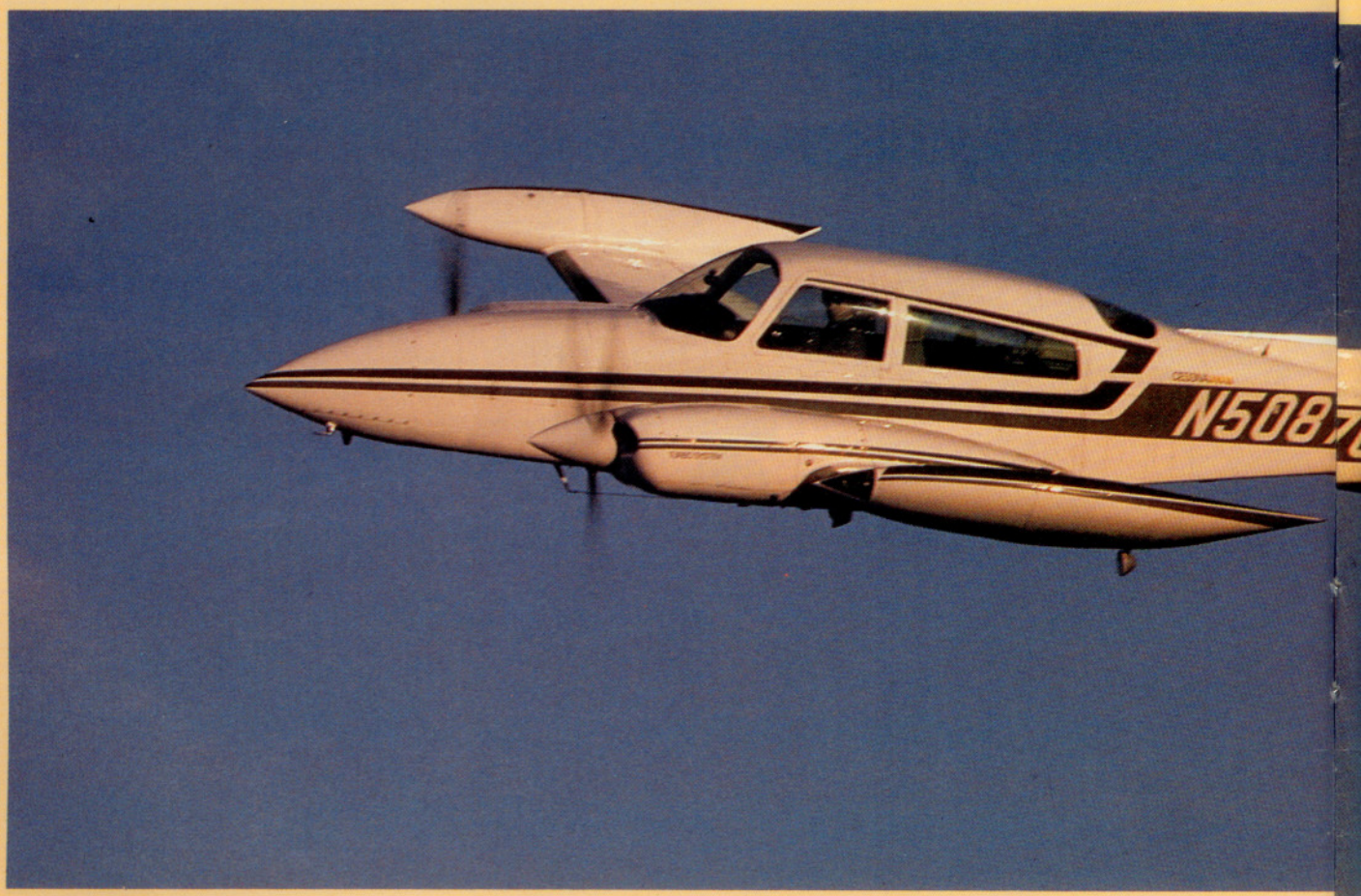
Still sleek and vital-looking after twenty-five years the Cessna 310 also gives competitive performance. Pilot workload is high, though, partly due to panel layout.

Weight and balance must be calculated carefully, including consideration of change during fuel burn. Loading is simplified with the large nose and aft cabin baggage bays and the two wing lockers in the rear of the engine nacelles.

Calculation of balanced field length requirements is essential, too, particularly if loading approaches gross weight. Takeoff performance at 5,300 pounds versus 5,500 pounds is markedly different. Even on cool days, gross weight takeoff eats up a lot of runway; acceleration to best single-engine climb speed of 106 knots seems to take forever, as does gear retraction. If anything goes sour during this period, a pilot will be extremely busy and should be concentrating on two things: maintaining control and getting the airplane on the ground. Anywhere.

All of these are not exclusive to the 310, of course. They apply to all airplanes and most particularly to multi-engine aircraft. But the 310 is a complex aircraft; there is a lot to consider and a lot to do to operate it.



Preflight is not particularly complex, but fuel levels must be checked carefully since line personnel often will miss the last few inches (in addition to making sure they know which tanks are the mains). It may not look like much, but it is a great deal of fuel. If the aircraft is not on a level surface, the imbalanced fuel load that will result can be a handful in flight. The five tank arrangement on 87C means there are nine drain points to be checked. Gear uplocks should be checked carefully, which means crawling around to get a look into the gear wells, and the nose-gear scissor should be checked to ensure there is no play at the joints and fittings.

It is essential to turn the master on and listen to ensure that the main fuel tank transfer pumps are working. They pump fuel from the aft end of the tank to the pick-up point to keep the latter from unporting. The transfer pumps are no go items.

Engine and turbocharger inspection is not as good as it was in earlier 310s (which had large access doors but also a tricky oil dipstick arrangement that could allow oil to blow out if improperly secured).

All of the caveats about the careful treatment of turbosupercharged engines apply to the Turbo 310, from start-up and warm-up through power application and reduction and cool down. The only way to approach the recommended 1,400-hour time between overhaul (TBO) is to treat the system like the gold it is. If several pilots fly the same airplane, all must be thoroughly briefed and checked lest the carelessness or ham-handedness of one be visited upon another in the form of a nasty surprise.

Starting is very simple if the recommended techniques are followed, although great care must be taken to ensure that the engines are not overprimed. Backfiring and fires are still possible if raw fuel collects.

The 310 requires a thorough checklist and strict adherence to it.

Once all the head and leg work to prepare for flight has been taken care of, the pleasure can begin.

Care must be taken with power application, and the engines must be warm. Once power has stabilized, acceleration through Vmc (80 knots) is fairly rapid at less than gross weight. After one transitions through Vyse and gear retraction, the airplane begins to fly solidly; but there is a lot to do, particularly if one is on an instrument departure. This is one airplane in which it pays to make the autopilot do the basic flying work while

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The 310 has sold well, but recent lack of development indicates Cessna may be turning attention elsewhere.

you do all the rest of the work.

Recommended climb power settings of 2,350 rpm per 32 inches of manifold pressure (lean to 100 pounds per hour fuel flow) and 125 knots produces an average climb rate of 1,000 to 1,200 fpm. Maximum performance climb (full power and 106 knots) can produce rates in excess of 1,700 fpm. Single-engine rate of climb in this configuration at gross weight is 370 fpm, if everything else is working right and the pilot is very smooth and precise.

Noise level with takeoff power is quite high. The first reduction, to normal climb power, helps a lot. Reduction to cruise power is a blessing by comparison, although I have found it necessary to make a great deal of use of the propeller syncrophaser because of propeller beat against the nose cone.

Once established at cruise, with all the systems operating normally, the 310 is a pleasure. The cabin is big and wide. The view out the windshield is panoramic. The big, flat nacelles and the canoe-like tip tanks still exude that old macho. If you squint, you can almost pretend you're flying a Lear.

But there is always work to be done. Fuel management is the biggest task at cruise. The recommended technique is to burn the mains down to 150 pounds (the quantity gauges

Cessna Turbo 310R II

Basic price $167,750 As tested $195,107

Specifications

Engines	2 Teledyne Continental TSIO-520-B 285 hp @ 2,700 rpm
Recommended TBO	1,400 hr
Propellers	McCauley 0850334-15, 78 in (3 blade)
Wing span	36 ft 11 in
Length	31 ft 11.5 in
Height	10 ft 11.8 in
Wing area	179 sq ft
Wing loading	30.73 lb/sq ft
Power loading	9.65 lb/hp
Passengers and crew	6
Cabin length	147.5 in
Cabin width	48.5 in
Cabin height	50 in
Empty weight	3,707 lb
Equipped empty weight (as tested)	3,956 lb
Maximum zero fuel weight	5,015 lb
Useful load (as tested)	1,200 lb
Payload with full fuel (basic aircraft)	1,193 lb
Payload with full fuel (as tested)	481 lb
Gross weight	5,500 lb
Maximum landing weight	5,161 lb
Fuel capacity (standard)	102 gal (100 usable)
Fuel capacity (w/opt tanks)	207 gal (203 usable)
Oil capacity per engine	13 qt
Baggage capacity	950 lb (65.6 cu ft) total
Each wing locker	120 lb (9.25 cu ft)
Aft cabin	360 lb (26.1 cu ft)
Nose compartment	350 lb (21 cu ft)

Performance

Takeoff distance (ground roll)	1,306 ft
Takeoff over 50 ft	1,662 ft
Accelerate/stop distance	3,250 ft
Rate of climb (gross weight) SL	1,700 fpm
Single-engine rate of climb (gross weight)	390 fpm
Maximum level speed (16,000 ft)	237 kt
Cruise speed (75% power)	
20,000 ft	223 kt
10,000 ft	201 kt
Cruise speed (65% power)	
20,000 ft	204 kt
10,000 ft	185 kt
Cruise speed (55% power)	
25,000 ft	195 kt
10,000 ft	177 kt
Range @ 75% cruise (with 45-min reserve)	100 gal/203 gal
20,000 ft	519 nm/1,242 nm
10,000 ft	491 nm/1,140 nm
Range @ 65% cruise (with 45-min reserve)	100 gal/203 gal
20,000 ft	545 nm/1,290 nm
10,000 ft	515 nm/1,200 nm
Range @ 55% cruise (with 45-min reserve)	100 gal/203 gal
20,000 ft	570 nm/1,360 nm
10,000 ft	540 nm/1,270 nm
Maximum operating altitude	27,400 ft
Single-engine service ceiling	17,200 ft
Vs1 (Stall speed with no flaps)	97 kt
Vso (Stall speed with full flaps)	72 kt
Vmc (Minimum control speed with critical engine inoperative)	80 kt
Vyse (Best single-engine rate-of-climb speed)	106 kt
Vxse (Best single-engine angle-of-climb speed)	98 kt
Vfe (Maximum flap-extended speed)	139 kt
Vle (Maximum landing-gear-extended speed)	138 kt
Va (Design maneuvering speed)	148 kt
Landing distance (ground roll) 93 kt (1.3 Vso)	640 ft
Landing over 50 ft	1,790 ft