THE THREE-TEN

Now and then

BY MARK M. LACAGNINA

PHOTOGRAPHY BY THE AUTHOR


N2610C

continued

We were conducting the pre-start check for the 1978 Cessna Turbo 310R when our concentration was interrupted by a smooth and powerful rumble. A 1955 Model 310 stalked by, gliding tall on spindly landing gear and thrusting its straight tail and large wing tanks proudly into the air. For a moment, our small piece of the ramp was a living museum, displaying two fundamentally similar but substantially different airplanes.

The original 310 was heralded by the company as its first business airplane. The newcomer hit the market like a lightning bolt on a clear day. The 310 quickly eclipsed its closest competitors, the Aero Commander 520 and the Beech Twin Bonanza B50, and established itself as a pilot's airplane. It is debatably the handsomest twin ever built by Cessna or any other manufacturer. The 310 also is an airplane that demands attention, a thorough understanding of its systems and operating procedures and a lot of respect.

With its swept tail, canted tip tanks, turbosupercharged engines, deice and anti-ice systems and optional fuel tankage, the R model we were sitting in was a reflection of 23 years of nearly constant refinement.

During the later years of its development, the 310 retained its popularity despite strong competition from Beechcraft's Barons. But last year, Cessna decided it was time for a change and replaced the 310 with the T303 Crusader (see "Cessna Crusader," March *Pilot*, p. 108). Today, prices range from about $20,000 for a good, early-model 310 to more than $100,000 for a Q or R model. A buyer who is careful in his selection and willing to fly and maintain the airplane properly can get very good performance and a lot of enjoyment in return for his investment.

The airplanes are fast, have good short-field capabilities and relatively good single-engine performance. Most owners contacted for this report said their 310s are not exceptionally expensive to operate and to maintain. One owner, however, conceded that he may have made an overly hasty decision. He bought his 310 for about $15,000, not knowing there was a hairline crack in one of the engine crankcases and a rather nasty case of wing spar corrosion. Getting the airplane airworthy cost another $15,000.

A thorough check-out by an experienced 310 pilot/instructor is a must. The airplane has many performance and handling characteristics that are best learned under the tutelage of a graybeard.

Preflight preparation is straightforward but does tend to require an unusually long amount of time to accomplish thoroughly. Unless you are exceptionally tall, you may need a stepstool to check the fuel levels in the wing tip tanks, which on the 310 are the mains. The master switch should be turned on momentarily to check for the sound of the fuel transfer pumps. They transfer fuel from the rear of the tanks to the ports in front to ensure an adequate flow at high angles of attack. An inoperative transfer pump is a no-go item. When the oil quantities are checked, the dipsticks themselves should be examined for evidence of corrosion. There are several service difficulty reports of rusted dipsticks that broke away from their caps and fell into the engine sumps. In addition, the dipsticks in several 310 models are channeled nearly horizontally into the engines. If the dipstick is not secured properly, oil can be pumped overboard.

The nosewheel has rather limited steering travel, and its linkage can be damaged by a careless ground tow. On preflight, therefore, the nose gear scissors should be checked for play. The shock strut also should be checked carefully for leaks and proper inflation. There are reports of under-inflated struts that allowed the nose gear to hit

and jam against other components during retraction.

Engine starts require a practiced touch. It is easy to over-prime one of the Continentals, especially on a cold day. If an engine floods, the pilot should allow sufficient time for any collection of raw fuel to exit through the manifold drain lines before trying again to start the engine. Otherwise, the pilot faces the possibility of an explosion or fire.

While taxiing, the rudder pedals can steer the nosewheel up to 15 degrees on older models and 18 degrees on newer 310s. For tighter maneuvering, the pilot can use differential braking and power application to pivot the airplane's nosewheel up to 55 degrees right or left.

Normal takeoffs are conducted without flaps. A 310 reaches recommended rotation speed—usually minimum single-engine control speed (Vmc) plus 10 knots—or recommended safe single-engine speed (Vsse)—very quickly. With the gear retracted, the airplane then accelerates rapidly past Vyse, the best single-engine rate of climb speed. However, the gear retracts rather slowly and a good procedure for initial climb is to maintain the best single-engine angle of climb speed (Vxse) to gain as much altitude as possible before leaving the airport fence.

The 310s have relatively high wing loadings and become fairly stable once airspeed has built beyond the white arc. The 310's controls are heavy but well harmonized. The airplanes give plenty of warning of an impending stall.

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Flap and gear speeds are rather low, and it takes some planning to slow a 310 down to mingle in the pattern.

In slow flight, it is easy to overcontrol a 310. There is a lot of weight out at the wing tips, and once a wing is in motion it likes to stay in motion. Until the right control touch is developed, the beginner may find himself engaged in some interesting Dutch roll oscillations on initial climb and short final. Turbulence also can initiate a rather annoying oscillation, even on the newer models, which have ventral fins. A good yaw damper is a welcome piece of equipment in any 310.

Visibility is excellent over the tapered nose and the trim engine nacelles. Only the tip tanks spoil what otherwise might be a panoramic view from the pilot's seat. Noise is a problem with all 310s, but especially for occupants of older models that have unmuffled, over-wing exhaust systems and very little soundproofing.

There are no cowl flaps on normally aspirated 310s. Early models have augmented exhaust systems. As the exhaust gases leave the engine, they create a low-pressure area that draws cooling air over the engine. (Air pressure from wind blowing against the augmentors can hamper the flow of cooling air over the engines. Therefore, the pilot should keep a sharp eye on the engine temperature indicators while holding for takeoff.) The normally aspirated 310R model has tighter engine nacelles and manually adjustable modulators (the operating manual insists on calling them cowl flaps) that bring cooling air in through louvers in the center of the nacelles. There are true cowl flaps on all 320s and turbosupercharged 310s.

Fuel systems in 310s equipped with auxiliary wing and nacelle locker tanks can keep the pilot quite busy. Each of the main (tip) tanks holds 300 pounds of fuel. Since all excess fuel is returned to the main tanks, they must be drained down to about 180 pounds each before selecting the auxiliary wing tanks, which should be used only during level flight. Fuel from the nacelle locker tanks is transferred directly into the main tanks. The locker tank transfer pumps are lubricated by fuel, and the pilot must be careful to turn them off once the transfer is completed. Some 310s have only one locker tank, and crossfeed must be used to transfer the fuel evenly into the main tanks.

The landing gear and split wing flaps are electrically actuated. The maximum extension speeds are relatively low, even on the newer models, and it takes some planning to slow a 310 down to approach and pattern speeds. The 310 is an exceptionally clean air-

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The cockpit of a 310 is a great place to be for anyone who knows the systems and the procedures. To avoid surprises, the engines and the gear require careful attention.

plane, and any changes in configuration result in marked changes in attitude. Flap extension, for instance, causes the airplane's nose to pitch up vigorously. To avoid startling the passengers, the pitch up should be anticipated and countered with a healthy push on the control wheel.

When it comes to landings, the 310 is much like the Piper Twin Comanche in that consistent smoothness proves rather evasive. The 310's elevator becomes very heavy during the flare. Usually, the mains contact the runway hard, followed by the solid clunk of the nosewheel. Two consecutive greasers are cause for breaking out a bottle of champagne.

The airplane in the accompanying photographs is owned by Leonard C. Rennie Jr. and his son, Leonard C. (Tres) Rennie III, both of Cheverly, Maryland. Their 310 is one of only 14 built during 1954 (and pronounced 1955 models by Cessna). N2610C has been modified with a one-piece windshield and over-wing exhaust port extensions.

The Rennies have owned their 310 for almost two years and like it so much they are considering selling their prized 1947 Bonanza. They normally operate the 310 at its optimum cruising

altitude, 8,000 feet, where it clips along at 170 knots, true, while burning about 25 or 26 gallons of fuel per hour. At 65-percent power, the 310 cruises at about 156 knots and burns about 24 gph. According to Tres, the 240-hp Continental O-470-B engines also burn or blow about one quart of oil each hour. The original 310's range is not what one might desire from a twin. The Rennies flight plan for an endurance of three hours, which leaves enough fuel remaining for another hour of flight at low power settings.

Tres is an airframe and powerplant mechanic and does almost all of the work on N2610C. "It actually is a very easy airplane to work on," he said. "The landing gear and engines require careful attention; but other than that, the 310 is not a maintenance-intensive airplane." Tres noted, however, that a 310, just like any machine, can deteriorate quickly if neglected.

Cessna offered auxiliary wing bladder tanks as options for the 310 in 1956. Each tank holds 90 pounds of fuel. In 1958, Cessna introduced the B model, which has a gross weight of 4,700 pounds and a basic empty weight of 2,960 pounds, increases of 100 and 110 pounds, respectively. The instrument panel was redesigned to group radio equipment in the center. The 310B featured better soundproofing and optional propeller anti-ice and wing deice systems.

The Cessna 310C was introduced in 1959 with fuel-injected, 260-hp Continental IO-470-D engines. The nacelles were extended to the trailing edges of the wings to house exhaust-muffling systems.

On the 1960 Model D, the vertical stabilizer was swept back 40 degrees to give the 310 an "advanced styling look characteristic of high-speed jet aircraft," according to Cessna's advertising copy. The swept tail also accounts for approximately 175 pounds of the airplane's gross weight of 4,830 pounds.

Cessna skipped a letter (as it would later skip M and O) and introduced the 310F in 1961. It has extra side windows and landing lights in the left wing, as well as on the nose gear. Landing lights previously were mounted only on the nose gear.

"Stabila-tip" wings appeared on the 1962 Model G. Cessna claimed that handling qualities and stability were greatly enhanced by canting the tip tanks 35 degrees. This claim, however, is the subject of much debate among 310 owners. The 310G also featured an optional sixth seat and a maximum takeoff weight of 4,990 pounds.

The Model 320 Executive Skyknight, approved under its own type certificate, was introduced in 1962. The six-seat airplane is powered by turbosupercharged, 260-hp Continental TSIO-470-B engines, has four side windows and a maximum takeoff weight of 5,200 pounds. Four years later,

Putting the Heat On

The Cessna 310 was not on the market long before people began figuring ways to make it go faster. The most notable example was the Riley Turbostream. Equipped with turbosupercharged, 350-hp Lycomings, the Turbostream climbs at 3,000 fpm, cruises at 280 knots and has a maximum operating altitude of 35,000 feet. The Turbostream modification no longer is available, but there are quite a few companies that are still actively engaged in the business of tweaking the 310—for a price.

Air America of Avoca, Pennsylvania (717/343-1228), offers two Turbocruiser conversions, both of which can cruise at 260 knots at 24,000 feet. One Turbocruiser has 310-hp Teledyne Continental TSIO-520-N engines and three-blade McCauley propellers. According to Air America, rate of climb at sea level is 2,000 fpm and normal cruise at 12,000 feet is 235 knots. This conversion costs from $30,000 to $62,000, depending on the model.

The other Turbocruiser is powered by 350-hp Lycoming LTIO- and TIO-540-J2BD engines and three-blade Hartzell props. This one climbs at 2,800 fpm and cruises at 244 knots. Cost is $139,000.

Both of Air America's Turbocruiser modifications are available for 310s beginning with the I model, the Turbo 310P, Q and R, and the 320B and C. The company also offers auxiliary fuel tank installations at prices that vary by model.

Inflatable door seal kits for all 310 and 320 models, as well as for a large number of other airplanes, are available from Bob Fields Accessories of Santa Paula, California (805/525-6236). Cost of the silicone composite seals and a manual inflation system is $277. An electric inflation pump boosts the price for the kit to $419.

Colemill Enterprises of Nashville, Tennessee (615/226-4256), offers the Executive 600 conversion of the 310F through Q and the Century 600 conversion of the 320 and the 320A through C models. Both include 300-hp Continental IO-520-E engines, three-blade McCauley props and Woodward prop governors. Colemill said the $38,500 modification increases single-engine rate of climb speed at 5,000 feet to 250 fpm and increases the single-engine service ceiling to 10,000 or 11,000 feet, depending on the model.

Three different engine conversions for Turbo 310s and 320 models built after 1965 are available from Ram Aircraft Modifications of Waco, Texas (817/752-8381). The first includes 300-hp Continental TSIO-520-E engines, three-blade Hartzell propellers, Woodward prop governors and synchrophasers and an improved exhaust system. Ram said the $32,500 conversion results in a climb rate of 2,150 fpm, a single-engine climb rate of 485 fpm, a 231-knot cruise at 75-percent power and a maximum operating altitude of 29,500 feet. A similar conversion, but with 310-hp TSIO-520-N engines, costs $63,500 and provides a climb rate of 2,600 fpm, a single-engine climb rate of 550 fpm, a 253-knot cruise at 75-percent power and a maximum operating altitude of 34,500 feet. Ram offers three-blade Hartzell Q-tip propellers as options for these conversions for $5,200.

Ram also offers a $78,500 conversion that includes 325-hp TSIO-520-NBR engines and Q-tip props. Ram said this conversion enables a T310 or 320 to cruise-climb to 18,000 feet in 12 minutes. Cruise at 75-percent power is 260 knots; 240 knots at 55-percent power. Climb rate is 3,100 fpm, and single-engine climb rate is 620 fpm. Maximum operating altitude is 35,500 feet, and single-engine service ceiling is 24,500 feet.

Robertson Aircraft Corporation of Everett, Washington (206/355-8702), offers a Hi-Lift modification for the 310G and R and the Turbo 310P, Q and R models. The $19,900 modification consists of replacing the airplane's split flaps system with Fowler flaps and the installation of a spring interconnect between flap and elevator controls to compensate for pitch-trim changes. Robertson said the modification enables an airplane to take off over a 50-foot obstacle within 1,470 feet and to land over that obstacle within 1,165 feet. Accelerate/stop distance is reduced to 1,680 feet, and Vso (stall in landing configuration) is 64 knots.

Roto-Master of North Hollywood, California (213/982-4500), installs turbosuperchargers on 310s through the I model. Roto-Master said the modification costs approximately $16,000 and enables a 310 to maintain rated sea-level power to 16,000 feet. —*MML*

continued

Model	310	310D	310R	320	Turbo 310R
Base price, new	$49,950	$59,950	$89,950	$69,950	$107,500
Current market value	$15,000 to $30,000	$20,000 to $35,000	$50,000 to $70,000	$20,000 to $50,000	$60,000 to $90,000
Specifications					
Powerplants	2 Teledyne Continental O-470-B 240 hp ea @ 2,600 rpm	2 Teledyne Continental IO-470-D 260 hp ea @ 2,625 rpm	2 Teledyne Continental IO-470-VO 260 hp ea @ 2,625 rpm	2 Teledyne Continental TSIO-470-B 260 hp ea @ 2,600 rpm	2 Teledyne Continental TSIO-520-B 285 hp ea @ 2,700 rpm
Recommended TBO	1,500 hr	1,500 hr	1,700 hr	1,400 hr	1,400 hr
Propellers	Hartzell, 2-blade, constant-speed, 80 in, full-feathering	Hartzell, 2-blade, constant-speed, 80 in, full-feathering	McCauley, 2-blade constant-speed, 81 in, full-feathering	Hartzell, 2-blade constant-speed, 78 in, full-feathering	McCauley, 3-blade, constant-speed, 78 in full-feathering
Length	27 ft 1 in	29 ft 7 in	29 ft 7 in	29 ft 6 in	31 ft 11.5 in
Height	10 ft 5 in	9 ft 11 in	10 ft 5 in	10 ft 5.7 in	10 ft 8 in
Wingspan	36 ft 1 in	35 ft 9 in	36 ft 11 in	35 ft 9 in	36 ft 11 in
Wing area	175 sq ft	175 sq ft	179 sq ft	179 sq ft	179 sq ft
Wing loading	26.2 lb/sq ft	27.6 lb/sq ft	29.6 lb/sq ft	29.6 lb/sq ft	30.7 lb/sq ft
Power loading	9.6 lb/hp	9.3 lb/hp	10.2 lb/hp	9.3 lb/hp	9.7 lb/hp
Seats	5	5	6	6	6
Max ramp weight	4,600 lb	4,830 lb	5,500 lb	5,300 lb	5,535 lb
Empty weight	2,850 lb	3,037 lb	3,603 lb	3,266 lb	3,707 lb
Max useful load	1,750 lb	1,793 lb	1,897 lb	2,034 lb	1,828 lb
Max payload	1,150 lb	1,193 lb	1,297 lb	1,434 lb	1,228 lb
Max takeoff weight	4,600 lb	4,830 lb	5,300 lb	5,200 lb	5,500 lb
Max landing weight	N/O	4,600 lb	5,300 lb	4,750 lb	5,400 lb
Fuel capacity					
std (usable)	612 lb (600 lb)	612 lb (600 lb)	612 lb (600 lb)	612 lb (600 lb)	612 lb (600 lb)
opt (usable)	—	792 lb (768 lb)	1,242 lb (1,218 lb)	798 lb (768 lb)	1,242 lb (1,218 lb)
Baggage capacity	200 lb	200 lb	950 lb	600 lb	950 lb
Performance					
Takeoff distance, ground roll	795 ft	800 ft	1,519 ft	870 ft	1,306 ft
Takeoff distance, over 50-ft obst	1,405 ft	1,395 ft	1,795 ft	1,470 ft	1,662 ft
Accelerate/stop distance	N/O	2,390 ft	2,400 ft	2,200 ft	3,250 ft
Rate of climb, sea level	1,700 fpm	1,800 fpm	1,495 fpm	1,924 fpm	1,700 fpm
Single-engine ROC, sea level	380 fpm	440 fpm	327 fpm	475 fpm	390 fpm
Power/altitude	75%/5,000 ft	75%/5,000 ft	75%/5,000 ft	65%/10,000 ft	65%/10,000 ft
Cruise speed	179 kt	188 kt	187 kt	182 kt	190 kt
Fuel consumption	168 pph	169 pph	169 pph	148 pph	172 pph (w/45-min rsv)
Range					
std fuel/opt fuel	640 nm/—	675 nm/950 nm	660 nm/1,345 nm	740 nm/965 nm	517 nm/1,205 nm
Power/altitude	65%/7,500 ft	65%/7,500 ft	65%/7,500 ft	65%/15,000 ft	65%/15,000 ft
Cruise speed	173 kt	182 kt	179 kt	190 kt	199 kt
Fuel consumption	154 pph	147 pph	146 pph	146 pph	171 pph (w/45-min rsv)
Range					
std fuel/opt fuel	675 nm/—	780 nm/980 nm	735 nm/1,410 nm	785 nm/1,010 nm	533 nm/1,250 nm
Power/altitude	60%/10,000 ft	60%/10,000 ft	60%/10,000 ft	65%/20,000 ft	65%/20,000 ft
Cruise speed	170 kt	180 kt	176 kt	199 kt	208 kt
Fuel consumption	144 pph	137 pph	135 pph	148 pph	171 pph (w/45-min rsv)
Range					
std fuel/opt fuel	715 nm/—	795 nm/1,025 nm	780 nm/1,585 nm	810 nm/1,055 nm	547 nm/1,290 nm
Max operating altitude	—	—	—	29,000 ft	27,400 ft
Critical altitude	—	—	—	16,000 ft	16,000 ft
Service ceiling	20,000 ft	21,300 ft	19,500 ft	—	—
Single-engine service ceiling	7,500 ft	7,700 ft	6,680 ft	18,800 ft	17,200 ft
Landing distance, ground roll	620 ft	620 ft	582 ft	640 ft	640 ft
Landing distance, over 50-ft obst	1,720 ft	1,720 ft	1,697 ft	1,770 ft	1,790 ft
Limiting and Recommended Airspeeds					
Vmc (Min control w/critical engine inoperative)	78 KIAS	71 KIAS	75 KIAS	77 KIAS	80 KIAS
Vx (Best angle of climb)	84 KIAS	84 KIAS	81 KIAS	91 KIAS	81 KIAS
Vy (Best rate of climb)	101 KIAS	104 KIAS	107 KIAS	111 KIAS	105 KIAS
Vyse (Best single-engine rate of climb)	N/O	97 KIAS	101 KIAS	104 KIAS	106 KIAS
Va (Design maneuvering)	138 KIAS	145 KIAS	148 KIAS	145 KIAS	148 KIAS
Vfe (Max flap extended)					
initial	N/O	139 KIAS	156 KIAS	139 KIAS	158 KIAS
approach	113 KIAS	122 KIAS	139 KIAS	122 KIAS	139 KIAS
Vle (Max gear extended)	113 KIAS	122 KIAS	139 KIAS	122 KIAS	138 KIAS
Vno (Max structural cruising)	174 KIAS	183 KIAS	182 KIAS	182 KIAS	181 KIAS
Vne (Never exceed)	214 KIAS	218 KIAS	223 KIAS	220 KIAS	223 KIAS
Vs1 (Stall clean)	67 KIAS	73 KIAS	75 KIAS	75 KIAS	79 KIAS
Vso (Stall in landing config)	58 KIAS	65 KIAS	63 KIAS	66 KIAS	72 KIAS

All specifications are based on manufacturer's calculations. All performance figures are based on standard day, standard atmosphere, at sea level and gross weight, unless otherwise noted. N/O, not obtained; —, not applicable.

power was increased with the incorporation of 285-hp TSIO-520-B engines. In 1969, the Skyknight was discontinued and a "Turbo System" model was added to the 310's type certificate. The 320 model later metamorphosed into the pressurized 340.

Meanwhile, Cessna continued to refine the normally aspirated 310. With the H model, introduced in 1963, the cabin was stretched 22 inches. The 310I has nacelle compartments that can hold up to 120 pounds of baggage each. Capacity of the rear fuselage baggage compartment was raised from 200 to 360 pounds. The I model also has a modified exhaust system. The exhausts were relocated beneath the wings for better engine cooling and to reduce noise. Further noise reductions were

effected with the 310J, which has three-inch propeller shaft extensions and floating engine mounts.

The nose of the 1966 Model 310K was extended six inches to make room for optional weather radar, and the post was removed from between two of the side windows. The maximum extension speed for full flaps was raised from 122 to 139 knots.

The L model has a one-piece windshield and larger retractable cabin entry steps. The airplane's landing gear motor and shock struts were improved, and maximum extension speed was raised from 122 to 139 knots. Capacity of the optional wing auxiliary tanks for the 310L was raised from 90 to 123 pounds, each.

Nacelle locker fuel tanks, holding 123 pounds each, were introduced with the N model in 1968. The next year, the nose gear, which formerly stretched forward of the 310's nose, was modified to extend straight down beneath the nose of the Model 310P.

The 310Q and Turbo 310Q models were produced from 1970 through 1974. In 1972, the aft roof line was raised 3.5 inches to provide more headroom for rear-seat passengers, and a rear window was added. The top of the windshield was extended nine inches aft, and the panel eyebrow was lowered to improve visibility.

The nose on each of the R models, introduced in 1975, was extended 32 inches to provide space for 350 pounds of baggage and avionics equipment. The engines of the 310R were changed to 285-hp Continental IO-520-Ms, and three-blade propellers were standard equipment.

Cessna built more than 5,200 normally aspirated and turbosupercharged 310s before production was discontinued last year. About 20 airworthiness directives (ADs) have been issued on the airplanes. The major ADs include: 69-14-01, which required installation of fuel transfer pumps in the main tanks; 70-03-04, 100-hour inspections for cracks in turbosupercharger turbine housings; 72-03-07, inspections of main landing gear struts for cracks and hydraulic leaks; 72-14-08, inspections every 60 hours for leaks in oil and fuel hoses; and 75-23-08, which requires 50- and 100-hour inspections of the exhaust systems on the 320 and T310. Other directives, 76-04-03 and 78-11-05, required modifications of Cessna ARC autopilot actuating systems.

In addition, recent service difficulty reports have cited problems caused by: broken alternator and generator belts and wires; corrosion of battery boxes; corrosion of wing skins, rivets and spar caps from exhaust gases; deteriorated fuel bladder tanks; leaking landing gear shock struts; broken and worn gear retraction system components; vacuum pump failures; cracked and corroded fuselage bulkheads and wing spars; and cracked engine crankshafts, crankcases and connecting rods.

For the prospective buyer, the 310's biggest problem may be its good looks. The airplane is so appealing it can entice a hasty purchase, and an unsuspecting buyer could end up with a poorly maintained lemon that would break both his heart and his budget.

If you have your heart set on a 310, take your time and shop around. There are quite a few of them for sale, and you can take your pick. Be sure to go over the engine and airframe maintenance logs with a fine-tooth comb. Seek out and talk with the people who previously flew and worked on the airplane. At just about any airport, you can find a sharp mechanic who knows where to look for trouble. Have him take a good look at the 310 you are considering.

Take pains with your homework and get a thorough check-out on the 310's systems and operating procedures, and you may find yourself the proud owner of an airplane that can go very fast and turn a lot of heads. □

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