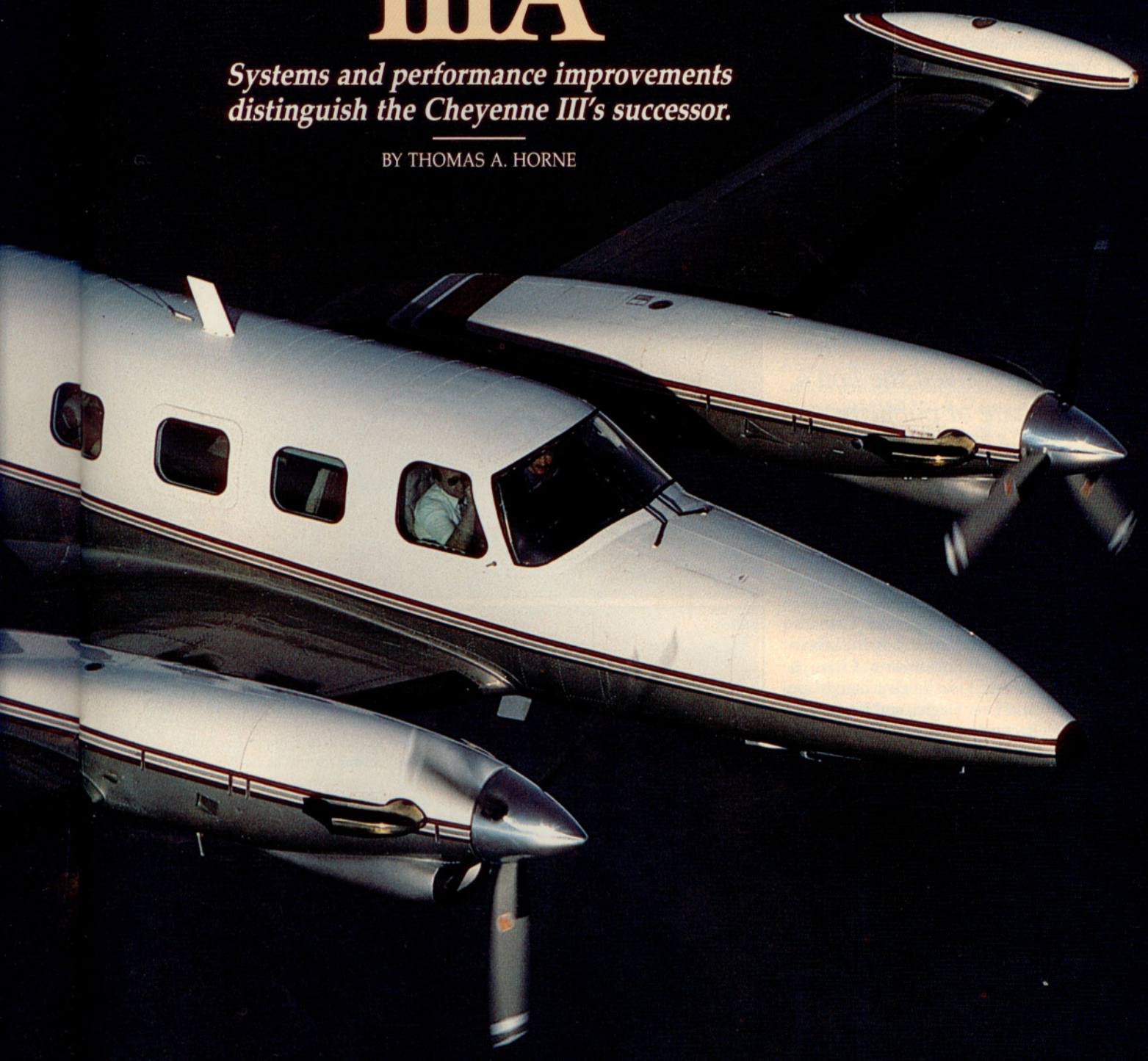
PIPER CHEYENNE IIIA

Systems and performance improvements distinguish the Cheyenne III's successor.

BY THOMAS A. HORNE



PHOTOGRAPHY BY ART DAVIS

• The past two decades have been times of change and adversity for all general aviation manufacturers, but Piper Aircraft Corporation must certainly have endured more than its share. In 1969, Bangor Punta Corporation wrested control of the company from the Piper family. In 1972, a flood destroyed the company's factory at Lock Haven, Pennsylvania. A growth phase took place in the 1970s, but in the 1980s, fortunes reversed. The market for general aviation airplanes plunged. Lear Siegler, Incorporated, bought Bangor Punta—and Piper—in early 1984 and promptly began to curtail production of single-engine airplanes. By the end of that year, the factory at Lock Haven—Piper's ancestral home—had been shut down and the manufacturing facilities relocated first to Lakeland, then finally to Vero Beach, Florida.

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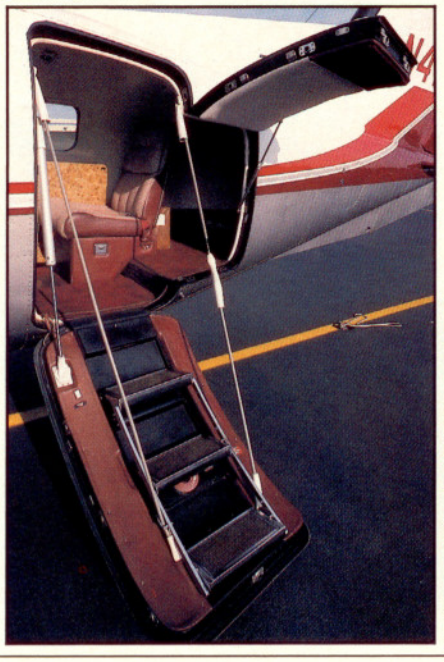
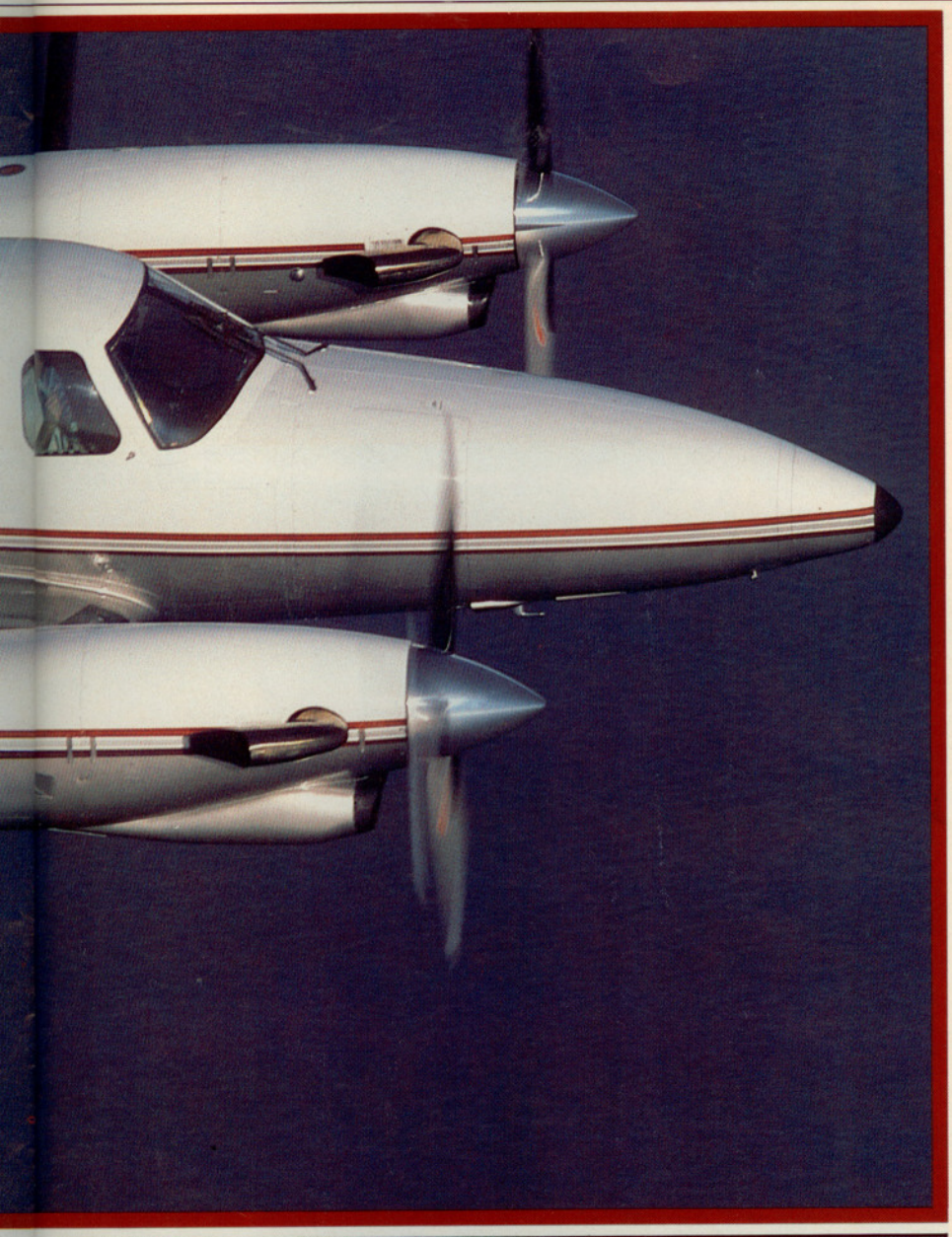
The Malibu and 400LS have received the lion's share of publicity. The IIIA's success has been a quieter one.

More changes. Piper's Aerostar line was discontinued in late 1984. By February 1986 most piston-engine airplane production had been suspended. In January of this year, L Acquisition Corporation, a corporation formed by the investment firm of Forstmann Little & Company and Lear Siegler, bought up the stock of Lear Siegler, and Forstmann Little effectively took over the faltering Piper, making numerous personnel changes and making little secret of its plans to do away with it altogether. At this time Piper manufactures only the PA-46 Malibu, the PA-42 Cheyenne IIIA and the PA-42 Cheyenne 400LS.

Of the Piper Malibu much has been said (see "The Malibu Makes It," February 1984 *Pilot*, p. 24, and "Piper Malibu," March 1985 *Pilot*, p. 104). It was a successful attempt to penetrate the pressurized-single market—a niche once held exclusively by Cessna's P210, as much a creation of the past as the Malibu is of the present.



The standard Cheyenne IIIA cabin has six cabin seats (right), but optional seating arrangements can accommodate up to nine. A ninth seat/flushing toilet is an $1,895 option. Aft baggage door (far left) gives access to an area capable of carrying up to 300 lb of cargo. Wing lockers are a standard feature. A holdover from the PA-31 Navajo design, each has a volume of 5.6 cubic feet and can carry up to 100 lb.



The 400LS (see "Piper 400LS," October 1986 *Pilot*, p. 38) is Piper's top-of-the-line model. Pitched as an executive rocket-sled and endorsed by one of the most overexposed salesmen of recent history—retired Brigadier General Charles E. Yeager—the 400LS, with some 35 total sales, continues to make a modest dent in the turboprop market. Some knowledgeable observers, however, feel that the 400LS's fire-breathing image may be discouraging some sales.

The Cheyenne IIIA is the unsung hero of the lot. For approximately $500,000 and 50 KTAS less, a prospective operator can have an airplane as comfortable, and nearly as capable, as a 400LS. And pilots—especially those stepping up to turboprops—may certainly find it less of a handful in high-work-load situations.

The IIIA is a beneficiary of several important design changes compared to earlier Cheyennes, the most important of which is the IIIA's more powerful Pratt & Whitney PT6A-61 engines. Though these engines produce the same 720-shaft-horsepower as the PT6A-41s found in the Cheyenne III, the Dash 61's critical altitude is 21,500 feet; the Dash 41 can hold its 720-shp rating to only 17,000 feet. This increased power also translates into a higher maximum operating altitude. The IIIA is certificated to 35,000 feet; the III to 33,000 feet.

Many changes made in 1983 with the "A" series modifications to the Cheyenne I are standard in the Cheyenne III and IIIA. For example, engine intake airscoops were moved closer to the propeller arcs, and separate air intakes were installed for the oil coolers (earlier models used engine intake air for oil cooling). Exhaust stubs were redesigned to discharge exhaust more in line with the flow of air past the engine nacelles; Piper engineers say that this change alone contributes an additional climb and cruise airspeed of six knots. Together, these changes boosted cruise speed (the IIIA at maximum cruise power and 30,000 feet turns in 295 KTAS, versus the III's 276) and allowed higher interturbine temperature (ITT) values in cruise (750 degrees Celsius for the IIIA versus the III's 685°C).

The airplane has a number of significant safety features. A "Q-sensor," fed by ram air from the pitot system, gives backup protection to all items normally deactivated by landing gear squat

switches. At airspeeds below approximately 104 KIAS (rotation speed is 105 KIAS), the Q-sensor will not only help prevent an inadvertent landing gear retraction, but will also deactivate the windshield heat, engine intake anti-ice and stall warning anti-ice systems. This can give peace of mind: Ground checks of pitot-stall warning system heat, for instance, are limited to a maximum of 10 seconds. Leave it on any longer and the heating elements may ruin the airplane's two lift transducers in the stall recognition systems—a no-go item if both systems are out and a $5,000 maintenance bill for each system. (If one malfunctions, there is a limitation to the center-of-gravity envelope.) For short-field or obstacle-clearance takeoffs where a swift gear retraction is desired, the Q-sensor can be manually disabled by pushing an override switch.

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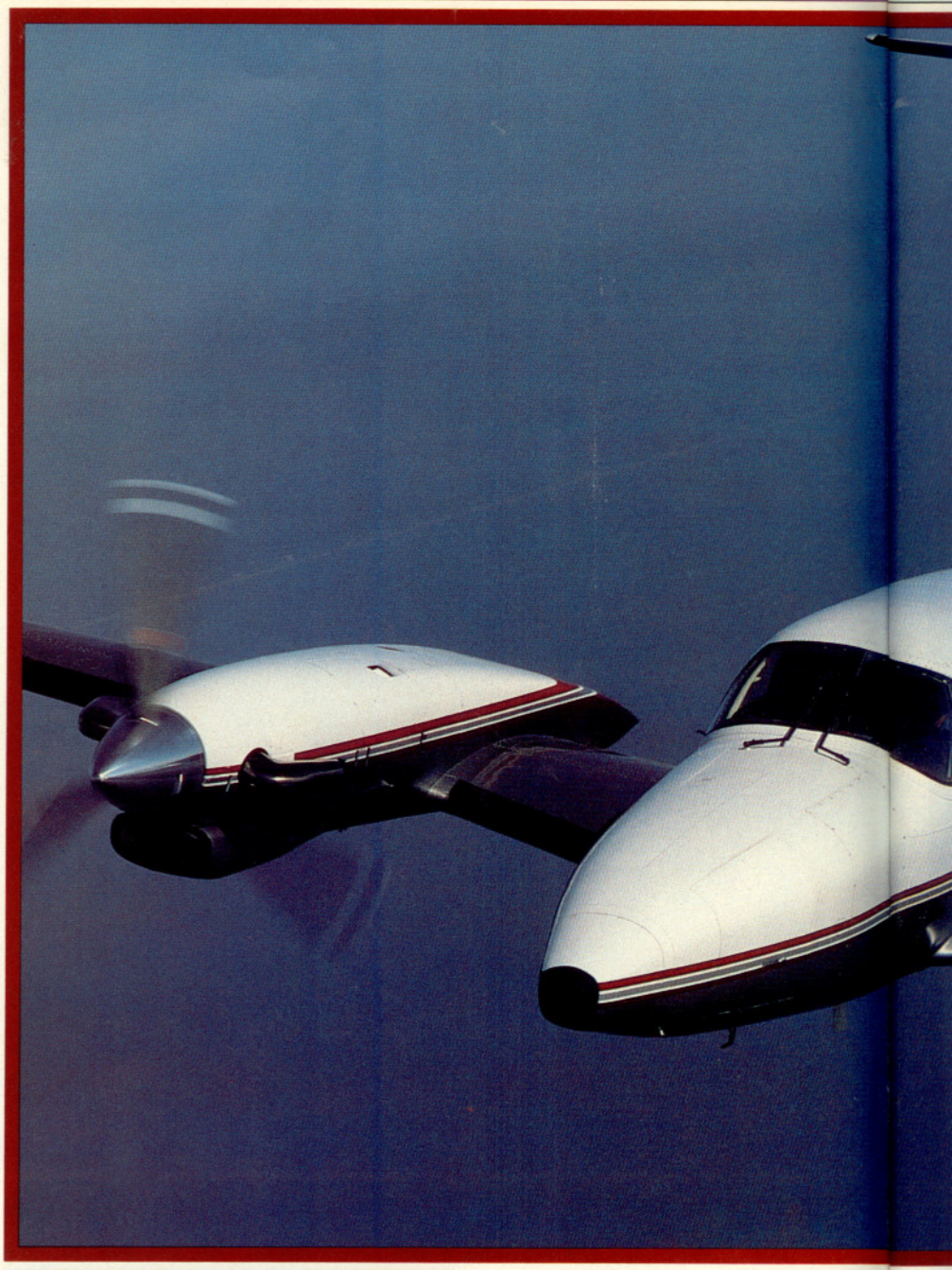
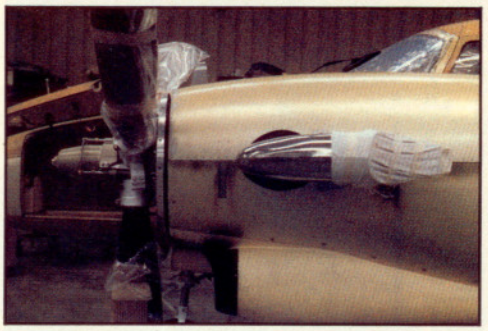
There are three propeller overspeed governors. As a last resort, fuel flow will be reduced automatically.

The electrical system is of the split-bus type and meets the strictest of foreign certification rules. Should both generators fail, a 28-volt nickel-cadmium battery will provide enough power to continue flight for approximately 45 minutes, assuming that nonessential electrical equipment is shut off.

Like earlier Cheyennes, the IIIA has not one, but three propeller overspeed governors. If the primary governor cannot limit propeller rpm to 2,000, a hydraulic topping governor driven by a reduction gear sets propeller rpm at 2,080. If *this* fails, there is a third method of control: A governor in the power turbine senses when propeller rpm exceeds 106 percent of the selected setting, then signals the fuel control unit to reduce fuel flow to a minimum value, thereby reducing turbine and propeller rpm. As in all turboprops, a reverse lockout, which prevents the propellers from moving toward reverse thrust in flight, is also standard.





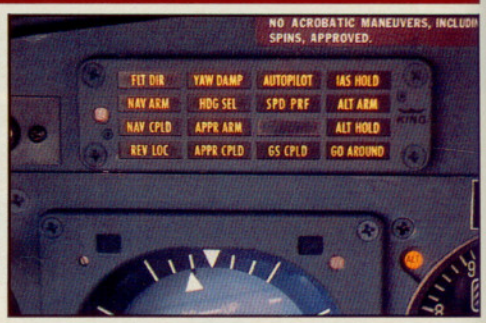
The streamlined, extended exhaust stubs (left) are the only easily recognizeable external design difference between the Cheyenne III and IIIA. Q-tip propellers (left, below) are standard; designers claim they reduce tip erosion, are more efficient and make less noise than conventional propellers. A late-April visit to the Vero Beach factory revealed two Cheyenne IIIAs on the assembly line (right). The customer, Lufthansa German Airlines, will use them as part of their pilot training program. A strong Deutschemark and a weak dollar make the IIIA a particularly attractive buy for the Germans. Alitalia, the Italian airline, has bought two Cheyenne IIIAs.

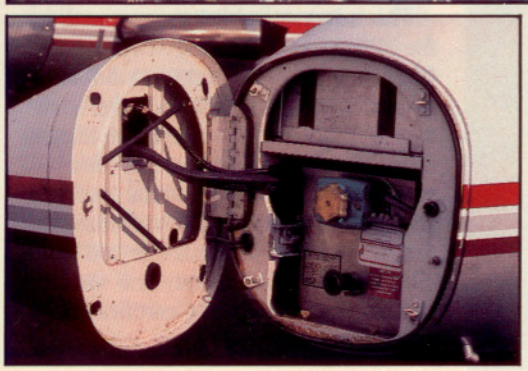
Another safety system of note is emergency pressurization. Should the normal system fail and the cabin pressure reach 12,000 to 12,500 feet, an emergency system can be activated. This can be done manually, but the system is also designed to activate automatically. Emergency pressurization is supplied by bleed air from the right engine only.

These and other features make the Cheyenne IIIA a relatively friendly airplane for those stepping up to turboprops. The procedures, while different from those used in turbocharged, pressurized singles and light twins, are no more difficult. Engine temperature, power and airspeed limitations, as with all airplanes, must be carefully observed, and the pilot must know the proper combination of power, attitude and configuration for each phase of flight. The Cheyenne IIIA must be flown by the numbers, particularly in the approach phase. For example, instrument landing system approaches should be flown with engines set at 550 pound-feet of torque (the measure of the work being performed by the propeller gearbox and a turboprop's primary indication for setting power), gear down, full flaps, propellers set at 1,700 rpm and a four-degree nose-down pitch attitude. This produces an airspeed of 120 KIAS. Experiment with other combinations of these variables and you may destabilize the approach, creating more work than necessary.

The Cheyenne series built its reputation as a price-competitive, easy-to-fly alternative to turboprops such as the Mitsubishi MU-2 and the smaller models of the Beechcraft King Air line. Operators familiar with the Piper Navajo—and there are many—tend to have brand loyalty and find it easy to move up to a Cheyenne. After all, Cheyennes carrying the PA-31T designation are an elaboration upon the Navajo's basic airframe design.

The adverse publicity generated by the litigation following two similar Cheyenne II takeoff accidents did much to tarnish the airplane's, and Piper's, image. The worst of the courtroom allegations, that the Cheyenne II demonstrates unstable longitudinal stability and overly sensitive pitch characteristics, was heavily publicized in 1983 and 1984 after inquiries into the circumstances surrounding the certification of these airplanes. To what extent did





A choice of a full King/Bendix or Collins avionics package is standard, including flight control system (above, right). Glareshield annunciators (above, left) tell of emergency and abnormal conditions. Access to radome and battery is easy, thanks to a double-hinged nose cone (left). Engine fire warning annunciators are standard (right), optional extinguishers cost $4,925.

Piper engineers know of stability problems? Did a stability augmentation system (SAS) fix the problem? Or is it a quick fix that can do more harm than good? Some of the answers may never be known because critical evidence mysteriously disappeared.

The Cheyenne III, IIIA and 400LS are an attempt to put the past behind. Built under a different type certificate than previous Cheyennes, these airplanes are more docile in pitch, have very mild stall characteristics, larger center-of-gravity envelopes and present less difficult loading problems. (To assist the pilot in figuring weight and balance problems, each new Cheyenne comes with one of Piper's greatest inventions: a plotter that shows movements of the center of gravity as each passenger, bag or pound of fuel is added to the airplane).

The IIIA's accident rate has been exemplary. The 1983, 1984 and 1985, Cheyenne IIIAs had a total of three airworthiness directives. Airworthiness Directive 83-8-1 required replacement or retorquing of propeller attach bolts on 1983 models; AD 86-5-2 required an inspection of United Instruments altimeters certificated to 35,000 feet; AD 86-17-7 required the replacement of certain hydraulic hoses.

No airworthiness directives have been issued against Cheyenne IIIAs manufactured in the 1986 and 1987 model years. A service bulletin was issued, warning of possible cracks in landing gear side braces and advising a thorough inspection of these parts.

Some 40 Cheyenne IIIAs have been sold. Lately, however, government agencies and foreign airlines have constituted the majority of the customers. The United States Customs Service has bought eight IIIAs for the purpose of identifying and intercepting aircraft suspected of importing illegal drugs. An unidentified number of other IIIAs see similar service.

Deutsche Lufthansa AG has purchased six IIIAs for the purpose of pilot training. Alitalia Airlines, the Italian flag carrier, has bought two for the same reason. These airlines, apart from their appreciation of the IIIA's suitability as a trainer for those transitioning to Transport category equipment, realize significant savings by buying American. Thanks to gross exchange-rate imbalances, foreigners can buy new airplanes at what often amounts to a fraction of

To be sure, the Cheyenne IIIA is a complicated airplane, but with the proper training it is easy to fly in a confident manner. FlightSafety International's Lakeland, Florida, training center specializes in Cheyenne pilot and mechanic initial and recurrent training. The cost of the courses is included in the purchase price of a new Cheyenne.

Using a week-long curriculum involving intensive ground school and simulator training, FlightSafety takes the pilot far beyond the information in the pilot's operating handbook and concentrates on proficiency in emergency procedures, many of which simply cannot be safely duplicated in the airplane. Those who fail to take advantage of this training are making a big mistake. Apart from a potentially dangerous unfamiliarity with the airplane, operators electing not to take this course run the risk of paying higher insurance premiums or being denied insurance altogether.

FlightSafety charges $5,250 for the pilot initial course and $3,150 for recurrent training sessions. Initial maintenance training is $2,825; recurrent courses are $1,400. Those prices are for a one-time curriculum. Under FlightSafety's full-service training program, pilots and mechanics may receive additional training throughout the year and save money in the long run. Either way, it is cheap insurance.

By the way, do not bring your golf clubs, tennis racquets or other recreational paraphernalia on your visit to FlightSafety. Instructors get down to business from day one, and the schedule is Spartan. After days of engine fires, partial-panel approaches to minimums (with a few other system malfunctions thrown in for good measure) and countless single-engine exercises, a student leaving his daily two-hour stint in the simulator will have little energy left for frivolities. Just remember: You are there for learning, not fun. And you *will* learn.

For further information, contact FlightSafety International, Marine Air Terminal, LaGuardia Airport, Flushing, New York 11371-1061; telephone 800/227-5656.

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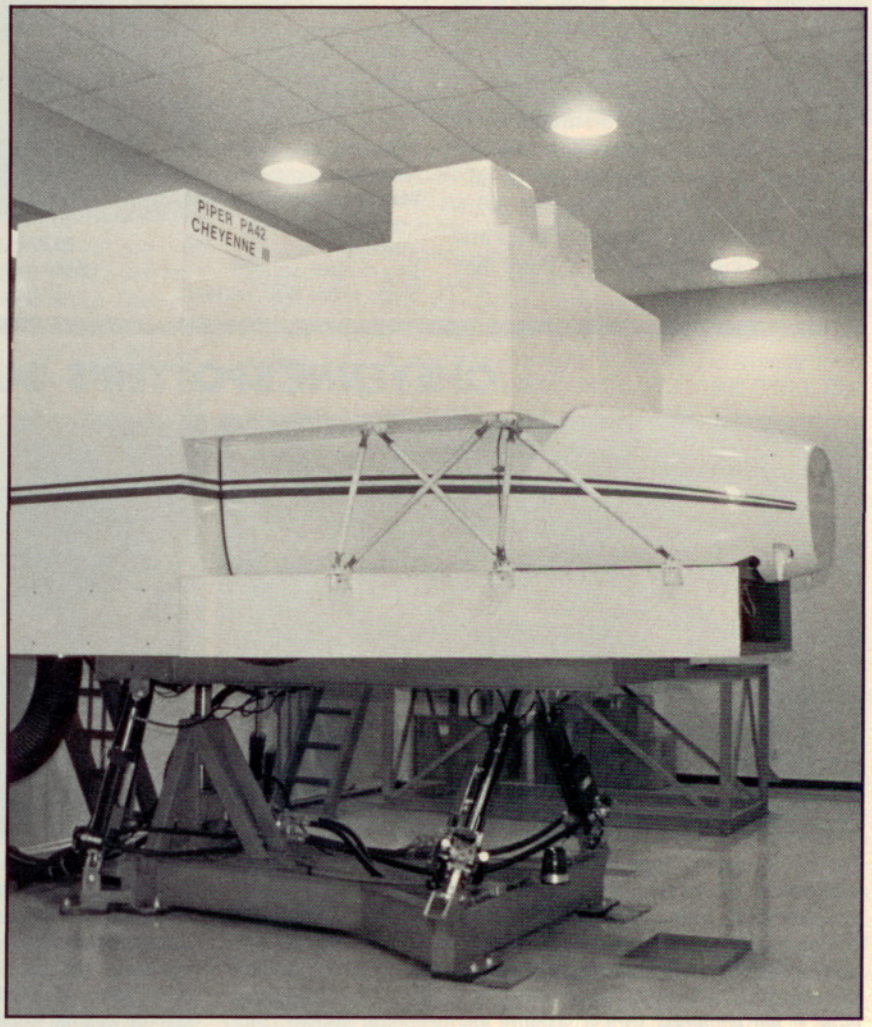


Beneath the calm exterior of FlightSafety's Cheyenne simulators (above) rages all manner of aeronautical mayhem. Some 144 emergencies can be very convincingly duplicated.

CHEYENNE IIIA

the list prices purchasers in the United States have to pay. A weak dollar automatically grants a discount to holders of stronger currencies.

At this writing, five Cheyenne IIIAs remain in inventory. Most of them, like N4117V, featured in these pages, are serving as demonstrators and are equipped with the standard avionics package, which includes a choice of either King/Bendix or Collins equipment and features radar, full copilot instrumentation, radar altimeter, RMI and flight control systems. Three-tube electronic flight instrumentation systems and much, much more are available as options. The King/Bendix EFIS sells for $121,460, while the Collins system goes for $106,800.

It is a paradox that Piper's current production airplanes have been developed and manufactured in such trying times. Now that their product line—what remains of it—has had its kinks worked out and been technologically refined, the company seems prepared to make its exit. Lear Siegler and Forstmann Little care more for the bottom line than for perpetuating the manufacture of airplanes, be they large or small. Beancounters have poor marketing skills and make lousy visionaries, but at Piper they are in sway. □

Piper PA-42-720 Cheyenne IIIA

Base price $1,898,500
AOPA Pilot Operations/Equipment Category:*
Global $2,081,715 to $2,158,535 (est.)

Specifications

Powerplants	2 Pratt & Whitney PT6A-61 720 shp each (flat rated)
Recommended TBO	3,000 hr
Propellers	2 Hartzell, three-blade, full-feathering, reversible pitch, 7 ft 11 in diameter
Length	43 ft 4¾ in
Height	14 ft 9 in
Wingspan	47 ft 8 in
Wing area	293 sq ft
Max wing loading	38.22 lb/sq ft
Max power loading	7.78 lb/shp
Seats	6-11
Cabin length	22 ft 11 in
Cabin height	4 ft 4 in
Cabin width	4 ft 3 in
Max ramp weight	11,285 lb
Max takeoff weight	11,200 lb
Max landing weight	10,330 lb
Max zero-fuel weight	9,350 lb
Basic empty weight	6,837 lb
Max useful load	4,363 lb
Max payload w/full fuel	610 lb
Fuel capacity, std	3,820 lb (3,753 lb usable) 570 gal (560 usable)
Oil capacity, each engine	6.5 gal
Baggage capacity, forward	300 lb, 16.2 cu ft
aft	300 lb, 31 cu ft
wing lockers	100 lb, 5.6 cu ft each

Performance

Takeoff distance, ground roll	1,465 ft
Takeoff distance, over 50-ft obstacle	2,280 ft
Accelerate/stop distance	3,363 ft
Max demonstrated crosswind component	
takeoff	22 KIAS
landing	25 KIAS
Rate of climb, sea level	2,380 fpm
Single-engine ROC, sea level	625 fpm
Cruise speed/endurance w/45-min reserve (total fuel consumption)	
@ max cruise, 25,000 ft	310 KTAS/4.9 hr (685 pph/102 gph)
@ long-range cruise, 35,000 ft	235 KTAS/9 hr (287 pph/43 gph)
Max operating altitude	35,840 ft
Single-engine service ceiling	23,200 ft
Landing distance, over 50-ft obstacle	3,043 ft
with propeller reversing	2,586 ft
Landing distance, ground roll	1,914 ft
with propeller reversing	1,457 ft

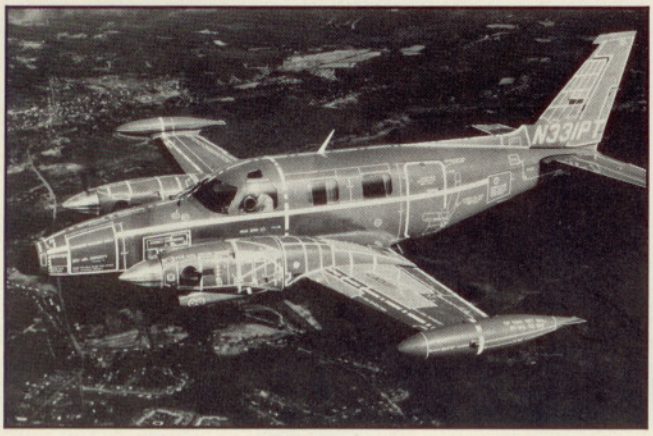
Limiting and Recommended Airspeeds

Vmc (min control w/one engine inop)	
0° flaps	96 KIAS
10° flaps, prop windmilling	100 KIAS
10° flaps, prop feathered	91 KIAS
Vx (best angle of climb)	92 KIAS
Vy (best rate of climb)	
0° flaps	128 KIAS
10° flaps	118 KIAS
Vyse (best single-engine rate of climb)	118 KIAS
Vsse (min safe single-engine speed)	118 KIAS
Va (design maneuvering)	
11,200 lb	173 KIAS
6,662 lb	140 KIAS
Vfe (max flap extended)	
full	150 KIAS
approach	194 KIAS
Vle (max gear extended)	172 KIAS
Vlo (max gear operating), extension	172 KIAS
Vmo (max operating)	
Vne (never exceed)	244 KIAS
Vr (rotation)	95 KIAS
Vs1 (stall, clean)	100 KIAS
Vs0 (stall in landing configuration)	89 KIAS

All specifications are based on the manufacturer's calculations. All performance figures are based on standard-day, standard-atmosphere, gross-weight, sea-level conditions unless otherwise noted.

**Operations/Equipment Categories are defined on page 98. The prices reflect the costs for equipment recommended to operate in the listed categories.*

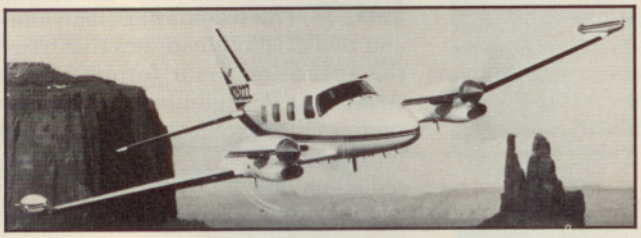
CHEYENNE SPOTTER'S GUIDE



The Cheyenne prototype first flew on August 20, 1969. Certification was granted on May 3, 1972. The original Cheyenne (PA-31T-620), produced from 1974 to 1977, did not carry a Roman numeral suffix designation. Powered by two Pratt and Whitney PT6A-28 turboprops rated at 620 shp each. Because of difficulties complying with certification standards for longitudinal stability, the Cheyenne and later Cheyenne II are equipped with a stability augmentation system (SAS) consisting of an elevator-downspring system (actuated by an angle-of-attack sensor) designed to provide the pilot with the appropriate stick force gradient—and to keep the airplane at its trim airspeed—when flying near aft center of gravity loadings, high power settings, low airspeeds and high angles of attack. Without the SAS, the aircraft demonstrated neutral static stability in this flight regime. Maximum operating altitude, 31,000 feet; 5.5-psi pressurization system. Max cruise speed at 20,000 feet, 265 KTAS. Empty weight, 5,025 lb; max takeoff weight, 9,000 lb. Tip tanks standard; fuel capacity, 390 (382 usable) gallons. Price new, approximately $536,700 (1974) to $665,000 (1977); current market value, $235,000 to $320,000.

In 1978 the Cheyenne I (PA-31T-1-500) was added to the product line, and the 620-shp Cheyenne was redesignated as the Cheyenne II (PA-31T-2- 620). Powered by two 500-shp Pratt and Whitney PT6A-11 engines, the Cheyenne I was marketed as a low-cost, step-up turboprop for Piper loyalists. Due to its reduced power, this airplane does not require a stability augmentation system. Maximum operating altitude, 29,000 feet. Max cruise at 20,000 feet, 244 KTAS. Empty weight, 4,904 lb; max takeoff weight, 8,700 lb. Standard fuel capacity, 308 (300 usable) gallons. Most airplanes were ordered with tip tanks—a $4,200 option that boosts fuel capacity by 82 gallons. The Cheyenne I was built through 1983. Price new, approximately $623,200 (1978) to $996,200 (1983); current market value, $310,000 to $525,000.

The Cheyenne IIXL (PA-31T-2-620XL) is a stretched (by two feet) version of the Cheyenne II. Certificated in February 1981 and built from 1981 to 1984, the IIXL is equipped with 750-shp Pratt and Whitney PT6A-135 engines flat-rated to 620 shp. It, too, has an SAS. Maximum operating altitude, 31,000 feet. Max cruise at 20,000 feet, 270 KTAS. Empty weight, 5,164 lb; max takeoff weight, 9,474 lb. Average price new, $1,224,000 (1981) to $1,562,500 (1984); current market value, approximately $605,000 to $1,050,000.



The Cheyenne IA (PA-31T-1A-500), certificated in May 1983 and produced in 1984 and 1985, brought several design improvements to the basic Cheyenne I. Redesigned cowlings allow more air to flow into the engine; situating the propeller closer to the engine airscoop allows greater recovery of high-velocity ram air. New, streamlined exhaust stubs yield more jet thrust than previous models and keep nacelle soot accumulations to a minimum. Together, these changes allow higher interturbine temperature (ITT) limits and 4.4-percent higher cruise speeds than the Cheyenne I. Other improvements to the standard airplane include an auto-ignition system, automatic starter disengage for simplified starting procedures and a larger windshield. Maximum operating altitude, 29,000 feet. Max cruise at 20,000 feet, 257 KTAS. Empty weight, 5,110 lb; max takeoff weight, 8,700 lb. Average new price was from $1,136,900 to $1,144,200. Current market value ranges from approximately $700,000 to $850,000.

The Cheyenne III (PA-42-720), with its larger dimensions, T-tail and more powerful 720-shp PT6A-41 engines, marked the most significant change to the series. In production from 1980 to 1983, the standard Cheyenne III has a full complement of deicing equipment, Q-tip propellers, more powerful 250-ampere/hour starter-generators (earlier Cheyennes have 200-ampere/hour starter-generators) and a 6.3-psi pressurization system backed up by an emergency system operated by the right engine's bleed air. Standard fuel capacity, 408 gallons; optional, 578 gallons. Maximum operating altitude, 33,000 feet. Max cruise at 20,000 feet, 290 KTAS. Empty weight, 6,389 lb; max takeoff weight, 11,000 lb (standard fuel), 11,200 lb (optional fuel). Average new price: from $1,296,400 (1980) to $1,655,900 (1983). Current market value: from approximately $600,000 to $850,000.

The Cheyenne IIIA (PA-42-720) superseded the Cheyenne III after 88 of the latter aircraft had been delivered. The IIIA is similar in appearance to the III but has more powerful PT6A-61 engines and 300 ampere/hour starter-generators. The IIIA also features an improved air conditioning system. The IIIAs ordered by Lufthansa feature flight decks configured to resemble that airline's Airbus A310 jet transports. Fuel capacity, 570 gallons. Maximum operating altitude, 35,000 feet. Max cruise at 25,000 feet, 310 KTAS. Empty weight, 6,837 lb; max takeoff weight, 11,200 lb. The average new price has ranged from $1,656,000 (1983) to $2,327,000 (1986). The current market value ranges from $860,000 to $2,200,000.

The Cheyenne 400LS (PA-42-1000), originally designated the Cheyenne IV, is the hot-rod of the line. In production since 1984, it is designed to compete with the performance of smaller fanjets. The 400LS (the LS stands for Lear Siegler, Piper's former parent company) has two 1,000-shp Garrett TPE331-14 engines and four-blade, 106-inch diameter, composite-construction Dowty Rotol propellers. Fuel capacity, 570 gallons. Pressurization system, 7.6 psi. Maximum operating altitude, 41,000 feet. Maximum cruise speed at 24,000 feet, 351 KTAS. Empty weight, 7,565 lb; max takeoff weight, 12,050 lb. Average new price: from $2,266,000 (1984) to $2,731,250 (1987). Current market value: from $1,800,000 to $2,822,000.