

# Progress Report: Swearingen's SJ30

Following dramatic developmental ups and downs, the Swearingen SJ30 is almost ready to take on the world.

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In its relatively short life, the Swearingen SJ30 business jet program has had dramatic ups and downs. It has been alternately hailed as a sparkling breath of fresh air in business aircraft design and summarily abandoned by one of its major backers. After dropping into quiet obscurity for the last six months, it is on the rise again and may be about to claim a share of the turbine-powered business aircraft market.

Although the idea for an efficient, low-cost (under \$2.5 million) business jet was formed almost a decade ago in the mind of aircraft designer and manufacturer Ed Swearingen, it wasn't until the mid-1980s that the availability of the lightweight, 1,900-pound-thrust Williams FJ44 turbofan engine made the project viable.

As the program took shape, it attracted the attention of Gulfstream Aerospace in Savannah, Georgia, and in the fall of 1988 a four-way partnership was formed to develop and market the four- to six-place aircraft. In addition to Gulfstream, the partners were Williams International of Walled Lake, Michigan; England's Rolls-Royce; and Swearingen Engineering and Technologies of San Antonio.

## **DISSOLUTION OF A PARTNERSHIP**

The name of the airplane became GulfJet, and the then-happy team was pictured at the NBAA convention of October 1988 holding a model of the airplane.

As the proposed design parameters of the aircraft developed, it was evident this would be no ordinary jet.

It would weigh a slight 10,000 pounds, have a cruise speed of over 400 knots and a range of 2,000 nm on its 500-gallon fuel capacity. The wing sweep would be nearly 30 degrees, and the stall speed 80 knots. It would be certified for single-pilot operation, and its price would be well under \$2.5 million. Its market was to comprise prospective owners and current operators of what Swearingen saw as less efficient and increasingly expensive turboprops, as well as smaller jets with inherent performance deficiencies.

For a while the GulfJet team was riding high. The promotion effort under Gulfstream's guidance was strong and convincing. A full-scale mockup of the fuselage made an appearance at the Paris Air Show in June 1989 and was thronged with interested parties. People from around the world wanted to place orders for the aircraft, but the GulfJet team had decided to defer accepting orders until later that year. About that time, the first murmurs of trouble surfaced.

While most of the details of the GulfJet partnership were not made public, it appeared the major financial burden—perhaps as much as \$75 million—for development and certification of the airplane was to fall on Gulfstream. But Gulfstream was part of Chrysler Corporation, and U.S. car sales were abysmal. Chrysler began to sell some of its far-flung business interests, and talk surfaced that the company was financially disenchanted with the Gulfstream acquisition. It began to look as though Chrysler wanted out. Indeed, a few

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## Pilot Report

days before the start of the NBAA convention in October 1989, Chrysler/Gulfstream took advantage of a condition in the partnership agreement and withdrew.

### PHASE TWO: ENTER JAFFE

Swearingen hastily found an interim backer; his good friend and associate Douglas Jaffe. Jaffe was the owner of San Antonio-based Comtran, the developer of hush kits for older commercial jets. He was also the backer of the SJ32T, a sport airplane that became a two-place turboprop trainer competing for the attention of the U.S. and other air forces around the world. The SJ32T had been designed and built by Swearingen, and that program had helped develop a mutual respect between the two men.

As displays were being erected at the 1989 NBAA convention, the name on the full-size mockup of what had been the GulfJet was changed to "SJ30," reflecting the name of the new partnership formed by Swearingen and Jaffe.

In spite of a brave showing at the convention, many NBAA attendees showed skepticism about the future of the program. This sense of doom was reinforced when Cessna announced that it also had entered the small, lightweight, Williams FJ44-powered business jet arena with the CitationJet.

The CitationJet, like the SJ30, was a four- to six-place business airplane with a price in the \$2.5-million range. Although the SJ30 and the CitationJet were to employ the same engine and have similar weight characteristics, the announced performance parameters of the CitationJet were considerably lower. Cessna, however, was taking orders. It signed up a half-dozen buyers in the course of the three-day NBAA show. On the other hand, Les Anderson, marketing director of Swearingen, was still declining to accept orders or down payments.

When the show closed and everybody went home, plenty of attendees doubted they would hear any more about the SJ30.

### SWEARINGEN TODAY

"A lot of people thought they had seen the last of us," conceded Ed Swearingen in his office on the second floor of a hangar on San Antonio's historic Stinson Municipal Airport. The airfield is ringed with busy, untidy hangars, most of them housing the multitude of small businesses that keep aviation flying. One of these hangars is home to the bustling headquarters of Swearingen Engineering and Technology.

"We've been working right along and have made good progress," Swearingen says. "We have been accepting orders with non-refundable deposits and will be announcing some important sales and service agree-

ments shortly. Development of the prototype is on schedule, and first flight will take place about midyear."

The main floor of the hangar is busy with perhaps 150 people working on various elements of the SJ30 prototype, painstakingly getting the airplane together. The 42-foot-long fuselage rests on a rack.

The radar nose is attached; the windshield and windows are installed; mounts for the engines are in place; and the 250-gallon, rear-fuselage tank is closed and sealed. The interior floor is down, and the cockpit has its pedals and control columns.

Beside the fuselage is the large jig where the horizontal stabilizer is almost ready for business. A few feet away is the huge angular frame for the wing, which is undergoing finishing touches and being readied for mating with the fuselage.

The timetable for critical waypoints in the development and certification of the airplane remain much the way they were laid out six months ago. After the wing and fuselage are mated, the engines and horizontal tail will be mounted. Landing gear will be installed and interior work will take over.

Necessary instrumentation should be finished by late May. First flight is targeted for "second-quarter 1990," or "mid-year." The chief test pilot on the program is scheduled to be Carl Pascarell, a professional pilot who also flies Boeing 727s for Continental Airlines. He is a close friend of Swearingen's and is much admired for his analytical ability. (He also was the test pilot on the Jaffe trainer program.) Certification and first deliveries are expected by late 1992.

"We plan to deliver six airplanes by the end of 1992 and another 20 in 1993," says Swearingen. "We are scheduled to produce 36 additional aircraft in 1994.

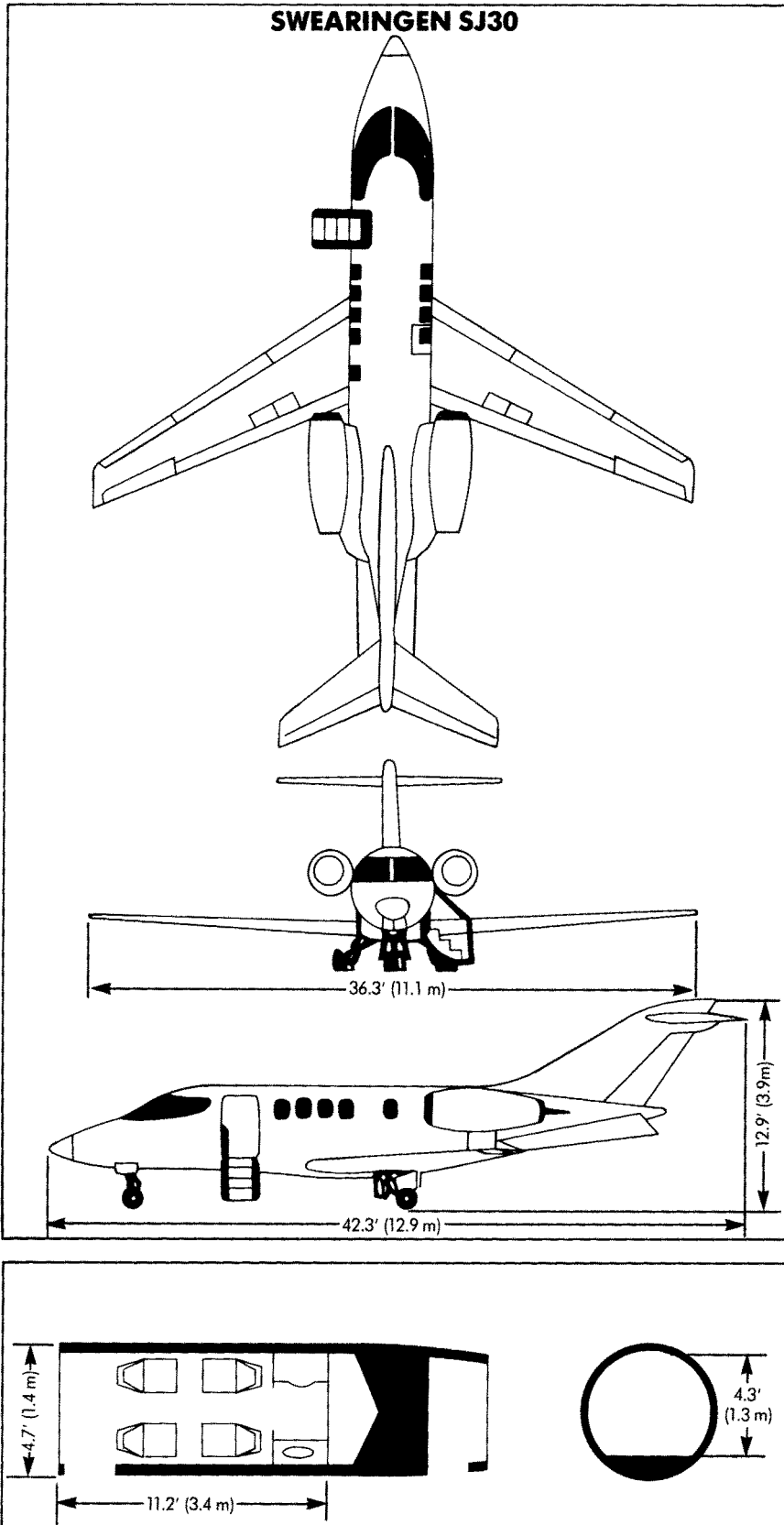
"We have been accepting firm orders with non-refundable deposits contingent only upon our not meeting the announced specifications," he continues. "The deposit at the time of signing the contract is \$50,000. There are two progress payments of \$100,000 each at specified points. The money is retained in an interest-bearing escrow account and will not be used until the customer's position in the production line comes up.

"At present we have firm orders for about 60 percent of our initial production effort, and I'm confident we will sell all of our production output for the next several years," says Swearingen. "The contract price of the airplane is \$2.35 million. This includes a standard avionics package and an interior suitable for the missions the airplane is expected to fly the most. We will be installing King Gold Crown equipment, autopilot, radios-the works. Of course, some customers will want other or additional equipment, and we're willing to install that.

"The announcement of a major sales and service

# Pilot Report

## SWEARINGEN SJ30



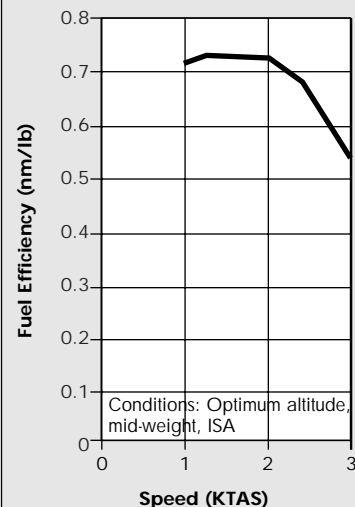
agreement with a large Japanese conglomerate, the Ishida Group, was made at Asian Aerospace in mid-February. The agreement calls for sales and service throughout the Pacific Rim countries, including Australia and New Zealand, and extending to India and Iran. We will be looking at similar arrangements in Europe and other parts of the world.

"The next step after [completion of] the prototype is development of the second airplane, which will be essentially a production design airplane. Whereas the first airplane is all hand-built, the next one will allow us to refine the production methods and procedures. This is critical to keeping our costs down," says Swearingen. "As I have said many times, we are dedicated to producing a highly efficient, high-quality airplane at a relatively modest cost. The cost of the airplane now, as in the early days of corporate jet airplanes, is driven by the cost of the engine."

### SJ30 DESIGN SPECIFICS

Swearingen's idea of an efficient airplane is rooted in his conviction that a minimum of design sophistication was employed in the early days of jet-powered business aircraft because

### SWEARINGEN SJ30 FUEL EFFICIENCY VS. SPEED



# Pilot Report

## PRELIMINARY SPECIFICATIONS: SWEARINGEN SJ30

### ENGINES

Model	2 Williams/RR FJ44
Power	1,800 lb ea.

### WEIGHTS (lb/kg)

Ramp	9,900/4,491
Empty	5,700/2,586
Zero fuel	7,600/3,447
Max takeoff	9,850/4,468
Max landing	9,500/4,309

### CABIN PRESSURE

10.0 psi

### PERFORMANCE

Max certificated altitude (ft/m)	41,000/12,497
Max cruise speed	445 kts
Long-range cruise speed	413 kts
Stall speed	81 kts
VREF	104 kts
MMO	470 kts
Rate of climb (fpm/mpm)	3,920/1,195
Balanced field length (ft/m)	3,330/1,015
NBAA VFR range	2,076 nm
NBAA IFR range	1,730 nm

jet fuel was cheap and the jet engines that were available, though relatively costly, could overcome almost any design shortcoming. The relatively high price of such aircraft, reasons Swearingen, set the stage for the then-less-expensive turboprop.

As fuel prices rose, and turboprops became increasingly expensive without achieving greater efficiency in design or performance, Swearingen determined he could introduce a new design concept into the field. Unlike the designs of most turboprops and other jets that were 20 years old, his aircraft would be innovative, yet would retain much of the reliability of proven materials and systems.

It would achieve its efficiency through the application of proven aerodynamic fundamentals used in many commercial aircraft. The result, he asserted, would be an extremely efficient aircraft in terms of speed, range, comfort, handling and maintainability. It also would be priced to attract new buyers, as well as to allow present owners to add to their fleet.

The relatively low cost of the SJ30, as well as that of the CitationJet, is due in large measure to the slim configuration, light weight and excellent efficiency of the Williams International FJ44 turbofan engine.

Williams for many years has been a manufacturer of miniature jet engines for military target drones and missiles. Many of the miniaturization techniques, and cost-

and weight-reducing manufacturing methods pioneered in these programs have been applied to the FJ44.

The result is a 1,900-pound-thrust engine with about one-fifth the number of parts (and available at a fraction of the cost) of comparable engines. Maintainability is enhanced and reliability is high. It also is reported to be "eerily quiet."

The power and size of the engine heeded Swearingen to flex his design muscles by introducing dramatic sweep and advanced aerodynamic devices to the SJ30 wing. The airfoil is almost 30 percent the size of the smallest Learjet wing and rakes back at 29 degrees. This provides increases in cruise speed. However, without compensatory wing devices it also could entail unsatisfactory stall and landing speeds. Swearingen plans to nullify these disadvantages by using full-span leading edge slats and single-slotted Fowler trailing edge flaps.

A combination of ailerons and spoilers provide lateral control and the spoilers can be extended as speed brakes and lift dump. Wing and horizontal tail leading edges are deiced.

SJ30 flight controls are essentially mechanical, employing cables and push-pull tubes. Electrically actuated pitch trim controls the horizontal tail, as well as the rudder and aileron trims. Spoilers are electro-hydraulically operated. The trailing-link landing gear is hydraulically operated, as is the nose gear steering. Flaps and slats are positioned by an electrically driven jack-screw system.

The all-metal wing is constructed of heavy 0.09-inch thick aluminum-alloy skin, as is the fuselage, chem-milled to afford strength at points of stress and to reduce weight where possible. A total of 250 gallons of fuel can be carried in the wing's integral tanks. The radar nose and wing leading edges behind the extendable slats, as well as a contoured area around the horizontal stabilizer, are constructed of fiberglass.

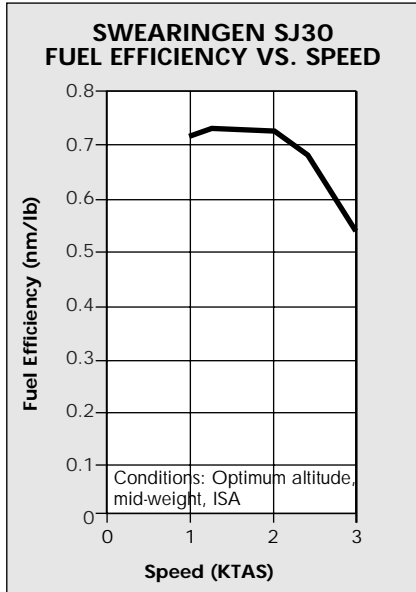
Standard cabin configuration will include four swiveling chairs, foldaway tables and other amenities, as well as a lavatory. A bulkhead separates the cockpit from the cabin, and a refreshment area is optional. The aircraft will be certificated to FAR Part 23 airworthiness requirements with appropriate FAR 25 amendments.

While the departure of Chrysler/Gulfstream from the program did not materially alter plans for design or production of the aircraft, the elimination of anticipated financial backing caused Swearingen some concern. The initial support by Jaffe was appreciated, but it was stopgap. Substantial additional funds had to be found soon.

According to Swearingen, that problem has been pretty much solved by a combination of investment banking sources and incentives offered by manufactur-

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# Pilot Report



ing in locations other than Texas, where Swearingen has lived and worked for decades. A decision will be made this month that may take Swearingen to a Northeast or Midwest location.

Although making such a move might be personally painful, Swearingen seems resigned to it. He was born, got his schooling and his first job in Texas.

His formal education stopped in his teens; his engineering knowledge is largely self-taught. He honed his craft and broadened his imagination with Dee Howard and Bill Lear. As a young man, he built a business out of refining the less-efficient designs of others, adding speed and range in the process.

Then he formed his own company to produce the Merlin and Metro aircraft. That company later was bought by Fairchild. It is clear that Swearingen feels he is doing now what he was meant to do. When the SJ30 flies, and if it does what it was designed to do, the event will be historic. **B/CA**