

Flight date 2046

A tale of business aviation in the mid-21st century.

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Contributing Writer

It's Dec 30, 2046 and I'm about to take my first business jet flight after 40 years. I've arrived at Newark West—a GA airport across from EWR (Newark NJ)—to catch a small jet to Santa Rosa Beach FL. As I walk up to the FBO, a retina scan confirms my identity. I pose no threat and the doors open automatically. I walk through the lobby and find my pilot, who is a mature female captain. I introduce myself: "I'm Mike Arnold. I

believe that I'm your passenger for Santa Rosa Beach."

"Hi, Mike. I'm Joyce Case. We'll be ready in about 10 minutes," she remarks, adding, "Have you flown in a light jet before?" I answer, "It's been 40 years. The last time was in 2006 when I was a 30-year old line pilot for a fractional company."

Joyce asks, "How would you like to ride right seat during the flight down?" I respond, "I'd love it!"

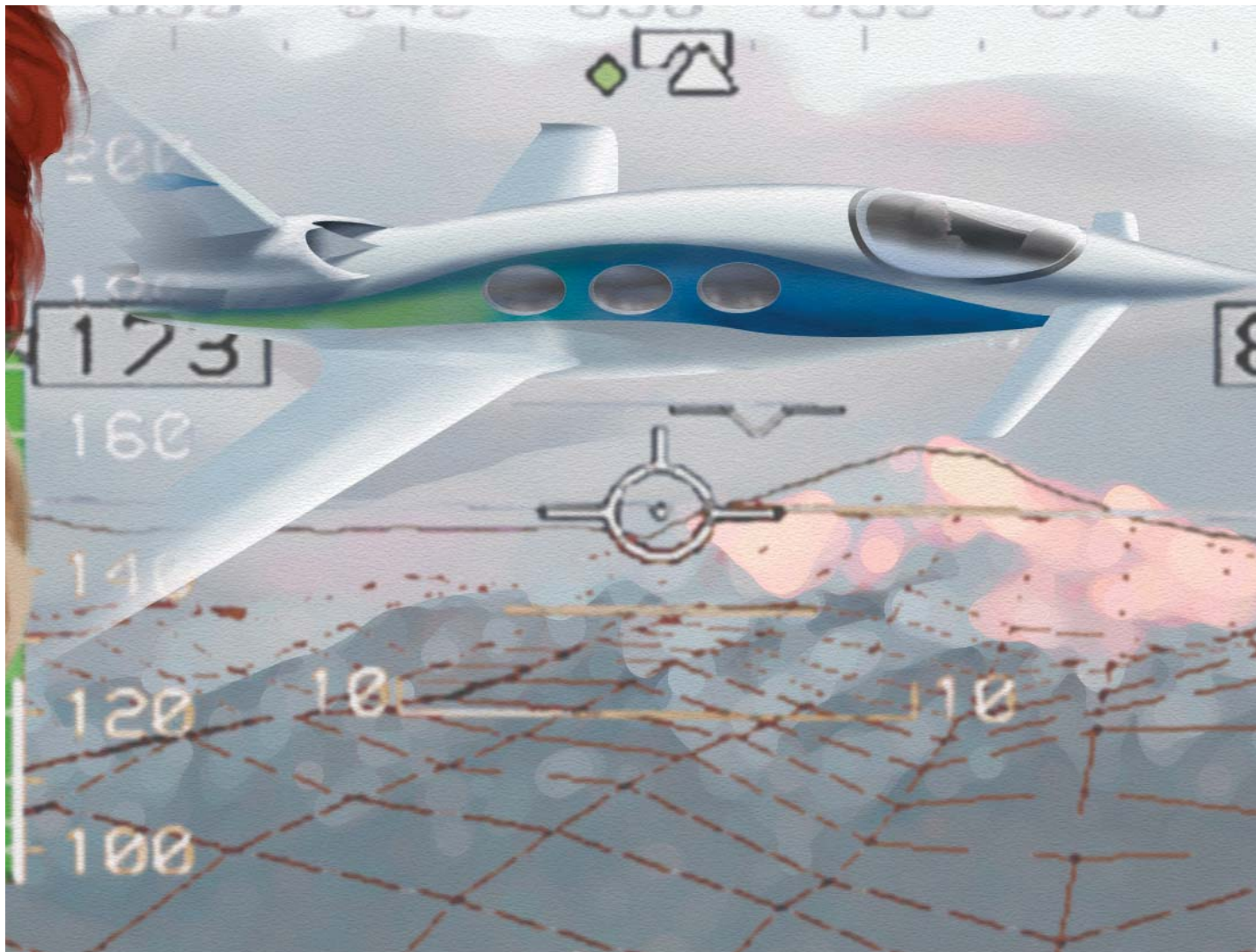
She glances at her wrist device—a personal information (PI) unit—and remarks, "My PI indicates that our 2 other passengers are 5 min-

utes out. I'll have the airplane brought around."

She taps a button and speaks quietly. Like most systems of the day, Joyce's datacomm is a blend of voice recognition and optical gear. She tells me, "Our other passengers subscribe to a ground travel forecasting system. It lets me know their arrival time to within 30 seconds. I just informed the counter staff that I wanted the Ramp Rat to bring up the aircraft."

"They call the tug driver a ramp rat?" I ask. Joyce chuckles, "No. The biggest source of damage back when you flew was hangar and ramp rash. Ramp Rats are the robotic tugs which are now used for all nonpowered ground movements. Ramp rash is a thing of the past."

We exit the FBO and enter a bustling but orderly ramp. Aircraft ranging from 4-pax personal jets to 18-pax corporate SSBs are in various stages of loading and unloading. Others are being towed by



Illustrations by Wayne Shipp

(L) Bizjet pilots in 2046 will use personal viewing devices—similar to sunglasses—which will display traffic, flight parameters and navigational information. The wearer will be able to see the airport and flight environment in 3D holographic form. (R) Personal jets, such as the PJ5E, will use sensory and voice-activated external doors and panels. Control surfaces composed of morphing technology will change shape to match performance requirements. Traditional flight controls such as rudders, ailerons and elevators will be obsolete. The powerplants of the future will be ceramic, 2-stage high-bypass fans powered by hydrogen peroxide.

Ramp Rats. We board a personal transporter (PT) and weave our way among the commotion.

I'm impressed with the route the PT selects. It avoids any taxiing aircraft and jet blast from running engines. Joyce points to a small jet just being pulled into a transit spot. "There she is—a PJ5E," says Joyce. "That's short for personal jet, 5-seats, 5th-generation."

The aircraft looks comparable to the Beech Duke I flew in my early days. It's sleek and low-slung, with lifting surfaces fore and aft reminiscent of the Piaggio Avanti. A turbine engine is embedded at the base of the vertical stabilizer. The composite fuselage is ultra-smooth and seamless. A large windscreen is integrated into the aircraft's tapered nose.

Our PT stops abeam the aircraft and Joyce exits. She walks up to the aircraft, reaches out with her hand, issues a command and a nearly-invisible baggage door opens. "All systems, including doors and hatches," she comments "are electronically activated by sensors and voice commands. Seals are smooth and security is perfect. We can't even start the aircraft if a panel is open."

I follow her through a quick walkaround. She narrates, "Both sets of wings are lifting surfaces with heated leading edges for icing protection. The leading and trailing edges are seamless. There are no slats, flaps or ailerons. The wings morph to create the optimum shape for lift and control. Instead of crude trailing-edge devices for

pitch, roll or yaw, the wing and rear stabilizer simply twist to create the control surface we want. And we have more control authority with less drag. It turns out that the Wright Brothers were correct."

She continues, "Notice the primary engine. It's a ceramic 2-stage high-bypass fan powered by hydrogen peroxide. Fuel is stored in cells behind the baggage compartment. Hydrogen peroxide burns clean. In fact, water vapor is the only by-product."

Joyce reaches up to the side of the tail cone and a set of ram air scoops open at the 10 and 2 o'clock positions. At the same time, the tail cone opens to create an 18-in exhaust pipe.

"These are intake and exhaust ducts for the second engine," she



Future FBO ground handling movements will be conducted through the use of low-slung, computer-controlled tugs such as the Ramp Rat. These automated tugs may help to eliminate aircraft damage caused by hangar rash and towing accidents.

adds. "It's one half the size and power of the primary engine. We use it for takeoff, climb, high-speed cruise, approach and landing."

We complete the walkaround and Joyce glances at her PI. "Our other passengers have just arrived. I'll clear with ATC and we'll be on our way." She taps the PI and says, "Newark West, Skycar 1547 ready to taxi in 7 minutes for Santa Rosa Beach, Florida."

I ask, "Who did you just talk with?" She answers, "ATC. Their computer system knows where we want to go. They already have our aircraft data. When I tell them our expected ready time, they just plug us into the flow and optimize our assigned altitude, route and weather conditions. You'll see as we taxi and climb out."

A PT carrying Jason and Jessica Andrews pulls up. They're heading for Santa Rosa Beach as well. I follow them into the cabin. The windows are huge and remind me of the Gulfstreams of yesteryear. I sit down in a forward, aft-facing seat. It's ultralight, airy and molds itself to my body. It also adjusts at the touch of an armpad button.

Joyce begins her trip briefing. "Welcome to Skycar. We'll depart from here, maneuver a little for our departure course and head south-southwest for Santa Rosa Beach. You can follow our trip on channel 2 of your personal viewing devices (PVDs). You wear them just like sunglasses. You'll be able to select 3D optics for entertainment or adjust your view for reading any

selection from the worldwide archives. A full briefing on the aircraft and its safety systems will appear after I start the engine. Fasten up and we'll be on our way."

Joyce touches a pad on the door frame. The cabin door closes and seals shut. She asks me to put on my PVD and configure my seat to face full forward. I press my seat controller and the seat moves slightly aft, rotates to the front then slides forward. Joyce slides into the centralized pilot control station to my left.

"You'll see the same PVD display I do, so you can follow along," she says and dons her PVD. She then taps a pad on her right armrest. A laptop-sized panel articulates out of the seat and positions itself in front of her. She remarks, "We were just beginning to use fly-by-wire systems when you quit flying. Now, all controls are fly-by-light. These systems weigh less, are more reliable and aren't nearly as subject to interference."

After a quick command, the screen powers up, displays the unit name "Flight Information Panel" and changes to show engine and system instrumentation.

Joyce issues another command and the primary engine begins to spool up. When it reaches idle, she grasps the sidestick controller on her right armrest and presses one of the fingertip pressure pads. A panel as wide as the cockpit and located just below the panoramic windshield comes to life. We see a split view of the ramp. The upper por-

tion replicates our view out of the windshield. The lower half provides a real-time planview of the ramp, taxiways and all aircraft. Any aircraft under power is highlighted in amber, while those in motion are visible in pulsing amber. She squeezes the sidestick controller's trigger and the lap display reverts to an aircraft schematic. A message flashes—"All systems normal. Ready to taxi."

Joyce presses another key and transmits, "Newark West Ground, Skycar 1547 ready to taxi." A controller answers, "Skycar 1547 proceed as directed." Joyce clears the area, grips the left sidestick controller and presses forward, remarking, "We can taxi automatically or manually. I like to do it myself."

I ask, "What happened to clearance delivery?" She tells me, "Traffic density got so heavy around the year 2020 that voice communications became a real bottleneck. We shifted to multichannel data transmissions. They're much faster, more reliable and the service is better. It's very rare to be delayed, even with 3 times as many jets in the air as 40 years ago."

About 500 yards from the end of the runway, Joyce orders the number 2 engine to start. When it's up to speed, a message flashes—"Systems normal. Configuration TBD." She commands, "Configuration set to normal takeoff."

I watch as the forward canards flex and warp slightly. A glance to the rear shows that the wing's leading edge has drooped. With another press of a toggle, the lap panel now shows a 3D departure course and communications. Joyce looks at me and says, "Here we go."

She uses her left sidestick controller to guide us onto the runway, then presses it forward. The aircraft automatically complies with the takeoff checklist, sets the radio frequencies and plots course information. We accelerate rapidly. The PVDs and panel displays come alive with familiar heading, attitude, altitude and airspeed cues. As we pass through 75 kts, Joyce adds back pressure and we lift off.

Visual cues call for an aggressive 15° climb and turn to the right. Passing through 100 ft, I hear the gear come up. Joyce's hands never leave the controls.

Old habits kick in. I look through the windscreen and am surprised to find the PVD drawing my attention to a highlighted airliner above and to our right. It's 3 miles distant. I look down at the cockpit display to find the aircraft haloed in amber with an extended track showing it will pass above and behind us. I also see several other aircraft within 5 miles. The PVD immediately highlights each one and gives their direction of flight. Joyce smiles with a nod, "A lot has changed in 40 years."

Our rate of climb is over 3000 ft/min. We pass through 4000 ft and I hear an aural tone. The flight information panel conveys that the aircraft has completed the climb checklist and has adjusted and updated course information. Looking forward once more, I see that the PVD now displays a trend course line centered within a shadowed tube. It is tracking our route.

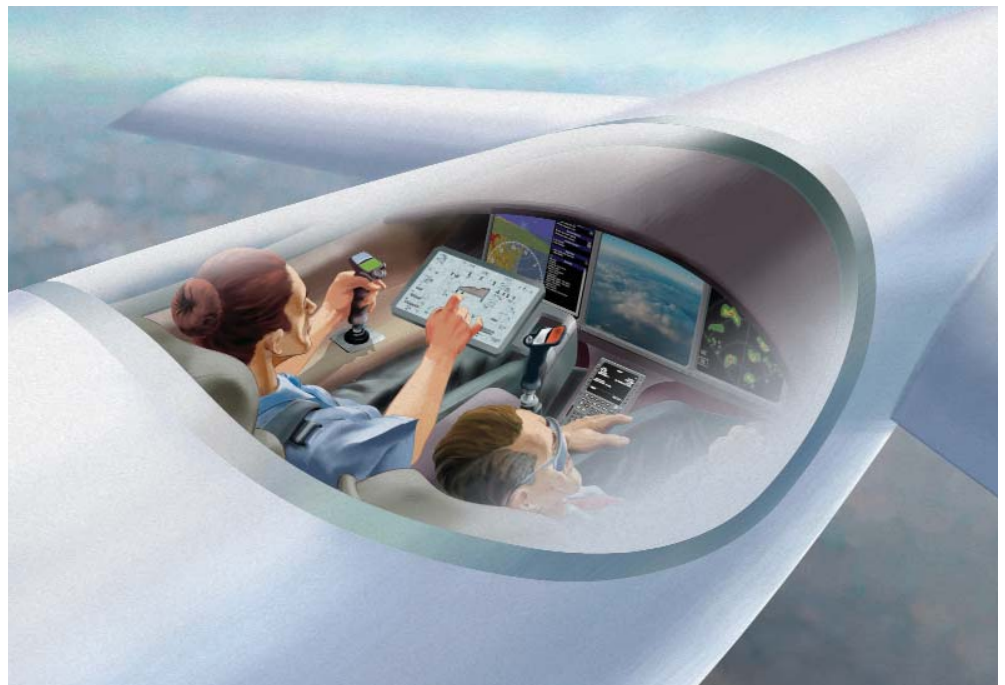
Passing through 18,000 ft, Joyce presses a pad on the sidestick controller. The aircraft automatically sets its cruise configuration. She looks over at me with a grin, "What do you think?"

"I'm a little overwhelmed," I respond, adding, "No voice communications?" She replies, "No. That went away with datalink. ATC loads our plan into the National Airspace computer and immediately puts us in the system. It analyzes our trip, traffic, weather and winds, and computes a solution while we taxi out. New super-accurate GPS II allows us to project a 3D position with real-time accuracy. Our onboard flight data system keeps track of the same information." She adds, "ATC is now so capable that we pretty well get the destinations and times we request."

There is a pause and she asks, "When you flew, we had just instituted DRVSM, right?" I answer, "Yes. We went to 1000 ft vertical separation."

"Well," she replies, "With GPS II we can now operate with 500 ft separation. Horizontal protected airspace is now down to just 1 mile."

I wonder about approach and runway capacity. She replies, "FAA came up with standardized GPS II approaches that became a template for almost all airports. Advances in



Cockpits of 2046 may feature fly-by-light flight controls, voice-activated commands and automated functions such as checklists and ATC communications. Avionics will be simple touch screens stowable in the pilot's seat armrest. Primary flight displays will be a single panel capable of displaying real-time, 3D views of the airport environment, flight arena, navigation and weather. Throttle functions, flight controls and computer commands are managed through the use of voice commands, pushbuttons and 2 sidestick controllers.

avionics made Cat II approaches easy. You saw a hint of what these avionics can do when you spotted those aircraft."

We level off in cruise and Joyce touches a pad on the left controller. Our projected course over Atlanta appears on a display along with a weather system overlaid on our route of flight. Joyce zooms in on that segment. The primary display splits to show a map view of our route through Georgia as well as a vertical view with color-coded regions. She notes, "This is the current status of turbulence on our route. We can avoid it with a few minor changes." She uses sight-guided cursors to move our flight-path eastward to make a run around the weather. The aircraft automatically makes a slight correction onto the new heading.

"ATC accepted your change that quickly?" I ask. She quips, "Sure. Routing is easier today because of precise data."

We finally begin our descent to Santa Rosa Beach. Altitude and track guidance are seamless. Sequencing into the airport shows 4 aircraft ahead of us on a single approach with 1-mile spacing.

About where the outer marker would have been, each aircraft adjusts its approach to alternate landing on the parallel runways. It's easy to see that the solution for crowded skies is scale and control. Slow approach speeds, like our 75 kts, and precision spacing make the entire process a nonevent.

As we climb into the PT at the FBO, I realize that I miss 2 very pervasive characteristics associated with aviation of 40 years ago. First, there's no distinctive whine of a turbine engine. Instead, it's a hush similar to a suburban roadway. Second, I miss the smell of kerosene. Still, this is a much more civilized brand of aviation than what I left behind in my youth. And maybe that's a good thing. ✈️



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