# Inflight Report

# Gulfstream G550

America's highest flying, longest range, most capable, pure business jet.

# By Fred George

oday, there are two performance contests going on in the heavy iron business aircraft market. Gulfstream's G550 is competing for first place. Everyone else is competing for second place.

If that conclusion seems brash, consider this: B/CA's May 2003 Purchase Planning Handbook shows that the G550, with topped tanks, can fly a longer distance with more passengers than any other current production business jet. It's the one and only business jet than can fly eight passengers from New York to Tokyo against 99 percent probability headwinds. That's a 6,624-nm

equivalent still-air distance, assuming 51-knot winds on the nose and a 0.80 Mach long-range cruise speed.

Moreover, the G550 has the highest thrust-to-weight ratio, the fastest climb times and the most payload of any pure business jet. Plainly put, it flies the highest and the farthest with the best fuel economy of any ultra-long-range business aircraft.

The G550's drag reduction improvements are even more effective at higher cruise speeds. Gulfstream claims it will be able to b cruise 6,000 miles with eight passengers at 0.85 Mach, a 300-mile improvement compared to its predecessor, the GV. Virtually no other business aircraft can beat that combination of range and § speed. On 5,000 mile and shorter trips, the G550 will be able to cruise at 0.87 Mach, thereby reducing travel time on westbound transatlantic trips between common European and North



The G550's engine thrust has been dialed up to 15,385 lbf, yielding shorter takeoff field lengths.

American city pairs to about seven to eight hours. Leave Paris after a late lunch meeting with clients. Arrive home in New York in time to discuss schoolwork with the kids over dinner.

Gulfstream achieved such performance gains not by adding fuel, but mostly by decreasing drag with dozens of tiny aerodynamic modifications to the wings, fuselage, empennage and engine nacelles. Rolls-Royce Deutschland also has improved the fuel efficiency of later production BR700-710 engines, also contributing to increased range performance.

The G550 has uprated engines that produce more takeoff thrust. This enables the G550, with a 500-pound heavier MTOW than the GV, to sport a 200-foot shorter standard-day takeoff field length. As airport density altitude increases, the G550's TOFL improvement, vis-à-vis the GV, becomes substantially larger.

Such performance, though, comes at the expense of net usable cabin volume. Even though it has 200 to 220 cubic feet more usable cabin volume than the GV, as a result of more compact avionics and better use of interior space, and the cabin door has been moved forward 2 feet and a seventh oval window has been added to the fuselage, the G550 still has the smallest passenger compartment of any ultra-long-range jet.

Up front, on the flight deck, the G550 shows off its best features. Gulfstream's new PlaneView cockpit, a private label and highly customized version of Honeywell's Primus Epic avionics suite, has the potential to become a tangible example of the Cockpit of the Future (see "Primus Epic PlaneView Avionics" sidebar). Standard equipment also includes a second-generation BAE Systems head-up guidance system and a Kollsman/OpGal infrared sensor Enhanced Vision System.

Finally, the G550 empty actually weighs 100 pounds less than a comparably equipped GV, even though it has two more cabin windows and two more passenger seats. One major reason is the aircraft's PlaneView avionics system weighs 150 pounds less compared to the GV's SPZ-8500 avionics suite because of lighter weight components and reduced wire count. Improved cabin completion materials also reduce weight.

That's the top level picture. Read on for the details.

#### Slipperier Structure, Fine-Tuning Systems

It's easy to differentiate a G550 from a GV from a distance because of its seventh cabin window and cabin door that's repositioned 2 feet forward. But you have to walk close to the aircraft to notice all the small drag-reducing modifications. If you push the speed up to nearly 500 KTAS, for example, you'll see about 8 to 9 percent lower fuel flows.

Many of these changes were initiated by Preston "Pres" Henne, senior vice president programs, engineering and test at Gulfstream. When Henne moved from



Numerous drag-reducing improvements, such as VGs that wrap around the winglet junctions, improve range performance, especially above 0.80 Mach.

Boeing Long Beach to Gulfstream Savannah, he brought along lessons learned from the MD-11 and Boeing 717 programs. For example, the G550's thrust recovery outflow valve, pioneered on the B717, exhausts cabin pressurization air in a nearly aft direction. Following the example of the 717, the G550's wing flap trailing edges now are quite blunt, thereby promoting clean

# **Gulfstream G550 Specifications**

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B/CA	Equipped	<b>Price</b>						\$45,750,000
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#### **Characteristics**

Seating	6/19
Wing Loading	80.1
Power Loading	2.96
Noise (EPNdB) 79.4/90.2/	90.8

### Dimensions (ft/m)

External See three-view
Internal
Length 50.1/15.3
Height 6.2/1.9
Width (Maximum) 7.3/2.2
Width (Floor)

## Power

Engines	. 2 RR BR700-710-C4-11
Output/Flat Ratin	g OAT°C 15,385 lb
	ea/ISA+15°C
тво	

#### Weights (lb/kg)

Max Ramp 91,400/41,458
Max Takeoff
Max Landing 75,300/34,156
Zero Fuel

BOW	21,909
Max Payload 6,200	
Useful Load 43,100/1	9,550
Executive Payload 1,60	
Max Fuel	8,595
Payload With Max Fuel 2,10	
Fuel With Max Payload 36,900/1	
Fuel With	
Executive Payload 40,994/1	8,595
mits	
Ммо	0.885
FL/Vмо FL 27	0/340
PSI	. 10.2
limb	
Time to FL 370 1	8 min.
FAR Part 25 OEI Rate (fpm)	. 594
FAR Part 25 OEI Gradient (ft/nm) .	. 242
eilings (ft/m)	
Certificated 51,000/1	5,545
All-Engine Service 42,700/	13,015
Engine-Out Service 25,820/	7,870

Sea Level Cabin ..... 29,200/8,900

Certification ..... FAR Part 25, 2002

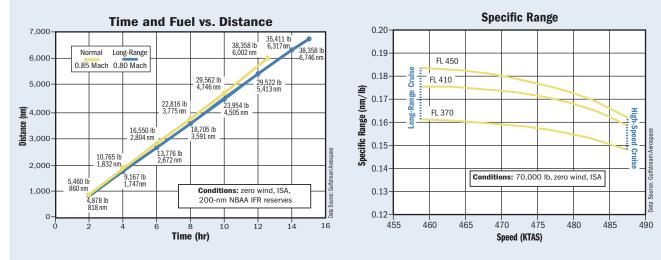
# **Gulfstream 550**

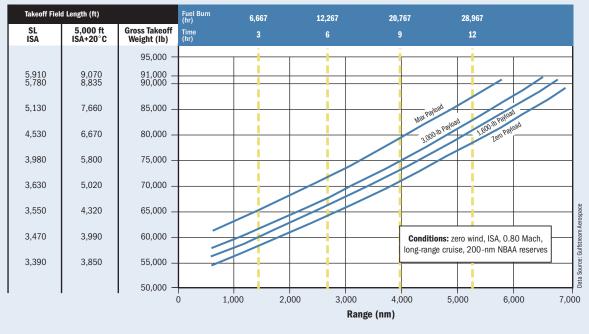
These three graphs are designed to provide a broad sketch of the Gulfstream 550's performance, based upon preliminary estimates from Gulfstream's engineering team. Do not use these data for flight planning. Such data will be available for operators from Gulfstream when the aircraft enters service late this year.

**Time and Fuel vs. Distance** – This graph shows the performance of the G550 at 0.80 Mach recommended long-range cruise and 0.85 Mach normal cruise. The average best range cruise may be slightly slower. The numbers at the hour lines indicate the miles flown and the fuel burned for each of the two cruise profiles.

**Specific Range** – This graph shows the relationship between cruise speed and fuel consumption at representative cruise altitudes for a mid-weight G550. Compared with the GV, the G550 squeezes about 4 percent more efficiency out of a pound of fuel at long-range cruise and achieves about 8 percent better fuel efficiency at high-speed cruise.

**Range/Payload Profile** – The purpose of this graph is to provide simulations of various trips under a variety of payload and two airport density altitude conditions, with the goal of flying the longest distance at 0.80 Mach. Assume a 48,300-pound spec BOW. Each of the four payload/range lines is plotted from multiple data points supplied by Gulfstream Aerospace, ending at the maximum range for each payload condition. The time and fuel burn dashed lines are based upon the 0.80 Mach cruise profile shown in the Time and Fuel vs. Distance chart. The runway distances assume a slats extended, flaps 20-degrees configuration.





## **Range/Payload Profile**

airflow separation aft of the wing.

Rudder, elevator and thrust reverser seals installed on the G550 also help to reduce drag. Repositioned, redesigned and more numerous vortex generators help prevent Mach-induced airflow separation on the fuselage just aft of the cockpit, the winglet-to-wing junction and various airfoils. The pylon fairing aerodynamics were refined and the leading edge vents were reshaped. Low-drag fairings were fitted to various antennas and the skeg. Some antennas were realigned with local flow patterns. The APU and air cycle machine exhaust outlets were reshaped to cut drag in cruise.

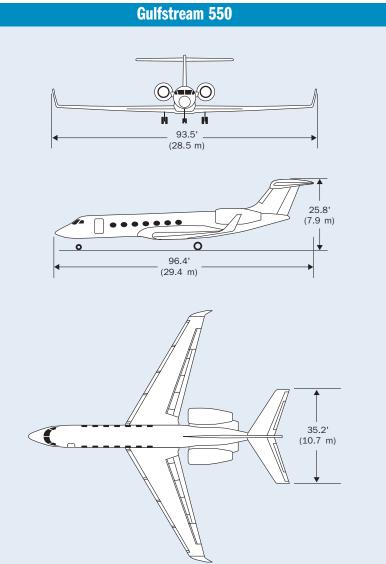
The G550's systems also have evolved. The problematic Vickers hydraulic pumps are gone, replaced by more-reliable Abex units. Incandescent bulbs inside the GV's annunciator light switches made them hot to the touch. And they were short-lived. LEDs replace the grain-o'-wheat bulbs in G550 annunciators. They're cool to the touch and they last an order of magnitude longer.

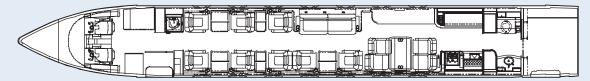
The GV's electrical system has been retained. Essentially, it's a DC system supplied by five transformer rectifiers powered by four AC generators — one on each engine, a third on the APU and a fourth, hydraulically powered standby unit linked to the left hydraulic system. AC power, though, is used for electrical anti-ice heaters and the battery chargers.

All the fuel is stored in left and right wing tanks, replenished either by a single point pressure refueling receptacle or over-wing fuel ports. Gulfstream quotes the fuel capacity as 41,300 pounds, based upon 6.75 pounds/gallon. Using the B/CA 6.7 pound/gallon standard, the fuel capacity is 40,994 pounds, as reflected in the accompanying specifications box. DC electric main and alternate fuel pumps in each tank supply the engines and provide motive flow to jet pumps that scavenge fuel from low points in the wings. Cross flow and inter-tank transfer functions are available to correct fuel imbalance. A heated fuel return system automatically recirculates warm fuel from the engines to the fuel tanks to prevent gelling during prolonged high-altitude cruise.

Left and right engine-driven hydraulics power the primary flight controls, spoilers, speed brakes and stall recovery stick pusher. The more critical left side also can be powered by an auxiliary electric pump or a right-to-left power transfer unit. It powers the landing gear, brakes, flaps and nosewheel steering. The left side aux pump also provides rudder boost in the event that both engine-driven pumps are inoperative, ensuring full authority rudder control.

The primary flight controls are hydraulically boosted. The horizontal stabilizer, powered by an electrically driven jackscrew, moves with flap position to compensate for pitch changes with configuration changes. Flap and stab movement is harmonized by a computer rather than being programmed by simple mechanical linkage. A Mach trim system compensates for relaxed aerodynamic





More compact Primus Epic PlaneView avionics and better packaging allowed the cabin door to be moved two feet forward. The change increases cabin volume by 200 to 220 cubic feet, depending upon galley configuration, and makes possible four seating areas.

pitch stability at high speed. A yaw damper improves directional stability and yaw-roll coupling characteristics.

The G550 retains the GV's all-fresh air pressurization system, with dual air cycle machines providing the refrigeration. The G550 has been fitted with a new engine bleeds-off pressurization system that enables the APU to supply bleed air to the cabin until the aircraft reaches 1,500 feet radio altitude. The function helps allow the engines to produce more thrust up to a



# **Primus Epic PlaneView Avionics**

The G550 sports an avionics suite that's as revolutionary as was the SPZ-8000 when it debuted on the GIV in the mid-1980s. Four active matrix LCD screens, in portrait configuration, dominate almost all the instrument panel area, offering almost one-third more display area than the GV's six CRTs. The outboard screens are PFDs, capable of displaying a full-width attitude indicator that's larger than anything yet installed on a production aircraft.

The inboard screens are dedicated to a new integrated navigation (I-NAV) system that combines background terrain, TAWS, TCAS, weather radar and flight plan route data. I-NAV also enables the crew to select special use airspace boundaries, airports, navaids and intersections on the screen. The inboard screens also combine traditional Gulfstream EICAS functionality with improved, interactive systems synoptic diagrams.

PlaneView uses hub-and-spoke architecture, similar to, but more advanced than, the GV's Primus 2000 equipment. Three Modular Avionics Units provide digital air data processing, FMS, fault warning, EGPWS, wind-shear detection and high-level display processing functions, thereby reducing the number of stand-alone remote boxes. This reduces wire count, weight and power consumption, while promising to increase MTBF by at least one-third.

In the triple-wide center console are three MCDUs linked to triple FMSes, all of which are interconnected. FMS performance management software has been updated to include wet runway computations for takeoff and landing, plus slope and ground spoiler malfunctions. All FMS performance computations now comply with the latest FAR Part 25 Amendment 92 requirements.

The center MCDU is usually configured as a radio tuning unit because there are no dedicated radio tuning heads aboard the aircraft. Other features include triple Honeywell Laseref V IRSes that are smaller and lighter than previous designs. Laseref V boxes also are self-aligning. They don't have to be shimmed and they can realign after power loss in flight. Compact Modular Radio Cabinets house Primus Epic radios that replace Primus II radios installed on the GV. The MRCs are housed in the left and right electrical equipment racks aft of the cockpit.

The standby instruments in the panel also have been improved. The Meggitt standby attitude indicator has been replaced with an L3 (formerly Goodrich) integrated standby instrument system that should deliver much improved reliability.

PlaneView, though, has yet to live up to its full potential. Several promised features are yet to be incorporated. At present, there is no high- and low-speed envelope protection linked to the auto-throttles, no electronic chart function, no head-down display of EVS and video imagery on the LCD screens, no vertical profile display on the I-NAV screen and no link between the VGS runway elevation and glidepath inputs and the FMS. Some of these functions should be certified by first customer deliveries. Others will be accomplished by December 2004.

point, thereby improving runway and oneengine-inoperative climb performance. The G550's BR700-710-C4-11 turbofans are now rated at 15,385 lbf to ISA+15°C compared with 14,750 lbf to ISA+20°C for the GV's -A1-10 engines.

Engine bleed air also is used for wing and engine anti-ice. The windshields and various probes are electrically heated for anti-ice protection. The APU, an operating engine or a ground service cart can supply pneumatic air for engine start. Below 30,000 feet, the APU also may be used for an assisted engine airstart. It's worth noting the APU can be started in flight up to 39,000 feet and is certified for operations up to 45,000 feet.

The Rolls-Royce Deutschland engines (formerly BMW-Rolls-Royce) account for about 10,000 pounds of the G550's empty weight. They feature a 48-inch-wide chord fan, a four-to-one bypass ratio, 10 axial flow compressor stages powered by two high-pressure turbines, followed by two low-pressure turbine stages that power the fan. Rolls-Royce briefly experimented with a 20 lobe mixer nozzle for the -C4-11 engine to improve fuel efficiency, but found that the original 10 lobe forced mixer for the -A1-10 yielded better overall performance.

#### Flying With PlaneView and VGS

The G550's flying qualities are very similar to those of the GV, so please refer to our April 1999 Analysis (page 54) for specifics. In essence, the GV and G550 have the nicest handling qualities of any Gulfstream since the GII made its debut in the late 1960s, in B/CA's opinion.

The G550's cockpit, though, is unlike anything ever fitted to a production Gulfstream aircraft. In late April, we strapped into the left seat of T1, Gulfstream's GV engineering "mule" that's been retrofitted with all the aero mods and avionics upgrades that production G550 aircraft will feature. Accompanied by engineering test pilot Jake Howard, we departed Savannah for a two-plus-hour nighttime demonstration flight to Asheville, N.C., and return.

Pulling out of the chocks at dusk, it immediately became apparent that the IR EVS system provides a much improved view of the ramp and taxiways in low light conditions, even with all landing and taxi lights switched on. Ground fog would have shown the system's true capabilities. EVS provides a considerably better view of obstructions and hazards than natural vision in low-visibility conditions.

The G550's visual guidance system uses a new remote box that reduces the size of the HUD overhead unit. This substantially improves headroom in the left seat. In addition, the combining glass has a larger viewing area than the original HUD 2020 system.

We noted that at idle thrust, the aircraft will accelerate beyond a comfortable taxi speed, requiring one thrust reverser to be deployed to prevent riding the brakes. However, our short taxi from Gulfstream's ramp to Runway 18 didn't require use of the buckets other than for testing in accordance with the taxi checklist.

Use of the VGS (visual guidance system) can be almost mesmerizing at times. The technology makes it so easy to look through the display and out the windshield that the pilot must consciously look down to maintain scan discipline. There's a whole lot more to monitor about the airplane, the engines, the PlaneView avionics and the systems than what's presented on the VGS combiner.

Moreover, atmospheric and background thermal conditions can cause the IR sensor to display infrared imagery clutter. On the night we flew, for example, an inversion layer, that retained the heat of the day, and thin, but comparatively warm cirrus clouds caused a degree of infrared clutter. This can be minimized with proper adjustments to gain and contrast controls.

In our opinion, effective use of IR EVS is going to require plenty of classroom training and considerable practice in flight, not unlike getting the most out of a modern weather radar in varying atmospheric conditions.

Flying with the VGS also requires some

# EVS Certification and FAA Infighting

The G550's infrared Enhanced Vision System is the first such technology to be installed on a production aircraft, culminating a 10-year, \$20 million R & D effort to certify the system for low-visibility approaches. The system uses a cryogenically cooled, highly sensitive IR camera that's tuned to detect both incandescent approach, runway and taxiway lights, and background thermal images. The camera is about 100 times more sensitive than uncooled designs and it also rejects almost all IR "noise" outside those two narrow temperature detection bands.

Even so, Gulfstream's engineering team knew that EVS would be difficult to certify because the FAA had no regulatory precedent to pave the way. As a result, the firm teamed up with FAA officials in the mid-1990s to iron out all anticipated certification problems, years before EVS ever flew on a Gulfstream test aircraft.

The government/industry partnership appeared to work well. The FAA's Long Beach and Atlanta offices, plus the former head of AFS-400 Flight Standards, reached agreement with Gulfstream on many thorny issues. B/CA contacted several FAA officials who flew with EVS and all endorsed its benefits and capabilities. The consensus was that if you could see an EVS image on the HUD of the runway environment at ILS minimums and if you could see the runway Kollsman/OpGal IR camera looks through a sapphire window lights with unaided vision, then you could



in a bubble on the bottom of the radome.

continue the approach to 100 feet agl. At that point, you would either continue the approach with unaided vision or go around. This would provide Gulfstream operators with a unique operational capability. They could land at ILS Type 1 RVR 2400 (200/0.5) weather minimums airports in CAT II RVR 1200 (100/0.25) weather conditions, provided that EVS could "see" the items required by FAR Part 91.175.

The FAA's Seattle-based Air Transport Directorate, however, remained steadfastly opposed to approving EVS for use in lieu of natural vision. But none of the ATD's officials had ever flown with Gulfstream's Kollsman/OpGal EVS. They were basing their opinions on experience with primitive IR EVS technology introduced decades before. And several were more familiar with Boeing's approach, which was years behind Gulfstream's IR EVS technology development. As a result, the rest of the FAA's team members overruled the ATD's objections.

But then, in June 2000, officials at the ATD tried another tactic. Since

they couldn't derail EVS certification, they initiated an NPRM that would impose Special Conditions on operational use of EVS. This indeed would set precedent, because FAR Part 25 Special Conditions never were intended to set operational criteria for use. AFS-400 Flight Standards is tasked with operational approvals.

By then, however, AFS-400 leadership also had changed. The ATD now had a close ally in office at Flight Standards. AFS-400, at the request of the ATD, asked the FAA's Associate General Counsel (AGC-200) to issue

> a legal opinion to clarify that EVS would not be used to determine visibility in lieu of natural vision. Part 91.175 currently requires unaided natural vision to determine visibility, the letter ruling stated unambiguously. The ruling could have reduced Gulfstream's \$1 million HUD/EVS to the status of "nice to have" equipment with no potential for operational credit in low-visibility conditions.

> The adverse ruling from AGC-200 was issued in January 2001, a copy of which was forwarded to the ATD and then leaked to at least one U.S. airliner manufacturer. Notably, Gulfstream wasn't provided a copy of this legal opinion by the FAA. Gulfstream officials fumed in private that ATD officials leaked the document to the airliner makers, but never informed them even though the letter directly affected the previously

agreed upon operational approval for EVS.

Patience prevailed. Gulfstream officials asked Nick Sabatini, the FAA's associate administrator for regulation and certification, plus several members of his Washington, D.C.-based team, to fly the system and then provide them with feedback. Their timing was ideal. Leadership at AFS-400 changed again, this time with an official who had no ax to grind.

Sabatini and his team were impressed. As a result of their flying experiences, they initiated an NPRM that will change Part 91.175 to include EVS as a means of complying with the need to "see" the runway environment at minimums in order to proceed with the approach, assuming the imagery is displayed on a HUD. So, Gulfstream appears to be back on track to gain operational credit for the use of EVS in low-visibility conditions. And Seattle-based ATD appears to be on notice that there's a new sheriff in Washington who's prepared to make buck-stops-here decisions regarding certification of new technologies.



Trailing-edge contours on the wing flaps promote clean air separation from wing, thus reducing drag.

technique adjustments. The flight director generates guidance commands based upon required flight path vector (FPV), not aircraft attitude. The pilot then moves aircraft attitude and throttles as necessary to make the FPV symbol coincide with the flight director command symbol. Once you've become accustomed to this design characteristic, it's possible to fly the aircraft with much greater precision than with an attitude-based system, in our opinion. Superimpose the FPV on the runway touchdown zone during landing approach, for example, and you're going

# FSI's Complete Training Package

When the G550 enters service late this year, FlightSafety International will have a complete pilot training program in place, including new classrooms with flat-panel displays that emulate the PlaneView avionics system, new flight training devices and a Level D G550 simulator.

FSI's training now includes mechanic and flight attendant instruction for Gulfstream operators as well. Mechanics receive classroom, mockup, systems and hands-on aircraft training.

Flight attendants, required by the G550 AFM as crewmembers when 10 or more passengers are on board, will receive service, safety, food prep, emergency medical and evacuation training. The training course includes a cabin mockup that fills with smoke, another one that dunks into a deepwater swimming pool and a third that features an onboard galley to enable the cabin crew to work within the confines of an actual aircraft. to land right on that spot.

Our first approach into Asheville, however, wasn't pretty. It reflected poor cockpit resource management on our part and lack of proficiency with PlaneView avionics programming, especially the manual switch between FMS and ILS guidance modes. The second and subsequent approaches, though, were much improved, enabling us to see an accurate picture of system capabilities.

One of the most impressive aspects of the system is the pilot interface. It's readily apparent that Gulfstream transferred most of the development work away from lab engineers and to flight test pilots at an early stage in the VGS development program. There's a two-way rocker switch on the yoke, for example, that enables the pilot to toggle on/off the EVS sensor once the runway environment is in sight. In an instant, this declutters the VGS combiner, enabling the pilot to continue the approach from 100 feet agl to touchdown with unaided vision. Using the toggle in the other direction selects complete or condensed HUD symbology, again decluttering the display when needed.

The side-mounted cursor control device is another example of engineering test pilot feedback. Gulfstream pilots rejected Honeywell's off-the-shelf CCDs in favor of a custom designed, ergonomically shaped armrest with integral handgrip, thumb cursor and switch assembly mounted on the left and right cockpit side walls. We found these devices highly intuitive and easy to use in flight. Best of all, the aircraft can be dispatched without them because all essential functions can be performed using traditional, conventional control devices. The G550 has an either/and blend of cutting edge and conventional avionics control devices.

Once Howard determined we were comfortable flying the system, he obscured the forward side of the combiner so that we couldn't see out the windshield. We then flew a VGS/EVS approach to touchdown, using the flare commands on the display for the roundout for a smooth touchdown. Then Howard reconfigured the aircraft for takeoff and we followed through with a touch and go — all done with the runway environment imagery on the HUD, but without natural, unaided vision. While this would not be done in everyday operations, it was a valuable confidence builder, showing the advanced capabilities of the VĞS/EVS.

Conclusions? The VGS and PlaneView avionics suite represent a considerable leap forward in situational awareness, one that should increase CFIT avoidance margins while providing operators with additional operational capabilities. But many of its advanced features won't be available until long after initial customer deliveries, as discussed in the accompanying "Primus Epic PlaneView Avionics" sidebar.

#### Improved Cabin Comfort

The GV boasted a 50.1-foot-long cabin, but only 40.6 feet were available in the passenger cabin because of bulky left and right electrical equipment racks mounted aft of the cockpit. Once you install a galley and lav, about 25 feet is available for passenger occupancy.

The G550's PlaneView avionics racks, in contrast, are so much more compact than the GV's SPZ-8500 boxes, that Gulfstream was able to move the cabin door forward by 2 feet and realize a 42.6-foot-long cabin. In addition, more space-efficient cabin layouts have been incorporated. As a result, forward galley configurations pick up



The cabin door has been moved 2 feet forward because of more compact avionics boxes.



The G550 has the most spacious cabin ever offered in a Gulfstream, plus 25 percent more baggage compartment capacity.

almost 6 feet more cabin length and 220 cubic feet more volume.

Moving the cabin door enabled Gulfstream to fit the aircraft with seven signature-shape cabin windows on each side of the fuselage. Layouts now have a window in the right side forward galley and another in the left side forward lavatory. There are three seating areas in the main cabin and a fourth, private suite in the aft cabin with its own lavatory.

Aft galley configured cabins now are 5 feet longer and have 200 cubic feet more cabin volume. The main cabin is configured with three and one-half seating areas, with plenty of light supplied by the 14 windows. The aft galley makes do with

artificial illumination. These changes make the available cabin in either forward and aft galley configuration more competitive with that of archrival Bombardier Global Express.

Baggage compartment volume also has been improved, although it's not nearly as large as the 226 cubic feet claimed by Gulfstream. The G550's baggage compartment, though, is about one-fourth larger in volume than the GV's trunk because of more space-efficient fresh water tanks and relocation of the vacuum lav waste tank to the rear equipment compartment in the unpressurized section of the aft fuselage.

Slow, overweight and checkered-quality



The G550 is easily distinguished by seven large, oval, signature-design windows on each side of the fuselage.

completions were Gulfstream's nemesis in the mid-1990s. That all changed with the acquisition of the K-C Aviation Centers and a top-level commitment by Gulfstream to improve interior completion quality. Operators now say that Gulfstream completions are tops for quality, on-time deliveries and weight control.

As a result, Gulfstream's 48,300-pound spec weight BOW is realistic and repeatable. However, that weight doesn't include popular options such as satcom, office equipment and external camera systems. It's not unreasonable to assume that such options will reduce the tanks-full payload to eight passengers in most production aircraft.

#### The Most Capable Gulfstream Yet Produced

The G550's nearly \$46 million price tag, not including satcom and other popular cabin options, marks it as the most expensive pure business jet ever produced. In return, the aircraft delivers more capabilities than any other business aircraft. No other business aircraft currently offers more range and better fuel efficiency. Certainly, no aircraft can match its operational capabilities during low-visibility instrument approaches.

The G550 retains plenty of ties with the GV, so pilots will be able to share a common type rating for both aircraft, in spite of the new avionics capabilities. And it should be less expensive to operate than the GV because of improved fuel economy and less avionics maintenance. Systems upgrades and new standby instruments also should shave a few dollars off operating costs.

The two extra windows, considerably longer cabin and fourth seating area will make the G550's cabin more comfortable for passengers. The GV's cabin, in contrast, was almost the same size as that of the G400 (aka GIV-SP). Passengers will also appreciate the increase in baggage compartment volume.

The G550 very much is a product of Gulfstream's facing stiff competition in the heavy-iron sector from Bombardier, Boeing and Airbus in the late 1990s. The Savannah-based firm owned this market for three decades and there were few serious challengers until recent years. Now that the G550 is poised for initial deliveries this fall, it appears that, once again, Gulfstream faces no contenders, at least when pure performance and cockpit sophistication are the measuring sticks.

For now, the G550 is the ultimate Gulfstream, top dog among U.S.-made business jets. **B/CA**