August 29, 2010 - Gulfstream Aerospace Corp. announced that its ultra-long-range, ultra-large-cabin Gulfstream G650 recently reached Mach 0.995 as part of its 1,800-hour flight-test program. Accomplishment establishes G650 as world’s fastest civil aircraft.

The aircraft achieved this speed during flutter testing, which evaluates the aircraft’s damping responses following an input from an external test device. Flutter testing is performed at a variety of frequencies, speeds, altitudes, weights and centers of gravity.

For the initial series of flutter tests, the aircraft achieved clearance out to both its design dive speed (Vd) and design Mach dive speed (Md) at altitudes ranging from 10,000 feet to up to the aircraft’s maximum certified altitude of 51,000 feet.

In order to achieve the maximum speed of Mach 0.995, Gulfstream experimental test pilots Tom Horne and Gary Freeman along with flight test engineer Bill Osborne took Serial Number (S/N) 6001 into a dive, pitching the aircraft’s nose 16 to 18 degrees below the horizon.

During the dive, flutter exciters introduced a range of vibration frequencies to the wing, tail and flight control surfaces to ensure the aircraft naturally dampened out the oscillations without further action from the pilots. Even under such extreme circumstances, the G650 performed flawlessly.

"The airplane is very predictable," said Horne, senior experimental test pilot, Gulfstream. "It’s very easy to control and to get precise control at those speeds. The airplane response has matched the expectations of our engineers, and we’ve been able to easily fly the test conditions and march through the test plan."

Members of the G650 flight-test crew celebrate achieving Mach 0.995. From left: Senior experimental test pilots Gary Freeman and Tom Horne and flight-test engineer Bill Osborne.

During the flutter test missions, a team of multi-disciplinary engineers in Gulfstream’s state-of-the-art telemetry center in Savannah monitored the aircraft’s behavior and determined real-time the damping characteristics of the aircraft.

The vibration frequencies exerted on the aircraft ranged from 2 hertz, or twice per second, to 58 hertz, or about as fast as a fluorescent light flickers. "We’re doing very well," said Pres Henne, senior vice president of Programs, Engineering and Test, Gulfstream. "The demonstrated flutter margins met or exceeded our expectations out to maximum speeds. That’s a good sign."

As S/N 6001 continued with flutter testing, S/N 6005 completed initial phase manufacturing and began engine testing. S/N 6005 is the fifth and final aircraft in the G650 flight-test program. Each aircraft in the program has a specific purpose, with S/N 6001 focused on envelope expansion, air data calibration, flutter, in-flight performance and flight controls.

S/N 6002 is used to evaluate the aircraft’s systems as well as its takeoff and landing performance, while S/N 6003 tests the avionics, in-flight load measurement and ice protection system. S/N 6004 will be the first G650 outfitted and tested with a full interior, which is currently being installed. S/N 6005 will participate in the reduced vertical separation minimum testing.

The G650 flight-test program officially began on Nov. 25, 2009. Through Aug. 25, the four airplanes currently flying in the program have completed more than 170 flights and 575 flight-test hours.
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