The Supersonic Dive of a DC-8

By William F. Smith, Jr.

THE ARTICLE IN THE FALL 1990 *Journal* by Dr. Richard K. Smith in which he states the Pan Am Boeing 707 that reached .94 "a speed record that has not been exceeded successfully by another subsonic airliner" is not so.

On August 21, 1961, Douglas DC-8, N9604Z, was flown to a true mach of 1.012 at a pressure altitude of 41,088 feet. The speed was attained in a dive in the Edwards Air Force Base area. The airplane was a DC-8-43 with Rolls-Royce Conway Mark 512 engines modified to Mark 509 thrust rating. The dive was initiated at a pressure altitude of 50,029 feet (geometric height of 52,090 feet). The purpose of this test was to achieve an altitude of 50,000 feet and sonic speed. The airplane was a standard series 43 except for flight test instrumentation, a test airspeed boom on the right wingtip. The wing had the four percent leading edge extension. At the maximum altitude, the gross weight was 170,600 pounds (a w/s of 1,493,000).

A pushover of 0.5 g was held for approximately 15 seconds (22 degrees pitch) and no airframe buffet was experienced during the acceleration to mach 1.0. Takeoff thrust was used throughout the entire maneuver including the pullout. The maximum true airspeed of 662.5 mph was attained at 39,614 feet pressure altitude. Prior to the dive, the stabilizer was trimmed such that approximately a 50-pound push force was required to maintain the stabilized dive. This was done to aid recovery because of the low elevator effectiveness. The Askania Range at Edwards AFB was used to provide geometric height.

The maximum observed mach on the production system did not exceed .96 in the true mach 1.0 area.

Recovery at 42,000 feet with full up-elevator gave no change in load factor (also stabilizer trim would not function with this condition). The pilot relaxed the elevator and changed the stabilizer trim from 0.5 degrees a.n.u. to 1.5 degrees a.n.u. This gave a 1.7 "G" and by 36,000 feet the airplane was recovered and decelerating below .95.

This airplane became the property of Canadian Pacific where it operated for many years. A plaque attesting to this accomplishment was displayed on board the airplane. Its whereabouts today is unknown as the airplane was ferried to Miami where it resided for a time awaiting sale.

The C.G. of 27 percent MAC provided an additional aid for recovery. An F-100 photo chase plane and an F-104 pacer airplane accompanied the flight.

A few interesting items during recovery. Buffet was experienced at 35,000 feet as the airplane was decelerating through .94 mach. During descent through 42,000 feet at mach 1, rudder pedal buzz was noticed and disappeared at 36,000 feet while decelerating. The rudder tab frequency was 28 CPS, but the rudder surface was negligible. Aileron tab buzz of 36 CPS was also noted.

The dive recovery was accomplished in about 5,000 feet.

This flight was Bill Magruder's idea and he was the pilot. Bill also planned a weight-lifting record but this was not done. I am always surprised so few people were aware of this accomplishment. However, Douglas did little to publicize the flight. Our friend, Joe Tomich, was the flight engineer. □

This DC-8 became the first jet transport to exceed Mach 1 when it attained true airspeed of M1.012 during a shallow dive. The DC-8 Series 43 is shown here with the F-104 chase plane.
(McDonnell Douglas courtesy of Harry Gann)