NASA SP-4201
This New Ocean: A History of Project Mercury
1989
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At the inception of the NASA manned satellite project, in the fall of 1958, the apparent solution to the problem of body support was an anti-g contrivance developed not by biodynamicists but by a group of practicing aerodynamicists in NACA's Pilotless Aircraft Research Division, part of the Langley Aeronautical Laboratory in Virginia. Maxime A. Faget, William M. Bland, Jr., Jack C. Heberlig, and a few other NACA engineers had designed an extremely strong and lightweight couch, made of fiber glass, which could be contoured to fit the body dimensions of a particular man. In the spring of 1958, technicians and shopmen at Langley molded the first of a series of test-model contour couches. The following July a group from Langley went to the Aviation Medical Acceleration Laboratory at Johnsville to try out their couch on the Navy's big centrifuge.

The Navy biodynamicists and the NACA engineers experimented with the couch and various body positions in an effort to amplify a g-load tolerance. The couch made at Langley had been molded to fit the physical dimensions of Robert A. Champine, one of the foremost NACA test pilots. Champine rode the Johnsville centrifuge to a peak of 12 g on July 29, then departed for a conference on the Pacific Coast. The next day Navy Lieutenant Carter C. Collins volunteered to test the couch. Since his frame was smaller than Champine's, the Johnsville experts had to pack foam-rubber padding into the recesses of the fiber-glass bed. Collins then climbed into the centrifuge gondola and seated himself in the couch, the back angle of which was set forward 10 degrees. The 4,000-horsepower centrifuge motor whirled the gondola progressively faster. On the first run the loads reached a peak of 12 g. Five more runs pushed the peak to 18 g. Then, on the sixth try, using a grunting technique to avoid blackout and chest pains, Collins withstood a peak of 20.7 g, applied transversely for a duration of six seconds. Later that day, Gray, inventor of the Iron Maiden, rode the centrifuge with the contour couch and also endured a 20-g peak. The acceleration patterns to which Collins and Gray were exposed corresponded to a reentry angle of 7.5 degrees. At that time the optimum reentry angle being considered for a manned satellite, 1.5 degrees, theoretically would expose the spacecraft passenger to only 9 g.39

The NACA engineers, already working overtime on designs for a manned orbital capsule, were elated. It seemed that they finally had an effective anti-g device that was small enough and light enough to fit into a one-ton ballistic capsule they had in mind for the initial manned space venture. They had, in fact, made a major contribution to the protection of a space rider from sustained high g forces, although they did not fully realize as yet that body angles were more significant features of the couch than its contoured support.

The procedure ultimately used for protecting the Mercury astronauts from the g loads of acceleration to orbital velocity and deceleration during reentry represented a combination of the advantages gained from many experiments by military and other specialists in flight physiology, as well as from the ingenuity of the aeronautical engineers in NACA and NASA. Although the idea of using a hammock either for the basic support or in combination with the contour couch was perennially attractive to the human-factors experts in Project Mercury, all Mercury astronauts sat in essentially the same couch designed by Faget and his coworkers in the spring of 1958. But added to this basic technique were restraining straps, a semi-supine posture, frontward application of acceleration loads, and the reversal of the spacecraft attitude during orbit to permit frontward imposition of reentry loads as well. The final elements in the NACA-NASA campaign to minimize the effects of insertion-reentry g buildups was the use as astronauts of experienced test pilots provided by the military services. During the centrifuge experiments of the fifties such men had consistently proved capable of withstanding higher g forces than nonpilots.