JULY 1997

Pilot instrument scan patterns (University of Illinois at Urbana-Champaign, IL): "In order to examine differences in flying expertise, 12 novice and 12 expert pilots flew a 7-segment simulation pattern under specific attentional constraints while cockpit instrument visual scan was recorded. Flight segments involved various combinations of maneuvering of heading, altitude and airspeed. Expert pilots performed better than novices on vertical and longitudinal, but not lateral control. They accomplished their superior vertical tracking by allocating more control resources to the vertical control. Analyses of scanning strategies revealed that experts: a) had shorter dwells and more frequent visits to most instruments; b) adapted their visiting strategy more flexibly in response to changing task demands; c) demonstrated a better mental model of cross-coupling and predictive relations between and within axes; and d) showed more frequent checking of axes whose values remained constant. The data is discussed in terms of their implications in pilot cockpit scan training program development."[2]

JULY 1972

New G tolerance (USAF School of Aerospace Medicine, Brooks AFB, TX): "Levels of 6.5 to 9.0 G for a duration of 45 seconds were sustained by a group of centrifuge subjects wearing standard personal protective clothing and using maximum voluntary M-1 maneuver. Of 14 subjects exposed at weekly intervals to progressively higher G levels above 6.5 G/45 sec., 9 tolerated 9 G/45 sec. without loss of vision. The amount of protection afforded the subjects at high-G levels was found to be dependent on (a) the type and amount of instruction in the performance of the M-1 straining maneuver, (b) amount of experience and confidence in performing the M-1 maneuver and (c) overall physical endurance and muscular coordination of the subject…

"This series of experiments indicates that man's ability to tolerate high, sustained G forces is greater than previously anticipated when using presently available protective techniques."[3]

Tilted seats (Crew Systems Department, U.S. Naval Air Development Center, Warminster, PA): "Several tilting, supinating seats which have been tested in flight and on centrifuges are described and their biomedical adequacy assessed. Only those which assure unrestricted visibility in all directions will be accepted by the pilots. This can be achieved by an adequate selection of the pivot points, and other design criteria which are synthesized. Concerted effort of designers, aeromedical investigators and-last but not least-pilots is urged for the realization of such an integrated G-protective man-machine system. Supinating seats should also be provided for the crew of winged re-entry vehicles (Space Shuttle). For the passengers multidirectional G protective systems with escape capabilities should be developed."[4]

JULY 1947

The future of human performance (U.S. Navy): "The future trend for our research programs in Aviation Medicine will be guided primarily by the trend of new aircraft performances. These point to extremely high speeds, high rates of climb, and ceilings well above fifty thousand feet. However noble our past accomplishments may have been, they are now rapidly becoming obsolete. It is most imperative that the physiological research programs keep pace with engineering and development accomplishments in aircraft design. Already we are in need of new definitions for human performance limitations, particularly with regard to G stress, altitude factors, and reaction time limitations in human performance characteristics. For instance, exactly what may be expected of a pilot flying in excess of seven hundred miles per hour and at an altitude of fifty or more thousand feet? How will he escape from aircraft at these speeds and altitudes? How will he survive such escapement? When do we reach the limit in pilot-controlled aircraft and thereafter pass over to the field of guided missiles and pilotless aircraft? These are some of the problems now before us and the need for their answers is increasingly urgent."[1]

Fatigue of long-range fighters (unknown institution): "Just as the Pacific War has accelerated the development, production and use of new long range bombers; new, similarly long-range fighters have come into being. This has caused corresponding stresses on the pilots who fly them. Fighter pilots were accustomed to missions of combat air patrol, ground support, dive-bombing or strafing of but several hours duration. Suddenly they have been confronted with missions of ten or more hours. A fighter pilot has more stress than other pilots for obvious reasons. He has no relief-pilot, no opportunity to stand up and stretch or lie down and rest. Mechanical improvements have been made and more are in the process but the simple fact remains – one pilot is flying one airplane for a long and tedious time."[5]

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