APRIL 1998

Mental workload in flight (Wright State University, Dayton, OH; Armstrong Laboratory, Wright-Patterson AFB, OH): "Psychophysiological and subjective measures provide unique information about mental workload during flight… Heart rate was sensitive to the demands of flight but not diagnostic with regard to determining the cause of the workload. Heart rates increased during take offs and landings and to an intermediate level during instrument flight rules (IFR) segments. By showing sensitivity to only the visual demands of the various segments of flight eye activity was more diagnostic. The theta band of the EEG demonstrated increased power during those flight segments which required inflight mental calculations. The subjective measures showed trends suggesting different levels of mental demand but demonstrated few statistically significant differences… Multiple measures, especially psychophysiological measures, provide a comprehensive picture of the mental demands of flight. The measures used in this study were shown to provide unique, non-overlapping information. Because of the continuous nature of the psychophysiological data it may be possible to develop systems which provide on-line monitoring of mental workload that can provide feedback to the pilot and aircraft systems."[3]

Nonsmoking flights (reprinted from 44th International Congress of Aviation and Space Medicine, Jerusalem, Israel, 1996): "Aeromedical experts are, in general, of the opinion that variables related to safety and health are of paramount importance and should be assertive enough as to convince the proper authorities of this fact. The bureaucratic battle of smoking in aviation has been won. Hopefully, all of us working together can assist in the implementation of the ICAO resolution by giving weight to health and safety and, therefore, displacing economic marketing as the most influential variable in the equation."[2]

APRIL 1973

Computer analysis of EKG (USAF School of Aerospace Medicine, Brooks Air Force Base, TX): "The study of cardiac rhythm in man during normal activity is relatively recent in origin. Equipment is available on the commercial market that allows 8-10 hr monitoring of the electrocardiogram without need for telemetry or interference with routine activities. Presently the electrocardiogram is reviewed at a speed of 60× recorded time by electrocardiographic superimposition and display on an oscilloscope. The School of Aerospace Medicine has developed a computer system which allows analysis at 60× recorded time. This system will detect the occurrence of an arrhythmia and produce a write-out of the arrhythmia with the preceding and subsequent normal beats in equivalent real time. There have been 510 patients studied. We have found that there is a highly significant difference in the occurrence of arrhythmias in patients with cardiovascular disease than in those with a normal cardiovascular system. We have also shown that computer analysis of long term monitoring is practical and more accurate than manual scanning."[5]

Drinking and flying (Ohio State University, Columbus): "Sixteen instrument-rated pilots flew instrument landing system (ILS) approaches at night in a light airplane while under the influence of 0, 0.04, 0.08 and 0.12% blood concentrations of ethyl alcohol. Tracking data in two axes were recorded continuously from the pilot's cross-pointer instrument; procedural errors were recorded by an experienced safety pilot. Procedural errors increased significantly in frequency and potential seriousness with each increase in blood alcohol level. At the highest level, the subjects lost control of the aircraft 16 times in 30 flights. Tracking error and variability also increased with alcohol levels; the tracking decrements were much more pronounced in less experienced pilots. The data suggest that even very low blood concentrations of alcohol cause significant performance decrements in flights"[1].

APRIL 1948

Solid oxygen options (University of Pennsylvania, Philadelphia): "Oxygen stored in solid form may be employed for breathing purposes and offers several advantages over conventional oxygen supply systems. Two sources of 'chemical' oxygen have been investigated from this point of view and both have recently been incorporated into compact portable units supplying oxygen to individuals in aircraft for periods of one-half to two hours…

"One method derives oxygen from the thermal decomposition of sodium chlorate which, when mixed with suitable accessory substances, can be cast into solid blocks containing 35 per cent by weight of utilizable oxygen…

"A second and perhaps more promising method is a much simplified rebreather system which derives its primary oxygen from pressed and catalyzed K_2O_4…

"The ultimate goal in the development of both methods has been to provide oxygen economically in compact expendable units which can be shipped, stored and used in much the same way as tinned food. This goal has not yet been achieved but the knowledge gained in developing the present equipment may be employed to assess the potentialities of chemical oxygen generators in aviation."[4]

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