PSYCHOLOGY

Efficiency in Cockpit

Suggestions for re-design of airplanes to provide better hearing and seeing and less fatigue for pilots and crew may improve their fighting.

➤ CHANGES in plane designs to aid the hearing and vision of American combat fliers were recommended to the Institute of Aeronautical Sciences meeting in New York.

"Both seeing and hearing, if accompanied by prolonged attentive effort, especially under conditions of unfavorable plane design, are capable of contributing to pilot and air crew fatigue and loss of efficiency," declared Prof. Walter R. Miles, Yale University psychologist. Collaborators with Prof. Miles in preparing the report were Commander Leon D. Carson, head of the Medical Research Section in the Navy's Bureau of Aeronautics, and Prof. Stanley S. Stevens, one of the directors of the Psycho-Acoustic Laboratory at Harvard University.

Plane gunners should be moved much nearer the aiming window, the scientists suggested. The position of the gunner now gives him the same sort of vision as he would have in a tunnel, since his eyes are some distance away from the window.

Sections of gun mounting, electrical switches and other gadgets which lattice the aiming window are also a hazard to vision and life, the scientists warned. They believe it will be possible to reduce the amount of structure in front of gunners.

Clearing away these obstructions to vision and moving the gunner nearer the window will "increase his angle of uninterrupted view, make visual pursuit of his targets easier, and reduce the blinding effect from the flashes of his own guns," Prof. Miles explained.

In the cockpit, the instrument panels have too large an illuminated area. They are usually illuminated too intensely and with a color that disturbs night vision. Indirect red light was recommended by Prof. Miles and his associates as best.

Discussion of vision from the cockpit disclosed that transparent enclosures often become discolored with exposure to sunlight or become checked due to temperature changes and vibration.

"Rapid strides in development of better plastics are being made," he explained, "and it should be possible soon to mold transparent cockpit enclosures of better grades of optical plastics in one piece. Surface hardening of such molded parts is desirable."

The ears of flying personnel take even greater abuse than their eyes, the scientists reported. Noise from air turbulences around the plane is in some ways more disturbing than the noise from the propeller itself. The interior of a glider plane, for example, is a very noisy place when traveling at 150 miles per hour. Conversation is difficult if not impossible.

Several methods were suggested for overcoming the distracting noises of combat flying.

"Judicious use of sound treatment in the plane, conversion to high-fidelity microphones and earphones, and the development of acoustic devices to shield the mouth and the ears of the personnel," Prof. Miles said, "will permit the aviator to carry on in the best noises which the aeronautical engineers are now planning to produce."

Science News Letter, February 6, 1943

AERONAUTICS—PHYSIOLOGY

Cooperation in Design

Engineer and biologist must work together if men are to be successful in handling the formidable airplanes now possible.

➤ ENGINEER and biologist must cooperate if human beings are to be really successful in handling the formidable flying machines which aeronautical invention has given them, Prof. D. W. Bronk, University of Pennsylvania biophysicist, told his audience at a lecture sponsored by the national science honor society, Sigma Xi. The biologist, and in particular the biophysicist, has as his task the discovery of the performance limits of the units of the human nervous system. The engineer must adapt his machine to a controlling organism operating within those limits.

As an example of these performance limits, Prof. Bronk cited the now familiar "blackout" experienced by dive bombers in pulling out of a steep, fast dive. It is known that the centrifugal effect of this sudden upswerve drains the blood away from the brain, and "blackout" results.

Basic reason for this momentary unconsciousness, the speaker revealed, is oxygen starvation on the part of the brain cells. Brain cells are at all times very greedy for oxygen; they never have more than a few seconds' supply on hand. So anything that cuts off fresh supplies, even for a little while, creates a physiological crisis—threatens a shutdown for lack of an essential material.

Prof. Bronk described some of the exceedingly delicate instruments used in modern physiological research to obtain data on the needs and capacities of nerve and brain cells. The brain cells' chronic state of incipient oxygen starvation was discovered by means of a microscopic metallic electrode that can be inserted into various regions of the nervous system with relatively little damage. Differences in the minute electrical current transmitted tell tales of fluctuations in amount of oxygen present, and hence of the relative state of efficiency of the cell at the moment.

Nerve cells can be isolated, yet kept alive, and thus studied as single units,