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**INVESTIGATION OF SUBSONIC OSCILLATIONS INFLUENCE ON
AIRCRAFT PERSONNEL WORKING UNDER NERVOUS-
PSYCHOPHYSIOLOGICAL OVERLOADS**

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ABSTRACT

Unfavorable influence of high intensity subsonic oscillations on humans has been determined in numerous scientific researches. Elaborated by authors investigations showed that humans being under abnormally high or long nervous-psycho-physiological overloads and other harmful factors significantly affect by subsonic even of low intensity.

Being in a complex with other harmful factors subsonic causes such undesirable facts as delays of visual sensor reaction, enhancement of operator mistakes, space disorientation.

Influence of subsonic of low intensity being together with other harmful factors especially presented in such human activity as aircraft running. This sort of human activity is characterized by near-extreme work conditions for the pilot or even for all crew when the pilot is under significant nervous-psycho-physiological overloads caused by subsonic influence what may be the reason of an emergency situation.

The highest levels of subsonic were fixed during flying up and landing of aircraft. Turbulent flows making by airflow streamlining over the chassis and wings elements are the main sources generate subsonic oscillations. Switching on of the engine reverse also gives hasty increase of subsonic level. It should be underlined that increase of subsonic level become especially dangerous during process of aircraft landing when the crew has being affected by different harmful factors, first of all by nervous-psycho-physiological overloads, become being influenced by subsonic also. These situations cause quick increase of likelihood of crew actions which are not adequate to changes of flying what might be the reason of an emergency situation.

Taking into account results of carried out investigations it is proposed by authors to review exist norms of subsonic for aircraft crew to make them more strict.

INTRODUCTION

The numerous scientific research establish the adverse influence of subsonic oscillations on human body. In psychophysiological experiments subjectively unpleasant sensations and associations, dysfunction of psycho-emotional environment, disorder of vegetative functions are registered.

The influence subsonic oscillations of high intensity human body is investigated most completely. In these research it is shown, that the action of low-frequency acoustic oscillations of high intensity is not limited by aural sensations, but brings numerous and diverse sensations to those being tested - fear, anxiety, weakness, groundless discomfort and oppressed condition.

What is the reason of such reaction human body (and animals too) to subsonic of oscillations? The reason is in hereditary fear of subsonic, as a harbinger of approaching danger.

DISCUSSIONS

Man stopped his evolution, when there was no machinery and no technogeneous subsonic sources. Sources of subsonic were such natural sources, as powerful waterfalls, erupting volcanoes. Subsonic was generated by earthquakes, upcoming storm, hurricanes, movement of groups of large animals. It is natural, that advantage in survival was received by those human beings, who could somehow perceive the subsonic. If not by hearings organs, than simply by a body. At the beginning of the development of mankind the subsonic was perceived as a harbinger of nature act. Therefore it is not surprising, that under the action of high - level subsonic the person, as well as other animals, has a feeling of anxiety and fear. This fact is widely known. However the threat of act of nature causes not only the feeling of fear, but also the excitement, the rise of feelings, something like «prestart» excitement. This feeling arises, when the person has chance to avoid the consequence of act of nature, i. e. is rather far from a zone of direct danger and can evade from approaching threat, applying maximum efforts. For this purpose the body throws out hormones into blood, causing the reaction of «prestart» excitement. Subsonic of rather low intensity, as a harbinger of far and to potentially not so dangerous act of nature, causes the excitement and the mobilization of protective properties of a body and helps us to leave the dangerous zone in time. For example, the person feels excitement, if he sees a fire, thunder-storm, tornado, an accident, but is at rather safe distance himself.

Thus the body reaction to the subsonic was quite adequate to the real danger. With the occurrence technogeneous subsonic sources the connection between a subsonic level and an approaching danger of act of nature was disturbed. Therefore, perceiving the subsonic oscillations of technogeneous origin, a person can feel anxiety, fear or excitement and rise of forces on the contrary, acting in different ways is a reaction to falsely perceived danger. Such deceit of feelings can have the heaviest consequences, especially if the person operates complex technical systems, for example, an airplane, a nuclear or chemical reactor. And if the person perceives sounds, being heard and visual signals, accompanying the danger, then he can critically conceive them, identify and on this basis make a correct decision, whether these sound

or light signals bear a warning of approaching danger or not. But subsonic oscillations the person perceives unconsciously. The person may probably not realize, that under the influence of even technogeneous subsonic, his organism without control begins to be prepared for reaction to nonidentified danger, without any control on the part of consciousness. Under the influence of this unrealizable, often unreal danger a role of the person's subconsciousness increases. The person becomes more impulsive emotionally and more alert. But the apparent danger is not displayed otherwise, than through subsonic and at long effect of technogeneous subsonic of a low level, for example, during a flight, the phase of emotional rise and mobilization of the body for the reaction to expected danger is replaced by a phase of disregarding the danger, the overestimation of one's opportunities, decrease of reaction to varied conditions. It is especially displayed in the work of aircraft crews.

If subsonic has low levels, first comes the, so-called "prestart" excitement, raising a speed of reaction of the personnel to arising dangers, and then, in a number of cases at long influence of subsonic of small intensity comes the decrease of feeling the danger and overestimation of their own opportunities. At this moment the crew loses caution, inadequately reacts to the visual and sound information of the danger or equipment malfunction, poorly supervises the indications of devices, flight and meteorological conditions, orders are not given and executed on time. At long influence of low levels of subsonic the subconscious expectation of danger, which has not come, is replaced by the person desire «to be unloaded». Risky evolutions of the plane are made, the crew begins to talk rather briskly. The subordinated members of the crew try to exceed their powers and attempt risky actions on their own. That how «the complex of a superman» is displayed. In other words the crew keeps the serviceability, but «the center of caution» is switched off, i. e. the members of the crew begin to incorrectly estimate the degree of risk of inadequate (wrong) action, i. e. if at a normal condition, without subsonic influence, the crew correctly estimates the degree of risk of one or another (wrong) action, then if it is under the influence of subsonic, its concepts of «possible - impossible», can be displaced its subjective estimation of the risk degree of wrong action is lowered. The person normally thinks, its reactions were not slowed down (and even may be vice versa), but the subjective estimation of the risk degree has changed (at some frequencies and levels it can unjustifiably increase, and in other cases to be underestimated). The probability of inadequate estimation of conditions and inadequate reaction to this or that situation is increased.

The person has the illusion, that he can do everything. Thus subsonic of small intensity does not affect professional skills, does not reduce productivity, does not affect the health, but the ability of objective estimation of a risk degree is reduced.

The reaction of the person to subsonic of high intensity is completely different, especially if sharp increase of its intensity occurs. In this case panic of reactions to sudden increase of subsonic level arises - fussiness, attempt to find the reason of danger sensation, caused by sharp increase of subsonic level, for example, search of ostensibly faulty systems of the plane, check of indications of devices, estimation of one's own actions and actions of other members of the crew as wrong and faulty action, panic attempt to change a mode of work of the plane systems or its course. If it occurs at landing - and just during landing the increase of subsonic level is observed,

then such inadequate reaction can result in crash. That is how «the complex of panic-monger and coward» is displayed.

CONCLUSIONS

1. Subsonic of small intensity, not exceeding allowable values, nevertheless has an essential effect on the operator, being in conditions of increased psychological overloads.
2. Subsonic of small intensity causes «the complex of a superman» in the operators' mind, therefore the ability of objective estimation of risk degree is reduced and the self-estimation of the opportunities raises.
3. In the analysis of failures, concerned with errors of aircraft crew, it is necessary to pay attention to the influence of subsonic on aircraft personnel during the whole flight.

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