

Symposium: Stress in Aircrew

STRESS - A PILOT'S VIEW POINT

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Man has always been exposed to stress as a part of his normal life whether in the stone age or in the space age. However, revolutionary changes in science and technology, have brought about a quantitative increase in the nature of stress faced by the man of today. It will not be an exaggeration to state that nobody is free from stress, may it be physical, physiological or psychological. The magnitude of these stresses is very relevant to both the nature and the complexity of the task.

The characteristics of the stress experienced by a pilot are unique in nature. While some degree of stress is desirable to make a pilot responsive and alert, excess of it will be undesirable as being counterproductive. Stress should be of an 'optimum level'.

Stress Factors

Figure 1 gives an overview of the stress factors superimposed upon the pilot and their influence on accident potential. The factors imposing stress on aircrew can be broadly classified as :-

a. Unusual flight conditions, which often induce the aircrew to take wrong action when faced with emergency 'attention failure'.

b. Unusual life conditions, such as financial problems, unhappy homes, frequent posting, supercession, etc.

c. Life-style factors, e.g., overambition, overconfidence, desire to excel in flying, one-up-manship, hurry, perfection, etc.

These stresses beyond the optimum level lead to deterioration of aircrew effectivity and at times may be disastrous. Besides the severity of these stresses, their rate of onset and duration are of considerable importance for the aviators. Another important factor is the knowledge of responsibility. The knowledge of the fact that when a pilot makes a mistake it may lead to a disaster causing loss of hundreds of lives and crores worth of property generates stress. A cumulative load of many such events in the immediate past predisposes a person to psychosomatic or even purely physical illness. It is also seen that such a cumulative stress load predisposes a person to attention failure, error of judgement or forgetfulness.

Pilot's Role in the Man-Machine-Mission System

The feed back control system, where the pilot is the central co-ordinator, is shown in Fig 2. The pilot is required to monitor the enormous data continuously being provided by the environment and aircraft instruments, to examine their content and significance for the task he is engaged in, i.e., filter, interpret and integrate into an action programme or modify into a new action plan and finally monitor the feedback to ascertain mission accomplishment - all to be finished in a few seconds. This imposes a heavy mental workload on the pilot. Physical factors such as acceleration forces, vibrations, noise and other environmental stresses determine the physical workload while the psychological stress factors such as fear of failure in the mission, responsibility stress, risk taking and the like contribute to the emotional workload.

A supersonic fighter pilot in a low level combat situation, flying at high speeds

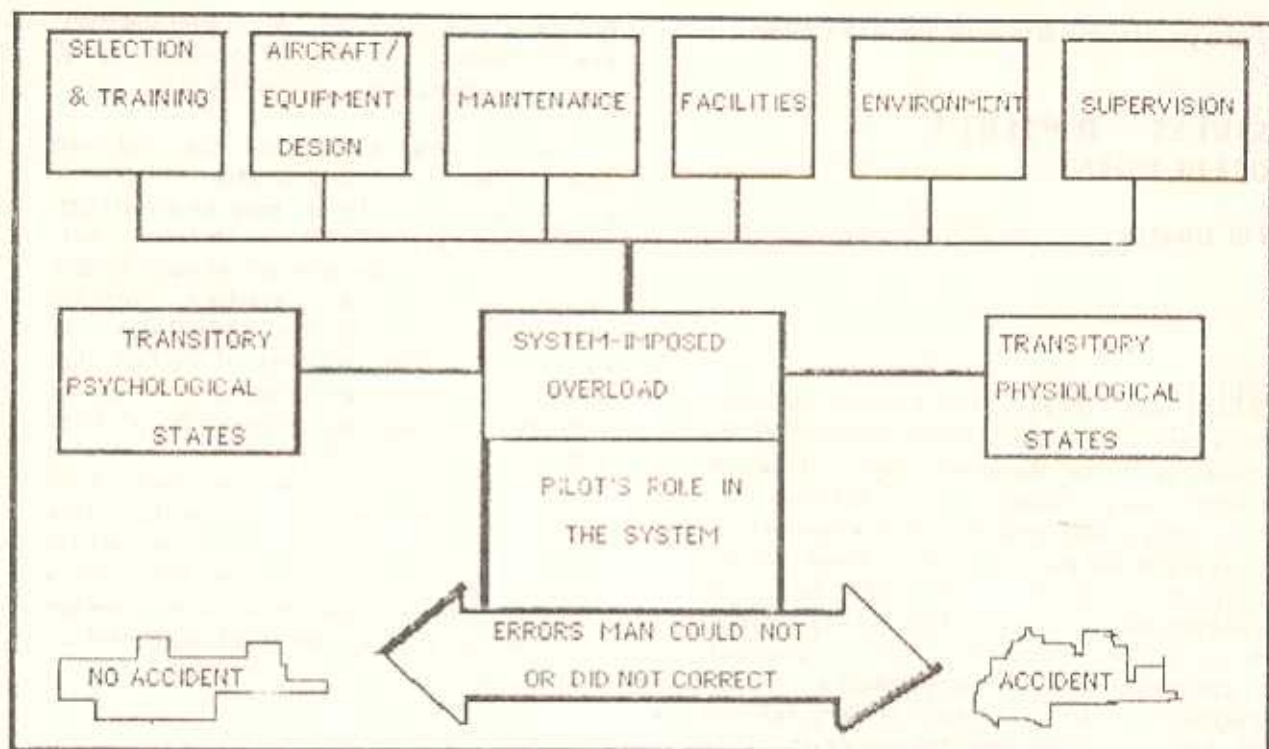


Fig. 1 Stress Factors

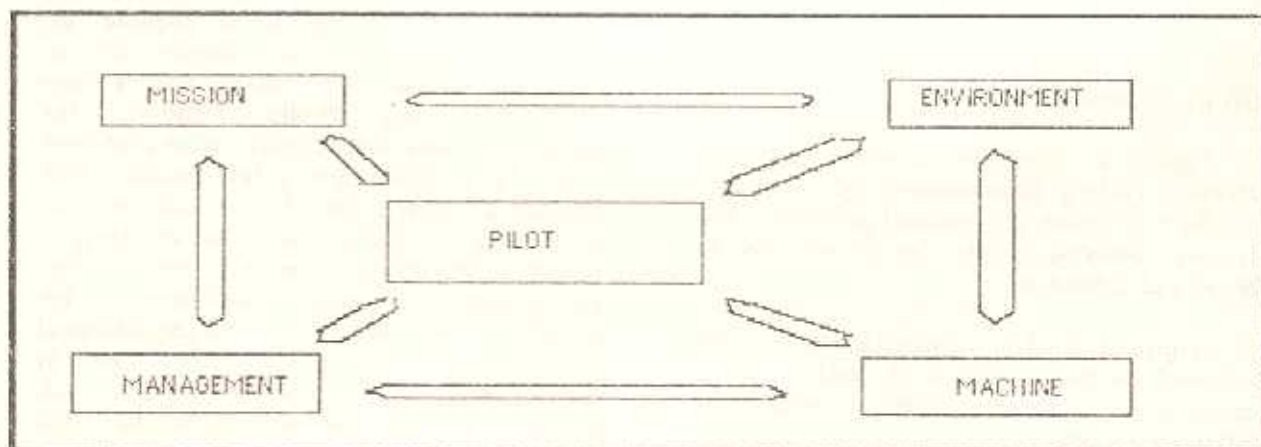


Fig. 2 Feed Back Control System

(approximately at 1000 kmph) and at low altitudes (about 2-3 km), may be a typical case in study. He is required to continuously keep a track of 'enemy' aircraft so as not to lose the advantage to attack, failing which mission accomplishment will be jeopardised. Simultaneously, he is also to monitor the position of friendly aircraft to enhance mutual support, monitor aircraft instruments to ensure normal functioning of aircraft, to detect system malfunction if any and at the same time look out for birds which pose a great threat to aviation - all these while being subjected to severe physical loads and psychological stresses. Most humans like to tackle a particularly difficult task when feeling fresh and rested and pilots are no exception. However, the most severe call on a pilot's skill and judgement comes at the end of a stressful sortie while carrying out approach and landing - a stage at which he is feeling tired if not fatigued.

While a lot of ground has been covered on reducing various environmental stress factors of aviation, two important areas still remain in a grey zone. They are G loads and disorientation. Of late, it has been revealed that loss of consciousness can take place due to high G loads/acceleration forces without any warning symptoms of grey out or black out. A number of F-16 aircraft have been lost due to this factor. Probably some of our UR (unresolved) accidents may also be attributed to this factor. Disorientation is yet another unresolved area which affects the pilot considerably and a number of accidents have been attributed to this factor.

Additional Stress Factors

Apart from the above stresses that a pilot encounters while carrying out the task that he is required to accomplish, there are additional stresses that are imposed on him when he forms a part of the Air Force operations. The Air Force in its responsibility to accomplish its mission needs to stretch its limited resources to span the entire country. The combat force has to operate

from a variety of air bases - from desert airstrips to those located in snow-cold mountains. While doing so, the pilots are exposed to extreme weather conditions, and a need to adapt to operating the aircraft in these conditions does add to his problems. Due to paucity of resources, but forced by the operational necessity, the additional stresses that a pilot faces are as follows:

- a. Long working hours both during day and night leading to fatigue and ill health.
- b. Frequent movements in the form of detachments and postings.
- c. Lack of adequate infrastructure in the form of personal flying equipment, family accommodation, medical and schooling facilities, power supply, etc.
- d. Communication delays leading to inadequate knowledge of weather conditions, long waiting periods at en route halts etc.
- e. Rural background posing initial difficulty in adjusting to the sophisticated aviation environment.
- f. Adaptation to aircraft - change of fleet, more sophistication.
- g. Psychological factors such as life-styles, fear of being grounded due to medical reasons, etc.
- h. Proficiency, training.

The additional stresses which are peculiar to our Air Force do have a deteriorating effect on the performance of the pilot in particular and the Air Force in general. These factors did engage the attention at the highest level. The awareness of these factors has set the ball rolling and efforts are being made to reduce, if not eliminate, these. The resources available to the Air Force can never match the requirement, especially with the escalation of the arms race

and the changing threat scenario. While the efforts at the organisation level are on, we at our level can contribute to a great extent, in our own way, to reduce this stress on the pilot.

Conclusion

The stresses on a pilot are multifarious. Flying is basically hazardous with inherent risks. The flying being carried out during operations, in a unique environment and using sophisticated aircraft, has a cumulative effect on workload. In this critical situation, any further increase of stress level due to system malfunction or an emergency may lead to

disaster. While the pilots, as a community, are engaged in their mission accomplishment, they remain generally unaware of the cumulative effects of stress, and how and when it crosses the optimum level. The best people to identify these aspects are the supervisors and the Squadron Medical Officers. This is a complex task demanding total involvement which will be able to achieve optimum utilisation of aircrew performance, build up a better rapport with the aircrew and eliminate the fear of being grounded due to medical reasons, and bring about an awareness in the aircrew about the nature of various stresses and their cumulative effects which affect their performance.