Human factors in aviation: A non-pharmacological approach to stress control in Flight Operations

by Capt. Frank Hawkins MPhil FRAeS

The Concept of Stress
The concept of stress is not new. The ancient Greeks and Egyptians talked of sleep problems, no doubt associated with their own stressful living and working situations. And more than a century ago people were already writing of “the stresses of modern living”. It seems that although we have been evolving genetically throughout time to match the developing environment, we are always lagging behind.

Throughout life we are facing stressors, both at home and at work. “The secret of health and happiness - and in the aviation world we should add safety and efficiency - probably lies in the success of the way we adapt to these stressors.

Many common disorders are now known to be due to failure or a breakdown of this adaptation process, rather than to damage caused by bacteria, poisons or physical injuries. High blood pressure, stomach ulcers, allergies, sexual dysfunctions, heart and kidney disorders, to name a few, all may come into this category. In flying, we are particularly concerned with the effects on performance.

As attitudes to Human Factors in aviation slowly become more enlightened, it is time to take a more constructive look at the problem of adaptation breakdown - stress - and its influence on human performance and see what can be done about it. Fortunately, the situation is not without promise.

The Operational Environment
During the last half century, we have seen quite dramatic developments in the commercial aviation environment: enormous advances in high speed aerodynamics, in thermodynamics and in avionics, so as to enhance the performance of the machine. But there has been relatively little attention given to the performance of man in this complex man-machine system. Yet a breakdown in his performance can be just as catastrophic as breakdown of the machine. It is worth recalling that in 1975 IATA calculated that human factors were cited in some 80% of aircraft accidents. Flying combines a number of stressors in a rather unique way. Flying staff face the recurring emotional stress of medical examinations and proficiency checks which can terminate a career at any time. They face family separation and the disruption of domestic life. They are under constant pressure from outside and inside not to fail, not to make normal human errors, in their critical tasks. And they face the recurring desynchronisation of the rhythm of their body’s systems as a result of irregular working/sleeping patterns and time-zone changes - perhaps the most serious physiological stressor of all met by long-range flight crews.

Means of Relief
With a few variations, the ways of countering stress in our society are rather
well-established. Perhaps the most common answer is alcohol. Another drug which many claim relaxes them is nicotine. But this, like alcohol, is toxic and addictive, and damages performance.

In addition to these "socially acceptable" drugs there is, of course, the whole galaxy of tranquillisers, sedatives, and sleeping drugs. They usually create relaxation and induce sleep - of a kind - until a tolerance develops to them. But they are all addictive and have undesirable side effects. (For example, it has been shown that adverse effects on performance of a single task can continue for more than 18 hours after taking one Mogadon tablet.)

If theses various forms of drugs all have their disadvantages, what then is left? Well, there are several non-drug techniques which have long been applied with success for the relief of stress-induced disorders. These techniques include various forms of meditation, biofeedback, progressive relaxation, electrosleep, auto-hypnosis and Autogenic Training (AT). It is this last method, which, after study, appears to offer the greatest benefit for flight crews. After learning, the practice of AT is entirely in the person's own hands. No equipment or drugs are used. It is easy to learn and has no mystical, ritualistic or religious associations. It serves to enhance the working of the body's own self-regulating mechanisms and does not unnaturally impose upon them. And finally, it has been in use for more than 60 years, and, particularly during the last quarter of a century, it has been very well documented with several thousand scientific papers written on its use.

Autogenic Training

AT is one part - the basic part - of Autogenic Therapy. The rest of the therapeutic technique is used almost solely for clinical application in connection with various disorders which respond to psychological medicine. Some aspects of this clinical application are of particular interest to us, as certain measures, such as raised blood pressure and cholesterol, are seen as stress symptoms.

With AT, elevated blood pressure can normally be expected to fall and it has been shown that many of those using beta-blocking drugs for the control of high blood pressure can have the drugs totally withdrawn after using AT for a number of weeks (see fig. I). Quite dramatic reductions in blood cholesterol have been shown with routine use of the technique, but it is interesting that if the practice of AT is then stopped, then cholesterol levels may be expected to rise again. Improved output of insulin amongst diabetics has also demonstrated the way in which the method appears to help the body's own regulating mechanisms to function effectively. As a general rule, a reduction in medication can take place simultaneously with the learning and practice of AT.

Outside the clinic, AT has been used in education where it has been shown that performance and behaviour in class, as well as at home, improved. Sportsmen (including certain British Olympic teams) have found improvement in performance with the use of AT.

Our particular interest here, however, is in the industrial application of AT, and increasingly industry is arranging for AT programmes to be established
internally for use of their own staff. Car and aero-engine factories in France, for chemical and telephone workers in Germany, railway workers in Czechoslovakia, coal industry staff in the UK, and airline staff in Sweden, to mention just a few.

The Technique
AT is a psycho-physiological technique; that is, it involves both the brain and the body. This makes it distinctive from other purely muscular, relaxation methods and is the reason why it is not suggested that it be learned on a "do-it-yourself" basis. Certain personal conditions can exist which would make the use of AT inadvisable and in certain other clinical cases it should only be used under close supervision.

The technique itself involves three basic components. Firstly, passive concentration. It is crucial to the success of the method to understand the difference between passive and active concentration, the latter often producing the opposite effect from that desired. Secondly, mental repetition of a group of formulas or phrases which are associated with certain parts of the body and certain conditions such as heaviness and warmth. And thirdly, the elimination of disturbing stimuli, for which purpose, three standard positions or postures have been developed. Errors in these postures can influence the effectiveness of the technique.

Learning AT takes from 5-10 sessions of one hour each, normally undertaken once a week. Once the system is learned, no more assistance is required and "you are on your own". It is then practised as desired. For maximum effectiveness, two or three periods of a few minutes a day are used but this is flexible and AT sessions of just a few seconds are also helpful. This is very compatible with the kind of tasks which occur on an aircraft - on the flight deck and in the cabin. Also compatible with this kind of environment are the postures to be used. A normal seat or even a cabin crew folding seat is adequate, and special short mental exercises can be done while standing - very suitable for certain cabin staff.

A Training Programme
AT is particularly suitable for learning in groups and this makes the application in industry convenient and cost-effective. Groups should be preferably about 5, but this, too, is flexible, and up to 10 can be taught effectively providing the group is rather homogenous.

In an airline, it would be appropriate if a relationships and a better sense of being at peace with oneself. Recoveries from bronchial asthma and a whole range of other psychosomatic disorders have been reported, as well as highly successful modification of self-destructive behaviour patterns and habits such as drug taking, compulsive eating and alcoholism. According to Wolfgang Luthe, Schultz's successor, now considered the world expert, Autogenic Training can help cure respiratory disorders such as asthma and tuberculosis, irritable colon, peptic ulcer, ulcerative colitis, obesity, sexual dysfunctions, hypertension, cardiac arrhythmias, low back pain, endocrine and metabolic dysfunction such as diabetes and functional thyroid disorders, and neurological disorders such as epilepsy, cerebral palsy and neuralgia.
The basic AT exercises are simple. Taking up one of three optional postures - sitting slumped rather like a rag doll on a stool, lounging in an easy chair, or lying on your back with your arms at your side - you make sure you are reasonably protected from noise and disturbances and that your clothes are loose and comfortable. You close your eyes and focus your attention on your arms, one at a time, with the suggestion ‘arms are heavy’ several times. Then go on to ‘legs are heavy’ then ‘arms and legs are warm’ and so on, working through the six steps. As the exercise gets familiar it is simplified and instead of having to go through each limb separately, the room were set aside in the medical department for training, as this would be convenient for the administration, record keeping and appointment planning. As an initial medical check is needed to ensure that there are no contra-indications, it would also be convenient from this angle.

Staff requirements consist firstly of a fully qualified AT practitioner, who would plan the complete programme, providing information, arranging and guiding the co-ordination discussions between the various interested groups (flight operations, crew scheduling, medical department, crew unions etc), and establishing the training groups. He would carry out all instruction and adapt the formulae used to the industry and to individual cases where this is desirable. He would monitor the progress of each trainee on an individual and personal basis and would refer the trainee for medical consultation if he diagnosed this as necessary. He need not be a full-time member of the airline staff.

One physician in the medical department should have had an AT briefing (half a day) which would enable him to carry out the pre-training medical check and understand the background of symptoms which may result in the trainee being referred back to him.

The cost of such a programme can thus be held to a very low level. The benefits, however, can be very extensive. Restoration of the body and brain takes place in the daytime as well as at night. AT significantly enhances that daytime restoration process. Reliance on drugs to reduce the effect of stress - including alcohol and nicotine - is likely to be reduced aid sometimes totally eliminated. Fatigue on duty can be reduced. Attitudes and behaviour become modified in a favourable way, affecting life at home and at work. The economic rewards associated with these benefits are self-evident.

There is now much evidence to show that in the relief of the damaging effects of normal occupational stress, Autogenic Training can provide a very valuable and effective tool, when it is taught with skill and practised conscientiously. The technique is now refined and available; whether it is applied or not depends only on those in the airline industry who would benefit from it and those who represent them or are responsible for their working effectiveness and personal well-being.