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The Society gratefully acknowledges the contribution of Gp Capt Navin Rattan VSM for his efforts in compiling this data and making this data available for use on the Society website.

DEVELOPMENT OF “ANTI – G “ VALVE

A.K. BASU

The importance of aeromedical research is well known and does not require to be gone into in any great detail. The discovery of new structural materials, propellants etc, arising from the race for leadership in aviation, has ushered in an age of high transonic and supersonic flying of military and civilian passengers. There is also a great deal of optimism among top-ranking scientists regarding inter-planetary travel in the not-too-distant future. In all these the limitations of the human system, however, seem to be very the deciding factor. These limitations have to be removed or reduced to a minimum before high speed and high altitude flying becomes common place.

In many western countries, research in Aviation Medicine has been undertaken for many years now. The United States has even an organisation for work on Space Medicine. The research done at the aviation centres have contributed much towards comfortisation and safety in flying. Recognising the importance of aeromedical research a few centres have been established by the I.A.F. for studying medical, physiological and psychological problems.

MEDICAL STANDARDS OF FITNESS

R ARUNACHALAM

Some are of the opinion that the medical standards we are now following were intended for the British and hence a little too strict and unsuitable for the average Indian. Even in the RAF it would appear there is laxity in the application of the standards laid down. We know of pilots who have flown aircraft effectively in spite of defects and disabilities. An extreme example is that of Bader, the famous RAF pilot with artificial legs who distinguished himself in the last war. This example is an example of exception. In practice, most cripples are really crippled for any work either on the ground or in the air. It should not be our intention to have descrepits and cripples flying aircraft in the Indian Air Force. We are trying to develop an Air Force and not a convalescent home for the diseased and disabled. At the same time, we cannot lightly ignore the fact that no less an Air Force than the Royal Air Force, with their years of experience has allowed persons to fly when we would have advised them to lead a retired life.

The time has come when we should have a comprehensive publication of our own dealing with medical standards and methods of examination. The material for this publication should be drawn from experience of the past, both ours as well as others, and based on scientific reasoning. There should be no question of watering down the existing standards merely in deference to an imaginary feeling that the average Indian is sub-standard. If the average Indian is indeed sub-standard then we will have no option, but to go in for pilots who are above average Indian standard. Conditions of modern aerial warfare do not allow of compromise or concessions. In formulating our standards we could introduce an element of flexibility to ensure that the services of experienced

pilots with disabilities are utilised in the air to the fullest possible extent. There can be a little compromise when there is experience to cover a disability.

Having defined the medical standards for our pilots, we will have to standardize our medical examination. The literature abounds with various tests, some complicated, some simple. In standardizing our tests, we will have to temper scientific knowledge with practical wisdom. It is futile having a series of precision tests if the medical officer has neither the time nor the patience to carry them out with exactitude. We are dealing with men not machines and passing them through a test bench as in a factory will not bring the desired results.

What exactly is the meaning of the term fitness? There is a term called 'total fitness' a comprehensive term which includes within its orbit physical fitness, mental fitness, emotional fitness and social fitness. As far as the Air Force is concerned, the term physical fitness can be interpreted to mean organic and functional soundness of the various systems of the body and the ability of these systems to work in co-ordination and held the body to carry out the task in hand whether it be on the ground or in the air. This work-co-ordination is vital to our concept of physical fitness in the Air Force. Afferent impulses, thought processes and motor actions have to be almost simultaneous and so automatic on occasions that none but the fittest can hope to survive in the air. The fitness we want is something peculiar to the Air Force. Pilots are expected to have the poise of ballet dancer, the alertness of a swordsman and be as cool as a cucumber when under fire.

We have also to ensure that the candidates we take are capable of working under conditions of prolonged and severe physical and mental stress and would serve the Air Force for long periods of time. The latter is of importance in peacetime when candidates come in with the object of getting a P.C. and making a career in the Air Force.

HUMAN FACTORS IN AIRCRAFT ACCIDENTS

DR W.T.V. ADISESHIAH

The infallibility of the mathematical universe is nowhere better illustrated than in the circumstances associated with aircraft accidents. Be it the error of commission or the fault by omission, nature awards a penalty and the severity of the penalty is as a rule commensurate with the gravity of the flaw. All accidents therefore make us stop and think at any rate, they ought to. The victim of the accidents should he be fortunate enough to survive, must figure out how the accident occurred and what could have averted it. Those not involved in the accident and even those not really concerned, would do well to think out safety measures for the avoidance of similar accidents in the future. Newspaper accounts of aircraft accidents lower the prestige of the service in the eyes of the public, and what is worse they have the effect of undermining that sense of security which is so essential for Service personnel who have to undertake missions of a hazardous nature.

ACCLIMATIZATION TO HEAT AND TROPICAL FATIGUE AMONG AIR FORCE PERSONNEL

M.K. MOOKERJEE, R.N. SHARMA

What human body is exposed to adverse atmosphere temperature the central and peripheral thermo-regulatory mechanism of the body adjusts dissipation or conservation of heat, in order to minimize the stress to maintain constancy of the internal environment. Although there is positive evidence of heat adaptation, majority of the reports deals with subjects who are not normally inhabitants of tropical countries or tropical subjects of doubtful nutritional standard. Some work in this line has been carried out on Armed Forces personnel by the Defence Science Organization and the present report is practically in continuation of the previous work.

Analysis of aircraft accidents rate during the last 4 to 5 years shows that the peak is always reached in the summer. There are many factors, which influence this high rate of accident both from man and machine point of view. All these factors remain to be critically analyzed before any definite conclusion can be drawn. Previous work on human efficiency can be expected and its relation with environmental temperature suggests that fall of efficiency can be expected while working under adverse environmental temperature (Mackworth 1950). It is well known that cockpit temperature of aircraft on the ground and during low level flying goes up considerably in summer and so does the air temperature at which the technicians service these aircraft. But it is not known to what extent it influences efficiency of these pilots or technicians. It may be pointed out here that the magnitude of stress involved is no less than in a marching soldier or a signal office man working in a hot room. Before the question of fall of efficiency is studied, it is desirable to know the physiological response to heat.

PARA MEDICAL AID

C.B.J. ALEXANDER

The employment of airborne troops as a specialized striking force in war is comparatively new in modern warfare. Exploits of these forces at Crete, Arnhem, Sicily, and the Rhine have added glorious chapters to the history of World War II. Medical units were formed, whose duty is was to accompany these forces into battles, thus maintaining the military medical principle that medical aid would be taken to the fighting soldier where ever he may be. This aid took the form of Parachute Field Ambulance, Surgical Teams, and Field Hygiene Sections. It is befitting the high ideals of military medicine that he first volunteer and subsequently the first Indian parachutist was a doctor. Shortly after World War II, the Royal Air Force introduced a Parachute Medical Team for air land rescue work. In 1951, the first Parachute Medical Team was formed in the Indian Air Force.

BINOCULAR VISION: SOME ASPECTS IN RELATION TO AVIATION

TG JONES

Binocular vision has been defined as the co-ordinated use of two eyes so as to produce a single mental impression. In its highest development, the blending of two images has into one result in the acquisition of stereopsis i.e., the perception of depth by parallax. Both eyes are harnessed together by static anatomical bonds and by dynamic anatomical bonds.

ROLE OF MEDICAL OFFICER IN THE I.A.F.

AJIT NATH

Medical Officer in the I.A.F. like his colleagues in the Army and Navy, one of the supporting arms of the men who fight. Our duty is to keep the men who fight in the air healthy and provide them all the medical requirements essential for their morale and efficiency. The duties regarding prevention of diseases, treatment of the sick and injured is very nearly the same in the three services. It is the medical problems of aviation which are so very different and unless one understands them it is difficult to appreciate the role of the duties of the Air Force medical officer.

It is a well known fact that military medicine has developed with the military environment of our times. In the last 20 years aerial warfare has created new problems for military medicine. To appreciate the part played the medical profession in the development of air power as a dominant force, a brief reference to the history of aviation is revealing.

SRINAGAR TO LEH

SHRINAGESH

The carriage of individuals suffering from certain types of illness and disabilities to unpressurised aircraft to hazardous to health and life. Among heart conditions it is inadvisable to accept individuals with Coronary occlusion or Angina Pectoris if attack has occurred within 60 days. Even after the lapse of this time, such patients have to be given special consideration. Whilst there is little apparent hazard when cardiac patients are transported at altitude below 5,000 feet without oxygen, at higher altitudes the mild degree of hypoxia plays a leading role in the causation of adverse effects. Above 5,000 feet and upto "reasonable " altitude additional oxygen is an essential requirement.

It might appear that the pressure cabin would solve all the problems of mild decompression, but in this particular instance certain peculiarities existed in the flight from Srinagar to Leh which required some consideration in view of the absence of detailed knowledge of the heart condition.

VARIATION OF BLOOD GLUCOSE IN MAN AT SIMULATED ALTITUDES BETWEEN 10,000 FT AND 30,000 FT IN DECOMPRESSION CHAMBER

MK MOOKERJEE, SK DASGUPTA.

It is well known that flying at high altitude causes both mental and physical evaluation. Cumulative effect of subacute Hypoxia was suggested as the cause by some workers, but repeated blood gas analysis and estimation of percentage of oxygen saturation by photo-electric method failed to present any evidence to that effect (Armstrong 1952). Similarly between the syndrome of anoxia and that of hypoglycemia, as far as C.N.S. is concerned has been proved (Eastern Gellborn 1938).

It has also been shown by the same author that hypoglycemia in the etiology of fatigue, investigation of lowered blood sugar level at lowered barometric pressure seemed indicated. Result of previous investigations carried out (Angelo and Forbes) failed to show any change of blood sugar when subjects were exposed to moderately low altitude (8,000 to 10,000 ft) for a long duration.

VOLUME 2

APRIL 1955

NO. 1

EFFECT OF TRAINING ON THE ABILITY TO RECOGNIZE OBJECTS MOVING AT HIGH SPEED

R BHATIA

It is known that in order to obtain a clear VISUAL definition of a moving object it is essential for its image to remain stationary on the retina for a brief period. When the relative velocity between the subject and his surroundings is low this is achieved by the eyes executing pursuit movements, which are reflex in nature and which help in keeping the image of the surroundings stationary on the retina. However, at high velocities the reflex fails thereby causing the image of the object to move across the retina with consequent deterioration in visibility. This is, in fact, the reason for the poor visibility of terrestrial objects from modern aircraft flying at high speed.

During the course of certain experiments on visibility of moving objects it was observed that it was sometimes possible to attain clear visibility (for fraction of a second) of no object moving at a high angular velocity. The question arose whether this ability to see fast moving objects momentarily could be improved by training and so the present laboratory investigation was undertaken to determine this point.

**SOME LIMITATION FACTORS IN DIVE BOMBING
(With special reference to human aspects)**

M .M. SHRINAGESH

Dive bombing received greatest notoriety during the early phases of World War II with the much publicized successes of the JU 87's (Stukas) which paved the way for the advance of German Panzer Divisions across Europe and enabled an Air Army to occupy the well defined island of Crete.

In these days of Jet aircraft, dive bombing still has some place in both strategic and tactical planning. With the increased speeds of modern aircraft an examination of some of the limiting factors of this method of carrying the war to the enemy is not out of place, especially as a number of lives and valuable aircraft are lost during the process of dive bombing training and tactics evolution.

EPIDEMIOLOGY OF AIR TRAVEL

J.K. SEHGAL

Time taken to fly from one country to another is now so short that infectious diseases can be easily carried back and forth by insect vectors and passengers. The incubation period of most infectious diseases varies from 5 to 14 days. A passenger carrying infection can be do a round-the-world trip these days without the disease becoming manifest. Therefore, in this air age, every county of the world must take adequate sanitary precautions against this new risk of infection.

EFFECTS OF SPEED AND LOAD ON THE PSYCHOMOTOR PERFORMANCE OF SIGNAL OPERATORS

DR W.T.V. ADISESHIAH

In any type of skilled performance, one will find a delicately graded pattern of movement, executed to response to some signals for action. It is generally believed that a well trained operator, proficient in the exercise of his skill, ought to be able to keep up his efficiency, even under stress, provided the amount of stress to which he is exposed does not exceed the limits of tolerance. Stress or no stress, his efficiency would depend on two factors

(1) Degree of Stability - This is indicated by the extent to which the operator is able to carry out some standard sequence of action at a steady, unfluctuating speed, without running ahead or lagging behind.

(2) Level of Accuracy – This would be at its peak if the operator executes every specific movement or action correctly, thereby accomplishing the particular purpose served by the skill. It will be necessary to ensure that no part of the action sequence is left undone and that its progress is not marred by error.

Stability and accuracy, then are the two basic components of efficiency in skilled performance even in situation which expose the operator to stress.

VOLUME 3

APRIL 1956

NO. 1

PSYCHOLOGICAL ASPECTS OF INSTRUCTOR PUPIL-PILOT RELATIONSHIP

M.Y.ALURKAR

Common complaints of the pupil-pilots, like headaches, air sickness and similar complaints psychological in origin, during the various stages of their flying training have some connection with Instructor/pupil-pilot relationship. The would-be pilots' efficiency and future career depend considerably on this relationship. It is not my intention to criticize any of the existing systems, but it is my earnest desire to make every one conscious of the psychological aspects of Instructors/pupil-pilot relationship which are so vital for efficient flying training.

INTRAVENOUS INJECTION OF OXYGEN

DR INDERJIT SINGH

Intravenous injection of oxygen is still in the experimental stage. It had attracted attention about 20 years ago, to counteract anoxaemia in pulmonary pneumonia, in case where oxygen by the pulmonary route was of no avail due to extensive consolidation and oedema of the lungs. The advent of sulpha drugs, however, drove pneumonia out, so that the subject did not receive much attention. The apparatus used in experiments on the subject was a pressure chamber for compression and decompression. This is a familiar apparatus used by aero-physiologists.

Intravenous injection of oxygen may be useful for victims of modern warfare. For example, one of the ways in which poison gas kills is to produce acute oedema of the lungs. Under such conditions the only way to oxygenate the blood is by injecting oxygen intravenously. There is no other method. In hydrogen war, the atomic radiation's might affect the lungs and produce oedema thereof. In that case also intravenous oxygen might be useful.

MODERN TRENDS IN AVIATION MEDICINEMM SHRINAGESH

Aviation Medicine is not a static science. As aeroplanes become more complex, fly faster and higher, Aviation Medicine progresses and expands often with staggering rapidity. I emphasize the dynamic nature of this relatively new Science in order to counteract previous tendencies which assume that what was good enough 5 or 20 years ago, will be good enough today or tomorrow.

It was not so very long ago that the very term "Aviation Medicine" had little meaning in India. Today, there is a growing realization that the conceptual entity, that this term stands for, is of considerable importance for the progress of Aviation. There is an ever growing consciousness amongst men who fly, even in India, that their progress and well-being is largely dependent on adequate and proper medical backing.

In some circles the practice of Aviation Medicine is narrowed down to aircrew and their immediate environment. In others, the environment is thought of purely in its physical attributes and its physiological effects on the human organism. In still others, emphasis is given solely to the maintenance of the physical fitness of flying personnel. The truth is that Aviation Medicine covers all these points of view and much more.

STUDIES ON RETINAL SENSITIVITY SHORTLY AFTER TAKE-OFF IN DARKNESSTG JONES, B. BHATIA

In night flying an efficient working of the visual mechanism for low levels of illumination is of particular importance at the time of take-off, the period immediately following it, and during landing. At the latter instance, the pilot has had time to adapt his eyes to the prevailing brightness throughout the course of the flight and should, therefore, be at little or no disadvantage. At the time of take-off, on the other hand, the situation is different. Due to the effects of previous and simultaneous illumination such as artificial lights in the flight offices and crew rooms at dispersal points, and from other unavoidable sources. It is usually assumed that the sensitivity of the pilot's

eyes at the time of take-off is considerably lower than its fully adapted threshold (Craik). This assumption had resulted in use of pre-flight adaptation, which according to Livingstone is of real value. It is impractical, however, to continue pre-flight adaptation during the taxiing phase. The effect of subsequent exposure to unavoidable lights on the airfield has not yet been ascertained. Further there is no report available in literature, which deals with the measurements of retinal sensitivity at the actual time of take-off and shortly afterwards. The present work is an attempt to fill these gaps.

BODY MEASUREMENTS IN RELATION TO COCKPIT DESIGN :

M.K. MOOKERJEE

MEDICAL ASPECTS OF PARATROOPER TRAINING :

C.B.J. ALEXANDER

VISCOUNT DEPRESSURISATION (British European Airways Report)

VISCOUNT G-AMOD LONDON/MILAN 28TH APRIL 1954

OBESITY IS DANGEROUS IN FLYERS

HAROLD W. ELLINGSON, FLYING SAFETY 12:22, APR 1956

VOLUME 4
NO.1

DECEMBER 1957

AVIATION MEDICINE RESEARCH

PROF. D.S. KOTHARI

SOME PROBLEMS OF MILITARY AVIATION

ARJAN SINGH

POST DECOMPRESSION SHOCK

K.K. MAJUMDAR

UNCONSCIOUSNESS IN FLIGHT

P.S. BAJWA

With the advent of high altitude and high speed flying, the incidence of impairment or loss of consciousness during flight appears to have increased. Recently 17 such episodes have been reported. The factors thought to be operative in those cases were :-

- (a) Previous or concomitant "G."
- (b) Hypoglycemia occurring a few hours after a light carbohydrate meal.
- (c) Hyperventilation of anxiety or anger.

It has been stressed in these reports that all these factors contribute to diminished cerebral activity and can cause unconsciousness which has been called **PHYSIOLOGIC UNCONSCIOUSNESS** by the authors. The incidence of such cases in the Indian Air Force, is not known. From the available evidence it appears that such cases are not very rare, although they are not reported for one reason or another. Further the possibility exists of such episodes playing a role in unexplained accidents.

SOME PERSONAL FACTORS IN FLYING TRAINING

S. ROY

HYPOXIA HELPED?

M.M. SHRINAGESH

VOLUME 5

JULY 1960

No 1.

**INAUGURAL ADDRESS, SIXTH ANNUAL AEROMEDICAL SOCIETY MEETING,
VIGYAN BHAWAN 21 FEB '59"**

SHRI V.K. KRISHNA MENON

PHYSIOLOGICAL PROBLEMS AT HIGH PRESSURE

PROF.J.B.S. HALDANE

**STIMULUS-RESPONSE COMPATIBILITY AND STRESS EFFECTS IN A ONE-
DIMENSIONAL COMPENSATORY TRACKING TASK**

H.G. GANGULI,

HUMAN PROBLEMS OF ESCAPE FROM JET AIRCRAFTAJIT NATH**PHYSIOLOGICAL TESTS AS AIDS TO DIAGNOSIS IN NEUROLOGY (A Case Study)**K.N.KOTHANETH,**DIETARY FATS & CORONARY DISEASES**J.K. SEHGAL,

Coronary disease is the most common cause of death due to heart disease countries today and claims immediate attention. It is true that the reported statistical increase in coronary in artery disease, is partly due to the higher proportion of older people, better methods of diagnosis and the greater interest in the disease. Another 40% of the increase in crude death rate can be ascribed directly to the changes in procedures and classification adopted with the sixth revision of the International Causes of Death. Taking the above factors into consideration at least 15% of the increase in the death rate can be attributed to coronary artery disease.

VOLUME 6**OCTOBER 1961****NO.1****THE ROLE OF THE AIR FORCE MEDICAL OFFICER IN THE FLYING SAFETY PROGRAMME**N.K. SHITOLEY, D.F.C.**BIOMEDICAL PROBLEMS IN ORBITAL AND SUBORBITAL MANNED SPACE FLIGHTS**C.A. VERGHESE

The recent successful orbital and suborbital manned space flights mark an exciting phase in space technology and space medicine. The space programme which gathered tremendous momentum with the ushering in of the International Geophysical year has kept its tempo ever after. During this short span many satellites have been launched into space and some of them brought back successfully. They gave useful data about the upper atmosphere and space, and also helped in solving different problems associated with launching, orbiting, and re-entry. In an orbital or suborbital flight, from count down to safe rescue, the cosmonaut is subjected to different types of stresses. These stresses are mainly due to (a) excessive acceleration, (b) extreme temperatures, (c) weightlessness, (d) radiation, and (e) problems of pressure and oxygen and (f) necessity for escape during a malfunction of flight system.

BODY MEASUREMENTS AND CRITICAL DIMENSIONS OF SINGLE SEAT FIGHTER COCKPIT FOR I.A.F

MULK RAJ

We have reached a stage in military aviation in India, where we shall increasingly depend on indigenous production for our operational aircraft. In so progressing, we must keep in view the larger aim that man must be integrated with the aircraft in such a manner that the man-machine team operates at peak efficiency. The realization of the full potential of this team can only be effected if full consideration is given to factors, which facilitate handling of the aircraft and ensure the safety and comfort of the operator. Of these factors one of the most important is the efficient design of the workspace. The workspace assumes a critical importance in fighter aircraft, as the weight and size affect both the performance and the economics of fight. The main effort in the design of a fighter workspace is therefore focussed on the necessary compromises between human comfort and efficiency and the optimum space for aircraft performance. It is true that the aircraft designer must exercise judgement in the choice of design limits. The general rule in the Air Force design of cockpits is that it accommodate at least 90% of personnel. According to Hertzberg, experience shows that the remaining 10% can also manage by accepting some extra discomfort, especially the last 2%. It is generally known and confirmed by sporadic anthropometric surveys that the average Indian is smaller than the average European. The aim of this project is to determine optimum size of a fighter cockpit, which would not only accommodate our pilots of various body sizes, but would also ensure them ease of operation, safety and comfort.

A REVIEW OF OPHTHALMIC EXAMINATIONS CARRIED OUT AT A.F. CENTRAL MEDICAL ESTABLISHMENT

TG JONES, M.C.

This paper will be restricted to an analysis only of the visual acuity and refraction, as determined in the ophthalmic examinations carried out at the Air Force Central Medical Establishment from June 1956 to July 1959. During this period 2, 266 ophthalmic examinations were recorded; of these the refraction details of 1,941 cases or 3,882 eyes were available for analysis.

PRELIMINARY INVESTIGATIONS ON B.M.R. AND BODY FAT ESTIMATIONS OF SUBJECTS EXPOSED TO HIGH INTENSITY SOUND”,

C.S.NAIR, C.A.VERGHESE,

The Basal Metabolic Rates of field service mechanics working on jet aircraft in the age group 30 to 50 are determined ; and the average value is found to be much lower than that of normal individuals of the same age group. The percentage body fat of the Joe t mechanics is found out by the skinfold technique using a pair of constant pressure calipers, the average percentage being 4.7, while the mechanics working on propeller aircraft of the same age and economic group have an average

percentage of 9.2. Probable explanations for these observations are given. Considerable amount of work by various investigators: Has been done on the auditory effects of the noise usually present in industrial centers. In general it has been found to cause permanent hearing loss, the impairment starting at a frequency of about 4,000 cps and gradually extending towards other frequencies. Auditory effects of noise on mechanics and maintenance personnel, showing progressive hearing loss, have been observed by P.Souvras. Souvras et al subjected animals to high intensity sounds, giving long exposures, and their results showed no change in general condition and weight, though the animals became deaf. By studying the histological changes in such animals, they showed that the colloid substance of the thyroid has shrunk and had become pale, Adrenal glands revealed evidence of great activity, with lipid excess in the fascicular zone. Exposure to jet engine noise showed an increase in the blood sugar content prolonged exposure to noise, however, induced no hyperactivity in the endocrine glands and this is attributed to adaptation to noise. Hematological changes^{8,9,10} in animals under noise exposure, showed a 20% decrease in the number of erythrocytes, when the exposure time is short; leucocytosis was also induced. No attempts have been made to determine either the B.M.R., or the percentage of body fat of people, who have been exposed to high intensity noise for many years. It was noticed during certain other investigations on maintenance personnel in aircraft hangers, that these individuals were invariably thin and complained of losing weight. This observation prompted the investigation.

THE MEDICAL EVALUATION OF AIRCRAFT

N.C. SARKAR.

In a well designed aircraft human and mechanical elements should be so integrated as to enable it to carry out its intended role with efficiency and safety. In aviation, to-day the achievements of the aerodynamics and the aeronautical engineer have pushed the machine to the limits of human capability, and in some instances have out stripped it. One of the chief objectives of Aviation Medicine is to define these limits, and to so adapt and so condition the human element, that efficient and safe performance beyond these limits is rendered possible, if necessary. No team evaluating aircraft can therefore be complete without a doctor trained in Aviation Medicine, and it will be incumbent on him to define the human limitations, and to assess how far the specifications have been

met in the final man-machine product, or how much more premium efficiency can be given over comfort and safety. In fact, it is most desirable that medical participation be associated with the production of an aircraft from the design stage. For the purpose of evaluation, the worst conditions that may possibly be encountered together with the maximum endurance of the aircraft should be taken into consideration. It is also essential to bear in mind that the aircraft should be capable of being flown by an average pilot, who has undergone a standardized pattern and period of training.

A CASE OF INSPIRATORY VALVE LEAK IN A PRESSURE BREATHING MASK (A131A),

B. BHATIA

AN UNUSUAL CASE OF DEAFNESS

V S N MURTY

This account is the description of an individual, who complained of deafness persisting in one ear after a trivial injury. The clinical diagnosis proved difficult. Nearly nine to ten months after the onset of the deafness, the individual was bitten by a snake and he was given anti-venin. This was followed by a severe reaction. Very soon after the reaction, he noticed that his hearing was restored, to near normal. The case is presented mainly because of its unusual nature.

VOLUME 7

APRIL 1962

NO.1

EXPERIENCES IN THE MOUNTAIN

N.S. BHAGWANANI

The Himalayas for ages have formed a part of our history and tradition. We have sanctified our mountains and called them by holy names. With devotion we look to them as – the abode of Gods. Now the time has come to go into them and guard them ; not merely worshipping them from a distance. Today our soldiers are scattered on the mountain frontiers at dizzy Himalayas heights.

THE INFLUENCE OF DIFFERENT SPECTRAL WAVELENGTHS ON ROD AND CONE SENSITIVITY UNDER CONDITIONS OF LOW ILLUMINATION

P.R.K. NAIR

In spite of vast improvements in radar and instrument flying, aircrew are dependent on some contact flying, even in the most advanced aircraft of today. For instance, formation flying and final stage of interception in combat flying and avoidance of collisions in commercial flying especially with increasing airport density, entail maximum air-to-air visibility at night, particularly under conditions of poor visibility (low illumination). In many missions, apart from the varied, requirements of visual tasks within the aircraft (general orientation, reading instruments, monitoring radar etc.) fine visual acuity outside the aircraft (target detection and identification, details of colour and terrain) may, indeed be critical. Proper choice of cockpit illumination therefore, has to be based on such varying visual requirements. Before dealing with the essential considerations for cockpit lighting, a discussion on certain characteristics of visual function in general will be relevant.

EFFECTS OF BREATHING 100% OXYGEN AT GROUND LEVEL ON BLOOD CLOTTING TIME AND PLATELET COUNT

C.S. NAIR

Blood clotting time and platelet count were determined on a group of normal healthy individuals of ages 20 to 30, exposed to 100% oxygen at ground level. Results show shortening of blood coagulation time and reduction of blood platelet count. No such changes were observed in control subjects who were fitted with mask and normal within a short time after oxygen breathing was discontinued. The results of these investigations conducted at ground level (680mm of Hg) is not applicable to aircrew who breathe 100% oxygen at much lower pressure.

A REVIEW OF OPHTHALMIC EXAMINATIONS CARRIED OUT AT AIR FORCE CENTRAL MEDICAL ESTABLISHMENT

TG JONES, M.C

In this paper the routine ocular muscle balance tests, as carried out at A.F. Central Medical Establishment from June 1956 to July 1959, are reviewed and analyzed against the background of the etiology of hetrophoria and the requirements for flying. The series covers 519 candidates for service and civil aircrew duties and 206 serving military and civil pilots.

MANAGMENT OF EPISODIC UNCONSCIOUSNESS - A REVIEW

D N GUPTA

Transient loss of consciousness is a vexatious symptom especially in flying personnel. The exact definition of unconsciousness is difficult, but it may generally be taken for our purpose, as a lack of or reduced awareness of the environment for a short duration. This ranges from (a) light headedness, reduced alertness, faints, classical syncope on one hand to (b) various ictal phenomenon on the other. The significance of the correct diagnosis, management, and disposal need not be stressed, especially in the case of aircrew.

DECOMPRESSION TESTING OF AIRCREW

H N DUTTA

Decompression testing is a laboratory procedure in which a person is subjected to a medically controlled " altitude environment at ground level known as the dempression chamber or altitude chamber where the ills of the flier under diminished atmospheric pressure can be evaluated without subjecting him to the actual inflight hazards and where accurate monitoring can be done without difficulty.

VOLUME 8

OCTOBER 1963

No 1

PYSCHOLOGICAL FACTORS IN EJECTION

S K MUKHERJEE

The phenomenal progress in aircraft performance capabilities in modern aviation has increased the magnitude and complexity of in flight escape problems in emergencies. This paper highlights the IAF ejection records with other air forces, recognition of the emergency, evaluation of the situation and descison, action, non standardization, seat separation and parachute deployment, fear and anxiety, habit interference, estimation of time, man machine engineering aspects, aircrew conditioning and educative programs.

EFFECT OF HYPOXIA ON DARK ADAPTED VISUAL THRESHOLD IN DIABETES

P M SUNDARAM

This report gives the results of an investigation into the relationship between visual perception and diabetes under conditions of hypoxia. The dark adaptation curves were plotted, using a Goldman Weekers adaptometer, of ten normal and ten diabetic subjects. Base line readings were taken at the ground level. Subsequently, they were exposed to a simulated altitude of 15,000 ft in a decompression chamber for half an hour without oxygen and the dark adaptation curve recorded. There was no significant difference in the ground level threshold between normal and diabetic subjects. At altitude the mean percentage rise in the final threshold was 116% in the case of normals and 220% in case of diabetics. This difference is probably due to retinal vascular changes associated with diabetes as also the failure of the retinal vasodilatory compensatory mechanism under hypoxia to come fully into play, due to changes in vessel walls associated with diabetes, causing diminished blood supply to the retina.

**ELECTRONIC TECHNIQUES FOR PHYSIOLOGICAL MEASUREMENTS AND
BIOLOGICAL ANALYSIS/ RESEARCH**

N MOHAN MURALI

In recent years electronics engineering has been applied to an increasing extent in medical research and experiments., especially in aviation medicine. Modern medicine has considerably developed its scientific aspect by the use of principles of general science. Both experimental and diagnostic conclusions must be based upon scientifically accurate quantitative data. Human senses are only semi quantitative and therefore inadequate. Hence, the senses must be supplemented with the instruments. The biologist and the physician have turned with this problem to the engineering faculty and this has brought the two professions concerned into partnership in the new field of medical electronics. This partnership will develop a new generation of medical instruments, apparatus, and equipment. This article briefly describes some electronic techniques used for physiological measurements and biological analysis research.

**ON THE ASSESSMENT OF EJECTION CHARACTERISTICS OF
PERSONAL SURVIVAL PACKS**

C A VERGHESE

In ejections from aircraft there is a necessity to limit accelerations produced during the ejection boost, so as to be below certain accepted values. A seat pack with improper characteristics could give rise to higher values of accelerations, and could produce a vertebral fracture in a subject, even when using the normally accepted cartridges. When a force is applied rapidly to an elastic mass, such as the seat pack- subject, a dynamic response is initiated in the mass. As pointed out by Frankland the displacement or acceleration at a point may range from a value equal to the average for the mass when the force static, to twice as great when applied instantaneously. It is observed by watts that the peak acceleration at a given point in a system depends upon the time of application of force, natural frequency and damping of the system.

RECORDING TECHNIQUES IN AEROSPACE MEDICINE

K K MAJUMDAR, C A VERGHESE

Electronic techniques of recording biomedical parameters are adopted in aerospace medicine both in actual flight and under simulated conditions. The factors which are significant for the aerospace medicine specialist in assessing the physiological state of the subject are (a) heart rate and ECG, (b) EEG (c) Blood pressure (d) temperature (e) blood and fluid distribution (f) electromyogram (g) blood oxygen saturation, (h) respiratory rate and depth and (i) respiratory gas composition. These are measured in conjunction with the physical variables of the flying or simulated environment. These techniques have been greatly instrumental in the rapid advancement of aerospace medicine. They have also helped in establishing the human tolerance to different types of flying stress, in imparting training to aircrew and others and in developing suitable protective equipment. Further, they have thrown considerable amount of light into human and animal physiology under stress.