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Glossary of Technical and Physiological Terms Related to Aerospace Oxygen Systems

RATIONALE

AIR171D has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

The scope of this document is to provide a list of specialized terms with their meanings. The glossary will assist the use of other documents related to aircraft oxygen equipment by defining ubiquitous terminology in context of this specialized field. The glossary contains terms of primary importance in the areas of chemistry, equipment, and physiology.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AIR825	Oxygen Equipment for Aircraft
AS8010	Aviator's Breathing Oxygen Purity Standard

2.2 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-PRF-27210	Oxygen, Aviator's Breathing, Liquid and Gas

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
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SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AIR171D

2.3 NACA Reports:

Available from NTIS, Springfield, VA 22161.

NACA-TN-3182 Manual of the ICAO standard atmosphere calculations by the NACA

3. DEFINITIONS:

ABSOLUTE PRESSURE: See Pressure, Absolute.

ABSOLUTE TEMPERATURE: See Temperature, Absolute.

ACAPNIA: A condition of diminished carbon dioxide in the blood; hypocapnia.

ACAPNIC: Suffering from acapnia.

ACIDOSIS, RESPIRATORY: A condition of the blood in which there is an increase of the carbonic acid of blood relative to the bicarbonate fraction with resultant decrease of pH; this occurs whenever elimination of carbon dioxide through pulmonary ventilation is impaired, as in respiratory obstruction, paralysis, pulmonary fibrosis, or other diffusion impairment.

ADAPTER: A mechanical means for connecting some part of one gas delivery system to another different gas delivery system.

ADIABATIC: Describes a process in which an energy change is accomplished on, or by a fluid, without heat transfer to or from the surroundings. See Compression, Adiabatic.

AEROEMBOLISM: (Archaic) Embolism due to air; may occur in surgery of head, neck and heart, induced abortion and severe decompression. Does not differentiate between trapped and evolved gas phenomenon. See Air Embolism.

AEROSOL: A colloid system in which the continuous phase (dispersion medium) is a gas. Normally, composed of liquid or solid particles usually 0.3 to 8 µm in diameter.

AIR, CABIN: Air flowing into the aircraft cabin, or air located in the aircraft cabin proper. The condition of cabin air is normally determined at the point where the air leaves the cabin.

AIR CONTENT, ALVEOLAR, DRY: See Gases, Respiratory.

AIR CONTENT, ATMOSPHERIC, DRY: See Gases, Respiratory.

AIR CONTENT, EXPIRED, DRY: See Gases, Respiratory.

AIR, BLEED: Air bled from the compressor of a gas turbine engine.

3. (Continued):

AIR, COOLING: A stream of air used as a heat sink.

AIR EMBOLISM: Embolism due to air; most frequently induced by transpulmonic pressure causing air insertion into one or more of the following: (1) arterial and hence cerebral gas embolism, (2) mediastinal and subcutaneous emphysema, (3) pneumopericardium, (4) pneumothorax.

AIR, RECIRCULATED: Air in enclosed spaces of environmentally controlled systems which is recirculated by fans or blowers.

AIR, STANDARD SEA LEVEL: Dry air at 15 °C (59 °F) and at a pressure of 101.3 kPa (29.92 in Hg) absolute.

AIR, REGENERATED: Air that has been conditioned by removing excess carbon dioxide, water vapor, odor, or other contaminants and, through the addition of oxygen, made suitable for breathing.

AIRWAY: (1) The anatomical path which air travels from the atmosphere to the alveoli (gas exchange areas of the lung). (2) Any passageway that serves primarily as a conduit for airflow. Particularly, in the process of human ventilation.

ALKALOSIS, RESPIRATORY: A condition of the blood in which there is a decrease of the carbonic acid fraction of blood relative to the bicarbonate fraction with resultant increase in pH; this occurs as a result of excessive elimination of carbon dioxide, as in hyperventilation.

ALTITUDE, DENSITY: The altitude corresponding to a given density in a standard atmosphere.

ALTITUDE, EQUIVALENT, OR CABIN: ICAO (International Civil Aviation Organization) standard altitude at which atmospheric pressure is equal to the cabin pressure.

ALTITUDE, PRESSURE: The altitude corresponding to a given pressure in ICAO standard atmosphere.

ALTITUDE, STANDARD: The altitude corresponding to the temperature and pressure as defined for an ICAO day and as tabulated in NACA-TN-3182.

ALVEOLAR AIR: Air surrounding the areas of actual gas exchange within the lung.

ALVEOLAR DUCT: A portion of the terminal air passages of the lung from which air sacs (alveoli) arise.

ALVEOLAR MEMBRANE: Thin layer of tissue which partitions the air in the alveoli from capillary blood, and through which gas exchange occurs between blood and alveolar air.

3. (Continued):

ALVEOLAR VENTILATION: Gas flow through the gas-exchanging regions of the lung, usually expressed as a rate. The volume of alveolar gas for a given breath is the difference between the tidal volume and dead space volume. Alveolar ventilation rate is the product of the alveolar ventilation and the breathing frequency.

ALVEOLUS (plural ALVEOLI): See Pulmonary Alveolus.

AMBIENT: Surrounding, or prevailing, i.e., ambient temperature.

ANEMIA: A reduction below normal in the number of erythrocytes (red blood cells) per unit volume of blood. Anemia is caused by a disequilibrium between red blood cell loss and production. The result is a decrease in the oxygen-carrying capacity of the blood.

ANEROID: A sealed, flexible, evacuated chamber that expands when exposed to a reduced ambient pressure and contracts when subjected to increased ambient pressure. See Control, Barometric.

ANOXEMIA: A reduction of oxygen content of the blood below physiologic levels.

ANOXIA: A total lack of oxygen; often used interchangeably with hypoxia to mean a reduced supply of oxygen to the tissues.

APNEA: See Respiration, Types of.

ARRHYTHMIA: Absence of rhythm, applied especially to any variation from the normal rhythm of the heart beat.

ARTERIAL BLOOD: Refers the blood found in the vessels (arteries) carrying blood away from the heart towards the tissues. Arterial blood is oxygenated, the normal exception being the blood in the pulmonary artery which is being pumped from the right ventricle of heart to the lungs for oxygenation.

ARTERY: A vessel through which the blood passes away from the heart to the various parts of the body.

ASPHYXIA: A condition due to lack of oxygen in respired air, resulting in impending or actual cessation of apparent life.

ASPIRATION: (1) Removal of accumulated mucus and foreign bodies from airway by suction. (2) To draw by suction into the airway, vomitus, food, secretions or excretions. May result in pneumonia as a result of the aspiration procedure. (3) The act of breathing or drawing in.

ASTHMA: Recurrent attacks of difficult breathing, with dyspnea (shortness of breath), cough, wheezing, and a sense of constriction of the chest.

3. (Continued):

ATELECTASIS: Partial or complete collapse, or imperfect expansion of the air sacs of the lungs; may include entire lobes or entire lung fields. May occur as a result of high G_Z exposure while breathing high concentrations of oxygen, particularly when wearing an anti-G suit.

ATMOSPHERE: (1) A mixture of gases surrounding the earth. (2) A mixture of gases surrounding an object or a person. (3) In expressing pressure of compressed gases, atmosphere is assumed to be 14.7 psia. Refer to Atmosphere, Standard.

ATMOSPHERE, STANDARD: Atmosphere in which: (1) the air is a dry perfect gas; (2) the temperature at sea level is 15 °C (59 °F); (3) the pressure at sea level is 101.3 kPa (29.92 in Hg) (760 mm Hg); (4) the temperature gradient from sea level to the altitude at which the temperature is -56.5 °C (-69.7 °F) is -0.006499 °C/m (-0.003566 °F/ft) and zero above that altitude; and (5) the density at sea level under the conditions described in 1 through 4 is 1.225 kg/m^3 (0.0765 lb/ft^3).

ATMOSPHERIC PRESSURE: See Pressure, Atmospheric.

ATOMIZER: Device to reduce a liquid or solid to small droplets, in the form of a spray. See Nebulizer.

ATPD: Ambient temperature and pressure, dry.

ATPS: Ambient temperature and pressure, saturated with water vapor.

AUTOMIX: A valve operated by barometric pressure which regulates the mixture of oxygen with ambient air to attain a percentage of oxygen according to altitude.

AVERAGE LUNG VOLUME: Average volume of gas within the lung and airways during respiration (residual volume plus expiratory reserve plus 1/2 tidal volume). See Lung.

BACK-UP OXYGEN: A secondary oxygen supply located on the aircraft to accommodate failure of the primary oxygen system. The supply may be activated manually, or automatically.

BAG, ECONOMIZER: A bag (connected to a mask) to which oxygen is admitted continuously at a fixed rate of flow, and which during expiration, is isolated from the mask by a check valve so that oxygen delivered to the bag during expiration is available for the next inspiration, thereby reducing the peak demand on the oxygen system.

BAG, REBREATHER: A bag connected through an open passage to a mask, so that oxygen delivered to the bag at a continuous fixed rate of flow becomes mixed with a portion of the expired gas, thereby providing a large volume of oxygen-enriched gas for the next inspiration, thus reducing the peak demand on the oxygen system and reducing the oxygen consumption by rebreathing a portion of each expiration.

3. (Continued):

BLACKOUT: A temporary condition in which vision is lost, due to an inadequate or lack of blood flow and the associated insufficient oxygen supply to the retina of the eyes, commonly induced by positive "G" forces of moderate intensity and duration. Blood pressure at the retina of the eye is equal to or less than intraocular pressure (eye pressure). An indication that "G" induced Loss of Consciousness is impending.

BAROMETRIC CONTROL: See Control, Barometric.

BENDS: A form of decompression sickness which is produced by evolution from solution of gaseous emboli (bubbles), primarily nitrogen, in and around the bending joints. Pain may be mild at onset, increasing in severity and may become intolerable. See Henry's Law.

BLEED AIR REGULATOR: A bleed air regulator is incorporated between the heat exchanger and the OEAS (oxygen enriched air system) concentrator in some OBOGS (on-board oxygen generation system) installations to prohibit excessive concentrator supply pressure, and to improve heat exchanger performance through flow reduction.

BLEED AIR SHUTOFF VALVE: The bleed air shutoff valve is a valve incorporated in some MSOGS (molecular sieve oxygen generation system) applications which is located in the bleed air line between the aircraft engine outlet port and the concentrator. It may be automatically and/or manually activated. Its purpose is to shut off bleed air to prevent conditions that may cause concentrator damage (such as an excessive temperature condition) or malfunction.

BLINKER: A type of oxygen flow indicator having a shutter that opens and closes during breathing.

BOTTLE, OXYGEN: See Cylinder, Gas.

BOYLE'S LAW: The volume of a gas is inversely proportional to pressure, temperature remaining constant.

BRADYCARDIA: Slowness of the heart clinically defined as a pulse rate less than 60/min. Also used to describe slowing of the heart rate below a normal value.

BRADYPNEA: See Respiration, Types of.

BREATH: The air taken in and expelled by the expansion and contraction of the thorax.

BREATHING: The alternate inspiration and expiration of air into and out of the lungs.

BRONCHI: (1) The bronchial tree and the bronchial lobes and segments considered together. (2) Genitive and plural of bronchus.

3. (Continued):

BRONCHIUM (plural BRONCHIA): One of the subdivisions of the bronchus, smaller than the bronchus and larger than the bronchioles.

BRONCHIECTASIS: Abnormal and chronic dilatation and infection of bronchial tubes and terminal air sacs and passage. Marked by fetid breath and paroxysmal coughing with the expectoration of mucopurulent matter.

BRONCHIOLE: A minute, thin walled branch of a bronchus, especially one that terminates in one or more alveolar ducts and alveoli.

BRONCHIOLITIS: Inflammation of the bronchioles, leading to bronchopneumonia.

BRONCHITIS: Inflammation and edema of the bronchial tubes leading to airway obstruction deep in the lung.

BRONCHOCONSTRICTOR: An agent that causes narrowing of the lumina of the air passages of the lung.

BRONCHODILATOR: An agent that causes an expansion of the lumina of the air passages of the lung.

BRONCHOSPASM: Spasmodic narrowing of the lumen of a bronchus associated with edema of air passages and air trapping.

BTPD: Body Temperature (37 °C or 98.6 °F), Ambient Pressure, Dry.

BTPS: Body Temperature (37 °C or 98.6 °F), Ambient Pressure, Saturated with water vapor (pH_20 - 47 mm Hg - 6.3 kPa).

CABIN, NONPRESSURIZED: An airplane cabin that is not designed, or equipped, for pressurizing and which will, therefore, have a cabin pressure equal to that of the surrounding atmosphere.

CABIN PRESSURIZATION: The process of producing ambient pressures within the cabin of an aircraft that are higher than outside ambient pressures. Aircraft pressurization (cabin altitude) schedules typically do not exceed the 8000 to 10,000 ft range.

CABIN, PRESSURIZED: An airplane cabin that is constructed, sealed, and equipped with an auxiliary system to maintain a pressure within the cabin greater than that of the surrounding atmosphere.

CANNULA, NASAL: A tube (or pair of tubes) designed to be inserted into one or both nostrils, for the administration of oxygen or other gases, or for sampling of respiratory gases.

3. (Continued):

CAPILLARY: A minute (6 to 8 µm diameter) thin-walled blood vessel, smallest of the blood-transport system. Capillaries constitute the interchange point between the circulatory system and the tissues, and connect the arterial system with the venous system.

CAPILLARY TUBE: (1) A small diameter tube inserted in a pneumatic or hydraulic system to produce a desired pressure drop. (2) A small diameter tube connecting a thermostatic or pilot valve with a bellows or diaphragm in a control device.

CARBON DIOXIDE (CO_2): An odorless, colorless gas which neither burns nor supports combustion. It is one of the chief products of combustion of carbon-containing substances. It is an end product of the living metabolic processes in the body. It is excreted in exhaled air.

CARBON MOLECULAR SIEVE: A concentrator utilizing carbon, or an activated carbon, matrix as the adsorbent for the separation of a mixture of gases.

CARBON MONOXIDE (CO): A colorless, odorless, toxic gas usually resulting from combustion of carbonaceous compounds in an insufficient supply of oxygen.

CENTRAL NERVOUS SYSTEM (CNS) DISORDERS: In context of physiological problems in aviation central nervous system disorders are a form of decompression sickness characterized by a gas (usually nitrogen) evolving from solution and finding its way to and causing decrement of function of the spinal cord and/or brain. See Neurological Decompression Sickness, Neurological Manifestations, and Henry's Law.

CHARLES' LAW: Under constant pressure, the volume of a gas varies proportional to temperature. Also known as Gay-Lussac's Law.

CHEMICAL OXYGEN GENERATOR: A device containing a compound with chemically bonded oxygen which, when properly activated, will produce a supply of gaseous oxygen at a purity, rate, and quantity suitable for breathing.

CHEYNE-STOKES RESPIRATION: See Respiration, Types of.

CHOKES (TRUE): A form of decompression sickness where a gas (usually nitrogen) evolves from solution in the lung area, causing respiratory distress, a dry non-productive cough, sharp pain in the chest, a sense of suffocation, and/or severe substernal pain. See Henry's Law.

CLOSED CIRCUIT SYSTEM: See Rebreather System.

COMPLEMENTAL AIR: See Reserve, Inspiratory.

COMPLIANCE: Compliance is a measure of the distensibility of the chest and/or lungs, and is expressed as volume change per unit airway pressure change. Compliance changes as the lung is inflated or deflated.

3. (Continued):

COMPOSITION CONTROLLER: A device incorporated in some molecular sieve oxygen generator (MSOG) systems to limit the oxygen concentration in the breathing gas supply to an upper bound. It is operational at ground level and above. Its purpose is to prevent, or minimize, the occurrence of acceleration-induced lung collapse (atalectasis) at an aircraft pressure altitude range where high-G maneuvers are possible and routinely performed.

COMPRESSION, ADIABATIC: Compression of a gas or mixture of gases without transmission of heat to or from it.

COMPRESSION, ISOTHERMAL: Compression of a gas or mixture of gases with removal of sufficient heat to maintain a constant temperature.

COMPRESSOR: A device in which work is done on a fluid (liquid or gas) to raise its total pressure.

CONCENTRATION: The amount of a given constituent present in a unit volume. May be expressed as a ratio, as a percentage, or in parts per million.

CONDITIONER: A device that warms, purifies, humidifies, or medicates inspired air.

CONDITIONING, AIR: The simultaneous control of all, or at least the first three, of the following factors affecting both the physical and chemical conditions of the atmosphere within a structure: temperature; humidity; motion; distribution; pressure; dust; and bacteria.

CONTAINER: See Cylinder, Gas.

CONTROL, BAROMETRIC: A method of control that depends on the barometric pressure of the atmosphere. See Aneroid.

CONTROL DIFFERENTIAL PRESSURE: A method of control that limits the maximum pressure differential between cabin pressure and atmospheric pressure and maintains this differential at all altitudes above those of the isobaric control. When operating, the differential control always overrides the isobaric control.

CONTROL, ISOBARIC: A method of control that maintains essentially constant cabin air pressure.

CONTROL, MANUAL: A control device regulated by hand.

COSTAL BREATHING: See Respiration, Types of.

COUPLING, AUTOMATIC OUTLET: An oxygen connection which when disconnected automatically closes a valve to prevent loss of oxygen, and reopens when reconnected.

CPR: Cardiopulmonary Resuscitation. Emergency procedure for reviving heart and lung function.

3. (Continued):

CREWMEMBER: A person assigned to perform duty in an aircraft during flight time.

CRITICAL POINT: That point at which liquid and vapor have identical properties; critical temperature, critical pressure, and critical volume are terms given to temperature, pressure and volume at the critical point. Above the critical temperature, gas cannot be liquefied by pressure alone. Critical pressure is saturation pressure corresponding to critical temperature.

CYANOSIS: A bluish-gray tinge in the color of mucous membranes and skin (usually first noticeable in the lips, ear lobes, and nail beds) associated with blood oxygen deficiency. Usually caused by the presence of excessive amounts (5 g or more per 100 cc blood) of reduced hemoglobin in the capillaries. Seldom recognized in subjects with less than 10 g hemoglobin per 100 ml blood.

CYANOTIC: Showing signs of cyanosis.

CYLINDER, GAS: Common name in aviation for a container of pressurized gas; may be portable or fixed to the aircraft, low or high pressure. Also called bottle, vessel or container. The terms flask and tank are seldom used in reference to aircraft gaseous systems.

DALTON'S LAW: The scientific principle which states that the pressure exerted by each gas present in a mixture is independent of other gases in the mixture, and that the total pressure of the gas mixture is equal to the sum of the separate pressures which each gas would exert if it alone occupied the entire volume.

DEAD SPACE: The volume of the respiratory system that is ventilated during breathing, but in which no gas exchange takes place.

DEAD SPACE, ANATOMICAL: The dead space volume associated with all non-gas-exchanging or conducting airways in the lung.

DEAD SPACE, MECHANICAL: The dead space volume associated with a breathing apparatus, such as an oxygen mask or respiratory valve.

DEAD SPACE, PHYSIOLOGICAL: A calculated or virtual, rather than an actual topographic value, that accounts for the difference between the pressures of CO_2 in mixed expired and alveolar gas (or arterial blood). The value expresses the degree of nonuniformity in the ventilation/perfusion ratios within the lung.

DECOMPRESSION: This term commonly refers to the loss of pressurization of an aircraft cabin or cockpit. When the decompression occurs in 1 s or less, it is termed an explosive decompression.

3. (Continued):

DECOMPRESSION SICKNESS: One or more physiological and physically adverse conditions produced by the evolution (expulsion) of gas (usually nitrogen) from tissues and fluids in the body as a direct result of a rapid drop in ambient pressure. Evidence exists that this can occur by reducing the barometric pressure by one-half of that to which a body is acclimated. See Henry's Law, Bends, Chokes (True)(False), Parasthesia, and Central Nervous System Disorders. Manisfestations include: (1) Bends: Manifestations of mild to severe pain, usually in the larger joints, due to gaseous nitrogen evolving from solution and collecting in the joints. (2) Chokes: Deep and sharp pain centrally located under the sternum due to gaseous nitrogen evolving from the blood and locating in the smaller blood vessels of the lungs and producing a dry, nonproductive cough. (3) Neurological Manifestations: The effects of nitrogen evolving from the blood and locating in the brain or spinal chord. Symptoms may include blurred vision, blind spots, flickering lights, headaches, or unilateral numbness or tingling. (4) Skin Manifestations: The effects of nitrogen evolving from the blood and locating in the subcutaneous tissue. Symptoms may include itching, hot or cold sensations, tingling, or appearance of a mottled rash.

DEMAND SYSTEM: An oxygen system using demand regulators. See Regulator, Demand.

DENITROGENATION: The reduction of the nitrogen concentration in the body by respiring 100% oxygen over a period of time in an attempt to promote the diffusion of nitrogen from the blood to the lungs, thereby eliminating much of the nitrogen dissolved in the body tissues.

DENSITY: The relationship between the weight of a substance and its volume.

DENSITY, MASS: The mass of any substance per unit volume.

DEW POINT: See Temperature, Dew Point.

DEWAR FLASK: A glass or metal container having an evacuated space between inner and outer walls. The design is commonly used for storing liquified gases.

DIAPHRAGM: (1) The muscular sheet which separates the thorax from the abdomen and is contracted to facilitate inspiration. (2) A thin membrane which, in a pressure-reducing (or demand) regulator, separates the gas being controlled from ambient atmosphere.

DIAPHRAGMATIC BREATHING: Respiration produced solely by use of the diaphragm. See Respiration, Types of.

DIFFUSION, GASEOUS: The movement of gas molecules from a region of higher partial pressure to a region of lower partial pressure.

DIFFUSION, RANDOM: The spontaneous movement of molecules or other particles in a region, owing to their random thermal motion, to reach a uniform concentration throughout the region.

3. (Continued):

DILUTER: A device for mixing atmospheric air with oxygen. See Automix.

DILUTER-DEMAND: See Regulator, Diluter-Demand.

DISTAL: At the greatest distance from a central point; peripheral.

DYSBARISM: A general term applied to any clinical syndrome caused by a difference between the surrounding atmospheric pressure and the total gas pressure in the various tissues, fluids, and cavities of the body. In aviation, term is normally used in the context of decompression sickness.

DYSPNEA: See Respiration, Types of.

ECONOMIZER BAG: See Bag, Economizer.

EDEMA, PULMONARY: An excessive accumulation of fluid in pulmonary areas containing alveoli, thus interfering with gas exchange. It is often caused by left heart failure and/or loss of oncotic pressure.

ELASTANCE: Elastance is the reciprocal of compliance and measures the increase of airway pressure for a given increase of lung volume.

EMBOLISM: Refer to Embolus. The occlusion of a blood vessel by an embolus.

EMBOLUS: Undissolved material, such as a clot, plug, fat globule, or gas bubble, carried by the blood from one vessel and forced into a smaller one so as to occlude or obstruct the circulation.

EMERGENCY OXYGEN: Oxygen normally used upon ejection from the aircraft. May also be used as an emergency source of oxygen in the event of the failure of the bleed air supply or OBOGS (on-board oxygen generation system).

EMPHYSEMA: A pathological condition of the lung characterized by reduction or loss of elastic fibers, ruptured alveolar walls and decrease in the pulmonary bed, regardless of cause.

ENDOTHERMIC: A chemical reaction in which heat is absorbed.

EQUILIBRIUM, MASS: A state of balance; a condition in which the quantity of materials taken into a body or system are balanced by corresponding quantity of materials given off.

ERGONOMICS: Human factors engineering which deals with machine design and workspace environments to make them compatible with human capacities and limitations.

ESOPHAGUS: The portion of the digestive conducting canal between the throat and the stomach.

EUPNEA: See Respiration, Types of.

3. (Continued):

EXHALATION: See Expiration.

EXOTHERMIC: A chemical reaction in which heat is released.

EXPIRATION: The expulsion of air from the lungs ordinarily due to relaxation of the diaphragm and thoracic muscles. However, expiration can also be forced with active muscular effort, and this is in fact used in pressure breathing when the expiration is the more active phase of respiration.

EXPIRATORY RESERVE: See Reserve, Expiratory.

EXPIRATORY RESISTANCE: The dynamic pressure differential related to a unit expiratory flow change. Also see Inspiratory Resistance.

EXPLOSIVE DECOMPRESSION: A very rapid reduction of air pressure inside an aircraft, coming to a new static condition of balance with the external pressure. A rapid cabin pressure drop during which a substantial over-pressurization and coincident damage to the lungs is experienced. A change in cabin pressure faster than the lungs can decompress. Generally, any decompression which occurs in less than 0.5 s.

EXTERNAL RESPIRATION: See Respiration, Types of.

FIBRILLATION, VENTRICULAR: Heart condition in which the ventricular beat is rapid, irregular, and ineffective. The spontaneous contraction of individual muscle fibers (fibrils) leads to irregular and ineffective beats without propulsion of blood. If persistent, this is rapidly fatal.

FALSE CHOKES: Dryness of the throat and coughing resulting from prolonged breathing of aviator's oxygen. This is not decompression sickness and is distinguished from true chokes by the lack of pain in the chest.

FILTER: A device serving to remove unwanted entities from a gas or liquid stream.

FILTER, AIR: A device for removing dust or other foreign particles or contaminants from air.

FILTER, SINTERED: A filter made by sintering together minute globules of metal (or ceramic) forming tortuous passages through which gas can flow, but particulates cannot.

FIRE-RESISTANT: (1) With respect to sheet or structural members, the capacity to withstand heat at least as well as aluminum alloy in dimensions appropriate for the purpose for which they are used; not readily ignited, requiring considerable heat input for ignition and flame formation. (2) With respect to fluid-carrying lines, other flammable fluid system parts, wiring, air ducts, fittings and powerplant controls, the capacity to withstand heat at least as well as aluminum alloy, in dimensions appropriate for the purpose for which they are used, under the heat and other conditions likely to occur at the place concerned.

3. (Continued):

FITTING, TUBE: A self-contained detachable device including a fluid passage for attaching or connecting fluid-carrying lines.

FLAME-RESISTANT: Not susceptible to combustion to the point of propagating a flame, beyond safe limits, after the ignition source is removed.

FLAMMABLE: With respect to a fluid or gas, susceptible to igniting readily or to exploding. Readily ignitable and burning rapidly or very rapidly as in an exploding combustion.

FLASH-RESISTANT: Not susceptible to burning violently nor rapidly when ignited.

FLOW INDICATOR: A device for indicating that breathing gas is flowing through a regulator, or to a mask. May be one of several types, such as a float-type (piston or ball), a vane which is deflected by the flow of gas, a rotating vane-wheel type, a blinker, or a gauge showing pressure drop across an orifice.

FLOW, LAMINAR: Smooth flow of a liquid or gas within a tube characterized by all particles flowing in layers parallel to the wall of the tube at linear flow rates that increase towards the center.

FLOW, MASS: The mass of a liquid or gas that flows through a passage of any given section during a unit of time.

FLOW, STEADY: A continuous flow of constant quantity under the prevailing condition.

FLOW, TURBULENT: Irregular and disorderly flow of a fluid, in which the particles making up the fluid do not move along lines parallel to the walls of the tube.

FLOW, VOLUMETRIC: The volume rate of fluid flow at a specified temperature and pressure expressed in volume units per unit of time.

FUNCTIONAL RESIDUAL CAPACITY: See Lung Capacities.

GAUGE, PRESSURE: An instrument that shows (typically by means of a pointer and dial) the pressure at a given point in a system. May be calibrated to allow either gauge pressure or absolute pressure.

GAUGE, QUANTITY: An instrument similar to a pressure gauge, except that it is calibrated to read the quantity of gas or liquid remaining in the storage container.

GAS: A material in the state of matter such that it has no fixed shape and its volume is controlled by the volume of the container in which it is confined.

3. (Continued):

GASES, RESPIRATORY, COMPOSITION OF: See Figure 1 (these are average values).

INSPIRED AIR			@ ALVEOLAR		EXPIRED GASES	
Gas	Vol. % Dry Gas	Variable mm Hg	Vol. % Dry Gas	Saturated @ 37°C mm Hg	Vol. % Dry Gas	Saturated @ 37°C mm Hg
H_20	--	~6	--	47	--	47
N_2 & Ar	79.0	596	80.4	573	79.2	565
0_2	20.9	158	14.0	100	16.3	116
$C0_2$	0.0	0	5.6	40	4.5	32
TOTAL	100.0	760	100.0	760	100.0	760

FIGURE 1 - Composition of Respiratory Gases

GASKET: The flexible sealing element in a stationary or static fluid seal.

GAY-LUSSAC'S: With constant pressure, the volume of a gas varies directly with temperature. Also known as Charles' Law.

GASEOUS OXYGEN SYSTEMS: Provide facilities to store gaseous oxygen in cylinders at either high or low pressure and to deliver it to aircraft occupants at a reduced pressure suitable for breathing. Basically consists of the following: cylinder(s), distribution tubing, direction valve(s), regulators, gauge(s), mask(s).

GRAHAM'S LAW: The rate of diffusion of a gas is directly proportional to the pressure and temperature and inversely proportional to the square root of the density (molecular weight) of the gas.

GRAYOUT: A temporary condition in which vision is hazy, restricted, or otherwise impaired, due to an inadequate or insufficient blood flow and the associated insufficient oxygen supply to the retina of the eyes, commonly induced by positive “G” forces of moderate intensity and duration. See Blackout.

HEAT EXCHANGER, MSOGS: Located between the pressurized air source and the oxygen enriched air system (OEAS) oxygen concentrator, the heat exchanger conditions the air supplied to the concentrator. Typically an air-to-air heat exchanger is used to limit air temperatures that would be too high for a breathing gas or which would be detrimental to molecular sieve performance.

HEMOGLOBIN: The iron-containing chemical compound in red blood cells that combines with oxygen, transporting it and giving it up as needed by body tissues. After releasing oxygen to the tissues, hemoglobin combines with carbon dioxide and transports it to the lung for exhalation.

3. (Continued):

HEMOGLOBIN, REDUCED: Hemoglobin from which oxygen has been removed.

HENRY'S LAW: The amount of gas dissolved in a solution is directly proportional to the partial pressure of the gas over the solution.

HERING-BREUER REFLEX: Reflexes originating in the lungs that tend to limit breathing excursion.

HOMEOSTASIS: The state of the body in equilibrium. The complex interaction of all systemic mechanisms whereby the body is kept in overall balance so that normal body functions are carried out.

HUMIDITY, RELATIVE: The ratio of the partial pressure of water vapor in the air to the partial pressure which saturated water vapor would exert at the same air temperature.

HUMIDITY, SPECIFIC: (Humidity Ratio) The weight of water vapor in air expressed in pounds or grains of water vapor per pound of dry air.

HUMAN FACTORS: The study of the physical, physiological, psychological, psycho-social, and pathological variables which affect humans' performance.

HUMAN FACTORS ENGINEERING: Application of the knowledge of human factors to the design and operation of devices, systems, and environments to optimize the safety, efficiency, and the general well-being of all persons who interact with them.

HUNTING: A term applied to the undesirable oscillation of a control device resulting in a poor degree of control. For example, a pressure reducing regulator which, instead of maintaining a constant output pressure, fluctuates cyclically from above to below the desired pressure.

HYPERCAPNIA: Excess carbon dioxide in the blood and body fluids, usually causing increased respiration. Also called hypercarbia.

HYPERPNEA: See Respiration, Types of.

HYPERTENSION: High arterial blood pressure defined by the World Health Organization to be greater than 165 mmHg systolic pressure and/or 95 mmHg diastolic pressure.

HYPERVENTILATION: See Respiration, Types of.

HYPOCAPNIA: Subnormal concentration of carbon dioxide in the blood, usually the result of hyperventilation. Also called hypocarbia.

HYPOPNEA: See Respiration, Types of.

HYPOTENSION: Low arterial blood pressure.

3. (Continued):

HYPOVENTILATION: See Respiration, Types of.

HYPOXEMIA: Oxygen deficiency in the blood. (Seldom used; superseded by Hypoxia.)

HYPOXIA: Oxygen want or deficiency; any state wherein a physiologically inadequate amount of oxygen is available to, or utilized by, tissue, without respect to cause or degree. See Anoxia.

INDICATOR, OXYGEN FLOW: A device that gives a signal (typically visual) when oxygen flows. See Flow Indicator.

INHALATOR: A device from which gaseous oxygen is inhaled, with or without pharmacological agents, for therapeutic purposes.

INLET, AIR: Openings or valves through which air is admitted to dilute the oxygen (as in a diluter-demand regulator or constant-flow mask).

INSPIRATION: Inhalation; the drawing-in of a breath by the expansion of the chest cavity, caused by contraction of the diaphragm and thoracic muscles.

INSPIRATORY RESERVE: See Reserve, Inspiratory.

INSPIRATORY RESISTANCE: The dynamic pressure differential related to a unit inspiratory flow change. Also see Expiratory Resistance.

INTERNAL RESPIRATION: See Respiration, Types of.

INTERSTITIAL: Situated between the cellular components of an organ or structure.

INTRAPLEURAL PRESSURE: See Pressure, Intrapleural.

INTRAPULMONARY PRESSURE: See Pressure, Intrapulmonary.

ISCHEMIA: Decreased blood flow through an area of tissue, body part, or organ.

ISCHEMIC HYPOXIA: Tissue hypoxia as a result of inadequate blood flow; such as in the brain. This can occur even in the presence of adequate ventilation and alveolar oxygen tension.

LAMINAR FLOW: See Flow, Laminar.

LARYNX: Upper part of the trachea, containing the vocal cords.

3. (Continued):

LIQUID OXYGEN: Liquid oxygen is a light blue, magnetic, transparent and water-like fluid that is produced by the fractional distillation of purified liquid air. When cooled to -182.9 °C (at 14.7 psia) oxygen passes from the gaseous to the liquid state. Standards documents MIL-O-27210 and AS8010 specify purity requirements for aviators' breathing oxygen.

LIQUID OXYGEN CONVERTER ASSEMBLY: A self-powered system for the storage of liquid oxygen and for its conversion to gaseous oxygen as and when required. Refer to AIR825 for liquid oxygen system details.

LOBECTOMY: Removal of a lobe of an organ or gland (usually refers to the removal of a lobe of the lung).

LIQUID OXYGEN SYSTEMS: Provide facilities to store and convert liquid oxygen to gaseous oxygen at a breathable temperature and pressure for aircraft occupants. Basically it consists of the following: converters (filler valve, heat exchanger, control valve, relief valve, distribution tubing, regulators), quantity indicator(s), shutoff valve(s), and other essential cockpit (or cabin) equipment.

LUMEN: The space in the interior of a tubular structure.

LUNG: The organ of respiration in which the venous blood receives oxygen from, and gives off carbon dioxide to, the air drawn through the trachea and bronchi into the alveoli.

LUNG CAPACITIES: (1) FRC - Functional Residual Capacity: The volume of gas remaining in the lungs following a normal expiration, average normal value of 2400 ml; often increases with age. (2) IC - Inspiratory Capacity: The maximal volume of gas that can be inspired following a normal expiration. (3) TLC - Total Lung Capacity: The volume of gas contained in the lung at the end of a maximal inspiration. (4) TVC - Timed Vital Capacity: A measure of the rate of emptying the lungs by forceful exhalation.

LUNG CAPACITIES: VC - Vital Capacity: The maximal volume of gas that can be expired from the lungs following a maximal inspiration.

LUNG VOLUME: (1) ERV - Expiratory Reserve Volume: The maximal volume of gas that can be expired following a normal expiration (end-expiratory position). (2) IRV - Inspiratory Reserve Volume: The maximal volume that can be inspired following a normal inspiration (end-inspiratory position). (3) RV - Residual Volume: The volume of gas remaining in the lungs at the end of a maximal expiration. (Also see Reserve and Residual items.) (4) TV - Tidal Volume: The depth of breathing; the volume of gas inspired or expired during each respiratory cycle.

MANOMETER: An instrument for measuring the pressure of liquids and gases by the height to which pressure raises a liquid.

3. (Continued):

MASK: A dispensing device and/or protective covering applied over part or all of the face to provide adequate respiratory gas to the wearer and, in some cases, to prevent inhalation of the gases in the atmosphere surrounding the wearer. (1) Fullface: Covers not only nose and mouth, but entire face including forehead, chin, and cheeks. (2) Oronasal: Covers nose and mouth; some types also cover chin. (3) Nasal: Covers nose only.

MINUTE VOLUME OF RESPIRATION: Volume of air inspired and then expired in 1 min (tidal volume x breaths/min).

MOLECULAR SIEVE: (1) A gas separation concept used in MSOGS (molecular sieve oxygen generation system). The sieve utilizes a preference adsorption medium that retains nitrogen molecules and allows molecules of oxygen and argon to pass through thus providing oxygen enriched breathing gas. (2) Materials that are crystalline zeolites that are used as adsorbents for gases and liquids. (3) A specific zeolite of sodium calcium aluminosilicate modified for nitrogen-oxygen separation in the MSOGS. (4) Materials having pores with physical dimensions in the order of magnitude characteristic of individual molecules and suitable to permit differential adsorption of some gases from a gas mixture.

MOUTHBIT: See Mouthpiece.

MOUTHPIECE: A device designed to be held in the mouth by the teeth and/or lips through which ventilatory gases are carried by respiration.

MOLECULAR SIEVE OXYGEN CONCENTRATOR: A type of oxygen concentrator that processes air through molecular sieve beds to provide an oxygen enriched breathing gas by a process of pressure swing adsorption.

MOLECULAR SIEVE OXYGEN GENERATION SYSTEM: An on-board oxygen generation system (OBOGS) that uses a pressure swing molecular sieve oxygen concentrator as the source of oxygen enriched breathing gas. Pressurized air may be obtained from engine bleed air or other compressed air sources.

MTBF: Mean Time Between Failures; see Probability of Failure.

MTBUR: Mean Time Between Unscheduled Removals; see Probability of Failure.

NEBULIZER: Type of atomizer that produces a uniform fine mist of medicament for inhalation, removing the larger droplets, usually by baffling, permitting only a mist of uniform droplet size (usually 3 to 5 µm) to emerge. See Atomizer.

NEGATIVE MASK PRESSURE NEUROLOGICAL DCS: See Pressure. See Central Nervous System Disorders.

3. (Continued):

NITROGEN: A colorless, odorless gas that does not sustain combustion. A non-metallic element existing free in the atmosphere of which it constitutes about 77% by weight. Also available in liquid form at -195.6 °C (-320 °F).

NTPD: Normal temperature (21 °C, 70 °F) and pressure (760 mm Hg, 14.7 psi, 101.3 kPa), dry.

ON-BOARD OXYGEN GENERATION SYSTEM: Provides facilities for generation and delivery of breathable oxygen to the aircrew onboard the aircraft through utilization of aircraft resources of bleed air and electrical power. Examples include: MSOGS, permeable membrane, and electrochemical.

OXYGEN ENRICHED AIR SYSTEM: Equipment that is common to all molecular sieve oxygen generation system (MSOGS) equipped aircraft. Consists of the molecular sieve oxygen concentrator, breathing regulator, composition controller (if required) and oxygen monitor (if required).

ONCOTIC PRESSURE: The osmotic pressure of the blood protein, lymph colloids and electrolytes in the vascular system.

ORIFICE: An opening, intended for the passage of a fluid, having a fixed diameter and flow coefficient and which may be calibrated to pass a desired volumetric flow at the anticipated pressure differential.

OVERTEMPERATURE SENSOR: The sensor located in the pressurized supply air line between the heat exchanger and the OEAS (oxygen enriched air system) oxygen concentrator. When used, the sensor will activate a warning signal in the cockpit if the temperature of the air supplied to the concentrator exceeds a preset level, and may activate the OBOGS (on-board oxygen generation system) bleed air shutoff valve.

OXIMETER: A device for measuring the oxygen saturation by determining the ratio of reduced hemoglobin to oxyhemoglobin in the arterial or venous blood.

OXYGEN: A colorless, tasteless, odorless gas, constituting approximately one-fifth of the earth's atmosphere; it supports combustion and is essential to life. It combines with most elements, and is carried in the blood by hemoglobin and in solution (PaO_2) from the lungs to the tissues. Also available in liquid form which vaporizes into gaseous oxygen.

OXYGEN CONCENTRATOR: The component of the OBOGS (on-board oxygen generation system) that processes air to provide an oxygen enriched breathing gas.

OXYGEN DISSOCIATION CURVE: A graph that indicates the amount of oxygen which will be given up by the hemoglobin at different oxygen tensions. This varies with pH, carbon dioxide tension, and body temperature.

OXYGEN METER: A device for measuring either the fraction of oxygen or the partial pressure of oxygen in air or other gas mixture.

3. (Continued):

OXYGEN MONITOR: The component of the on-board oxygen generation system (OBOGS) which monitors the partial pressure of oxygen in the breathing gas delivered to the aircrew. May be used to warn the aircrew when the partial pressure of oxygen is below prescribed levels.

OXYGEN SATURATION OF THE BLOOD: Fraction of total hemoglobin which is in the form of oxyhemoglobin (equal to the amount of bound oxygen divided by the maximum amount of oxygen which can be bound by the hemoglobin).

OXYGEN SYSTEM, HIGH PRESSURE OXYGEN SYSTEM, LOW PRESSURE: A system for delivering oxygen where the supply contained in one or more bottles or cylinders at 1800 to 2200 psi (12.4 to 15.2 MPa). A system for delivering oxygen where the supply is contained in one or more bottles or cylinders at 400 to 450 psi (2.8 to 3.1 MPa).

OXYGENATION: The saturation of a substance with oxygen, either by chemical combination, chelation, or by mixture.

OXYHEMOGLOBIN: A hemoglobin molecule to which oxygen is attached or chelated.

P: Symbol for physiological partial pressure. PaO_2, $PaCO_2$, etc. - partial pressure of arterial oxygen, carbon dioxide, etc.

Pa: Arterial symbol, used to designate the source of blood gas, or other components of arterial blood, i.e., PaO_2, partial pressure of arterial oxygen tension; $PaCO_2$ arterial CO_2 tension, etc.

P_A: Alveolar symbol, used to designate alveolar gas tensions, i.e., P_ACO_2, alveolar CO_2 tension; P_AO_2, alveolar oxygen tension, etc.

PARASTHESIA: A form of decompression sickness where gas (usually nitrogen) evolves, forming bubbles under the skin and producing symptoms such as an itchy, gritty sensation frequently exhibiting a mottled red rash. Frequently associated with adipose tissue. Also known as Skin Symptom decompression sickness (DCS). See Decompression Sickness.

PARTIAL PRESSURE: See Pressure, Partial.

PEEP: Positive end expiratory pressure.

PERFUSION: The act of pouring over or through, especially the passage of a fluid through the vessels of a specific organ or body part.

PERICARDIUM: The membranous sac covering the heart.

PERMEABILITY: The property or state of being passable, i.e., permitting passage of a substance.

3. (Continued):

pH: Symbol denoting hydrogen ion concentration. By definition, a solution with a pH of 7.00 is neutral; one with a pH of more than 7.00 is alkaline; and one with a pH lower than 7.00 is acid. Normal blood pH is 7.35 to 7.44. Mean value - 7.38 at 37 °C (98.6 °F).

PHARYNX: The area between the cavities of the mouth and nose and the larynx and esophagus. The upper portion is usually termed the nasopharynx; the lower portion, the oropharynx or the hypopharynx.

PHYSIOLOGY: The study of the functions of living organisms and their parts.

PIPESTEM: A type of mouthpiece. See Mouthpiece.

PLENUM: An accumulation device which may be either an integral part of the concentrator or mounted on the airframe. It provides reserve breathing gas for periods when breathing rates exceed the MSOGS (molecular sieve oxygen generation system) breathing gas production rate. It also may provide breathing gas heat exchange with the cockpit to deliver a breathing gas at cockpit temperature.

PLEURA: A membrane enveloping the lungs (visceral pleura) and covering the inside of the thorax (parietal pleura). There is a pleura for each lung.

PLEURAL CAVITY: The potential space included between the parietal and visceral layers of the pleura; it is not an actual space unless opened.

PNEUMONECTOMY: Operative removal of an entire lung from either the right or left thorax.

PNEUMONIA: Inflammation of the lung with resultant fluid accumulation within the lung.

PNEUMOTHORAX: Abnormal presence of air or other gas in the pleural cavity sometimes leading to rapid death if unrecognized. The gas may be introduced in an "artificial pneumothorax" to collapse a lung to promote healing of tubercular lesions (obsolete), or the gas may enter through an external wound penetrating the thoracic wall, or through rupture of an alveolus or cavity of the lung or of an air sac or bronchiole.

3. (Continued):

PORTABLE DISPENSING EQUIPMENT: Usage designations: (1) Supplemental: An oxygen supply primarily for use when cabin altitude exceeds 10,000 ft (3048 m) and the cabin ambient air requires oxygen enrichment for physiological reasons during emergency cabin decompressions. (2) Protective Breathing: An oxygen or air supply used for protection against harmful gases; typically used during smoke, fire, and other emergency situations in flight. Provides protection to the eyes, mouth, and nose in order to protect the user from the effects of smoke, carbon dioxide or other harmful gases. Protection is required for both sedentary and active crew members. Some equipment in this classification is suitable only for sedentary crew members or low altitude non-decompression threat environments. (3) First Aid: An oxygen supply used for any medical emergency but also used for physiological treatment following cabin decompression and for the entire time that cabin pressure altitudes exceed 10,000 ft. (4) Medical (Therapeutic): An oxygen supply, often with up to 5% carbon dioxide added to enhance a breathing reflex, made available prior to flight, specifically for a passenger needing an enriched oxygen supply during the course of the entire routine flight. Typically airline and FAA approval is required. Caution: Medical oxygen may not meet aviation purity standards. Oxygen quantity and usage or flow is specified by the passenger's physician.

POSITIVE MASK PRESSURE: See Pressure.

PRESSURE: Pressure is defined as a measure of force per unit area.

Normally used as a modifier to designate a portion of a system or unit which is normally exposed to system pressure. The term pressure is considered to mean gauge pressure, as defined below, except where otherwise specified:

Pressure, Absolute: The total pressure above a vacuum of true zero pressure. Absolute pressure is atmospheric pressure plus the gauge pressure.

Pressure, Burst: The test pressure that a component or system must withstand without rupture.

Pressure Drop: The reduction in fluid pressure due to resistance to flow. When applied to a fluid control unit, pressure drop is measured between given ports of the unit at a given flow and does not include the loss of fittings which are installed in ports. (Normally, the value applicable to a complete flow pattern at rated flow, unless otherwise stated.)

Pressure, Gauge: Pressure as related to ambient atmospheric pressure.

Pressure, Minimum Operation: That pressure below which a mechanism may not operate (as in a pilot-operated valve which requires a certain minimum pressure for operation).

Pressure, Negative: Pressure lower than atmospheric.

Pressure, Output: In a pressure control device, such as a pressure reducer, the pressure that will be produced at the outlet port.

3. (Continued):

Pressure, Positive: Pressure greater than atmospheric.

Pressure, Proof: The pressure that a component must withstand as a production inspection test without damage, normally related to rated pressure.

Pressure, Rated: The nominal maximum input or operating pressure.

Pressure, Reseat: In a valve that closes itself against pressure, as in a check valve or relief valve, that pressure at which the valve will close itself so that flow rate recedes to a certain specified leakage.

Pressure, Service: Same as Pressure, Rated.

Pressure, Surge: The maximum magnitude of a transient pressure rise.

PRESSURE, ATMOSPHERIC: The pressure exerted by the gases that make up the earth's atmosphere. At sea level, 760 mm Hg, 14.7 psia, 1 atmosphere, or 101.3 kPa.

PRESSURE CONTROLLED RESPIRATOR: Pressure limit controls the cycling rate of the respirator.

PRESSURE-DEMAND OXYGEN SYSTEM: A demand oxygen system that furnishes 100% oxygen at higher than ambient pressure above a specified latitude (safety pressure usually initiates between 28,000 to 32,000 ft).

PRESSURE DIFFERENTIAL STATIC: The difference between the static pressures at two points in a fluid system.

PRESSURE DIFFERENTIAL, TOTAL: The difference between the total pressures at two points in a fluid stream.

PRESSURE DROP, TOTAL NONRECOVERABLE: The loss of total pressure between two points in a fluid stream equal to the total pressure differential.

PRESSURE, INTRAPLEURAL: The normally subambient pressure that exists within the potential or actual space between visceral and parietal pleura (between lungs and chest wall).

PRESSURE, INTRAPULMONARY: Alveolar pressure. The pressure of the air within the lungs, normally below atmospheric during inspiration and above atmospheric on expiration.

PRESSURE, PARTIAL: The pressure exerted by one gas in a mixture of gases; equal to the fraction or percentage of one gas in the mixture multiplied by the total pressure.

PRESSURE REDUCER: See Regulator, Oxygen Pressure.

3. (Continued):

PRESSURE RISE, DYNAMIC: The maximum static pressure increase developed by the momentum of a fluid stream when its velocity is reduced to zero.

PRESSURE, SAFETY: See Safety Pressure.

PRESSURE, STATIC: The pressure that would be measured by a probe having zero velocity relative to the fluid. Pressure measurement taken by the probe normal to the direction of motion of the fluid closely approximates this pressure.

PRESSURE, TOTAL: The sum of the static pressure and the dynamic pressure in a fluid system.

PRESSURIZING, CABIN: Increasing the pressure in a compartment above that of ambient pressure and controlling the pressure in said compartment.

PROBABILITY OF FAILURE: The rate of failure of a critical system or component in aviation is usually expressed as improbable or extremely improbable as defined below. The performance of an aerospace product or component is then tracked by its MTBF (mean time between failures) and MTBUR (mean time between unscheduled removals). These time relationships are then monitored. The terms improbable and extremely improbable below are often used.

1. Probable: Probable events may be expected to occur several times during the operational life of each airplane. A probability on the order of 1×10^{-5} or greater.
2. Improbable: Improbable events are not expected to occur during the total operational life of a random single airplane of a particular type, but may occur during the total operational life of all airplanes of a particular type. A probability on the order of 1×10^{-5} or less.
3. Extremely Improbable: Extremely improbable events are so unlikely that they need not be considered to ever occur, unless engineering judgment would require their consideration. A probability on the order of 1×10^{-9} or less. Used in the design of a system to define the probability of a failure; that is, a failure probability of one event in 1,000,000,000 flight hours. The likelihood of such a failure is expressed as "extremely improbable".

Figure 2 summarizes the relationship between the severity of consequences of an event and the probability of occurrence which is generally considered acceptable by airworthiness authorities.

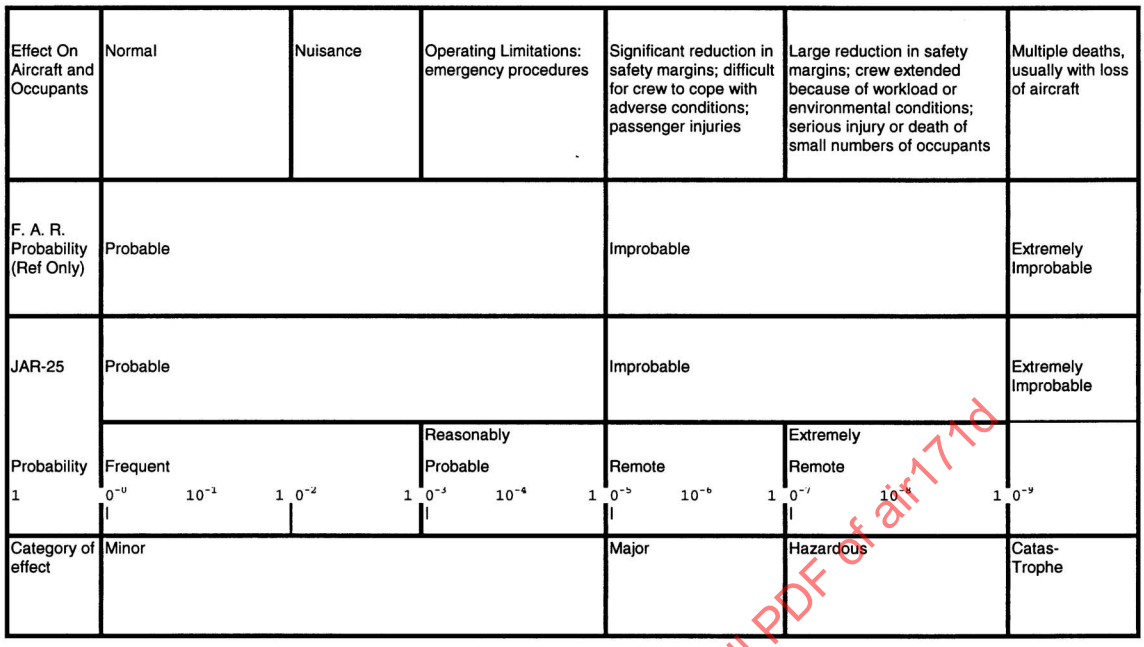

FIGURE 2

3. (Continued):

PULMONARY AIR: Air in the lungs. See Alveolar Air.

PULMONARY ALVEOLUS (Plural ALVEOLI): A small saclike dilatation along the walls of the alveolar sacs and alveolar ducts through the walls of which gas exchange takes place between alveolar gas and pulmonary capillary blood.

PULMONARY VENTILATION: Movement of air into and out of the lungs. See Minute Volume.

QUOTIENT, RESPIRATORY: The ratio of the volume of carbon dioxide produced to the volume of oxygen consumed in respiration. Theoretically, ranges from 0.7 to 1.0; average usually assumed to be 0.85.

RAPID DECOMPRESSION: A rapid reduction of air pressure inside an aircraft, coming to a new static condition of balance with the external pressure. Generally, any decompression which occurs in 0.5 to 20 s.

REBREATHER BAG: See Bag, Rebreather.