

AIR FORCE AEROSPACE MEDICAL RESEARCH LABORATORY



LINEAGE

STATIONS

Wright Patterson AFB, OH, 8 Sep 1979

ASSIGNMENTS

COMMANDERS

Maj Harry G. Armstrong, May 1935
Dr. J. William Heim (Acting), May 1940
Cpt Otis O. Benson, Sep 1940
Col W. Randolph Lovelace, Jun 1943
Col Lloyd Griffis, Oct 1945
Col Edward J. Kendricks, May 1946
LTC A. Pharo Gagge, Jun 1946
Col Walter A. Carlson, Dec 1949
Col Robert H. Blount, Jul 1951
Col Jack Bollerud, Jan 1954
Col John P. Stapp, Apr 1958
Col Andres I. Karstens, Aug 1960
Col Joseph M. Quashnoch, Jan 1964
Col Raymond A. Yerg, Jun 1966

Col Clyde H. Kratochvil, Aug 1968
Col Clinton L. Holt, Oct 1970
Col Frederick F. Doppelt, Aug 1973
Col Roy L. DeHart, Jul 1976
Col George C. Mohr, Jun 1980

HONORS

Service Streamers

Campaign Streamers

Armed Forces Expeditionary Streamers

Decorations

EMBLEM

MOTTO

NICKNAME

OPERATIONS

The Laboratory's parent command, Air Force Systems Command (AFSC), is responsible for the rapid advancement of aerospace technology and its adaptation to operational aerospace systems. AFSC is organized to provide the most up-to-date and effective management of all Air Force scientific and technical resources. AFSC takes an idea and through research, development, test, evaluation, procurement and production, delivers a fully operational aerospace system to an Air Force operating command. AFSC meshes resources into a worldwide organization of scientists, engineers, and managers with responsibilities spanning the entire weapon system acquisition process.

The AFAMRL headquarters, Aerospace Medical Division (AMD) at Brooks AFB, Texas, a division of AFSC, has four closely interrelated missions: research and development, medicine, education, and occupational and environmental health. The AMD accomplishment of these programs involves the personnel of our Laboratory; USAF School of Aerospace Medicine (USAFSAM), Brooks AFB; Wilford Hall USAF Medical Center, Lackland AFB, Texas; USAF Occupational and Environmental Health Laboratory (OEHL), and the Air Force Human Resources Laboratory, both at Brooks AFB, Texas. AMD provides a single point of management for the medical and life sciences research and development (R&D) program. Major contributions are made to the biotechnology R&D by both USAFSAM and AFAMRL

AFAMRL was established at Wright-Patterson AFB, Ohio, in 1935, under the guidance of Captain Harry G. Armstrong, MC (later Air Force Surgeon General), who became the Laboratory's first Commander. Dr. Armstrong recruited Dr. J.W.

(Bill) Heim, our first civilian scientist, from the Harvard School of Public Health, Boston, Massachusetts. Dr. Armstrong and Dr. Heim conducted some of the earliest investigations in the field of aeromedical research. Since its early beginning, AFAMRL has played a key role in the engineering design and development of an enormous variety of protective equipment, has participated in spectacular achievements and has undertaken a myriad of investigations to improve the pilots' performance. Each year AFAMRL presents the Harry G. Armstrong Award for Scientific Excellence, its highest award, to recognize a scientist or engineer most closely emulating the scientific expression demonstrated by our founder. The Laboratory's collocation with the Aeronautical Systems Division (ASD), Air Force Wright Aeronautical Laboratories, Air Force Institute of Technology, and our affiliation with the Wright State University Medical Program fosters close working relationships among the medical and research disciplines represented. The proximity of the Laboratory and the ASD System Program Offices allows close coordination to resolve mutual problems involving integration of biotechnology inputs to new aerospace systems.

The Air Force Aerospace Medical Research Laboratory's mission is to conduct behavioral and biomedical research to define the limits of human tolerance and the degradation of human performance under the conditions of environmental stress associated with aerospace operations. Results of these scientific efforts are published as technical reports, articles in scientific journals, handbooks, military specifications, and occasionally as scientific textbooks or chapters in academic textbooks. Further responsibility lies in establishing design criteria and new biotechnology techniques for future aerospace systems to protect and sustain personnel in any conceivable Air Force operational situation. The Laboratory also provides technical assistance to other federal agencies consistent with Air Force mission requirements and availability of resources.

Approximately 300 scientists and support personnel comprise the AFAMRL staff. The majority have attained national and international reputations. This capability provides an unsurpassed academic atmosphere for conducting research efforts. In addition to our own people, approximately 200 on-site contractors provide invaluable mission support.

To provide the most efficient operating structure, AFAMRL is organized into five divisions. The three research divisions— Biodynamics and Bioengineering, Human Engineering, and Toxic Hazards— make major contributions to the AMD Biotechnology Program. The other two divisions— Veterinary Sciences and Technical Services— perform diverse support activities in animal care, their proper use and handling; administration, maintenance and materiel, resource management, and plans and programs.

The multidisciplinary Biodynamics and Bioengineering research and development program is supported by a variety of man-rated biodynamic simulators. The Dynamic Environment Simulator, a man-rated centrifuge with a 20-ft arm, is capable of producing sustained acceleration up to 20 G in combination with three-degrees-of-freedom motion of the payload. This device can be flown with close-loop control by a pilot, much as a high performance aircraft, for determin

ing force capabilities in combat mission tasks. Other devices include an impulse accelerator and a terminal impact decelerator combined in a single track, a 50-foot drop tower, a 1000-G precision impact device, a 6-degree-of-freedom device, a 20-foot displacement vertical accelerator, five single-degree-of-freedom vibration devices, a dynamic pressure chamber (infrasound and sonic boom simulation), and multiple wideband acoustic simulators employing reverberation and anechoic exposure chambers. The Division is also supported by extensive hybrid computer data management facilities. The Biodynamics and Bioengineering facility is functionally and geographically coupled with the major hardware development laboratories, ASD System Program Offices, and engineering organizations in the Air Force Systems Command. For 50 years these factors have made it possible to provide vital biodynamic data, design criteria, and human test support to improve the safety and effectiveness of Air Force personnel in normal operations and during emergency situations. The Human Engineering Division is supported by a variety of complex specialpurpose facilities unique to the scientific community. To accomplish its mission of designing and quantifying performance of visual systems, an image metrics laboratory provides full capability for both the quantification of visual/display stimuli, as well as for measuring the human psychophysical response mechanisms. Research in the areas of decision-making, man-centered systems, systems simulation, and computer graphics is supported by a tailored digital computational/simulation system. In addition, the program to enhance operator performance in strategic offensive and defensive systems has required the development of special-purpose simulators that permit complete mission simulation for the B-52G/H strategic aircraft defensive and offensive systems crews. Other significant research tools include a variety of simulators: the roll axis tracking simulator (RATS), capable of rotation and oscillation about the longitudinal axis of the gondola; multi-axis tracking simulator (MATS), capable of motion in the roll and yaw axis, combined with motion along a horizontal, circular track; the manned threat quantification (MTQ) simulator, which functionally duplicates the performance of selected threat anti aircraft systems; and a sophisticated television tracking simulator.

The Toxic Hazards Division includes a nationally recognized capability for inhalation toxicology centered around eight unique exposure chambers called Thomas Domes. These domes are large glass-paneled structures, 12 feet in diameter and 8 feet high, which permit unrestricted visual and photographic observation of experiments in progress. The domes have an altitude capability and are air-locked to permit entry during long, continuous exposures without disturbing the exposure parameters. These design features make them excellently suited for handling highly toxic and suspect carcinogenic chemicals. The exposure facility includes numerous other commercial chambers and has associated with it a hands-off gasmixing facility used to generate and maintain precise concentration levels of hazardous materials common to the missile industry.

Through the years, the Laboratory has made significant contributions to

aerospace efforts ranging from leather cap and goggle days to the moon and beyond. Many of its outstanding contributions also have had direct impact on improving the quality of life in the civilian sector. The people of AFAMRL are particularly proud of twice receiving the Air Force Outstanding Unit Award for exceptionally meritorious service during the period 1 September 1962-30 June 1964 and again for the period 1 October 1977-30 September 1979. In 1979, the Laboratory was elevated to an Air Force unit from a major command controlled unit.

On 18 May 1985, the Laboratory will celebrate the completion of 50 years as a military organization.

The Air Force Aerospace Medical Research Laboratory is a component of the Aerospace Medical Division of the Air Force Systems Command (AFSC). The mission of the laboratory is to conduct behavioral and biomedical research to define the limits of human tolerance and the degradation of human performance under the conditions of environmental stress associated with aerospace operations. The laboratory is also responsible for establishing design criteria and developing new biotechnology techniques for future aerospace systems to protect and sustain personnel in any conceivable operational situation.

The laboratory was established at Wright Field on May 18, 1935, as the Physiological Research Unit, under the guidance of then Capt. Harry G. Armstrong, MC [Medical Corps], the laboratory's first Commander. Early work conducted at the unit was pioneering Aeromedical research on flight stresses and equipment concepts to protect the aviator.

During the 1940s, the laboratory began to study the physiologic effects of abrupt deceleration, curvilinear flight, and the problems associated with high altitude operations, including requirements for G-suits, oxygen systems, and pressure breathing. During the latter part of 1941, Capt. A. Pharo Gage investigated the benefits of administering pure oxygen at pressures of 15 to 25 mmHg above the ambient pressure during high altitude chamber flights. The first of his experiments was carried out in the chamber up to 43,000 feet, using himself as the first subject. In November 1942, Lt. Col. William R. Lovelace, II, MC, with Boeing pilot A. C. Reed and copilot J. A. Fraser, made the first aircraft flight using pressure breathing equipment in a B-17E to an indicated altitude of 42,900 feet. The problem of high altitude bail-out was a major concern of the Army Air Forces in 1943. In June of that year, Colonel Lovelace jumped from a height of 40,000 feet at Ephrata, Washington, the highest altitude jump attempted up to that time. The magnitude of parachute opening shock was found to be far greater at altitudes above 30,000 feet than when the parachute was opened closer to the ground. In 1945, the laboratory began biodynamics research on upward ejection seats for safer escape from high-speed aircraft. Much of the activity was based on earlier work done by the German Air Force.

On April 2, 1951, the laboratory transferred from the Air Materiel Command to the Wright Air Development Center of the Air Research and Development Command (ARDC), and during the 1950s, the laboratory efforts moved into the space era. Some of the laboratory's significant work included the study of effects of zero G on monkeys and mice in the Aerobee rocket, large-scale

anthropometry studies of USAF flying personnel, development of an operational partial pressure suit in 1951, the full-pressure X-15 suit in 1957, down ward ejection studies with the B-47, the weightlessness program using a C-131 aircraft, and the 120-hour aircrew habitability studies for nuclear powered aircraft in 1958. Early in 1959, the laboratory began a series of physiological, psychological, and biomechanical tests on the candidates for NASA's Project Mercury. To better reflect its expanded mission, the laboratory was renamed the Aerospace Medical Research Laboratory in August 1959.

On January 1, 1962, AFAMRL was reassigned to the Aerospace Medical Division. During the 1960s, the laboratory acquired a number of major new facilities, including the computer-based Human Engineering System Simulator and the Dynamic Environmental Simulator (a three-axis centrifuge) to conduct advanced biomedical research on the effects of aerospace flight on crew performance and safety. Consequently, during the latter part of the 1960s and early 1970s, a great expansion in research activity occurred.

The research efforts of the laboratory led to establishment of national and international standards on aircraft noise hazards, human engineering design procedures, and toxic exposure limits. Much of this work supported the System Program Offices responsible for development of the highly sophisticated F-15, F-16, and F-111 aircraft. In addition, many joint efforts were conducted with NASA, the Department of Transportation, Environmental Protection Agency, and the Army and Navy.

In the 1980s, AFAMRL continues to contribute to advances in aerospace medicine in the areas of human engineering, biodynamics, and toxicology. The multidisciplinary staff is composed of approximately 300 scientists, engineers, and support personnel. Additionally, approximately 200 on-site contractors provide invaluable mission support.

AFAMRL is currently organized into five divisions. The three research divisions—Biodynamics and Bio-engineering, Human Engineering, and Toxic Hazards— make major contributions to the biotechnology program of the Aerospace Medical Division. The other two divisions— Veterinary Sciences and Technical Services—perform diverse support activities in the care, proper use, and handling of animals and in administration, maintenance and materiel, resource management, and plans and programs.

IS THIS THE ARMSTRONG AEROSPACE MEDICAL RESEARCH LABORATORY

Lieutenant Harry G. Armstrong was assigned to duty as Flight Surgeon in the First Pursuit Group, Selfridge Field, Michigan, on September 15, 1931. He regularly flew with the Group in the P-16 aircraft, a two place open cockpit biplane. These flights exposed the aircrew to extremely cold temperatures, windblast, noise, high altitude, vibration and high acceleration forces in combat maneuvers. This flying environment prompted Armstrong to begin a series of efforts to develop better aircrew protective equipment. He quickly encountered local resistance to his activities. Frustrated, Armstrong wrote a letter to Major Beaven, Air Surgeon, Hq. Army Air Corps, in June 1934. He described the flight environment and the resistance to his efforts. He requested assistance from the Air Surgeon and the Engineering Section at Wright Field. Armstrong did not receive a

reply to his letter. Instead he was issued orders in July, 1934, transferring him to the Medical Branch at Wright Field. Captain Armstrong, who had no research or development experience, flew to Washington and contacted Major Beaven about the assignment. Major Beaven told him "you are the one that complained and you are the logical man to try and solve it." Captain Armstrong flew to Wright Field in August 1934 to meet the resident medical officers and obtain information about the assignment. He had lunch with Major Grow, Flight Surgeon, Patterson Field, and Major Reed, Chief, Medical Branch, Wright Field. Armstrong had never met or been acquainted with either of these officers prior to this luncheon. A heated argument developed between these two men over the assignment of Captain Armstrong. Shortly after his return to Selfridge Field, Armstrong was advised that his orders had been changed and he was now assigned to the Engineering Section, Equipment Branch.

Captain Harry Armstrong was transferred to the Materiel Division, Engineering Section, Equipment Branch, at Wright Field on September 16, 1934. He was the only medical officer in the entire Engineering Section. When Captain Armstrong reported for duty in the Equipment Branch, Bldg 16, he was treated as a consultant and not assigned to any project. He spent the next few days getting acquainted with the people, programs, and facilities in the Equipment Branch. The Branch was responsible for research, development, and testing of all subsystem equipment used in support of Army Air Corps flight operations. To accomplish its mission, the Branch had available in the basement of Bldg, 16, an extensive machine shop, an engineering group, photo department and a drafting group. To reach these facilities from the first floor of Building 16, there was a circular stairway within the Equipment Branch that descended to the basement. Also located in the the basement was the altitude chamber which had been used previously for training in the School of Aviation Medicine at Mineola, New York. The chamber was in good operating condition. The Equipment Branch used this chamber plus two smaller chambers and a cold box for testing new experimental equipment. When the chamber tests involved human subjects, the Equipment Branch requested a medical officer from the dispensary. Two months before Armstrong's arrival, the chamber had been used to test a full pressure suit designed by the world famous pilot, Wiley Post (E.O. 666-2, Serial No.I-54-431, June 21,1934, Capt. Hagenberger)

For the next few months, Armstrong worked on the problems he encountered at Selfridge Field and the projects assigned by the Chief, Equipment Branch. He was also assigned to work involving the Explorer II sealed gondola being manufactured in Building 16. Captain Armstrong served as the Flight Surgeon for this record breaking balloon flight which attained an altitude of 72,000 feet. Concerned that he might be working on misdirected efforts, he sought guidance from Major Echols, Chief Engineering Section. Major Echols stated "that he was not a physician and that he felt research in the field of medicine should be Armstrong's responsibility and that he should pursue his own ideas." Echols further said "that if Armstrong got into trouble with his work, that he would back him one hundred percent." Captain Armstrong then prepared and sent to Major Echols a proposal to establish a Physiological Research Laboratory within the Equipment Branch. Major Echols favorably reviewed the proposal and forwarded it through the Materiel Division to Hq. Army Air Corps.

Captain Armstrong flew to Washington on April 16, 1935 and met with Lt/Col Grow, Chief, Medical Division, Office of the Chief, Army Air Corps, and the Army Surgeon General. Captain

Armstrong presented the proposal he had submitted to Major Echols. The Armstrong proposal was accepted by those senior medical officers. Their only guidance was to establish a coordinated relationship between the Physiological Research Laboratory and the School of Aviation Medicine to avoid duplication of effort. The Materiel Division, Engineering Section, formally recommended the establishment of a Physiological Research Laboratory on April 25, 1935. The Chief, Army Air Corps, issued a directive on May 29, 1935, establishing the Physiological Research Laboratory within the Equipment Branch.

(Historical Note:) In 1935 there was a rapidly evolving need for a formalized medical research activity at Wright Field. Headquarters, Army Air Corps, had directed the Engineering Section to initiate a sealed pressure cabin airplane development program on April 29, 1935. The Equipment Branch was assigned responsibility for development of the sealed pressure cabin. The Branch was also directed to conduct a comprehensive study of the combined engineering and physiological requirements and to incorporate the data into an engineering specification. The Chief, Equipment Branch, assigned Armstrong the job of providing the physiological data. Armstrong's report, ACTR #4165, dated December 19, 1935, was used in the aircraft specification. A contract was awarded to the Lockheed Corporation in 1936 and the XC-35 aircraft was delivered to Wright Field in the spring 1937. It was a derivative of the commercial Lockheed Electra. Amelia Earhart used this type of aircraft on her ill-fated flight around the world.

The mission of the new Physiological Research Laboratory was established at Langley Field, Virginia, on June 19, 1935.

The approved mission defined three research goals which were necessary for the satisfactory performance of tactical combat flights.

Physical discomfort • Mental distraction • Fatigue

These goals were further refined into prime technical areas.

Protection from cold, windblast, heat, oxygen want

Comfortable seating

Clear vision

Reduction of noises

Avoidance of extreme centrifugal and centripetal forces

Avoidance of heavy, bulky, or constricting clothing, and personal equipment

Simplification of airplane operation

The staff of the new Physiological Research Laboratory was Captain Armstrong and Sgt. Lloyd Stevens, a medical technician on loan from the dispensary. The annual budget was \$100.00 for supplies and \$600.00 for animals. Captain Armstrong flew to Harvard University in an O-25 aircraft on November 30, 1935, to consult with Professor Drinker about laboratory equipment and hiring personnel. Professor Drinker recommended his graduate assistant, Dr. J.W. Heim. After an interview, Captain Armstrong hired Dr. Heim for the position of associate physiologist. He reported on June 21, 1936. Private Ray Whitney was assigned to the Laboratory in November 1937. In the fall of 1938, Sgt. Fuhry was assigned to the Laboratory and two other men, Pvt. Moyer and Pvt. Robinson, were on loan from the Base dispensary. On February 10, 1939, the Equipment

Branch was renamed the Equipment Laboratory and the Physiological Research

Laboratory name was changed to the Aero Medical Research Unit. Miss Mae Callen joined the Unit as stenographer in June 1939. Mr. John Hall joined the Unit on September 5, 1939, as assistant physiologist. Dr. Ernest Pinson was hired on September 11, 1939, as an associate research physiologist. Sgt. Harold Lichty was assigned to the Unit in 1940.

Captain Armstrong was reassigned on May 30, 1940, to a course of instruction at the Banting Institute, Toronto, Canada. Dr. J.W. Heim was appointed Acting Chief, Aero Medical Research Unit, on May 30, 1940. Captain Otis Benson, Jr. was appointed Chief, Aero Medical Research Unit, on September 16, 1940.

The Aero Medical Research Unit experienced the same rapid expansion as other organizations in the Army Air Forces during 1941. Captain Otis Benson was Chief, Aero Medical Research Unit. Major Dill, assigned as Chief of Research. Dr. J. W. Heim, Chief, Personnel and Administration.

The Aero Medical Research Unit was removed from the Equipment Laboratory on July 1, 1942. It was reorganized as an independent laboratory and renamed the Aero Medical Research Laboratory. Major Otis Benson was Chief of the Laboratory. The new laboratory was divided into five Branches: Dr. J. W. Heim, Chief, Administrative Branch; Captain John Murphy, Chief, Funds, Property, Maintenance Branch; Major Dill, Chief, Physiology Branch; Major Randy Lovelace II, Chief, Service Liaison Branch; Major Adolph Gagge, Chief, Biophysics Branch. Captain Frank G. Hall, Chief, Chamber Unit in the Physiology Branch. Lt. Francis Randall, Chief, Anthropology Unit in the Biophysics Branch. Dr. Guillemin, Chief, Physics Unit in the Biophysics Branch. Lt/Col. Craig Taylor, Chief, Clothing Test Unit in the Biophysics Branch.

The following mission was assigned to the Laboratory:

To conduct research to determine the effect of flight on the human organism and to recommend methods or means of neutralizing or eliminating those effects of a deleterious nature which adversely influence the efficiency, health, or safety of flying personnel

To coordinate the activities of the Laboratory with service and non-service organizations engaged in similar investigational problems

To coordinate the human requirements of flight with the development of equipment by other Laboratories in the Materiel Center

To conduct research on the problems in biophysics, physics, and engineering of importance in aviation medicine

To initiate and supervise service and field tests of items of medical interest

To develop standardized and test items of medical equipment used in connection with military flying

To develop educational devices for indoctrination of flying personnel.

The Aero Medical Research Laboratory was renamed Aero Medical Laboratory in December 1942. Lt. George Maison was appointed Chief, Centrifuge Unit in the Physiological Branch, on December 11, 1942. Colonel Otis Benson was reassigned overseas and Colonel W. Randolph Lovelace was appointed Chief, Aero Medical Laboratory, in April 1943.

Colonel Edward J. Kendricks was assigned as Chief, Aero Medical Laboratory in May 1946. A special group of German scientists and their associated technical support personnel were assigned under "Project Paper Clip," to the Aero Medical Laboratory in May 1947. They had been involved in related aero medical research during the war. Primarily from the Helmholtz Institute in Bavaria, they were Dr. Hans Mauch, Dr. Henschke, Dr. Ernst Franke, Dr. Otto Gauer, Dr. Henning Von Gierke, Dr. Hans Oestreicher, Mr. Henry Seeler, Dr. Hans Amtmann, Mr. Frank, Dr. Ernsthausen, Mr. Fritz Klemm, Mr. Willie Buehring, Mr. Franz Rinecker, Mr. Paul Hermann, Mr. Wolf Von Wittern, and Mr. Erich Gienapp.

An Aero Medical remote location facility was established at Muroc Army Air Field, California in 1946. Lt/Col. Mike Sweeney sent Captain John Paul Stapp to the 2000 foot track to build a rocket sled and conduct human and animal experiments in abrupt acceleration.

The Personal Equipment Laboratory transferred responsibility for research and development on all clothing to the Aero Medical Laboratory on April 12, 1947. Mr. Don Huxley was appointed Chief, Clothing Branch. Other members of the Clothing Branch were Mr. Abe Plotkin, Mr. Bill Walker, Mr. Lennie Moore, Mr. Roy Harlan, and Mrs. June Murphy. The Clothing Branch occupied two offices on the first floor of Bldg. 29.

Construction of Bldg. 33 was completed in the fall of 1947. The human centrifuge in Bldg. 55 was disassembled in summer 1948. Clothing Branch moved into the refurbished building in October 1948. The Clothing Branch was the center of all new developments in uniform clothing, flight clothing and personal protective clothing in the Air Force.

The Aero Medical Field Laboratory was established at Holloman Air Force Base, New Mexico, in 1949. It provided technical assistance for the Aerobee rocket flights using animals. Several years later it became the primary facility for abrupt acceleration sled tests, under the supervision of Lt/Col. John Paul Stapp.

Col. Kendricks was transferred from the Laboratory in June 1949. Lt/Col. Adolph P. Gagge (MSC) served as Acting Chief of the Laboratory from June 1949 until December 1949. Colonel Walter A. Carlson was assigned as Chief, Aero Medical Laboratory in December 1949.

Dr. Paul Fitts, founder of the Psychology Branch in the Army Air Forces, departed the Laboratory in 1949. Dr. Walter Grether was assigned as Chief.

Air Research and Development Command (ARDC) was established on April 2, 1951.

The Aero Medical Laboratory was transferred from the Directorate of Research and Development, Air Materiel Command, to Wright Air Development Center, ARDC, in accordance with ARDC G.O. No. 10, June 7, 1951.

Colonel Walter A. Carlson was transferred and Colonel Robert H. Blount was assigned as Chief,

Aero Medical Laboratory, in June 1951. Colonel Jack Bollerud was assigned as Chief of the Laboratory, in January 1955. Dr. Harvey Savely departed the Laboratory for the Office of Scientific Research, in 1956. Wright Air Development Center (WADC) combined all the Laboratories into the single Directorate of Laboratories in July 1957. Colonel Bollerud was transferred in April 1958. Colonel John P. Stapp was assigned as Chief, Aero Medical Laboratory.

N A C A was reorganized into the new N A S A to conduct the civilian space program in July 1958.

In the spring of 1958, the Aero Medical Laboratory was reorganized into a three Division management structure with Captain Edward DeWilton (USN) Chief, Bio-Medical Sciences Division, Mr. Wayne McCandless, Chief, Engineering Division, and Lt/Col. Howard Parris, Chief, Behavioral Sciences Division.

The greatest increment in growth of the Behavioral Sciences Division occurred in 1958 when the Air Force Personnel and Training Research Center, with headquarters in San Antonio, Texas, was abolished. The Behavioral Sciences Division was given added responsibilities in the areas of operator and maintenance training and qualitative personnel requirements information (QPRI).

As a consequence of this increased responsibility, the Behavioral Sciences Division established a new Branch, Training Psychology, headed by Dr. Gordon Eckstrand. The name of the Aero Medical Laboratory was changed to Aerospace Medical Laboratory on August 3, 1959.

Wright Air Development Center was redesignated Wright Air Development Division on December 15, 1959. The Aerospace Medical Laboratory was concurrently renamed Aerospace Medical Division. It was organized into four components: Biomedical Laboratory, Behavioral Sciences Laboratory, Life Support Systems Laboratory, and Personnel Laboratory (located at Lackland Air Force Base, Texas).

The Biomedical Laboratory directed research in the biomedical, biological, and related physical sciences for application to aerospace systems, to produce maximum effectiveness of both the human and physical components of systems to which biological knowledge may contribute.

The Behavioral Sciences Laboratory directed research in the behavioral sciences to produce maximum effectiveness of the human component in aerospace systems.

The Life Support Systems Laboratory directed research in engineering sciences to develop techniques and principles for the protection, sustenance, and survival of aerospace systems operating personnel.

Personnel Laboratory conducted research and development in support of the operation and qualitative improvement of the Air Force Personnel System. This included the development of concepts and techniques concerned with the functional areas of personnel requirements, procurement, classification, training assignment utilization, proficiency measurement, promotion, retention, separation, and accounting.

Colonel John Stapp was transferred to the Aerospace Medical Center at Brooks Air Force Base, Texas, in August 1960, and at that time Col. Andres Karstens assumed command of the Division. The Aerospace Medical Division was reassigned from the Directorate of Advanced System Technology, WADD, to the Assistant for Bioastronautics, Hq ARDC, and redesignated the Aerospace Medical Laboratory on November 20, 1960.

On this date, the Laboratory lost responsibility for engineering and development of end items. The operational support development area 580 A: human factors, human engineering application work, systems engineering functions, and personnel subsystems activities were removed from the bioastronautics research mission. They remained the responsibility of the Directorate of Systems Engineering under WADD. The Clothing Branch was transferred into the Systems Engineering organization. Various other smaller functions and their personnel were reassigned to the Systems Engineering mission. The Laboratory was directed to provide bioastronautics technical support to the engineering organizations when requested.

In 1961, Aeronautical Systems Division (ASD) was established at Wright-Patterson in conjunction with the activation of the Air Force Systems Command (AFSC) with headquarters at Andrews Air Force Base, Maryland. This change reflected a growing need to meld the acquisition, delivery, and support of modern systems, together with their development, into a single management effort. Need for this concept of systems management was spurred on by the quickening pace in technological development. Creation of the Air Force Systems Command consolidated research and development of systems with the follow-on functions of systems procurement and production. Previously these follow-on functions had been carried out by the Air Materiel Command (AMC), which in the reorganization became the Air Force Logistics Command (AFLC). ASD, then, was born from the merger of two organizations at WPAFB, the former Wright Air Development Division and AMC Aeronautical Systems Center.

The Aerospace Medical Laboratory was assigned to the Aeronautical Systems Division on May 8, 1961. The Physical Anthropology Section was transferred from the Biophysics Branch, Biomedical Laboratory, to the Human Engineering Division, Behavioral Sciences Laboratory.

The Aerospace Medical Division, Air Force Systems Command, was established on November 1, 1961. It was formed by combining certain elements which had been assigned to three different major commands of the Air Force: the Alaskan Air Command, the Air Training Command, and the Air Force Systems Command.

The Aerospace Medical Laboratory was assigned to the new Aerospace Medical Division on January 1, 1962. The name was changed to 6570th Aerospace Medical Research Laboratories. The emblem of the 6570th Aerospace Medical Research Laboratories was approved on December 13, 1963.

Col. Karstens departed the Laboratory on January 16, 1964 and Col. Joseph Quashnock assumed Command of the Laboratory.

The Laboratory went through a major reorganization on November 22, 1965. The Biophysics Laboratory, Physiology Division, Multienvironment Division, and Biotechnology Division were all abolished. The Environmental Medicine Division, Life Support Division and Toxic Hazards Division were established. These three Divisions and the existing Biodynamics and Bionics Division were all placed under the existing Biomedical Laboratory. The Technical Editing Office, and the Library were assigned to the Technical Operations Office. The Biospecialities Branch was abolished and the Nutrition program was transferred to the School of Aerospace Medicine. Project 6301 was transferred to the School of Aerospace Medicine.

Col. Quashnock was transferred to the Aerospace Medical Division on June 13, 1966 and Col. Ray Yerg assumed Command of the Laboratory.

The Training Research Division of the Behavioral Laboratory was transferred to the newly established Air Force Human Resources Laboratory on July 1, 1968.

Col. Ray Yerg was transferred to Hq. USAF on August 1, 1968 and Col. Clyde Kratochvil assumed Command of the Laboratory.

Dr. J. W. Heim, the first civilian employee of the Physiological Research Laboratory, retired in August 1968 after 32 years service. Dr. Heim was hired by Captain Armstrong in June 1936.

The Laboratory was reorganized on September 1, 1968. The Behavioral Sciences Laboratory and the Biomedical Laboratory were abolished. The Biodynamics and Bionics Division, Human Engineering Division, Multienvironment Division, and Toxic Hazard Division were established. The Laboratory management structure on 30 June 1969 included Biodynamics & Bionics Division, Environmental Medicine Division, Human Engineering Division, Support Services Division, Technical Operations Division, Toxic Hazards Division and Veterinary Medicine Division.

The Holloman Aeromedical Laboratory, its daisy decelerator, related equipment, and nine personnel were reassigned to the 6570th Aerospace Medical Research Laboratory on July 1 1970.

Colonel Holt was appointed Commander, 6570th Aerospace Medical Research Laboratory on August 24, 1970.

The Technical Advisor Office was abolished in October 1971.

Mrs. Mae (Callen) Poszywak retired from the Air Force in 1971, after 32 years of service. She was the second civilian employee and the first full-time stenographer to be hired by Captain Armstrong in June 1939. Mrs. Poszywak had been responsible for all the administration activities in the Aero Medical Research Unit.

Mr. John Hall retired from the Laboratory in 1971, after 32 years of service. He was the third civilian employee to be hired by Captain Armstrong in September 1939. He worked as a physiologist in the Aero Medical Research Unit in the basement of Building 16.

The Laboratory was authorized a Vice Commander position in March 1972. Colonel Doppelt was appointed the first Vice Commander of the Laboratory.

Colonel Doppelt was appointed Commander, 6570th Aerospace Medical Research Laboratory in 1973.

Mr. Raymond U. Whitney retired from the Laboratory in June 1973, after 36 years of service. He was permanently assigned to work with Captain Armstrong in the Physiological Research Laboratory in 1937. He participated in the pioneering altitude chamber experiments, working directly with Dr. Armstrong. He also flew with Captain Armstrong in the pressurized cabin experiments in the XC-35 airplane. He was the first person in the Physiological Research Laboratory to receive the Distinguished Flying Cross for this pioneering work in the altitude chambers. He also participated in the altitude tests of the BOB oxygen mask with Dr. Lovelace and Dr. Boothby in 1938. Dr. Lovelace, Dr. Boothby and Dr. Armstrong received the Collier Trophy for this research and development work.

Dr. Walter Grether retired from the Laboratory in June 1973 after 32 years of service. Major Grether was the first officer assigned to work with Lt/Col. Paul Fitts, founder of the Air Force Engineering Psychology program. Fitts and Grether organized and developed the broad based human engineering research program.

Dr. Melvin Warrick retired from the Laboratory in June 1973 after 31 years of service.

Dr. Julien Christensen retired from the Laboratory in 1974 after 33 years of service. Mr. Charles Bates replaced him as Chief, Human Engineering Division.

Mr. Ernest Martin retired from the Laboratory in 1975 after 33 years of service. He was called to active duty in the Aero Medical Research Laboratory as an aviation physiologist. He worked in the original altitude chambers located in the basement of Building 16, the site of the Physiological Research Laboratory.

Colonel DeHart was appointed Commander, 6570th Aerospace Medical Research Laboratory, in 1976.

In April 1977, there was a reorganization and renaming of the Biodynamics and Bionics Division. Those changes included: the new name, Biodynamics and Bioengineering Division, abolishing the Neurophysiology Branch, expanding the mission of the Biomechanical Protection Branch, and the Biodynamic Effects Branch, establishing a position of Director, Plans and Programs, in the Division office.

A functional and organizational realignment of the Environmental Medicine Division was accomplished on July 18, 1977. Those changes included: the new name Manned Systems Effectiveness Division, expansion of the mission of the Systems Technology Branch, the Analysis and Simulation Branch, the Simulation Support Branch, and abolishment of the Environmental Physiology Branch.

A Technical Services Division was established in September 1977. That action consolidated the

Technical Operations Division and Support Services Division.

The Laboratory organizational name was changed from 6570th Aerospace Medical Research Laboratory to Air Force Aerospace Medical Research Laboratory, in 1979.

The Laboratory was reorganized in May 1979. The Manned Systems Effectiveness Division was abolished. Its research programs were distributed between the Biodynamics and Bioengineering Division and the Human Engineering Division. The Laboratory now had five operating divisions; Biodynamics and Bioengineering, Human Engineering, Toxic Hazards, Technical Services, and Veterinary Sciences.

In 1982, two new Advanced Development Program Offices were established for management of the 6.3 programs; Crew Automation Technology (CAT), and the Crew Escape Technology (CREST)

Air Force Order of Battle
Created: 20 May 2013
Updated:
Published: 12 Sep 2015

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