FILM STUDY GROUP

SUBJECT INDEX AND REPORT

T.O.M.REEL NO. 103

Prepared by

CALIFORNIA RESEARCH CORPORATION

CALIFORNIA RESEARCH CORPORATION

RICHMOND, CALIFORNIA

INDEX OF TECHNICAL OIL MISSION MICROFILM

REEL NO. 103

(Prepared by California Research Corporation)

INDEX OF REEL #103

INDEX OF REEL #103 (Continued)

INDEX OF REEL #103 (Continued)

INDEX OF REEL #103 (Continued)

INDEX OF REEL #103 (Continued)

CALIFORNIA RESEARCH CORPORATION

RICHMOND, CALIFORNIA

ABSTRACT OF TECHNICAL OIL MISSION

MICROFILM

REEL NO. 103

Prepared by California Research Corporation

REEL NO. 103

June 15, 1940 — EXPERIMENTS WITH SAFETY FUELS FOR INTERNAL COMBUSTION ENGINES — Frame No. 7049-7059

Some fuels with high viscosity and properties as tabulated in Frame No. 7052 -so-called safety fuels- have been subjected to engine tests which showed poor ignition characteristics. Some means of improvements are discussed in connection with these experiments, illustrating charts are included.

April 26, 1940 — A STROBOSCOPE FOR NOZZLE RESEARCH — Frame No. 7060-7075

A mechanical equipment is described which opens a possibility of stroboscope research and photography of injection processes, jets and sprays produced from different nozzles. Experiments are described which demonstrate the function and suitability of the new instrument to do the mentioned research work. Pictures and tables illustrate the report.

April 17, 1940 — EFFICIENCY TESTS OF PUMP 3 AT OPPAU — Frame No. 7076-7079

A centrifugal water pump was subjected to tests under various operating conditions. The results are summarized, tabulated and charted.

May 27, 1940 — REPORT ON THE HEAT CONDUCTANCE OF INSULATING BRICK FOR HIGH PRESSURE FURNACES — Frame No. 7080-7089

These experiments tested two different insulating materials for high pressure furnaces by exposing them to various hydrogen and nitrogen pressures and temperatures in order to determine their suitability as a substitute for asbestos. Experimental results are tabulated and discussed.

June 5, 1940 — REPORT ON MEASUREMENT OF CETANE NUMBERS DOWN TO ZERO — Frame No. 7090-7095

The test engine as originally designed could not determine cetane numbers lower than about 20. By redesign (particularly in regard to the piston) greater compressions ratios were obtained which permitted evaluation of low cetane numbers. Results with some heavy Diesel fuels are discussed and illustrate the suitability of the engine for the purpose. The test results are tabulated and charted.

June 18, 1945 — REPORT ON A LIGHT FIRECLAY — Frame No. 7096-7100

These are heat transfer experiments with pressed light fireclays for ~~insulation of furnace interiors similar to those~~ in Frame No. 7080-7089.

August 25, 1940 — LUBRICATION TESTS IN THE BMW 132 SINGLE CYLINDER TEST ENGINE — Frame No. 7100-7128

For these tests the engine had to be changed in some respects and special equipment was added. The details of the changes and the equipment as well as the test method and some tests are accurately described, pictured and tabulated.

REEL NO. 103

July 30, 1940 — IGNITION DELAY MEASUREMENTS WITH THE F.K.F.S. INSTRUMENT — Frame No. 7129-7145

After some discussion of the possible methods for ignition delay measurements the operation of this new instrument and its accuracy are described. The results of tests with 16 different fuels are tabulated, charted and briefly compared. Several pictures illustrate the report.

July 16, 1940 — HEAT TRANSFER BY PIPES HAVING WELDED OR PRESSED FINS — Frame No. 7146-7156

The fins on these so called hairpin pipes for tar heaters originally were welded. A cheaper method of pressing the fins on the pipe is described. Though the heat conductance was higher with welded fins, the difference for practical operating conditions is said to be negligible.

July 26, 1940 — REPORT ON A LIGHT FIRECLAY — Frame No. 7157-7161

This concerns a light fireclay for furnace insulation intended to replace asbestos. Details are not legible.

August 21, 1940 — COMPARISON OF CETANE NUMBERS MEASURED BY THE I. G. DIESEL TEST ENGINE AND BY THE H. V. A. ENGINE — Frame No. 7163-7166

In five series of experiments the cetane number of Diesel fuels were determined in both test engines. Although the actual cetane numbers varied, both engines gave satisfactory rating results. One cetane number determined by the I. G. engine corresponded to 0.92 cetane number in the other engine. The experiments are described, tabulated and charted.

August 27, 1940 — REPORT ON TWO CEMENT ASBESTOS MATERIALS FOR THE INSULATION OF HIGH PRESSURE OVENS — Frame No. 7167-7174

In order to economize on the scarce asbestos experiments were made to test the insulating properties of two mixtures each containing 10% of asbestos. The experiments and results are described, tabulated, charted and are in general considered as very satisfactory.

Sept. 13, 1940 — REPORT ON THE HEAT TRANSFER OF AN IRON SULFIDE CRUSTED HIGH PRESSURE PIPE — Frame No. 7175-7182

The heat radiation through a tube of 1 meter length and with an interior diameter of 32.9 mm. and an exterior diameter of 48.5 mm. was measured and the method described. The tube without being cleaned contained a crust of iron sulfide attached to its inner walls. The experiments were then repeated with a clean tube of the same dimensions and the thus obtained measuring results were compared to those obtained before.

October 12, 1940 — RESEARCH ON INSULATING MATERIALS FOR THE INTERIOR OF HIGH PRESSURE OVENS — Frame No. 7183-7190

The scarcity of asbestos lead to the development of insulations from mixtures of cement and asbestos and later to the use of light fireclays without asbestos. The insulating properties of these various materials were described, compared and tabulated.

REEL NO. 103

October 25, 1940 — A NEW INSTRUMENT TO MEASURE KNOCK INTENSITY IN INTERNAL COMBUSTION ENGINES — Frame No. 7191-7200

A new electro-acoustical instrument for direct recording and indicating of engine knocks is described and illustrated. It can be used in test engines to register both initiation and intensity of the knock.

October 31, 1940 — INVESTIGATION OF KNOCK VIBRATIONS IN MULTICYLINDER ENGINES — Frame No. 7201-7209

Since in an engine with several cylinders the human ear cannot detect which one or whether all of the cylinders are knocking an instrument has been devised and tested which allows the measurement of knocks in an individual cylinder. The instrument, its operation and some experiments are described, illustrated and considered satisfactory.

June 5, 1940 — A RATING METHOD FOR AIRCRAFT ENGINES AND AIRCRAFT ENGINE FUELS — Frame No. 7210-7220

Based on the Motor Method octane rating a new method of rating is suggested making use of an additional number with the engine operating under the most severe conditions. By the use of two test gasolines, it was found possible to determine knock rating and knock sensitivity in order to achieve the most favorable relation between fuel and engine operating conditions. The method is illustrated by test experiments which are described and discussed.

December 2, 1940 — ACCEPTANCE TEST OF A PUMP IN A TURBINE AGGREGATE ON OCTOBER 31, 1940 — Frame No. 7221-7226

A gyroscopic pump of certain make was subjected to a series of tests. The results were tabulated, charted, and discussed.

April 3, 1941 — TEMPERATURE RELATIONS OF INTAKE AIR CYLINDER AND RADIATOR WATER AND THEIR INFLUENCE ON THE ENGINE EFFICIENCY — Frame No. 7227-7236

In two test engines comparative tests to find the temperature relations for best engine efficiency were carried out. The experiments are described and the results tabulated, charted and discussed.

Date illegible — ACCEPTANCE TEST OF A PUMP IN A TURBINE AGGREGATE AT OPPAU — Frame No. 7240-7252

A series of pump tests described and discussed is similar to the test in Frame No. 7221-7226.

January 19, 1942 — HEAT TRANSMISSION AND DISTRIBUTION IN A 250 MM. "CONTACT TUBE" — Frame No. 7253-7270

Temperature-measurements were carried out in a contact oven of 258 mm. diameter and 1 meter length. The oven was steam jacketed (100°) and cold air of 20° entrance temp. was passed through the interior. A carbon heating element (contact) of cylindrical form supplied the heat and the temperatures at different

points within the oven were measured for various air currents. The experiments are described in detail, and the theory of heat transmission is developed with formulas. Figures, charts and tables complete the report.

October 9, 1943 — COMPARATIVE TEST ACCURACIES OF THE OPPAU TEST ENGINES IN EXPERIMENTS WITH VARIOUS AVIATION GASOLINES — Frame No. 7271-7279

These experiments were aimed at an investigation of the accuracy of the Oppau test engines. The details of the experiments are described, results are tabled, charted and pictured and shortly reviewed.

August 1, 1942 — THE INFLUENCE OF THE LEAD CONTENT OF ENGINE FUELS ON AIRCRAFT ENGINE PARTS — Frame No. 7281-7312

The report investigates damage to certain engine parts by the use of gasoline containing above 0.12% of "lead". Reduction of "lead" to 0.09% did not decrease engine wear. The experiments are described in detail, the results are tabulated, charted and discussed, proving that deposits of lead severely damaged the exhaust valves and other engine parts. Photographs illustrate the text.

August 1, 1942 — DESCRIPTION OF RUSSIAN AIRCRAFT ENGINES AM 35 AND AM 38 — Frame No. 7314-7395

These two types of captured Russian engines with their accessories and technical details are thoroughly described. They have been flown and results of these test flights are discussed in particular. Pictures of engine parts and charts and tables illustrate the report.

October 20, 1942 — MEASUREMENT OF PISTON TEMPERATURE IN THE RUNNING ENGINE — Frame No. 7396-7435

This method of measurement was originated in America and the Netherlands. The method and the complicated instruments operated by thermocouples are described in detail and illustrated by pictures and charts.

March 25, 1943 — EXPERIMENTS WITH A FOUR-BALL INSTRUMENT FOR LUBRICATING OIL INVESTIGATIONS — Frame No. 7436-7455

Such an instrument similar to one first invented by Boerlage was constructed and tested with different oils. The instrument and experiments are described in detail, the results are tabulated, charted and discussed, demonstrating the suitability of the instrument for wear and lubricating measurements. Photographs illustrate the report.

July 10, 1943 — MEASUREMENT OF THE FRICTION COEFFICIENT WITH THE P.T.R. INSTRUMENT — Frame No. 7456-7473

This instrument measures the frictional resistance between a rod of about 4/5 of an inch and a lubricated rotating disc. The method is described in detail and friction experiments with two different lubricating oils are made.

The results are discussed, tabulated and charted.

July 28, 1943 — SULFUR CONTAINING ADDITIVES FOR AVIATION OILS — Frame No. 7474-7495

The report discusses the great general difficulties in evaluating the lubricating effect (oiliness) of lubricants. Two different lubricating oils have been tested by various methods. These are discussed and the comparative results listed in tables. It has been found that certain sulfur containing additives in lubricating oils increase their lubricating effect (oiliness). One table shows some relations between sulfur content and lubricating properties listing various appropriate sulfur compounds as additives. Several charts containing auxiliary data are added to the report.

Aug. 28, 1943 THE D.V.L. TEST STAND FOR AIRCRAFT ENGINE FUELS Frame No. 7496-7520

The D.V.L. test stand using a BMW single cylinder engine and supercharge methods for testing aviation fuels is described. In order to obtain uniform test results from the various test stands, the equipment for the D.V.L. stand is built according to certain established principles which are discussed. Particulars are described and pictured.

January 15, 1943 — THEORETICAL AND EXPERIMENTAL INVESTIGATION OF THE OPTICS OF CURVED PLEXI GLASS SHEETS FOR USE IN AIRPLANES — Frame No. 7523-7530

In modern aviation plexiglass has taken the place of glass more and more and particularly curved sheets are frequently used, also flat sheets become curved under the strain of air pressure. The investigation of the optical problems involved include the avoidance of optical defects and the study of the special properties of the material. Starting from the relatively simple formula describing the path of a light ray through a glass plate the very complex formulae covering light passage through materials with curved surfaces are developed. Many charts and graphs illustrate the text.

January 15, 1943 — ELECTRICAL ROTATING MAGNETIC SYSTEM FOR LARGE ROTATIONS — Frame No. 7531-7534

The report discusses the technical construction difficulties for measuring instruments using rotating magnetic systems; the difficulties increase in particular for wider ranges of rotation. A new device allowing rotations of 270° is described and pictured and its theory discussed.

January 15, 1943 — THE THEORY OF THE REFLECTION OF A PLANE ACOUSTIC WAVE FROM THE SURFACE OF A GLOBE — Frame No. 7534

The acoustic formulas applying to the problem are developed and discussed.

January 15, 1943 — THE CALCULATION OF PRESSURE DISTRIBUTION FOR AERODYNAMIC PROFILES — Frame No. 7535-7542

Formulas are developed and some examples showing their application. Pictures, graphs and tables illustrate the involved problems.

REEL NO. 103

THE EFFECT OF CHEMICAL ADDITIVES IN REDUCING THE TENDENCIES OF LUBRICATING OILS TO FORM DEPOSITS IN INTERNAL COMBUSTION ENGINES

January 15, 1943 Frame No. 7542

The formation of carbonaceous deposits in internal combustion engines by resins contained in lubricants and by the use of leaded gasolines results in piston rings sticking and constitutes a serious problem. The possibility of eliminating resin forming substances from lubricating oils by suitable additives motivated a series of experiments which are briefly summarized.

THE APPLICATION OF REFRIGERATION IN AIRCRAFT CONSTRUCTION AND AVIATION

January 15, 1943 Frame No. 5743-7550

The necessity of high flying speeds and to avoid atmospheric disturbances in lower levels of the atmosphere has increasingly favored high flying in the stratosphere at very low temperatures. Both engine and personnel must adapt themselves to these conditions. The required ground study opened a new field for refrigeration. Research conditions and artificial chambers had to be created where the human body and the aircraft engine could be subjected to scientific tests. Some of the pertinent problems and refrigeration equipment suitable for producing cold chambers are described, discussed and pictured.

INVESTIGATION OF SHOCK AND WEAR ON AIRCRAFT LANDING GEAR WHILE ROLLING OVER THE GROUND

January 15, 1943 Frame No. 7551-7552

The high speed of aircrafts rolling over the ground before taking off causes considerable strain on the rolling equipment particularly when the ground is somewhat uneven. Test fields have been built where little metal knots on a smooth plane supply artificially the strain conditions. The speed of the airplane and height of these knots permit the calculation of the force of the shock to the wheels. Experiments and calculations regarding the problems under investigation are described.

January 16, 1943 FROM GERMAN RESEARCH INSTITUTES Frame No. 7553-7554

This is a short literature review on various technical and research subjects.

THE INFLUENCE OF GASOLINE VAPOR ON THE PRESSURE OF A SUPERCHARGER AND THE TEMPERATURE IN THE CHARGING PIPES

1942 Frame No. 7556-7562

In order to establish the throttle curves of aircraft engines the engine is usually charged with compressed air while in practice many chargers use air-gasoline mixtures. The theoretical and practical effect of the use of these mixtures is thoroughly discussed and explained with illustrations by experiments, charts and calculations.

REEL NO. 103

1942 THE STRAIN OF THE SCREW CONNECTIONS BY THREAD DIFFERENCES BETWEEN BOLT AND NUT THREAD Frame No. 7563-7567

Such differences can be caused by uneven heating, or temperature influences as well as by inaccurate finish of the metal work. The strain occuring in such cases can be calculated; methods and formulas for this purpose are developed and illustrated by pictures and charts.

Aug. 1942 UNSTABLE DISTURBANCES IN A LAMINAR FRICTION LAYER Frame No. 7568-6585

For the calculation of profile resistance of bodies in an airflow from a certain direction, the turbulences in the laminar layer have to be taken into account. Their calculation based on differential equations is rather involved and so are the physical phenomena to be dealt with. These phenomena and problems are discussed, pertinent formulas are developed, and charts illustrate the calculations.

1942 THE PROPELLING WING Frame No. 7586-7594

This report contains a discussion of the possibility and problems involved in a combined wing and propeller system, by which the propeller forces would be acting within the wing plane. The principle of the helicopter combined with those for the winged aircraft would apparently afford a new solution of an old aviation problem attempting to apply the principles of the bird wing for human aviation. Starting from a historical review the paper presents the necessary calculations of the propelling and stabilizing forces for such a construction. The explanatory text is illustrated by formulas, graphs and pictures.

August, 1942 THE NOZZLE INFLUENCE ON WIND TUNNEL CORRECTIONS IN A STEADY AIR CURRENT Frame No. 7595-7602

This paper treats a highly mathematical problem of aerodynamics. Frequently wind pockets form around the airplane wing. Parallel planes are apt to act as nozzles in strong air currents forming whirlpools of air. The complicated calculations necessary to express and compensate the aerodynamic forces involved under such conditions are comprehensively discussed, formulas are developed and charts illustrate the problem and its solution.

AIRCRAFT RESEARCH LITERATURE Frame No. 7603

March 15, 1943 THE ABSORPTION OF DISSOLVED DIPOLE MOLECULES ON SOLID METALS Frame No. 7606-7611

The effect of dipole molecules such as stearic acid dissolved in a lubricant, forming one of the problems involved in the investigation of boundary film lubrication is investigated. The general problems of solid friction and lubrication under heavy load are briefly outlined. A new kind of measuring instrument for such lubricating conditions is presented and described together with a series of experiments which are discussed. The text is illustrated by pictures and charts.

REEL NO. 103

March 15, 1943 WEIGHT DISTRIBUTION ACROSS THE ENTIRE WING SPAN Frame No. 7612-7619

This aviation problem is treated mathematically. Formulas and charts illustrate the explanatory text.

March 15, 1943 AIRPLANE FRONT WHEEL STEERING Frame No. 7619

This paper gives a brief description of the function of a steering wheel in the nose of an airplane controlling its motion while the plane rolls over the ground.

March 15, 1943 FAILURE OF THE COURSE GYROSCOPE TO REGISTER DURING CURVE FLYING Frame No. 7620-7626

After a brief explanation of the principle of the gyroscope, the change of the rotation axis in curve flying is pointed out as responsible for failing registration. By mathematical calculations the pertinent problems and means of compensation are investigated. Pictures and charts illustrate the text.

March 15, 1943 WING FLUTTER AS A SPECIAL AVIATION PROBLEM Frame No. 7626-7627

The phenomenon called wing-flutter, its nature, and cause are briefly discussed under physical and mathematical aspects.

March 15, 1943 ELECTRICAL IMPULSE FOR AIRPLANE WHEELS Frame No. 7627

This is a brief paper suggesting electric impulse for the airplane wheels before landing in order to avoid considerable wear during landing by the shock and friction on the motionless wheels suddenly accelerated to the landing speed of the rolling airplane.

March 15, 1943 A THREE MOMENTAL BALANCE FOR MEASURING FORCES OF AIR CURRENTS Frame No. 7628-7632

The instrument, its principle and operation are described and pictured, the details of the construction and the measuring operation are explained.

March 15, 1943 SOME REMARKS ON ALTITUDE REGISTRATION IN AVIATION Frame No. 7632-7635

Three different measuring principles for altitude recording are explained and the attempt is made to correlate them so as to obtain a general standard for altitude measurements.

March 15, 1943 FROM GERMAN RESEARCH INSTITUTES Frame No. 7636-7637

This is a brief literature review.

INVESTIGATIONS, MEASUREMENTS AND TESTS OF CENTRIFUGAL PENDULUMS IN ROTATING SWINGING SYSTEMS Frame No. 7638-7652

The theory and compensating effect of centrifugal pendulums installed

in rotating swinging systems and in particular in aircraft engines are briefly sketched. An experimental research stand for pendulum experiments of various kinds in combination with rotations and oscillations occuring in running engines has been developed. The report describes various systems of pendulums and their theory as well as practical experiments and charts.

A LABORATORY TEST METHOD FOR THE AGING OF LUBRICATING OILS — Frame No. 7653-7660

The aging of engine lubricating oils may lead to piston ring sticking, forming of sludge and deposits. The so-called aging is a consequence of oxidation and high temperatures to which the lubricating oil is normally exposed in the running engine. Various methods have been devised to subject lubricating oils to artificial aging conditions and to test these artificially aged oils and compare the results to the properties of the fresh oil. A review of these test methods, test results and principles for their evaluation is contained in this report which is illustrated by tables and charts.

THE TEST OF LUBRICATING OILS BY FRICTION AND WEAR EXPERIMENTS IN ENGINES — Frame No. 7662-7667

In order to test the wear and friction properties of engine lubricating oils of the same viscosity, experiments in a single cylinder test engine were made. These experiments and the measuring instruments used are described, the results are charted, pictured and briefly discussed.

THE APPLICATION OF STRAIN OPTICS IN PRACTICE Frame No. 7668-7671

An optical method for strain measurements in plastic models is described. These models consist of artificial resins such as "trolon" and "dekorit" which have been treated in a certain also described manner. By use of white and polarized light of different colors it is possible to measure the shearing stress in these models by optical means. The theory and practical operation of this method is explained and illustrated by pictures, charts and tables.

INVESTIGATION ON THE DISTRIBUTION OF PRESSURE NEAR THE MAIN WING CONNECTION OF A MIDDLE WING AIRPLANE — Frame No. 7672-7681

In order to investigate aerodynamic conditions near the aircraft body and the main wing connection calculations have been made with a theoretical airplane construction which is called "middle wing" plane. The mathematical principle is illustrated by a series of calculations and explained in the text. ~~Further illustration is given by figures and charts. Finally the paper tries to~~ show the value of this method of calculation for the solution of some practical aerodynamical problems of aircraft construction.

THE D.V.L. INDICATOR FOR LONGITUDINAL INCLINATION. AN AUXILIARY INSTRUMENT FOR THE TAKE OFF OF SEA PLANES — Frame No. 7682-7685

The correct angle is of special importance for the take off of sea

planes. While in former seaplane constructions the pilot was in a more or less favorable position to control this angle by his eyesight watching the position of the floaters on the water this control is increasingly difficult for the pilot in modern constructions in which the floaters cannot be seen from the pilots seat and especially during night flying. A new instrument has therefore been designed which by means of a gyroscope shows not only the actual vertical angle of the aircraft but also the theoretically most suitable angle of the least resistance so that the pilot has only to watch this instrument and to make the necessary corrections. The theory, construction and operation of this new measuring instrument illustrated by pictures and charts is described and explained.

6 COMPONENT MEASUREMENTS OF ELLIPTIC WINGS Frame No. 7687-7695

Based on theoretical calculations for elliptic wings in a paper by Kriene some eliptic wing models were built and subjected to aerodynamic experiments. These wing constructions and their theoretical problems are discussed, the experiments are described and the results compared to theoretical calculation results. The text is illustrated by figures, formulas and charts.

CALCULATIONS OF LATERAL STABILITY FOR AIRCRAFTS Frame No. 7696-7703

These calculations are said to be very complicated and to require much time. Since the results of these calculations are extremely important and vary very much with even small changes of construction, the attempt has been made to find a simpler method for the determination of these most important data. Thus, these data could be found quicker and with more ease, and such a method for quick calculation is valuable specially when an aircraft type under construction is subjected to any changes. Theoretical calculations of aerodynamic data for a number of single cases have been made and are discussed as illustrated by formulas and charts. From these stability calculations some principles of correlation between the calculated data are derived in order to read the change of one figure from the change of the correlated figure, thus saving much calculus.

CORRECTION OF MEASURED STARTING TIME AND DISTANCES FOR SEAPLANES SO AS TO BE INDEPENDENT OF WIND OR AIR DENSITY Frame No. 7704-7709

While for starting land aircraft the ground resistance at the take off decreases steadily until the plane leaves the ground, the resistance by the water during take off of a seaplane increases and under certain conditions of weather and heavy load may even become so great as to inhibit the take off. For seaplanes the measurement of the distance covered between start and take off and the calculation of the right angle of attack and of the water resistance is highly important. Comparative figures are often influenced by accidental weather factors and thur blur the result of such measurements and their applications for construction purposes. In order to obtain independent and reliable data for construction purposes certain principles of measurement have been established and theoretically derived that will permit judging the take off features of a seaplane type under construction. The method and details of these calculations and measurements are explained and illustrated with formulas and charts.

REEL NO. 103

AERODYNAMIC PROBLEMS OF THE AIRPLANE BODY Frame No. 7710-7714

The body of the modern aircraft offers about 1/3 of the total air resistance. Though the form and air-resistance of the wings has been repeatedly and thoroughly investigated the investigation of the influence of form and profile of the airplane body on air resistance has not yet been very thoroughly investigated. Principles and resistance calculations as are known from wing profiles are applied to similar conditions and effects of the aircraft body and experiments under varied conditions for example by attaching bombs to different parts of the aircraft body were made and are described. The report is illustrated by many charts and formulas. Some aerodynamic principles and basic relations are derived.

THE INFLUENCE OF SUBSONIC SPEEDS ON THE SLIDE NUMBER OF GYRO WING AEROPLANES Frame No. 7713-7720

The report is concerned with a highly technical aerodynamic problem of air currents and their occurrence at subsonic speeds near the wing tips of gyro wing airplanes. The problem is explained and its solution by means of mathematical calculations is presented. Charts and tables supplement the text.

THE STABILITY CONDITIONS IN THE FIESELER SHAFT TOWING AIRCRAFT Frame No. 7721-7730

The report gives a brief description of this kind of towing aircraft to which a trailer aircraft is connected through a shaft with a universal joint. The trailer aircraft is equipped with a large vertical fin fitted on the wing in order to keep the trailercraft stable in the flying direction. The paper is concerned with the calculation of various currents around these profiles and their influence on the stability of the trailer. These and similar aerodynamic problems are explained and approached by formulas, and illustrated by figures and charts.

RESEARCH LITERATURE Frame No. 7731

THERMODYNAMICS OF FLOWING GASES Frame No. 7734-7740

The paper investigates the thermodynamical changes of ideal gases flowing through tubes of equal and variable diameter undergoing heat exchange. These conditions are subject to certain thermodynamic formulas derived from the general gas laws. The text is illustrated by several charts.

THE EXPERIMENTAL DETERMINATION OF THE MOMENT OF INERTIA AROUND THE TRANSVERSE AXIS OF LARGE AIRPLANES Frame No. 7740-7745

The normal method of determining the moment of inertia is hardly feasible with a large aircraft on account of the technical difficulties. The paper proposes the determination of the moment of inertia around the transversal axis. The theory of this method and ways to apply it for the special purpose of large aircrafts are explained and the pertinent formulas developed. Some charts and pictures illustrate the text.

REEL NO. 103

THE CONSTRUCTION OF PROPELLER BLADES Frame No. 7745-7758

The paper is concerned with certain difficulties in the construction of propeller blades. These difficulties are explained, the principles of construction to be followed are outlined and a method and machinery for the construction of the blade type that fulfill the theoretical demands are described in detail with blueprints, sketches and charts.

A NEW HYDRAULIC PRESS FOR VARIOUS USES Frame No. 7759-7762

This kind of hydraulic press is described in its technical details including pictures and sketches. The operation of the press is explained and some of its uses, especially for the manufacture of aircraft parts are pointed out.

MIPOLAM PRESS CUSHIONS FOR THE FORMING OF LIGHT METAL Frame No. 7763-7768

A so-called press cushion is described which allows the strainless pressing of some light metal parts for aviation in one single pressing action. The installation of the press cushions and its operation as well as the material called "Mipolam" are described, several pictures and blue prints illustrate the text. "Mipolam" is a synthetic resinous material, is said to give better results than rubber and to be more durable.

AIRCRAFT DESIGNER AND CONSTRUCTION ENGINEER Frame No. 7769-7771

The tasks of the aircraft designer who plans and calculates new aircraft types and of the construction engineer who according to these plans supervises the construction are very different. The paper outlines some technical details and principles of cooperation between the designer and the construction engineer.

FROM GERMAN RESEARCH INSTITUTES Frame No. 7771-7772

This is a short literature review.

THE CURRENT FIELD OF THE LAVAL-NOZZLE Frame No. 7774-7785

The flow of gas currents through and around the so-called Laval-nozzle is the subject of this paper. Solution of the involved problems is presented by means of physical formulas and mathematical calculations, which are developed after a short description of the principle of the Laval-nozzle. Many charts illustrate the text.

MEASUREMENT OF AIRCRAFT POSITIONS Frame No. 7786-7798

The calculation of flight distances depends on various data measured during the flight by the numerous measuring instruments of the aircraft. The instruments and the methods of measurements differ and the paper outlines several measuring methods with instruments used in German aviation. The text is illustrated by many charts. Calculations for the compensation of so-called measuring errors and directions for measurements under special conditions complete the report.

REEL NO. 103

TIPOVER POINT AND SUCTION

This paper treats the complicated stability problem of a flat plate moving horizontally through a frontal air current. The stable position of such a plate is greatly increased if the air is sucked off from both sides of the plate. The formation of air turbulences disturbing the stability and finally causing the tipover of the plate is thus considerably delayed. This problem is mathematically developed and also various other connected aerodynamic questions are discussed. Many charts and calculations are contained in the text.

STABILITY LIMITS OF CIRCULAR CYLINDER WALLS

Frame No. 7806-7820

The complicated play of aerodynamic forces along and around a horizontally moving circular cylinder of indefinite length is the subject of this paper. Formulas and methods to calculate these forces and their effects are developed. By means of these calculations is is possible to determine the stability limits of such a body and also the danger points of bending or breaking. Charts, tables and formulas illustrate the text.

CURVES OF AIRCRAFT WING PROFILES EXHIBITING A "SINGULARITY"

Frame No. 7822-7826

The form of the profile curves of aircraft wings is of extreme importance in aerodynamics and one discontinuity of the curved line can be of serious consequence. The paper is concerned with the pertinent aerodynamic problems and the calculation of the involved forces. A designing method is explained which allows the design and calculation of one discontuity or singularity of the profile curve. The method and detail of these calculations are developed and illustrated by formulas and charts.

DISTURBANCES IN THE HEIGHT CONTROL OF AN AIRPLANE FITTED WITH A HEIGHT BUOYANCY LANDING EQUIPMENT

Frame No. 7827-7832

A certain German aircraft of the Dornier type had been fitted with a landing equipment utilizing the buoyancy effect of a splitted flap or short wing near the back end of the stabilizing wings. When the model plane with this equipment was tested an unexpected instability during operation of this flap occurred. Wind tunnel experiments in order to investigate the aerodynamic cause of this behavior were carried out. The details of the experiments, the aerodynamic problems involved and the outlines of their calculation and effect form the subject of this paper. Many figures, tables and charts accompany the text.

VIBRATION EXPERIMENTS IN THE WIND TUNNEL WITH AN AIRCRAFT WING EQUIPPED WITH STEERING RUDDER AND AUXILIARY RUDDER

Frame No. 7833-7841

In order to derive principles for the construction of a steering control free from vibrations, wind tunnel experiments were carried out, details of which are described. Based on these experiments aerodynamic calculations were made aimed at avoiding possible vibrations by air currents and turbulences. Many figures and charts illustrate the text.

REEL NO. 103

AN ELECTRICAL INSTRUMENT FOR THE MEASUREMENT OF VIBRATIONS IN FLYING AIRCRAFTS Frame No. 7842-7851

For the specific purposes of measuring vibrations in flying aircrafts the direct measuring methods by oscillographs and other directly registering instruments proved inadequate. A new instrument with indirect registration of the vibrations transformed by electrical means seems to offer the desired solution. A very detailed description of this instrument, its parts, operation and method are given. The text is illustrated by many pictures, sketches and charts.

BUMP RESISTANCE OF STRENGTHENED CYLINDER WALLS EXPOSED TO STRAIN AND INTERIOR PRESSURE Frame No. 7852-7857

The paper is concerned with the investigation of the aerodynamic conditions of a cylinderical body such as might form a part of an aircraft construction. The aerodynamic equations by which to calculate the desired data of resistance and stability are developed and the results charted.

A LABORATORY METHOD FOR THE DETERMINATION OF THE LEAD CONTENT IN AIRCRAFT FUELS Frame No. 7858-7865

In order to increase the knock-stability most of the current aircraft fuels contain a certain amount of tetraethyl lead so that the lead content is in some way an indicator for the knock-stability of the gasoline. The paper gives a short review of the various methods of quantitative lead determination for gasolines such as the chromate method, the method with hydrochloric acid, the sulfate method, iodine method etc. Special attention is given to a titration method which is described as rather new. Test results for the same kind of fuels by various methods are listed in a table and demonstrate that all the methods in general are fairly reliable.

STEEL WELDING IN A METAL LIGHT ARC Frame No. 7866-7868

The paper gives a review of electric welding experiences on aircraft sheet metals by use of metal electrodes. The advantage of electric welding as compared to blow pipe or gas welding is that a much smaller region of the welded material is exposed to the heat and its deforming effects so that the electrically welded piece needs less finishing treatment than the gas welded piece. Choice and composition of the metal electrodes are of considerable influence on the tempering quality of the welded piece. Experiments with certain electrodes are listed in tables with special attention to the pressure resistance of the welded piece. The paper contains some details of the welding method and materials used.

A SIMPLE NOMOGRAPHIC METHOD TO DETERMINE THE REAL FLYING SPEED AND THE REAL TEMPERATURE OF THE OUTSIDE ATMOSPHERE FROM THE REGISTRATIONS OF THE AIRCRAFT INSTRUMENTS TAKING IN ACCOUNT THE COMPRESSIBILITY OF THE AIR Frame No. 7877-7886

After explaining that on account of the compressibility of the air and the speed of the airplane the data registered by the airplane instruments are not

absolute data, but that such can be calculated from data registered during two flights at different speed and temperature, the paper gives the principles and necessary formulas and calculations for the determination of what is called the real flying speed and the real temperature of the atmosphere outside of the airplane. From these formulas and figures a method is derived which allows doing these calculations with a slide rule. Many formulas, charts and tables illustrate the text.

MEASUREMENTS WITH A BACK PRESSURE AMPLIFYING INDICATOR WITH GREAT INDEPENDENCE FROM THE BLOWING ANGLE OF THE PRESSURE CURRENT Frame No. 7887-7891

An experimental instrument is described for aerodynamic back pressure measurements, consisting mainly of a so-called venturi nozzle of cylindric form containing a pressure tube. A spreading flap ring in the back of this nozzle has the purpose of making the instrument independent from changes in the blowing angle of the air pressure. The operation of this instrument for the registration of back pressures transmitted by an amplifier in order to register also small pressure changes is described and formulas are developed for the necessary calculations. Pictures and charts illustrate the text. Some experiments are discussed. The summary of the results is not very satisfying and acknowledges that the instrument has to be considerably improved before being suitable for practical use.

A NEW TRAILING EFFECT (Nachlaufeffekt) Frame No. 7891-7894

The paper describes wind tunnel experiments aimed at investigating bouyancy effects on a profile fixed behind a wing. This profile trailing behind the wing opposes a considerable resistance to any kind of change in direction. This phenomenon is made the subject of wind tunnel experiments which are described in detail and charted. The aerodynamic forces and resistances are calculated by formulas. The phenomenon itself is defined as a trailing effect (Nachlaufeffekt).

THE WIND CURRENT BEHIND AN AIRCRAFT WING Frame No. 7894-7895

The aerodynamic conditions of the aerial currents behind an aircraft wing are subject to various influences and forces. By calculating these forces each according to its special formula it is possible to form a concept of the air current conditions behind the wing. The calculating methods and formulas and some examples are briefly explained and charted.

INVESTIGATION OF VIBRATIONS OF COUNTERWISE ROTATING PROPELLERS Frame No. 7896, 7886

This paper is concerned with the vibrations occurring in counterwise rotating propellers. These vibrations are explained and their intensity is calculated, at first for a single propeller and subsequently for both propellers.

A SUITABLE TEST METHOD FOR ADHESIVES (GLUES) FOR AIRCRAFT CONSTRUCTION Frame No. 7897-7901

The adhesives used in the aircraft industry are not only supposed to

hold parts of the same material together, but very often heterogeneous materials such as wood and fabric or fabric and rubber or plastic material are connected by an adhesive "glue". The gluing adhesive power of such material for aircraft construction is of great importance so that ordinary test methods of the glue and its thread between two fingers are too primitive. A test apparatus for the adhesive or glue properties of connecting materials is described, the employed terminology is defined and a method of evaluation of the experimental data is given. Some experiments with 3 meterials are described and the results tabulated. The text is illustrated by several pictures.

INVESTIGATION OF THE MOTION OF A PLATE ENTERING THE FLOW OF AN AIR CURRENT — Frame No. 7902

This is a brief report on experiments in a wind tunnel and the method employed to measure and register the observed aerodynamic data.

FROM GERMAN RESEARCH CENTERS — Frame No. 7903-7904

A short literature review.

ON THE THEORY OF WING PROFILES — Frame No. 7906-7913

The aerodynamic theory of wing profiles is developed mathematically and the derivation of formulas and methods of calculation explained. The text is illustrated by pictures and charts and the method of calculation is said to be applicable to any kind of normal wing profile.

THE KNOLLER-BETZ EFFECT AS A MEANS TO INCREASE THE EFFICIENCY OF A BEATING WING

The possibility of propelling an airplane by a mechanically beating wing moving up and down like a bird wing is discussed in this paper. The propulsion by such a wing motion is debated and it is believed that the efficiency can be greatly increased by dividing the wing surface into two separate parts. The wing motion is calculated according to aerodynamic principles and in particular the propelling effect of the second or rear section of the subdivided wing is favorably mentioned as the Knowler-Betz effect. The text is illustrated by several charts.

THE INFLUENCE OF THE BODY ON THE STATIC LONGITUDINAL STABILITY OF AN AEROPLANE

An aerodynamic principle and calculating method of the influence of the aeroplane body on the longitudinal stability of the aircraft as a whole is developed and illustrated by several charts and tables with comparative results of measurements carried out with experimental construction models.

CHANGES IN THE HARDENING PROPERTIES OF DURALUMINUM BY PROGRESSIVE COLD HARDENING — Frame No. 7927-7929

The paper is concerned with the heat treatment of duraluminum (an alloy

of aluminum, copper and magnesium). A series of experiments was carried out in which a metal sheet of duraluminum was subjected to heat treatment. Temperatures were chosen between 100 and 300° and subsequently the metal was chilled and left in storage at about 20°C. During this storage process the hardness of the metal increased considerably. The experiments are discussed and illustrated by charts and tables.

THE RELATION OF THE SHAPE OF PROPELLER BLADES TO THE STRAIN BY CENTRIFUGAL FORCES Frame No. 7930-7931

This paper is concerned with the centrifugal forces acting on propeller blades and scoops in addition to shearing stress and aerodynamic forces. The theoretical problem is discussed and a method of practical calculation is developed. Some calculation results are charted and listed in tables.

THE THERMODYNAMIC PROPERTIES OF SMALL AIR-COOLED CYLINDERS Frame No. 7932-7940

The efficiency of small cylinder engines, with combustion chambers not over 1 lit. volume, is discussed in this paper. Particular attention is given to the thermodynamic factor of this problem. Three types of such engines are compared and the data listed in a table. The comparetive details are discussed and illustrated by pictures and charts. The paper shows that a small engine with high super charge can favorably compete with larger engines.

CONTROL OF THE PISTON TEMPERATURE DURING FUEL ENDURANCE TESTS Frame No. 7941-7948

The paper gives a brief survey of test methods for lubricating oils, so-called ring sticking tests, the result of which are criticized as unreliable on account of insufficient control of piston temperatures. Some experimental arrangements and possible causes of error are discussed and finally a measuring method to determine the piston temperature in the running engine is described and an instruement for such measurement is devised and illustrated by pictures. Some experiments with this instrument are discussed and illustrated by charts.

ELECTRO MECHANICAL OSCILLATING AND REGULATING INSTRUMENT Frame No. 7949-7952

Such an instrument is described and devised in particular to be used in aviation and intended to supply a mechanical impulse like the main spring of a watch-movement but independent from the vibrations and other disturbing influences to which a mechanical watch-movement would be subject in an airplane. Several pictures and sketches illustrate the description of instrument and method.

THE COMPRESSIBLE AIRFLOW AROUND A ROTATING ELIPSOID ACCORDING TO THE METHOD OF GENZEN RAYLEIGH Frame No. 7954-7961

This is an aerodynamic problem which is discussed and developed by mathematical formulas.

INVESTIGATIONS ON THE BUOYANCY(LIFT) OF THE WING IN AN INHOMOGENOUS AIR CURRENT Frame No. 7962-7967

Some experiments aimed at the investigation of this aerodynamic problem

are described and illustrated by charts and tables.

DEVELOPMENT OF THE OIL-COOLING SYSTEM FOR THE BMW 801 ENGINE Frame No. 7982-7983

This paper discusses the problem of sufficient air supply for the requirements of an oil-cooling system for the BMW 801 aircraft engine for which the air cooling surface of customary oil radiators is insufficient. Designs of suitable profiles are suggested and illustrated by pictures. The pertinent thermodynamic problems are treated. The text is illustrated by many charts. Some radiator systems and their efficiency are briefly compared and theoretical requirements for the best radiator system are outlined.

THE EFFECT OF NITROGEN IN HEAT-RESISTANT AUSTENITIC STEELS Frame No. 7984-7987

This metalurgical paper discusses the limited ways by which nitrogen can be introduced into steel. In steels containing chromium, manganese and nickel, a certain amount of nitrogen is helpful to save nickel or the even more expensive molibdenum. The same goes for austenitic steels in which nitrogen increases the consistency and stretchability. The paper contains many phase charts and some details and tables about the composition of some steel alloys.

HEAT AND LOAD CAPACITY OF CONDUITS IN AIRCRAFTS Frame No. 7988-7992

These important data are usually taken from capacity tables. However in order to save weight and for the particular conditions of conduits in aircrafts new direct ways of calculating these data are developed and described.

A GEAR MOVEMENT PROBLEM FOR ARTILLERY Frame No. 7993-7997

A special problem of gear movement and construction for an artillery piece is described. The solution is developed by differential calculus. The text is illustrated by several charts and tables.

PHOTOGRAPHY OF THE WHIRL TRAILS OF AIRCRAFTS Frame No. 7998-8000

It had been observed that the exhaust gases of aircrafts occasionally formed well-defined whirl trails behind the two wing tips and could be photographed. The paper discusses the theory of the formation of these whirls and how to utilize them for the study of air and gas conditions behind the airplane.

RESEARCH LITERATURE Frame No. 8001

THE FORCES KEEPING AN AIRPLANE IN STRAIGHT LINE WHILE ROLLING OVER THE GROUND AND THE TENDENCIES OF SIDE-TRACKING Frame No. 8004-8017
December 30, 1942

This paper investigates the mechanical and aerodynamic forces acting on an airplane while moving on the ground. Motion on 2 and 3 wheels is investigated and equations are developed for the calculation of the various impulses during ground motion. The text is illustrated by charts and tables.

REEL NO. 103

ADDITIONAL STRESS IN STEEL-DURALUMINUM CONSTRUCTIONS CAUSED BY HEAT EXPANSION Frame No. 8018-8023

These stress problems and their calculation are explained.

THE BEHAVIOR OF OUTSIDE-THERMOMETERS IN THE DISTURBED CURRENT OF AN AIRPLANE FLYING AT A HIGH SPEED Frame No. 8023-8929

The special thermometrical problems of temperature measurements under such conditions are discussed and a "diffusion thermometer" is described as the best solution for reliable measurements.

METHOD TO MEASURE VERY SMALL THERMO-ELECTRICAL POTENTIALS BY MEANS OF SLIDING CONTACT RINGS Frame No. 8030-8032

The paper discusses the loss of potential occurring in such measurements due to the formation of foreign substances, such as oxides, between brush and contact ring. A method using an auxiliary graphite brush is described as practically causing no loss of potential whatsoever.

FROM GERMAN RESEARCH INSTITUTES Frame No. 8032

A literature survey.

TEMPERATURE AND PRESSURE MEASUREMENTS OF HYDROGEN FLOWING FROM A HYDROGEN STEEL CYLINDER Frame No. 8033-8035

These measurements are described and were motivated by breakage of rubber connections.

FLOW RESISTANCE IN PLANE RECTANGULAR TUBES WITH PARTICULAR ATTENTION TO THE INITIAL LOSSES Frame No. 8037-8058

The flow problems occurring in rectangular air passages are outlined. Various theories are reviewed and a formula for the flow resistance is developed. Several experiments are described and their results tabulated and illustrated by charts.

FLOWS OF SUPERSONIC SPEED HITTING AGAINST CONICAL SURFACES Frame No. 8059-8069

These flow problems are of particular interest for the calculation of the trajectory of an artillery projectile. The theory and practical calculation of the dynamic and aerodynamic force acting under these conditions are developed and illustrated by charts, pictures and formulas.

PLASMA ELECTRONIC OSCILLATIONS IN A VACUUM DISCHARGE TUBE Frame No. 8070-8078

Experiments with an apparatus that might be characterized as a sort of Klystron are described and the plasma electronic oscillations are discussed as to their origin, nature, control and relation to the speed of the electrons. The paper is illustrated by charts and pictures.

REEL NO. 103

RADIO SONDES USING 25 M. MIRROR REFLECTED WAVES Frame No. 8079-8083

Experiments with a 3 m. diameter parabolic mirror reflector and a method to calculate balloon positions and wind speeds are described. A series of radio sonding measurements with group of 3 such radio sondes is discussed. Pictures and charts illustrate the paper.

EXPERIMENTS ON THE FLOW THROUGH A TURBINE BLADE GRID Frame No. 8085-8093

Experiments with some air turbine blades are described and the aerodynamic flow problems in connection with such profiles are discussed. Methods of calculating the aerodynamic forces are explained and the results of some experiments are illustrated by pictures and charts.

A NEW REGULATOR FOR GASOLINE MIXTURES IN AIRCRAFT ENGINES Frame No. 8094-8106

The paper discusses the various factors on which the composition of the most favorable fuel air mixture for internal combustion engines with fuel injection depends. Instead of determining each single factor by a special instrument a new regulator is described which by combining these instruments in the right way regulates the fuel gas mixture so as to supply the aircraft engine with the most economical and efficient fuel mixture. The results of some experiments are charted and compared to results with other regulators.

VIBRATIONS IN AIR PROPELLER BLADES AND THEIR RELATION TO THE FORCES IN THE ENGINE Frame No. 8107-8112

The nature and causes of the propeller blade vibrations was investigated by experiments with a B.M.W. 9 cylinder aircraft engine on the test stand. These experiments are described in detail, calculations are developed with formulas, the results are charted and tabulated. The vibrations are mainly caused by the engine revolutions causing resonance in parts of the blade and by some crankshaft vibrations caused by centrifugal forces acting on the crankshaft.

INVESTIGATION OF ORBITAL VIBRATIONS IN AN ENGINELESS AIRPLANE Frame No. 8113-8122

An engineless airplane flying with fixed height controls will exhibit two kinds of vibrations, a quick and rather subdued first kind in the direction of the angle of attack and another slow and not subdued kind, the so-called orbital vibration. These vibrations were investigated with an experimental airplane and the aerodynamic calculation of their nature was developed. The calculations and the experimental results are said to be at variance in some points. The paper is illustrated by many pictures, charts and tables.

THE INFLUENCE OF THE INERTIA OF GASES DURING FIRING (OF GUNS) Frame No. 8123-8131

When a shot is fired from a gun the projectile is accelerated by the expansion of the exploding gases in the barrel. Due to the inertia of the gases the pressure against the bottom of the projectile is not quite uniform and this results in a difference between the theoretical and actual speed of the projectile

at the time of leaving the barrel. For practical purposes certain simplified calculation methods are in use, while this paper is concerned with the exact calculation of the responsible forces and inertias according to the laws of gases and thermodynamics. Theory and formulas of these calculations are explained and developed.

LITERATURE — Frame No. 8132

Dec. 15, 1944 — VIBRATIONS OF AIRCRAFTS — Frame No. 8135-8148

The nature and possible causes of these vibrations are discussed. Various experiments are described proving that the vibrations originate from the engine and the propellers. The local installment and cushioning of the engine is of particular importance. Many charts, pictures and tables illustrate the report.

PHOTO-ELECTRICAL DETERMINATION OF DIRT IN LUBRICATING OIL — Frame No. 8149-8150

A method is described by which the oil is exposed to a light ray connected with a photocell. The oil is made to pass between two glass plates of constant distance. The more the light ray is darkened by the oil, the dirtier it is. Thus an exact method to measure the dirt content of lubricating oils and test the necessity for oil changes can be developed. Pictures and charts illustrate the report.

PROPULSION BY THE EXHAUST GAS JET OF AIRCRAFT ENGINES — Frame No. 8151-8153

A work sheet is propounded and explained which allows to calculate the propelling force of the exhaust gas. Calculations of suitable nozzle sizes and propulsion effects are presented. The report is illustrated by charts.

THE STRESS PROPERTIES OF AIRCRAFT CONSTRUCTION PARTS WITH CARVED PROFILES — Frame No. 8153-8154

Some profiles of various materials are compared and comparative stress calculations are made.

FLUTTER-CALCULATIONS — Frame No. 8154

Problems for the calculation of the "flutter" phenomenon are described and methods of solution are discussed.

BUOYANCY LIFT — Frame No. 8155-8162

The aerodynamic problem of buoyancy lift is discussed and some particulars are illustrated by tables and charts with comparative date.

THE COMPARATIVE SHEARING STRENGTH OF SOME WOODEN AIRCRAFT CONSTRUCTION MATERIALS — Frame No. 8163

Some shearing stress experiments with various wooden materials are

briefly described and summarized.

SELF-IMPROVING ALUMINUM ALLOYS Frame No. 8164

The self-improving properties of such alloys after heat treatment are described and their usefulness for many purposes is pointed out, in particular for manufacturing models for experimental stress calculations. The technique of sand casting such pieces makes this a cheap and easy method.

FLUTTER CALCULATIONS Frame No. 8164

As in Frame No. 8154 another method for the calculation of the "flutter" phenomenon is explained.

SHEET METAL SUBSTITUTION BY STEEL Frame No. 8165-8170

Such a substitution does not merely consist in a change of a material but involves many problems of stress and strain resistance which are explained and discussed. The text is illustrated by charts and tables.

GERMAN LITERATURE OF FOREIGN COUNTRIES Frame No. 8170-8174

This is a list of available translations.