

FILM STUDY GROUP
SUBJECT INDEX AND REPORT
T.O.M. REEL NO. 108

Prepared by
CALIFORNIA RESEARCH CORPORATION

CALIFORNIA RESEARCH CORPORATION

RICHMOND, CALIFORNIA

INDEX OF TECHNICAL OIL MISSION MICROFILM

REEL
Reel No. 108

(Prepared by
California Research Corporation)

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CALIFORNIA RESEARCH CORPORATION
RICHMOND, CALIFORNIA

ABSTRACT OF TECHNICAL OIL MISSION
MICROFILM

REEL NO. 108

(Prepared by California Research Corporation)

REEL NUMBER 108 (ABSTRACT)

THE I.C. TEST ENGINE DESIGNED FOR TESTING THE KNOCK RATINGS AND PROPERTIES OF VARIOUS GASOLINES. (No year) Frame 9559-9617

A single cylinder engine is described in minute detail with all its accessories and with illustrating pictures and charts. The installation and operation and the different test operating conditions are discussed. The method of the test is described and explained, the various uses and limits of accuracy are pointed out, and in the end some practical directions are given on where to obtain the necessary operating materials and how to care for and maintain the equipment.

INSTRUCTIONS FOR THE SUPERVISION AND MAINTENANCE OF THE AIRCRAFT ENGINES AND EQUIPMENT. October 31, 1940 Frame 9618-9625

The paper describes those engine parts and functions which must be carefully supervised and maintained to avoid wear. Accessories and gauges are given special attention. Test rules and instructions are outlined with much technical detail and illustrative figures and tables.

HIGH STRENGTH AIRCRAFT STEELS May 15, 1940 Frame 9629-9651

The steels used in aircraft construction requiring a strength of at least 90 kg/mm sq. (128,000 lbs. per sq. in.) are discussed in extensive detail, their composition and properties are treated and special uses are described. Illustrations, charts and tables of comparative data are included.

INSTRUCTIONS FOR THE TESTING OF PARTS AND EQUIPMENT FOR AIRCRAFT ENGINES AND INSTRUMENTS. May 15, 1940 Frame 9652-9658
This is an instruction leaflet for use in the services.

The purpose, necessity and method of various routine tests are systematically and extensively discussed and treated, outlining technical details and their importance including some charts and illustrative material.

TEST OF MATERIALS FOR AIRCRAFT AND ENGINE CONSTRUCTION. Frame 9659-9698
November 30, 1939

Tests of materials, in particular chemical tests usually involve destruction of the tested items. The report discusses various test methods and purposes and reviews in particular means and principles to carry out such tests by methods that would save the tested materials, chiefly metals, from destruction. Detailed optical, electrical, magnetic and X-ray methods leaving the tested materials intact are described with accuracy. Charts and illustrations and many features and examples are offered.

THE USE OF SYNTHETIC MATERIAL IN AIRCRAFT CONSTRUCTION. Frame 9699-9721
January 31, 1941

Pressed artificial resins and hardened phenol formaldehyde resins, their technical properties and special uses including test methods and data on practical suitability are scientifically discussed. The second part is concerned with transparent materials for the replacement of glass. Many properties of these materials are listed in detail, comparative charts, figures and illustrations accompany the text.

PISTON RINGS

October, 1939

Frame 9722-9741

The purpose and function of piston rings and the technical problems involved are discussed. The suitable materials, their properties and advantages are reviewed and special attention is given to the manufacturing processes. The effect of piston ring profiles on engine efficiency and oil consumption is described. Function of the ring, maintenance, wear and test methods are treated in detail. Many theoretical and practical items are illustrated by figures and charts.

CONSTRUCTION AND BASIC PRINCIPLES OF NOZZLES AND INJECTION APPARATUS FOR DIESEL AND OTTO CYCLE AIRCRAFT ENGINES.

Frame 9742-9753

Injection methods in Diesel aircraft engines and Otto cycle engines are reviewed and technical details of nozzles and injection pumps discussed. In the second part the operation and functional injection parts of the Diesel engine are described in detail. The third part gives the analogous description for the Otto engine. Some illustrations and figures accompany the text.

AERODYNAMIC COOLING OF NOZZLES IN LIQUID COOLED AIRCRAFT ENGINES.

April 1, 1940

Frame 9754-9763

The history, principles and problems of aerodynamic cooling of nozzles are outlined. The possibilities and lines of development with particular reference to liquid cooled cylinder blocks are described and the technical problems involved are discussed. Cooling efficiency, measuring methods and data are reviewed with charts, pictures, graphs and formulas.

THE CONSTRUCTION OF THE COMBUSTION CHAMBER IN THE AIRCRAFT ENGINE.

Frame 9764-9794

~~The thermodynamic process in the interior of the combustion chambers~~ of Otto and Diesel engines, in particular the intake and exhaust gas exchange and the combustion processes and their relation to the construction of the combustion chamber are described and discussed. Correlated details such as the arrangement and operation of the spark plugs, of the injection nozzles and valves are given attention. Some thermodynamic principles and their application to the combustion chamber are developed by formulas. Illustrative charts and figures accompany the text.

THE EXHAUST LINES, STACKS AND MUFFLERS IN AIRCRAFT ENGINES.

October 31, 1940

Frame 9795-9803

The exhaust lines, stacks and mufflers are designed to conduct the exhaust gases to points where the engine operation and efficiency are least affected, subduing the noises as far as possible. The air resistance is thereby avoided and the exhaust heat utilized. Guided by these principles the technical details, equipment and pertinent theoretical principles are discussed and illustrated by formulas, figures and charts.

DESIGNING AND CONSTRUCTION OF VALVE SPRINGS FOR AIRCRAFT ENGINES.

May 15, 1940

Frame 9804-9821

The purpose, operation and principles of construction of valve springs of different designs are discussed. Chief attention is given to spiral types, and material, theory, and design. Many formulas, charts and illustrations accompany the text.

CARBURETORS FOR AIRCRAFT ENGINES. May 15, 1940

Frame 9822-9841

In spite of the increasing influence of the injection technique for the Diesel and Otto cycle aircraft engines the smaller carburetor-equipped engine which is more economical in construction and operation has its own field for training machines, private aircraft, etc. The special features and operating conditions of the aircraft engine require adaptation of the carburetor in several respects. The technicalities of construction, theory, method of operation, fuel consumption, testing and maintenance of various types of aircraft carburetors are treated in this detailed report containing many formulas and illustrations.

CONSTRUCTION AND DESIGN OF MULTIPLE-BANK AIRCRAFT ENGINES.

May 15, 1940

Frame 9842-9868

The vital questions and problems of the cylinder arrangement and dimensions for multiple-bank constructions are discussed. Correlation of overall engine efficiency, construction and weight and details of operation are theoretically explained and finally some special multiple-bank constructions such as 12 and 24 cylinder engines are critically reviewed. The text contains many illustrations.

ELIMINATION OF WATER IN AIRCRAFT ENGINE AND FUEL TANKS BY FILTERS.

(Covers material from 1938-1939)

Frame 9869-9878

The different kinds of filters, such as metal strainers, tissue and felt strainers, paper and laminated filters, etc. are discussed and described with illustrations.

FUEL PUMPS

May 15, 1940

Frame 9879-9890

Various types of diaphragm pumps, injection pumps with two or three pistons, constant displacement rotary pumps, etc. are described and their action and efficiency discussed and compared; text is illustrated by figures and pictures.

EFFECT OF BENZENE AND IRON CARBONYL UPON KNOCK RATINGS OF VARIOUS GASOLINES AND VARIOUS SPARK SETTINGS. October 4, 1937 Frame 9891-9899
(Research report Oppau)

The anti-knock effect of benzene and iron carbonyl as fuel additives are discussed and compared. Test charts and tables supplement the text.

EXPERIMENTS WITH SYNTHETIC LUBRICATING OILS. Frame 9904-9909
(Research report Oppau) March 1, 1928

Research oils have been tested and test results are discussed; the results are said to be satisfactory. A few charts are added to the text.

REPLACEMENT OF ADDITIVE A IN MOTALIN (A GASOLINE) BY XYLIDINE. Frame 9910-9917
(Research report Oppau) November 5, 1930

The report is concerned with tests of xylidine as an anti-knock agent and its effect in engine deposition. The results indicate the suitability of the use of Xylidine.

EXPERIMENTS ON THE INFLUENCE OF A LOWER POUR POINT ON THE OPERATION OF DIESEL OILS. (Research report Oppau) February 22, 1935 Frame 9918-9929

Lowering of the pour point has only little influence on the starting of crystallization (turbidity) of the lubricating oil. However, the fuel pump can pump oils with a lower pour point at lower temperatures which is of some advantage.

INFLAMMABILITY OF GAS-AIR OR VAPOR-AIR MIXTURES BY FLYING SPARKS FROM GRINDING MACHINERY. Frame 9930-9939

The report is concerned with the inflammability and incendiary danger involved by air vapor or air gas mixtures in technical plants where flying sparks from grinding machinery might touch off fires or explosions. Igniting tests were made and the inflammability limits of mixtures charted. The report gives a summary and description of these tests recommending suitable precautions derived from experiments.

RESULT OF THE EVALUATION OF CAPTURED MATERIALS Frame 9940-9961
November 15, 1944

Various captured British, American and Russian lubricants and gasolines have been tested. The report gives the details of these tests and compares the results to German specifications of gasolines and lubricants.

REPORT OF THE FIFTH ASSEMBLY OF THE ASSOCIATION FOR KNOCK RESEARCH Frame 9962-9972
February 16 & 17, 1943

Knock rating tests which are described in detail including the equipment used and the accuracy obtained.

REPORT ON SYNTHETIC GASOLINE Frame 9973-998

Knock rating tests have been made and are described. Their results and the various aspects of the problem involved are discussed.

EXPERIMENTS ON THE OCTANE RATING DETERMINATION OF LIQUIFIED GASES

Frame 9981-9985

These experiments are aimed at testing the knocking behavior and octane rating of compressed liquified gaseous engine fuels mixed with various percentages of liquid hydrocarbons. The test equipment is described and experiments and their results discussed.

THE INFLUENCE OF OPERATING CONDITIONS ON KNOCKING BEHAVIOR OF ENGINE FUELS

Frame 9986-9989

The influences of the operating conditions on the knocking behavior of engine fuels are discussed and illustrated by various experiments.

TEST STAND EXPERIMENTS REGARDING THE USE OF THE "RESEARCH METHOD" AND THE "MOTOR METHOD" OCTANE RATINGS IN PRACTICE .

Frame 9990-9994

Tests with different test engines are described and discussed and as a result the so-called motor method is preferred to the research method because the test conditions of the former correspond better to the practical operating conditions.

COMPARISON OF MOTOR AND RESEARCH METHODS FOR THE RATING OF PETROLEUM BASED FUELS.

Frame 9995-9996

The two methods are briefly described and compared and the preferences left undecided.

PREPARATION OF TETRAETHYL LEAD FOR LEADING OF GASOLINES IN THE LABORATORY

Frame 9997-9999

The report gives directions for the preparation of a tetraethyl lead solution of known strength and outlines the importance of leading gasolines with a solution of known strength for comparative octane rating tests.

RESEARCH ON PISTONS

Frame 10001-10012

Report reviews the use of new materials for the construction of pistons, especially for aircraft engines. The various alloys containing magnesium and aluminum and magnesium together and problems of metallurgical treatments and surface finishing are discussed. A review of some frequent defects and suggestions on how to prevent them by special working methods complete the illustrated report.

REPORT ON THE RESEARCH WORK AT OPPAU

Frame 10013-10019

A historical survey of the development, scope and fields of the research work at Oppau laboratories is given.

THERMO TECHNICAL RESEARCH AT OPPAU

Frame 10020-10025

This report reviews the field of work, comprising thermo dynamic research, laboratory experiments and testing of various machinery and equipment for measuring heat conductivity, etc.

QUALITY OF FLUE ASHES AND THEIR USES.

Frame 10026-10029

With increased use of coal dust in furnaces flue ashes are abundantly produced so that the profitable use of this waste material is a problem. The report discusses possibilities of use as an insulating material and gives the description of physical and chemical properties of the ashes in this respect.

DEVELOPMENTS OF METHODS TO DETERMINE KNOCK RATING OF LIGHT GASOLINES.

Frame 10030-10033

The importance of the octane rating and methods of its determinations are reviewed.

TEST OF DIESEL FUELS

Frame 10034-10037

This is a review of the Oppau equipment for testing Diesel fuels. Some testing experiments are described and their results charted.

COLD WEATHER STARTING EXPEDIENTS FOR DIESEL ENGINES

Frame 10037-10039

Some of these expedients such as preheaters, etc. are described and their principles of operation and efficiency discussed.

THE HESSELMANN ENGINE AND ITS FUELS

Frame 10040-10042

The peculiar nature of the Hesselmann engine which is a spark ignition engine with direct fuel injection into the combustion chamber is described and compared to Otto and Diesel engines and the differences in the fuel used is discussed.

EXPERIMENTS WITH MOTOR VEHICLE FUEL PREHEATERS.

Frame 10043-10044

A short review on the importance of solid fuels in particular during war times, is given and their suitability and adaptation for use in motor vehicles is discussed, in particular the problem of preheating and igniting these fuels.

TESTS OF ENGINE LUBRICATING OILS

Frame 10045-10047

The principles of testing lubricating oils by motor or engine tests are outlined and the advantageous use of a special test engine is advocated.

FRICITION AND ENGINE WEAR DURING LUBRICATION

Frame 10048-10050

Methods and machinery to measure these two important factors of friction and wear and their variation with various oils are discussed and described.

THE I. G. TEST ENGINE

Frame 10051-10054

A brief illustrated description of this test engine and its purposes is given, for a more detailed report see Frame 9559-9617 of this Reel.

ELECTRICAL MEASURING METHODS.

Frame 10055-10058

Instruments for the electrical measurement of pressures, flame propagations and injection spray patterns are discussed. The Stroboscope in particular is given attention.

THE OPTICAL REFRACTIVE INDEX AND DISPERSION AS AN ANALYTICAL AUXILIARY MEANS FOR THE INVESTIGATION OF GASOLINE AND DIESEL FUEL PROPERTIES.

Frame 10059-10062

The theoretical principle and operation of such measurements are discussed and comparative results illustrated by charts.

THE EVALUATION OF THE EQUATION OF COMBUSTION

Frame 10063-10066

The use of the equation for calculating air requirements, the amount of combustion water and of generated heat, the increase of volume etc. is discussed and illustrated by graphs.

A LIST OF RESEARCH LITERATURE PUBLISHED BY RESEARCH LABORATORIES AT OPFAU
Frame 10067-10068

THE PROBLEM OF RATING ENGINE FUELS Frame 10072-10092

After a review of the principles of octane and knock rating measurements a method of graphically charting the knock vibrations for such purposes is discussed and advocated.

THE RATING OF DIESEL FUELS Frame 10093-10139

The test of fuels in the single cylinder engine, the relation between delayed ignition-cetane number are discussed. Knocking in Diesel engines and methods to measure knock ratings in a single and multiple cylinder Diesel engine are described and illustrated by experiments and charts.

DEVELOPMENT OF EQUIPMENT FOR KNOCK RESEARCH Frame 10140-10158

Instruments and methods are described to register knock vibrations in the running engine on the road or in the air. Some experiments are described and illustrated by pictures and charts.

ELECTRO ACOUSTICAL TEST METHODS FOR KNOCK RESEARCH IN SINGLE AND MULTIPLE CYLINDER ENGINES Frame 10159-10200

Instruments and methods for such experiments in different engines are described and comparative experiments are discussed and shown with pictures and charts.

PROBLEMS OF FUEL RESEARCH AND THE PROPER FUEL SUPPLY TO THE ENGINE. Frame 10201-10219

The article points out that un-interrupted fuel supply to the running engine is very much a matter of good gasoline properties, especially at freezing temperatures or under other special conditions. The different methods of gasoline production to obtain the characteristics desired are reviewed with particular attention to knock stability.

THE STUDY OF FUEL FLOW THROUGH THE INJECTION NOZZLE Frame 10220-10252

This report is concerned with the investigation of the development of the spray or jet by the nozzle and its different forms, considering variations of air and fuel pressure, size of drops in the spray, etc. A series of experiments is discussed and the attempt is made to derive some principles for the practical operation of diesel engines.

PROPERTIES OF AVIATION FUELS AND TEST METHODS. Frame 10253-10289

The aircraft engine fuels can be divided in two classes, those for the Otto engines and those used in Diesel engines. Their quality depends on such properties as knock resistance, volatility, purity, heating value and stability. These properties are discussed in their theoretical importance. Practical test methods are described to test for the above mentioned properties with the objective to avoid engine disturbances such as vapor lock, corrosion and residue formation. Many experiments, figures and charts supplement the test.

NOISES ASSOCIATED WITH TEST STAND OPERATION Frame 10292-10319

During a convention at Stuttgart a group of research workers discussed the question of eliminating and reducing the various noises connected with the operation of engine test stands.

REDUCTION OF TEST STAND NOISES

Frame 10322-10373

The discussion forming the object of the preceding frame nos. is continued and several suggestions are made how to avoid and reduce engine test stand noises.

THE THERMO CELL

Frame 10374-10382

This report is concerned with the DVL thermo cell designed to measure high and quickly changing temperatures such as occur in the combustion chamber of an engine. The method is also applicable to all kinds of other temperature measurements. Illustrated descriptions of the construction of the cell, its theory and operation is given. Experimental data and charts are included and discussed.

INSTRUCTIONS FOR THE USE OF THE EXHAUST GAS TEST INSTRUMENT.

Frame 10386-10409

Such an instrument was designed in order to obtain a control of the heat conditions of the exhaust gas which would allow one to derive conclusions as to the quality of the fuel mixture being supplied to the engine. The thus gained knowledge could be used in order to make the necessary corrections to the fuel mixture being supplied. The instrument is described, its theory and operation explained by means of figures and charts.

CONSTRUCTIONS AND PLANS FOR EQUIPPING ENGINE RADIATORS WITH AUTOMATIC FLAPS.

10411-10420

The purpose and theory of these hydraulic and mechanical flaps are explained. Designs and plans of construction are pictured and described.