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The Little Girl in the Radiator **A Radiator Concept Based on Capillary Retention of Liquid Full Scale Investigation of the Drag of a Wing Radiator** Lightweight, High-temperature Radiator for In-space Nuclear-electric Power and Propulsion *Space Radiator Analysis and Design The Drag of Airplane Radiators with Special Reference to Air Heating (comparison of Theory and Experiment)* **Radiators in Hydronic Heating Installations** *Space Radiator Analysis and Design* **Design considerations for lightweight space radiators based on fabrication and test experience with a carboncarbon composite prototype heat pipe** Space Radiator Analysis and Design **Synopsis of Aeronautic Radiator Investigations for the Years 1917 and 1918 E. D. R - Ratings for Every Darn Radiator (and Convector) You'll Probably Ever See** The Effects of Atomic Oxygen on the Thermal Emittance of High Temperature Radiator Surfaces **Potassium Rankine Cycle Vapor Chamber (heat Pipe) Radiator Study** Review of British Radiator Tests **Radiator People Infrared Heater Used in Qualification Testing of International Space Station Radiators Horn Radiators of Complex Configuration** Experimental Steady-state Performance of a Multitube, Centrally Finned, Potassium Condensing Radiator *Radiator Traps* **Getting Off the Radiator** *RF Coaxial Slot Radiators: Modeling, Measurements, and Applications* **Radiators for Aircraft Engines (Classic Reprint) The Journal of Plumbing, Heating, Air Conditioning Contractors The Heating and Ventilating Magazine** Design Considerations for Lightweight Space Radiators Based on Fabrication and Test Experience with a Carbon-Carbon Composite Prototype Heat Pipe. Rev **Sanitary & Heating Engineering** *Design and Performance Optimization of a Car Radiator* **Design Considerations for Lightweight Space Radiators Based on Fabrication and Test Experience with a Carbon-Carbon Composite Prototype Heat Pipe Analysis of a Double Fin-tube Flat Condenser-radiator and Comparison with a Central Fin-tube Radiator** SAE Transactions **Radiator Days** *Low-mass, Intrinsically-hard High-temperature Radiator. Final Report, Phase I.* **Study of Frequency-scanning Array of Radiators on Convex Curve The Journal of the Society of Automotive Engineers Air Service Engine Handbook** Conscious **American Garage & Auto Dealer A Multimegawatt Space Power Source Radiator Design Domestic Engineering and the Journal of Mechanical Contracting**

Dorothy Preston's debut memoir, Getting Off the Radiator: A Story of Shame, Guilt, and Forgiveness, is the story of a child growing up in a twenty-eight-room mansion infested with roaches and overrun with hippies, thieves, drug abusers, alcoholics, and a murderer. The youngest of seven children abandoned by their father, Preston watched while her mother struggled to keep food on the table and a roof over their heads while also diving deeper into the bottle, standing in line for welfare, and renting rooms in their home for income. Given the cast of characters who passed through the house and the absence of parental guidance, the family lived the life of a twisted fairy tale in which shame, guilt, and anger played leading roles. Preston recounts her journey through childhood into adulthood, her years waging battles with her difficult past, overcoming adversity, practicing forgiveness, and cherishing the love of a family whose bonds cannot be broken. Beautifully written and accompanied by intimate family photographs, this is a memoir that breaks open what it means to live with a difficult past while struggling to embrace a hopeful future. "A collection of Lucy's early comics. This book is populated with experiments, assignments, and style attempts in a collection of short pieces that range from the charming to the obscene. Enjoy her later work? Take a glimpse through some of the foundations that established Lucy's drawing and writing style in this collection of her student works"--provided by publisher. This report discusses the design implications for spacecraft radiators made possible by the successful fabrication and proof-of-concept testing of a graphite-fiber-carbon-matrix composite (i.e., carbon-carbon (C-C)) heat pipe. The prototype heat pipe, or space radiator element, consists of a C-C composite shell with integrally woven fins. It has a thin-walled furnace-brazed metallic (Nb-1%Zr) liner with end caps for containment of the potassium working fluid. A short extension of this liner, at increased wall thickness beyond the C-C shell, forms the heat pipe evaporator section which is in thermal contact with the radiator fluid that needs to be cooled. From geometric and thermal transport properties of the C-C composite heat pipe tested, a specific radiator mass of 1.45 kg/sq m can be derived. This is less than one-fourth the specific mass of present day satellite radiators. The report also discusses the advantage of segmented space radiator designs utilizing heat pipe elements, or segments, in their survivability to micrometeoroid damage. This survivability is further raised by the use of condenser sections with attached fins, which also improve the radiation heat transfer rate. Since the problem of heat radiation from a fin does not lend itself to a closed analytical solution, a derivation of the governing differential equation and boundary conditions is given in appendix A, along with solutions for rectangular and parabolic fin profile geometries obtained by use of a finite difference computer code written by the author. Juhasz, Albert J. Glenn Research Center NASA/TP-1998-207427/REV1, E-11139-2/REV1, NAS 1.60:207427/REV1 Radiator surfaces on high temperature space power systems such as the SP-100 space nuclear power system must maintain a high emittance level in order to reject waste heat effectively. one of the primary materials under consideration for the radiators is carbon-carbon composite. Since carbon is susceptible to attack by atomic oxygen in the low Earth orbital environment, it is important to determine the durability of carbon composites in this environment as well as the effect atomic oxygen has on the thermal emittance of the surface if it is to be considered for use as a radiator. Results indicate that the thermal emittance of carbon-carbon composite (as low as 0.42) can be enhanced by exposure to a directed beam of atomic oxygen to levels above 0.85 at 800 K. This emittance enhancement is due to a change in the surface morphology as a result of oxidation. High aspect ratio cones are formed on the surface which allow more efficient trapping of incident radiation. Erosion of the surface due to oxidation is similar to that for carbon; so that at altitudes less than ?600 km, thickness loss of the radiator could be significant (as much as 0.1 cm/year). A protective coating or oxidation barrier forming additive may be needed to prevent atomic oxygen attack after the initial high emittance surface is formed. Textured surfaces can be formed in ground based facilities or possibly in space if emittance is not sensitive to the orientation of the atomic oxygen arrival that forms the texture. Beginning in 1985, one section is devoted to a special topic The multimegawatt space power sources (MMSPS) proposed for deployment in the late 1990s to meet mission burst power requirements, require an increase by four orders of magnitude in the power rating of equipment currently used in space. Prenger and Sullivan (1982) describe various radiator concepts proposed for such applications. They range from the innovative liquid droplet radiator (Mattick and Hertzberg 1981) to the more conventional heat pipe concept (Girrens 1982). The present paper deals with the design of the radiator for one such system, characterized by both high temperature and high pressure. It provides an estimate of the size, mass, and problems of orbiting such a radiator, based on the assumption that the next generation of heavy launch vehicle with 120-tonne carrying capacity, and 4000-m3 cargo volume, will be available for putting hardware into orbit. Heat transfer analyses of circular plan extended surfaces of space radiators with meteorite protection are presented herein. The circular extended surfaces include rectangular plates of uniform thickness and triangular, trapezoidal, and constant-temperature-gradient profiles. Complete radiator systems are analyzed and illustrative examples are given. The thermal analyses of circular extended surfaces produced relationships between the physical properties and dimensions, element and environmental temperatures, and rates of heat transfer. These are shown graphically for all types of elements. The optimum proportions of space radiator elements having the greatest ratio of heat radiation rate per pound of weight are also indicated graphically, and procedures for their calculation are shown. The discussions on radiators include dimensional-thermal relationships, and the temperature distribution in duct walls for complete units. Equations and graphs using simplifying assumptions are also presented for use in making a quick analysis of heat exchanger performance. Even though approximate, these data will save a designer considerable time in establishing a suitable configuration. General transient systems are also analyzed, as are more complex transient systems wherein a radiator is used for heat exchange to an environment. If you're replacing a steam boiler, there's only one right way to size that boiler, and that's to measure the radiators. If you're replacing a hot-water boiler, you'll do a heat-loss calculation on the building as it is today, but it also pays to measure the radiation to see if you can reduce the water's temperature and save fuel. The challenge, though, is that it's often difficult to find the ratings for many of those old radiators and convectors, and that's why I compiled this book. I've been saving heating books and heating-manufacturers' literature since 1970. I have a lot of this stuff. E.D.R. is 272 pages of nothing but radiator and convector ratings and if that old unit is out there in the field, it's probably also in this book. This is a terrific resource for any heating professional who wants to get it right the first time. This report contains a survey of past radiator research. This report also is intended as a systematic comparison of theoretical and experimental radiator drag, with the object of ascertaining the most important loss sources and their interaction in different cases of installation, and to separate the radiator systems which are amenable to calculation, both as regards axial flow and drag. The sources of loss due to the diffuser are to be looked into closely as in many cases they can be of preeminent magnitude and their customary appraisal, according to Fliegner's formula, does not meet actual conditions. Besides, generally applicable equations and charts are developed for the rapid determination of the heating effect of radiators as regards flow and drag, and then checked by routine tests on hot radiators. An important class of antenna devices ? horn radiators ? is discussed in this book. The author aims to synthesize and classify the plentiful materials that are scattered over short-run publications, and present to the readers an up-to-date concept of this problem. Two heat rejection radiator systems for the International Space Station (ISS) have undergone thermal vacuum qualification testing at the NASA Glenn Research Center (GRC), Plum Brook Station, Sandusky, Ohio. The testing was performed in the Space Power Facility (SPF), the largest thermal vacuum chamber in the world. The heat rejection system radiator was tested first; it removes heat from the ISS crew living quarters. The second system tested was the photovoltaic radiator (PVR), which rejects heat from the ISS photovoltaic arrays and the electrical power-conditioning equipment. The testing included thermal cycling, hot- and cold-soaked deployments, thermal gradient deployments, verification of the onboard heater controls, and for the PVR, thermal performance tests with ammonia flow. Both radiator systems are orbital replacement units for ease of replacement on the ISS. One key to the success of these tests was the performance of the infrared heater system. It was used in conjunction with a gaseous-nitrogen-cooled cryoshroud in the SPF vacuum chamber to achieve the required thermal vacuum conditions for the qualification tests. The heater, which was designed specifically for these tests, was highly successful and easily met the test requirements. This report discusses the heating requirements, the heater design features, the design approach, and the mathematical basis of the design. Ziemke, Robert A. Glenn Research Center NASA/TM-2004-212332, E-13928 The desire to explore deep space destinations with high-power and high-speed spacecraft inspired this work. Nuclear Electric Propulsion (NEP), shown to provide orders of magnitude higher specific impulse and propulsion efficiency over traditional chemical rockets, has been identified as an enabling technology for this goal. One of large obstacle to launching an NEP vehicle is total mass. Increasing the specific power (kW/kg) of the heat radiator component is necessary to meet NASA's mass targets. This work evaluated a novel lightweight, high-temperature carbon fiber radiator designed to meet the mass requirements of future NEP missions. The research is grouped into three major sections: 1) a micro-scale radiation study, 2) bench-scale experimental and analytical investigations, and 3) large-scale radiator system modeling. In the first section, a Monte Carlo ray tracing model built to predict the effective emissivity of a carbon fiber fin by modeling the radiation scattering among fibers showed that the added surface area of the fibers over a flat fin surface increases the effective emissivity of the radiator area by up to 20%. The effective emissivity increases as the fiber volume fraction decreases from 1 to about 0.16 due to increased scattering among the fibers. For fiber volume fractions lower than 0.10, the effective emissivity decreases rapidly as the effect of radiation transmission becomes significant.In the second section, thermal analyses of the carbon fiber radiator fin predicted that these radiators could meet NASA's performance targets by reducing the areal density to 2.2 kg/m2 or below. These models were validated through experimental tests conducted on sub-scale radiator test articles. This work elevated the technology readiness level (TRL) of the carbon fiber radiator fin from level 2 to 4. In the last section, a radiator system model for an NEP vehicle was built to analyze the dependence of radiator mass on selected system parameters. The model was used to minimize the radiator mass for test cases. The results predicted that carbon fiber fins operated near 600°C reduced the radiator mass by a factor of 7 as compared with traditional radiators operating near 100°C. This significant mass-reduction could enable future NEP systems. The thermal analysis of component elements of space radiators is described. Elements include rectangular and circular plates of uniform thickness, triangular and trapezoidal fins, and constant temperature-gradient fins. A complete condenser and a radiator are analyzed and illustrative examples given. The thermal analyses produced relationships between the physical properties and dimensions, element and environmental temperatures, and rates of heat transfer. These are shown graphically for all types of elements. The optimum proportions of space radiator elements having the greatest ratio of heat radiation rate per pound of weight are also indicated graphically, and procedures for their calculation are shown. The discussions on condensers and radiators include dimensional-thermal relationships and weight-optimizing procedures for complete units. (Author). The intensely thought-provoking science fiction novel, Conscious, is set a year or three into the future. The 'Internet of Everything' is making the world a more connected place than ever before. Work, play, and everything else besides, are becoming increasingly automated ... and that's where the problem starts! Because something odd is happening: 'things' are beginning to misbehave and no-one can work out why. What starts as an amusing mystery quickly becomes very dangerous indeed. A ragged bunch of academics, scientists and philosophers are on the case - and may know the answer. But now they have to convince people that their crazy explanation is true. And that's only the start. Against a backdrop of a world suddenly beginning to fall apart, they're in a race against time to get someone to do anything about it. And not everyone is on their side! After a career of scientific publication, this is Vic's first fictional work. This report discusses the design implications for spacecraft radiators made possible by the successful fabrication and Proof-of-concept testing of a graphite-fiber-carbon-matrix composite (i.e., carbon-carbon (C-C)) heat pipe. The proto-type heat pipe, or space radiator element, consists of a C-C composite shell with integrally woven fins. It has a thin-walled furnace-brazed metallic (Nb-1%Zr) liner with end caps for containment of the potassium working fluid. A short extension of this liner, at increased wall thickness beyond the C-C shell, forms the heat pipe evaporator section which is in thermal contact with the radiator fluid that needs to be cooled. From geometric and thermal transport properties of the C-C composite heat pipe tested, a specific radiator mass of 1.45 kg/m2 can be derived. This is less than one-fourth the specific mass of present day satellite radiators. The report also discusses the advantage of segmented space radiator designs utilizing heat pipe elements, or segments, in their survivability to micro-meteoroid damage. This survivability is further raised by the use of condenser sections with attached fins, which also improve the radiation heat transfer rate. Since the problem of heat radiation from a fin does not lend itself to a closed analytical solution, a derivation of the governing differential equation and boundary conditions is given in appendix A, along with solutions for rectangular and parabolic fin profile geometries obtained by use of a finite difference computer code written by the author. Juhasz, Albert J. Glenn Research Center RTOP 632-1A-1X... This book addresses key design and computational issues related to radiators in hydronic heating installations. A historical outline is included to highlight the evolution of radiators and heating technologies. Further, the book includes a chapter on thermal comfort, which is the decisive factor in selecting the ideal heating system and radiator type. The majority of the book is devoted to an extensive discussion of the types and kinds of radiators currently in use, and to identifying the reasons for the remarkable diversity of design solutions. The differences between the solutions are also addressed, both in terms of the effects of operation and of the thermal comfort that needs to be ensured. The book then compares the advantages and disadvantages of each solution, as well as its potential applications. A detailed discussion, supported by an extensive theoretical and mathematical analysis, is presented of the computational relations that are used in selecting the radiator type. The dynamics of radiator heat output regulation are also covered, with particular emphasis on underfloor-surface radiators, for which this aspect is particularly important. The book closes with a chapter presenting computational examples. It includes numerous examples of calculations for all essential thermal parameters of radiator operation in heating installations. Excerpt from Radiators for Aircraft Engines Temperature differences between the air and the water in the radiator will be taken, for reasons explained below, as the differ. Ence in degrees between the average of the temperatures of the water on entering and leaving the radiator and the temperature of the air at entrance. About the Publisher Forgotten Books publishes hundreds of thousands of rare and classic books. Find more at www.forgottenbooks.com This book is a reproduction of an important historical work. Forgotten Books uses state-of-the-art technology to digitally reconstruct the work, preserving the original format whilst repairing imperfections present in the aged copy. In rare cases, an imperfection in the original, such as a blemish or missing page, may be replicated in our edition. We do, however, repair the vast majority of imperfections successfully; any imperfections that remain are intentionally left to preserve the state of such historical works. This authoritative resource presents theoretical models of coaxial slot radiators. Numerical methods are used to present the solutions of those models, as well as focus on radiator applications, including measurements and calibration techniques. In each chapter, the experimental results are used to confirm the theoretical computer calculations. Both industry application aspects and academic theories and formulations are explored many with numerical calculations written in MATLAB code. In addition, this book contains many configurations and technical drawings providing the reader with more effective interpretation and explanation. This book provides easy to understand mathematical symbols, design guidelines, measurements, and applications for coaxial radiators suitable for both engineers and scientists. The thermal analysis of component elements of space radiators is described. Elements include rectangular and circular plates of uniform thickness, triangular and trapezoidal fins, and constant temperature-gradient fins. A complete condenser and a radiator are analyzed and illustrative examples given. The thermal analyses produced relationships between the physical properties and dimensions, element and environmental temperatures, and rates of heat transfer. These are shown graphically for all types of elements. The optimum proportions of space radiator elements having the greatest ratio of heat radiation rate per pound of weight are also indicated graphically, and procedures for their calculation are shown. The discussions on condensers and radiators include dimensional-thermal relationships and weight-optimizing procedures for complete units. Tests were made on the left lower wing of the 1927 Williams racer in the Twenty Foot Propeller Research Tunnel, in order to determine the effect of the wing radiator on the airfoil characteristics. It was found that the radiator doubled the minimum drag of the portion of the wing which is covered, and also reduced the lift somewhat. A structurally integrated vapor chamber fin (heat pipe) radiator is defined and evaluated as a potential candidate for rejecting waste heat from the potassium Rankine cycle powerplant. Several vapor chamber fin geometries, using stainless steel construction, are evaluated and an optimum is selected. A comparison is made with an operationally equivalent conduction fin radiator. Both radiators employ NaK-78 in the primary coolant loop. In addition, the Vapor Chamber Fin (VCF) radiator utilizes sodium in the vapor chambers. Preliminary designs are developed for the conduction fin and VCF concepts. Performance tests on a single vapor chamber were conducted to verify the VCF design. A comparison shows the conduction fin radiator easier to fabricate, but heavier in weight, particularly as meteoroid protection requirements become more stringent. While the analysis was performed assuming the potassium Rankine cycle powerplant, the results are equally applicable to any system radiating heat to space in the 900 to 1400 F temperature range. An analytical study of a flat condenser-radiator with a double fin-tube geometry (closed sandwich) with variable tube side-wall thickness was performed for a Rankine space-power electric-generating system. The analysis of the double fin radiator included consideration of tube and header pressure drops, meteoroid protection for the tubes and headers, along with a detailed presentation of the heat rejection analysis and total weight characteristics. The double fin-tube radiator is compared to a conventional central fin-tube configuration on a heat rejection to weight basis for a four-panel radiator configuration. Both fin and tube geometries are compared on the basis of the same power level, working fluid temperature, tube and header pressure drop, radiator material, and meteoroid protection criteria. A beryllium radiator for a 1-megawatt system and a columbium alloy radiator for a 5OO-kilowatt system, both at a radiating temperature of 1700 R, were chosen for the weight and geometry comparison. The conclusion reached indicates a substantial weight savings can be realized with the double fin-tube arrangement if the tube side-wall thickness can be reduced as a result of a possible meteoroid bumper effect of the enclosing fins. Weight reductions compared to the central fin-tube geometry of up to 32 to 39 percent were shown to be possible for the maximum reduction in side- wall thickness in the two examples considered. This result further substantiated the preliminary conclusions given in an earlier reference that compared the double and central fin-tube configurations neglecting the effects of headers, pressure drops, tube wall temperature drop, and powerplant thermodynamic cycle considerations. "What was that?!" Benjamin's eyes open with a start. The room is dark, not a sound. He looks around slowly. Maybe I was dreaming? Yes. I must have been dreaming." Then suddenly, BANG! BANG! BANG! CLANKITY-CLANG-CLANG! HISSSS! Benjamin covers his head with the covers... this is no dream... A modern, fresh take on "things that go bump in the night." this debut children's book author Patricia Attoe and illustrated by Julia Ennis is a charming tale of getting past fear and embracing the unknown. Beautifully bound, this book is one that can be passed down through the ages, parents to children, sibling to sibling, and so on. The first in what will be an ongoing series, the delightfully illustrated Radiator People is the perfect bedtime story that will capture the imagination of children and their parents as they read together. Thermacore, Inc. of Lancaster, Pennsylvania has completed a Phase I SBIR program to investigate the use of layered ceramic/metal composites in the design of low-mass hardened radiators for space heat rejection systems. The program is being monitored by the Los Alamos National Laboratory (LANL) for the Strategic Defense Initiative Organization (SDIO). This effort evaluated the use of layered composites as a material to form thin-walled, vacuum leaktight heat pipes. The heat pipes would be incorporated into a large heat pipe radiator for waste heat rejection from a space nuclear power source. This approach forms an attractive alternative to metal or silicon-carbon fiber reinforced metal heat pipes by offering a combination of low mass and improved fabricability. Titanium has been shown to have a yield strength too low at 875°K to be a useful radiator material. A silicon carbide fiber reinforced titanium material appears to have sufficient strength at 875°K. but cannot be welded due to the continuous fibers, and the preferred heat pipe working fluid (potassium) has been demonstrated to be incompatible with silicon carbide at 875°K. Moreover, titanium does not appear to be acceptable for radiators subjected to anticipated laser threats. As part of this effort, Thermacore performed composite material evaluations on combinations of refractory metals and ceramic powders. Layered composite tube samples with wall thicknesses as thin as 0.012 inches were developed. Fabrication experiments were performed that demonstrated the weldability of layered composites. Two titanium/titanium diboride composite tubes were successfully fabricated into potassium heat pipes and operated at temperatures in excess of 700°C. A hybrid composite tube was also fabricated into a potassium heat pipe. The tube was composed of alternating layers of niobium-1% zirconium foil and layers of a mixture of titanium powder and titanium diboride powder. Problems of realizing a convex slotted-guide array of radiators with frequency scanning are examined. Results of calculations of the required parameters of the radiator array are set forth for a number of specific cases along with experimental results of a study of a convex array of radiators designed on the basis of calculation results. (Author). The story of one man's attempt to understand Alzheimer's disease as its progression slowly changed the personality of his mother. This is the hillariously funny, and often heart-breakingly sad story of a family's fight against dementia. A tale of love, joy, humanity and despair that will make you want to laugh and cry at the same time. This true story is full of wonderful characters, the Whistling Woman, who never said a word, Captain John,who thought he lived on a boat, the little man in the red bandana who had just had his brain cleaned, the Irish Band that lived in the house, and of course, the Little Girl in the Radiator, whose special secret was the key to the whole mystery. Over 25 million people in the world have dementia, and if each one has only three other family members who try to take care of them, then over 100 million people are directly or indirectly affected by a disease no-one fully understands. This book is for anyone who has an elderly relative. This book provides an investigation of the overall design of a car radiator. For the specified requirements of heat dissipation from a car engine, the methods to optimize its performance have been analyzed. The proper amount of heat that can be transferred by varying parameters such as number of tube rows, fin density etc. has been calculated. The radiator material, size, tube area, core size was defined to obtain the heat rejection needed for a typical engine at normal car speeds. The usage of louvered fins becomes significant in radiators owing to requirement of high amount of heat rejection abilities of radiator. The analysis presented in this book should help shed some light on increasing the performance of car radiator and should be helpful to professional design engineers working for an automobile industry.