Journal of Solar Energy Engineering

Book Reviews

Solar Energy Programs for HP-41 and TI-59 Calculators

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Solar Energy Laboratory,
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Madison, Wisconsin
1981, 206 pages, $50.00

This book presents thirteen programs that can be used directly with HP-41 or TI-59 programmable calculators. Extensive notes are provided to help the user, and the program equations are keyed to the text *Solar Energy Thermal Processes*.

The programs provided include: EXRAD, which computes daily, hourly or instantaneous extraterrestrial radiation on a horizontal surface on any given day; R, which provides the instantaneous radiation on an inclined surface given the instantaneous horizontal radiation; RBAR1, which gives $\bar{R}$ and $(\tau\alpha)$ for tilted surfaces directly facing the equator; RBAR2, which calculates the same factors as the more limited RBAR1 for tilted surfaces rotated at azimuth angles of up to $\pm$ 90° from due south; UTOP, which uses Klein's correlation to compute collector top loss coefficients; TRANS, which computes $(\tau\alpha)$ as a function of angle of incidence; CORFAC, which computes modified F_R, $(\tau\alpha)$, and U_L values for use when ducts and a heat exchanger cause losses between the collector and storage; STORE, which provides formatted storage of local data for monthly average insolation, ambient temperature, and degree days; FCHART, a programmed version of the monthly f-chart method for solar space-heating and DHW systems; PHIBAR, which calculates $\bar{\Phi}$, the monthly-average daily utilizability function from data provided by program RBAR1; PHIF, which programs the $\bar{\Phi}$, f-chart design method for space heating, air-conditioning and industrial process heat; DG, which provides the un-utilizability design method developed for direct-gain passive systems (a fairly detailed description of the method is provided); and ECON, which provides a life-cycle cost analysis of a solar heating system and a comparable conventional system.

The menu of programs is certainly useful to the practicing professional, and could be profitably employed in the classroom as well. However, the user should be aware that an errata sheet to the first printing was provided with the review copy, indicating that errors, inevitable in a work of this kind, are beginning to surface. The book performs a useful service to the solar community, but an updated errata should be obtained by any serious user.

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Solar Energy Handbook

Jan F. Kreider and Frank Kreith, eds.
McGraw-Hill Book Company, New York, 1981
1,120 pages, 697 illustrations, $49.50

This imposing volume has 29 chapters, each written by individual authors, and is divided into six sections that cover most of the methods of converting solar into other useful energy forms. The flyleaf tells us that the book ". . . emphasizes *practical* applications rather than dusty theories" and the preface claims that it contains "all the archival data and procedures available for solar assessment and design." Although this reviewer found some dusty theories and impractical applications, and a lack of some archival data and procedures as well, the Handbook does indeed contain a wealth of information. The over 1000 pages in the body of the Handbook, set in very small type (occasionally unreadable such as the passage below Fig. 15.A.1) provide much of the information needed for design of conventional solar systems. However, the solar system installer or designer will find some information lacking. For example, no information is given on pump or blower selection or comparison of control methods. On-off control for a liquid system is discussed in a short paragraph, while standard practice for air systems is described at greater length.

The organization of the Handbook is straightforward, although the inclusion of the single chapter devoted to "Energy Storage for Solar Applications" under the section on *Perspective and Basic Principles* is puzzling. Section I on *Perspective and Basic Principles* has six chapters dealing with history, radiation, optics, heat transfer and thermodynamics, optical properties of materials and, as noted, storage methods. Section II, *Solar-Thermal Collection and Conversion Methods*, has four chapters dealing with non-concentrating, moderately concentrating and highly concentrating collectors, and solar ponds. *Low-Temperature Solar Conversion Systems* are the subject of nine chapters in Section III. Covered are DHW, air and liquid heating systems, performance prediction for heating systems (f-chart), space cooling, passive systems, system modeling, agricultural systems and OTEC. Three chapters in Section IV are devoted to solar-thermal electric power, process heat and heat engines under *Solar High Temperature and Process Heat Systems*. Wind energy, photovoltaics and biomass are treated in separate chapters under *Advanced and Indirect Solar Conversion Systems* in Section V. Finally, Section VI, titled *Architecture, Economics, the Law and Solar Energy* treats building energy conservation, economics and law in the final four chapters. (I found little, however, that could be called architecture.)

A short appendix gives SI and English engineering units and conversion factors, and a common nomenclature. Short biographies of the authors and an index follow. Although the grouping of the chapters is given in the table of contents

under the six sections noted, the body of the Handbook is not itself divided into sections; rather, the chapters simply proceed in order.

In summary, this is a useful gathering of a large amount of information. It suffers from the organizational problems inherent in a volume drawing from a large number of authors, i.e., uneven treatment, some repetition, some omissions, and a difficulty for the reader in drawing forth a coherent picture of any particular system because the discussion of components is scattered among various chapters. Nevertheless, the editors have compiled a Handbook that should be on the shelf of any serious practitioner in solar energy, and despite the flyleaf emphasis on applications, on the bookshelf of serious researchers as well.

Solar Electricity Handbook A simple, practical guide to solar energy: how to design and install photovoltaic solar electric systems. 2012 Edition Michael Boxwell. www.GreenstreamPublishing.com. Greenstream Publishing 12 Poplar Grove, Ryton on Dunsmore, Warwickshire, CV8 3QE. United Kingdom. Published by Greenstream Publishing 2012.