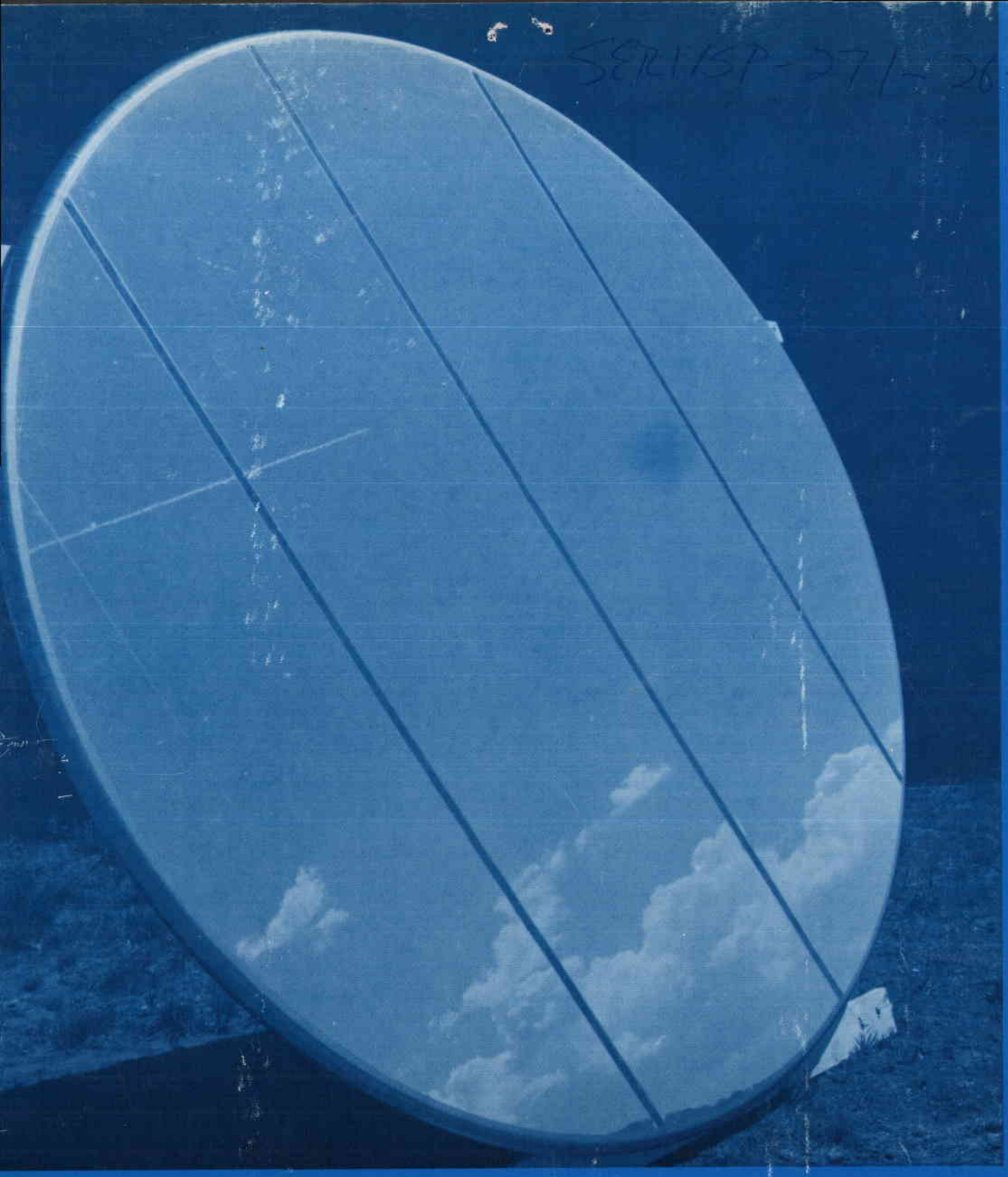

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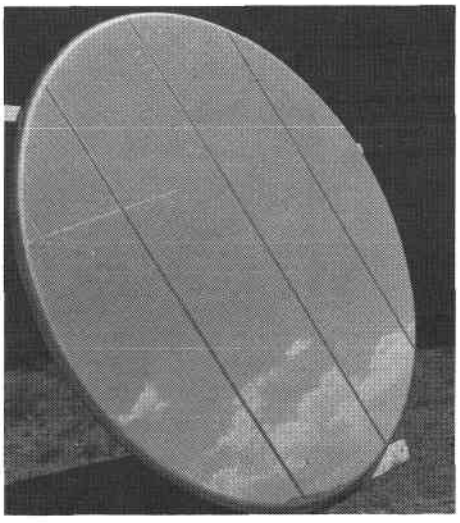

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Contents

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1617 Cole Boulevard, Golden, Colorado 80401

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Preface

The research and development (R&D) described in this document was conducted within the U.S. Department of Energy's (DOE) Solar Thermal Technology (STT) Program. The goal of the Solar Thermal Technology Program is to advance the engineering and scientific understanding of solar thermal technology, and to establish the technology base from which private industry can develop solar thermal power production options for introduction into the competitive energy market.

Solar thermal technology concentrates the solar flux by means of tracking mirrors or lenses onto a receiver where the solar energy is absorbed as heat and converted into electricity or incorporated into products as process heat. The two primary solar thermal technologies, central receivers and distributed receivers, employ various point and line-focus optics to concentrate sunlight. Current central receiver systems use fields of heliostats (two-axis tracking mirrors) to focus the sun's radiant energy onto a single tower-mounted receiver. Parabolic dishes up to 17 meters in diameter track the sun in two axes and use mirrors or Fresnel lenses to focus radiant energy onto a receiver. Troughs and bowls are line-focus tracking reflectors that concentrate sunlight onto receiver tubes along their focal lines. Concentrating collector modules can be used alone or in a multi-module system. The concentrated radiant energy absorbed by the solar thermal receiver is transported to the conversion process by a circulating working fluid. Receiver temperatures range from 100°C in low-temperature troughs to over 1500°C in dish and central receiver systems.

The Solar Thermal Technology Program is directing efforts to advance and improve each system concept through the research and development of solar thermal materials, components, and subsystems, and the testing and performance evaluation of subsystems and systems. These efforts are carried out through the technical direction of DOE and its network of national laboratories who work with private industry. Together they establish a comprehensive, goal-directed program to improve performance and provide technically proven options for eventual incorporation into the nation's energy supply.

To be successful in contributing to an adequate national energy supply at reasonable cost, solar thermal energy must eventually be economically competitive with a variety of other energy sources. Components and system-level performance targets have been developed as quantitative program goals. The performance targets are used in planning research and development activities, measuring progress, assessing alternative technology options, and making optimal component developments. These targets will be pursued vigorously to ensure a successful program.

Introduction

SERI has been designated by the U.S. Department of Energy to manage the nation's Solar Thermal Research Program within the national Solar Thermal Technology (STT) Program. Approximately 20% of the STT Program's annual funding is to be devoted annually to research; important SERI functions include:

Conduct in-house research and systems analysis studies in support of STT Program goals and objectives (i.e., long-term, high-risk research on solar technologies that private industry cannot reasonably be expected to undertake).

Award and manage subcontracts — to industry, universities, federal laboratories, etc.—to perform research and development (R&D) in support of SERI in-house research and/or in support of STT Program objectives.

Coordinate the transfer of research results into the technology development community or to industry.

Identify, evaluate and benefit from R&D activities funded by other organizations (e.g., Naval Research Laboratory, Office of Naval Research, etc.) that have applicability to the STT Research Program.

The R&D conducted in the STT Research Program is designed to advance scientific understanding and establish a sound technological base to enable industry and end-users to make well-informed choices among technology options. The major thrusts in the Program are:

Development of silver/polymer film materials for use in constructing low-cost, lightweight collectors and concentrators.

Development and demonstration of the feasibility of low-cost stretched membrane and other heliostat concepts for high temperature production of electricity, IPH, and fuels and chemicals applications. Performance characteristics being sought are: life of at least 5 years, average optical efficiency greater than 90%, and cost of \$40 to \$60/m^2.

Identification, characterization, and evaluation of heat transfer fluids and compatible storage materials for use with solar thermal receivers and heat exchangers that operate at temperatures in the range of 600°C to 1100°C—materials that are low-cost, chemically inert, noncorrosive, and able to withstand thermal cycling, nonuniform heating and transient solar input.

Conducting research to understand the high temperature/high flux direct absorption principle using that understanding to assess the technical feasibility of low-cost direct absorption receivers capable of operating efficiently at temperatures above 900°C, and to evaluate the potential of unique or beneficial use of concentrated solar flux.

Identifying, evaluating and assessing the technical feasibility of promising new low-cost concepts and new applications of the technology.

Scope of the Bibliography

This bibliography contains citations of technical publications that have emerged from the federal Solar Thermal Technology (STT) Research Program at the Solar Energy Research Institute (SERI). The entries include research performed at SERI and at various universities and other organizations under SERI subcontract from 1977 through September 30, 1984. The types of references include journal articles, papers presented in conference proceedings, monographs, chapters in monographs, and technical reports.

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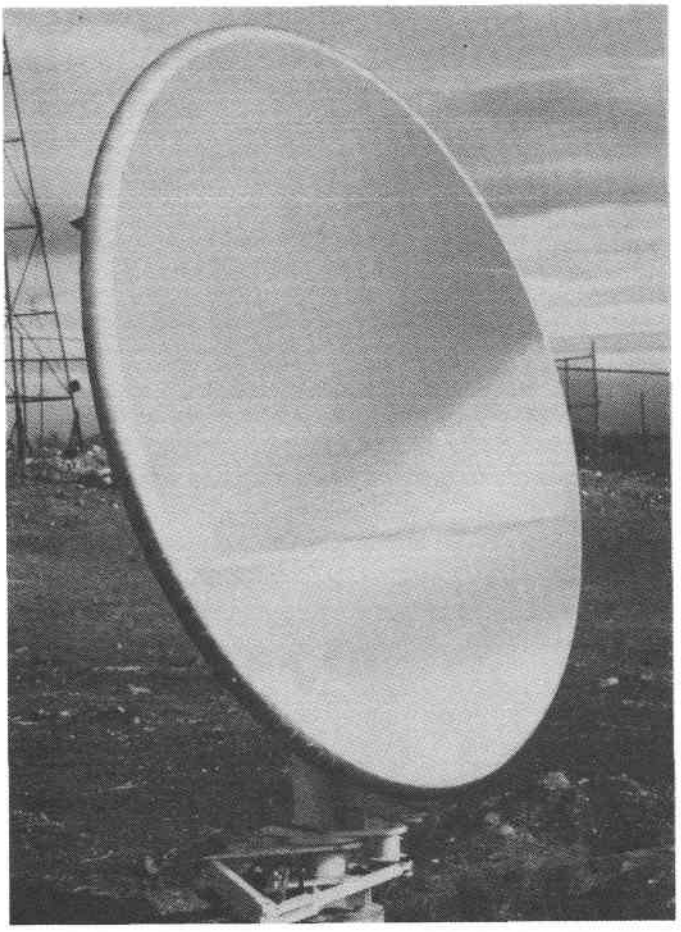

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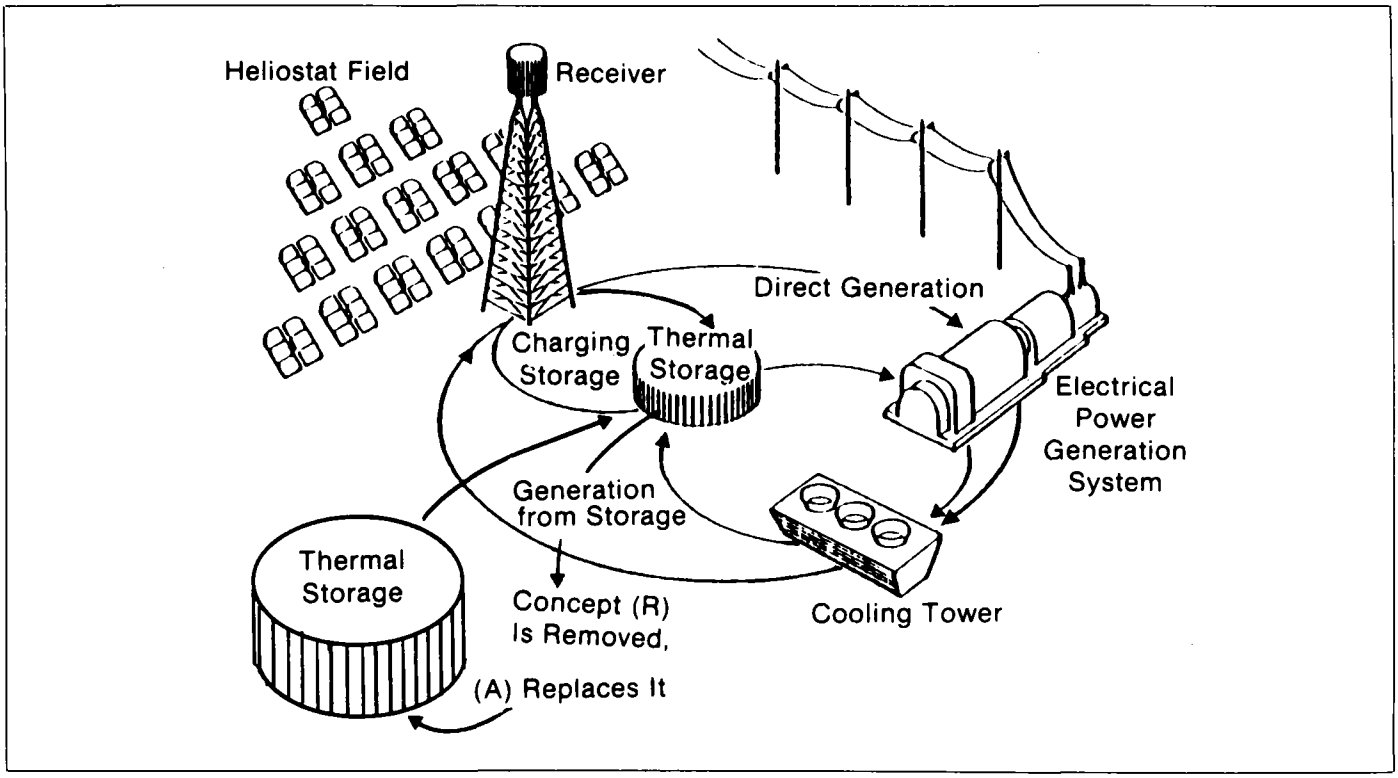

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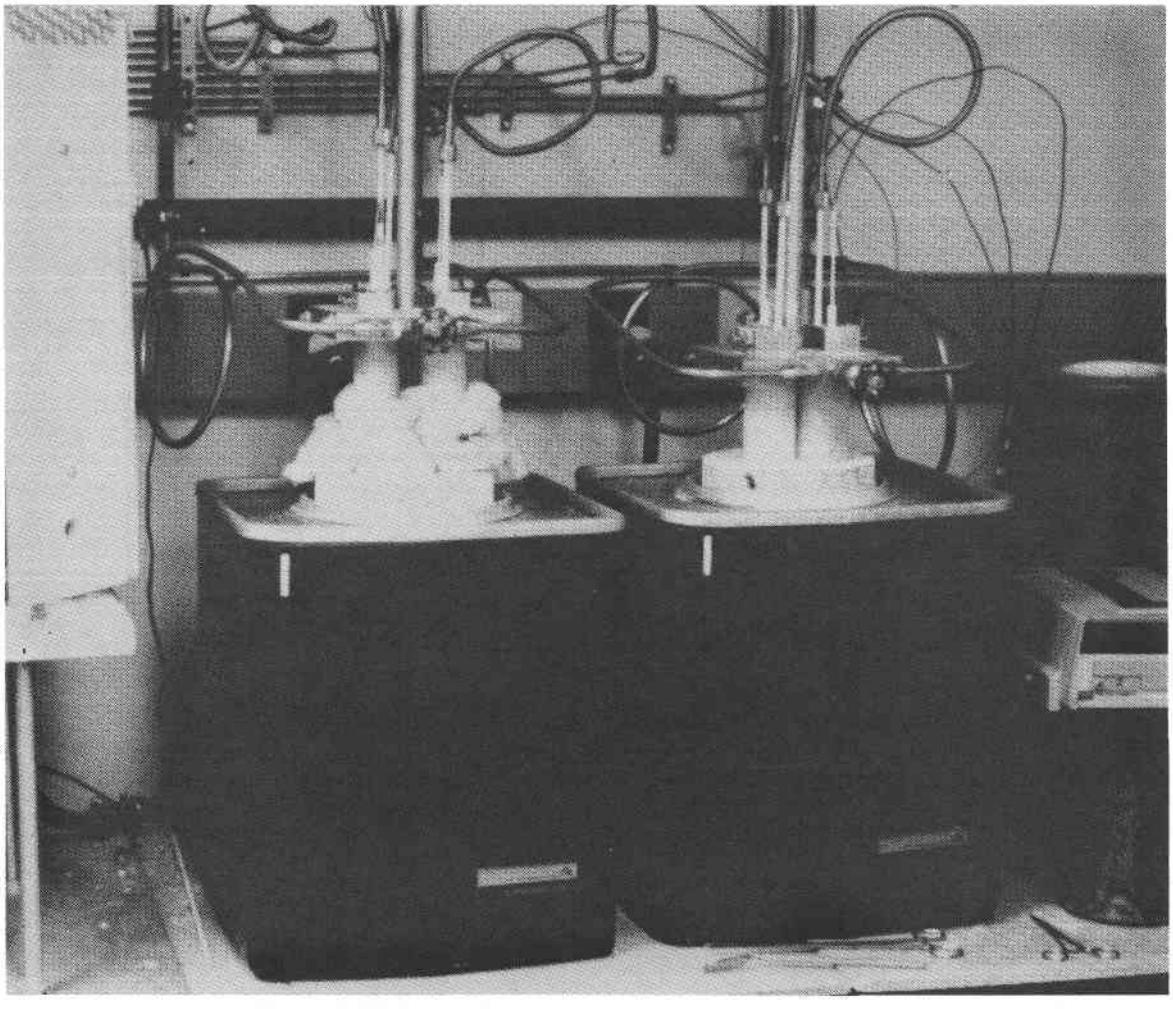

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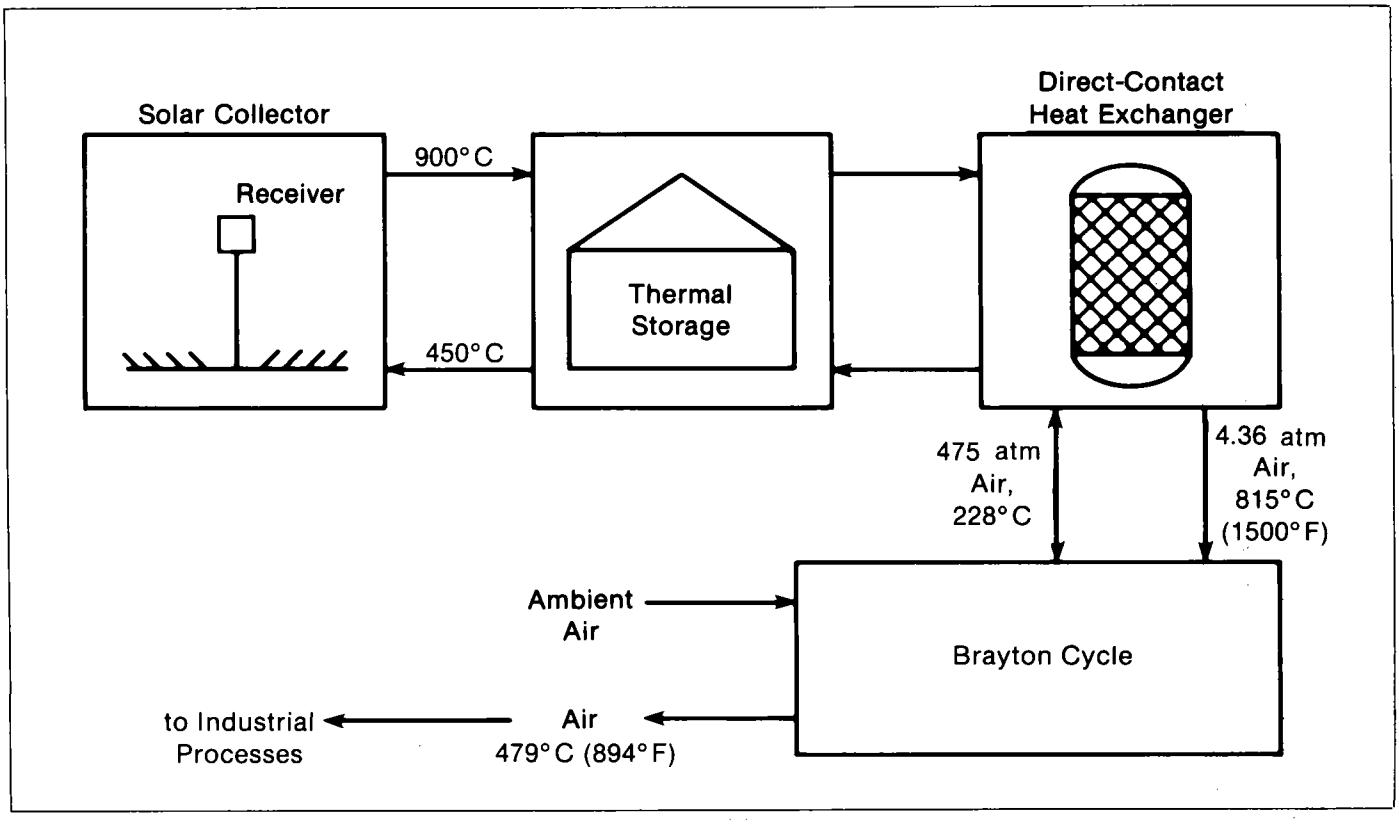

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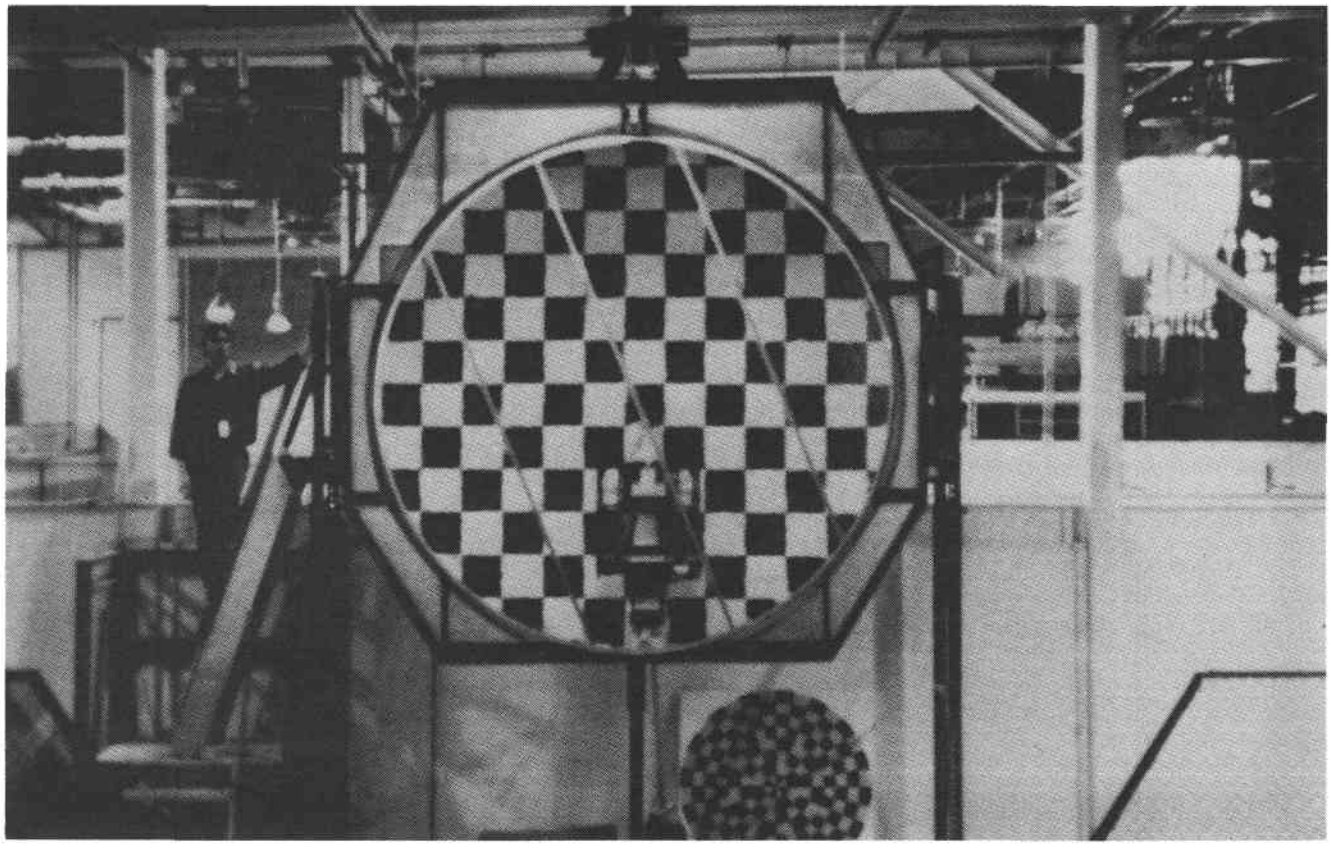

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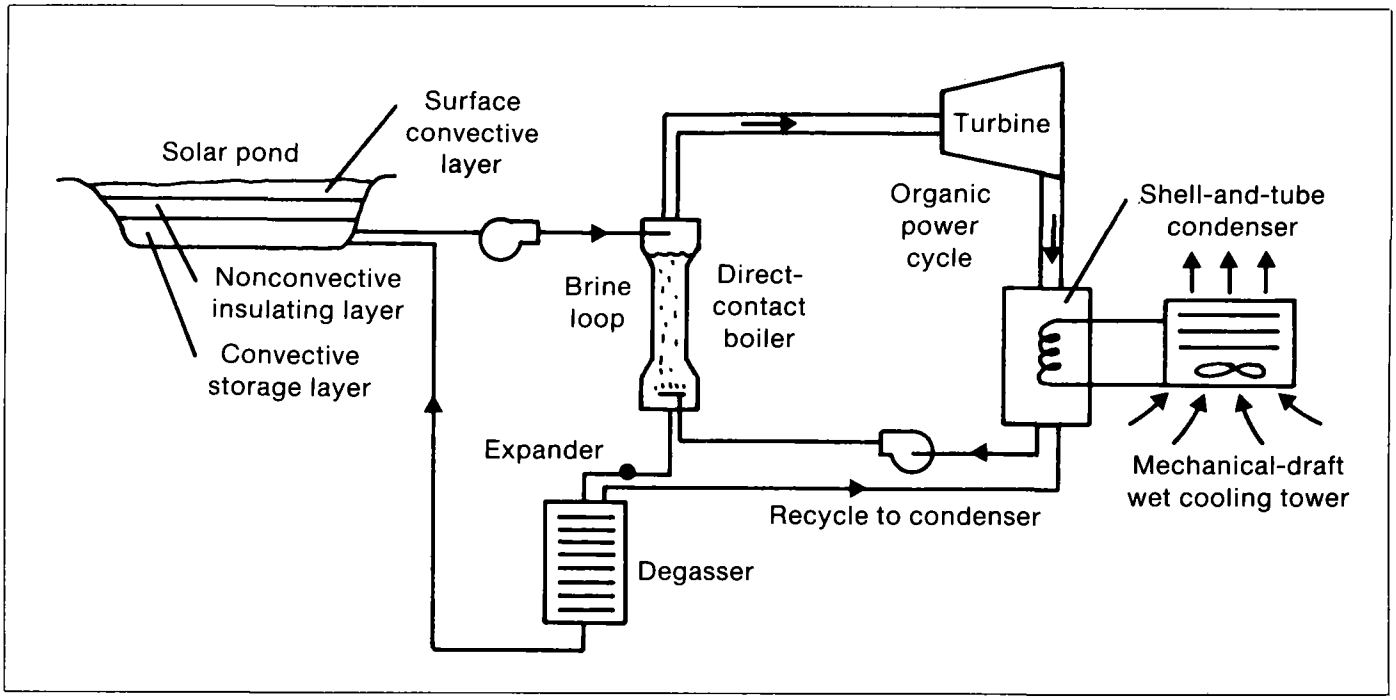

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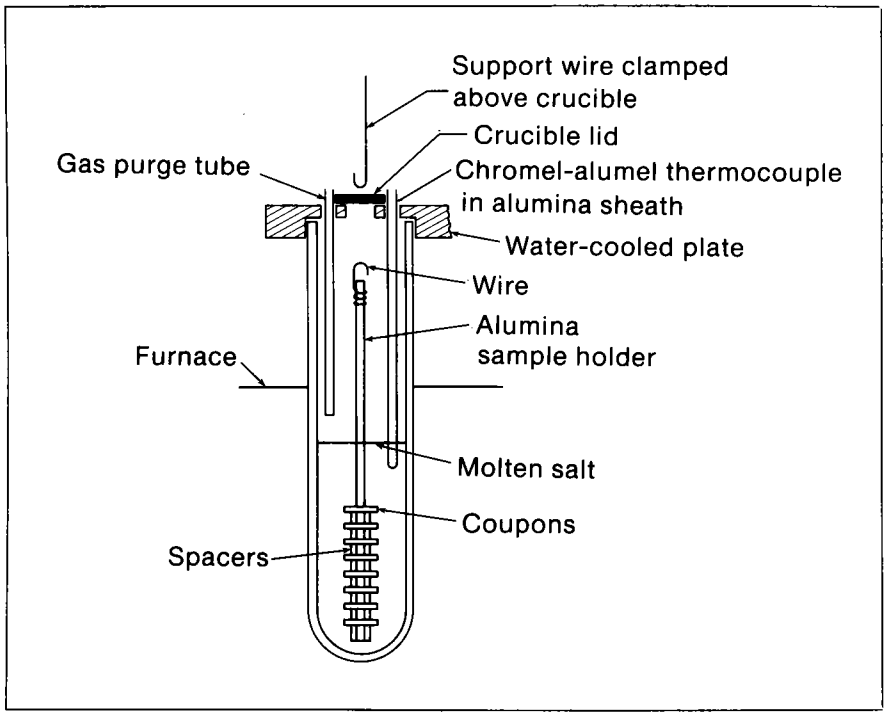

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Name _____
Organization _____
Address _____
City, State, ZIP _____

SHIP TO: Date _____
(Enter if different from address at left)
Name _____
Organization _____
Address _____
City, State, ZIP _____

Method of Payment
☐ Charge my NTIS deposit account no. _____
☐ Purchase order no. _____
☐ Check enclosed for $ _____
☐ Ship and Bill. See reverse (not applicable outside North America).
☐ Charge to my ☐ American Express ☐ Visa ☐ Master Card
Account no. _____
Card expiration date _____
Signature _____
(Required to validate order)

ORDER OPTIONS

It is vital that you order by NTIS order number or your order will be manually filled, causing a delay. You can opt for *airmail/first class delivery* as indicated below. Just check the *Priority Mail Services* box. **If you're really pressed for time, call the NTIS Rush Handling Service (703) 487-4700 or (800) 338-4700.** For a $10 per copy charge your order will be mailed within 8 working hours. Or, you can pick up your order in the Washington Information Center and Bookstore or at our Springfield Operations Center within 24 hours for a $6 per copy charge.

	NTIS ORDER NUMBER***	USER ROUTING CODE (see reverse)	QUANTITY: Paper Copy	QUANTITY: Micro-fiche	QUANTITY: Other (specify)	UNIT** PRICE	PRIORITY* MAIL SERVICES	TOTAL PRICE
1								
2								
3								
4								
5								

*Add $3 per item for First Class Delivery in North America
**Add $5 for each paper copy Airmail Delivery outside North America
***MAIL PRICES SUBJECT TO CHANGE

Enter Grand Total $

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