pinched off to demonstrate a sixfold smaller rate of pressure rise than that for an equivalent red-rubber vacuum hose—and the fact that it is immune to ozone;

2. the technique of mica splitting with water;

3. the strategy of short pumpdown time in instances involving thermal evaporation where some residual gas pressure is not deleterious, but where a lower pressure with greater oil-pump backstreaming is intolerable;

4. the virtues of "dry-ice" packs on the throat of a metal diffusion pump, as an effective trap or pump for vapors;

5. the high fluidity on melting, and the excellent strength of virgin indian shellac—the more often shellac is remelted, the more cheesy it gets;

6. heating by focused visible and/or infrared radiation, as for soldering;

7. thermally evaporated solder coats—as long ago as the beginning of World War II, my associate, J. Winget, and I put thermally evaporated adhesive silver films onto the polished flanges of a complex glass system for assembly with soft solder. This made a system bakable to well over 100° C, for outgassing. We also put such solder coats on the rims of the lenses for solder attachment to oximeters, for simplicity of gastight closure, etc.

These are some of the items that I had expected to find. Their absence inspired one to consider the topics treated as being short of comprehensive. Nevertheless, there are many new things assembled here. With the books yet to be published, the comprehensiveness of the coverage of vacuum physics and vacuum procedures will no doubt become substantially complete.

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HANDLING CREATIVE PEOPLE

Title Management for Research and Development

Author H. A. Collinson

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Pages vii + 131

Price 16/-net

Reviewer Walter H. Esselman

This book is an excellent addition to the library of anyone interested in the management of a research and development organization. The author reflects his experiences in the planning and execution of development programs. Since this experience was obtained in Great Britain, some of the terminology differs from that in common use in this country. The book is, however, interesting and easy to read.

Following an introductory chapter, which broadly presents the requisites of a good research and development manager, the author describes a set of techniques for improving the efficiency of a research and development department. The subject is treated according to classic principles of forecasting, planning, organization, coordination, command, and control. He emphasizes that the management of research and development reduces basically to the direction of people and, therefore, has much in common with the problems encountered in the management of other endeavors. For example, the technical manager can learn much from the methods used in the management of a production department, with the fundamental difference being the degree of predictability of both the schedule and quality of the results. The initial definition of a development program must be based upon the careful selection and planning of the projects. This selection process is carried out with the close collaboration of the other functions and must be directed toward achieving the forecasted goals of the organization. Decisions not to work on some intriguing projects are difficult, but essential to assure that reasonable attention can be applied to the selected ones.

This section is followed by a review of the methods of organizing a research and development effort. The author describes a functional organization that is working on many small- to relatively large-size projects. The project team approach, consisting of a team of highly skilled personnel drawn from an organization based on technical disciplines, is endorsed. A more complete discussion of the problems associated with this type of organization would have been of great value. For example, the selection of the team leader and the relationship of the project team to functional line management is a complex question fraught with many pitfalls. Very sound advice is given concerning the need for flexibility of organization and mobility of staff. The accelerated development programs prevalent today seem to require continual organizational updating to accommodate technical changes and completion of various phases of effort.

One of the most interesting chapters in the book describes the factors affecting the research and development worker's efficiency. The treatment of this subject shows the author's awareness of the importance of maintaining the proper morale and motivation of the research worker. The subjects covered include salary, status publications, encouragement, training, attendance at sci-

entific meetings, and freedom to consider new ideas. The last subject, involving the handling of new ideas suggested by the staff, is one of the most difficult tasks facing the research and development manager. Tact, and a positive approach to evaluating his ideas, can do much to develop enthusiasm and self-confidence in the scientist or engineer. While it is not always possible to allow the worker to choose his project, he can be allowed considerable choice in the methods of approach.

Another interesting chapter discusses the creativity, selection, and evaluation of personnel. The creative individual is well-described and the author's thoughts are well-summarized by the following quote: "Creative people are not peaceful to live with; they require top management to make difficult decisions and the ideas put forward pose complex questions."

On the evaluation of technical programs, the author proposes a combined quantitative-qualitative approach. The quantitative evaluation would apply to those projects where the commercial utilization can be readily assessed. When proper recognition is given to the inherent limitations and accuracy of the best estimates of development costs and expected return, the quantitative method can be developed into a useful evaluation tool. The assessment of the more fundamental work, and the development of information of general long-range use, must necessarily be qualitative. The evaluation of projects of this latter type must, to a large extent, be based on the combined judgment of the research and development manager and other members of top management.

A worthwhile addition to the book would have been a review of the role of modern digital computers in the management of a research and development organization. More sophisticated management techniques are now possible on a practical and economical basis. Prompt feedback of information provides the tools to quickly analyze and adjust to changing requirements and enchances the efficiency of an organization.

Walter H. Esselman is Deputy Manager of the NERVA Project at the Westinghouse Astronuclear Laboratory. In his 26 years of service with Westinghouse, Esselman has played a highly creative role in the design and development of advanced control and power systems, particularly in the nuclear field. For the past 16 years he has held managerial positions of increasing scope and responsibility. He is a Fellow in the American Nuclear Society, a Fellow in the Institute of Electrical and Electronics Engineering, and was a delegate to the Second Conference on Peaceful Uses of Atomic Energy in 1958. He has been awarded approximately 15 patents. While working for Westinghouse, he received his PhD from Polytechnic Institute in Brooklyn in 1953.

BOOK ANNOUNCEMENTS

Although the following books will not be reviewed, they may be of interest to some of our readers:

Radiation Preservation of Foods (proceedings of International Conference on Radiation Preservation of Foods, September 1964), National Academy of Sciences, 1965, 424 pp., $9.00

Radioisotopes and Circulation, Gunnar Sevelius, ed., Little, Brown and Co., 1965, 307 pp., $13.00

The Provision of Radiological Protection Services, International Atomic Energy Agency, 1965, 82 pp., $2.00

The Basic Requirements for Personnel Monitoring, International Atomic Energy Agency, 1965, 44 pp., $1.00

Engineering Systems Analysis, Charles M. Haberman, Charles E. Merrill Books, 1965, 318 pp., $8.50

Plutonium, M. Taube, Pergamon, 1964, 258 pp., $8.50