



The SLAC Blue Book: A Brief History

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Affectionately known at SLAC as simply, “The Blue Book,” The Stanford Two-Mile Accelerator, has been a classic on site since the day it was published in 1968. Shepherded into existence by an editorial committee of four SLAC staff members led by Richard B. Neal, the massive 1169 page, more than ninety-author treatise thoroughly documents all facets of the development, design, and individual systems of the Stanford University two-mile electron accelerator.

What follows is an account of the origins of the book by the participants in its creation: Richard B. Neal, Gregory Loew, Doug Dupen, Harry Hoag, and Director W. K. H. “Pief” Panofsky.



A book is born

Richard B. Neal, Associate Director of SLAC in 1967, vividly remembers *The Blue Book*'s beginnings:

“In those days, Director’s Check-off meetings were regularly held in Panofsky’s office each Thursday starting at 3:00 p.m. On one particular meeting date,

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probably late in 1966 or early 1967, the Two-Mile Accelerator had already been completed on schedule and within the planned budget, and the machine had already begun to supply beams for the earliest research programs. A general feeling of success and anticipation was prominent throughout the Laboratory. There was a rather full agenda planned for the meeting, but the topic of a *Blue Book*, as we later came to know it, was not on this official agenda.”¹



Dick Neal (1972)



“Before the meeting was called to order, someone mentioned that the completion of the accelerator and its successful operations would probably mean that various key members of the laboratory would now be leaving SLAC and moving on to greener pastures and new challenges. This rather casual remark opened a torrent of concerns and responses among those present. The regular agenda was temporarily set aside as more people joined in this discussion. The gist of the concerns was: “With the departure of those key individuals from SLAC, won’t a great deal of intellectual knowledge and experience associated with the design and construction of the Two-Mile Accelerator be lost, a loss that would require years and great expense to replace? What can be done to prevent this from happening?”

¹ Gregory Loew, head of Accelerator Physics at that time, consulted his personal archive of appointment calendars and was able to determine from an entry on March 16th, 1967 that “the meeting in Pief’s office where the idea was born probably took place in the week before that date.” Based on Gregory’s documentation, we were able to locate in the SLAC Archives the Director’s Check-off meeting minutes for a March 14, 1967 meeting.

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Doug Dupen (1975)

Doug Dupen, then SLAC Director of Technical Information, notes that documenting the contribution of Aetron-Blume-Atkinson (ABA), the joint venture that provided architect-engineer-management services for the accelerator project, was a particular concern.

Neal: “Various ideas were tossed around, some of them sound, others trivial. Finally Matt Sands, who was Deputy Director of SLAC at that time and who had been relatively quiet up to then, spoke up and said (in effect) “Why don’t we publish a book about the various components and systems of SLAC and the experiences gained in producing them? Then various people may leave SLAC but they will leave their accumulated theoretical and technical contributions behind. The book will serve to present and coordinate all of the information better than a hodgepodge of miscellaneous reports could achieve.” I was immediately impressed with this advice and quickly supported Matt’s suggestion. After further discussion by those present, it was agreed that his suggestion had great merit and should be adopted. Panofsky approved. Further details about this plan were delayed for decisions in future *ad hoc* meetings.

Not to drop this hot topic, a meeting was held in the SLAC auditorium a couple of days later that was attended by a large audience of the laboratory staff which potentially included many or most of those who would later contribute to *The Blue Book*. Extensive discussions led to the conclusion of virtually all present that the preparation of such a book was a timely and worthy project for selected individuals of the staff. A few policy matters were discussed: for example, it was agreed that all contributions to the book would be identified by printing the name or initials of the author at the top of each contribution.”

Harry Hoag notes that enthusiasm for the book “...grew out of a widespread pride in the huge machine we had all collectively designed and built. It certainly was “state of the art” (a widely overused expression) at the time, with thousands of ideas, designs and inventions which needed to be documented, and hundreds of scientists and engineers who deserved lasting credit for their work and achievements.”

Assembling the pieces

An Editorial Committee was immediately formed, composed of Richard B. Neal, Doug Dupen, Gregory Loew, and Harry Hoag, and it wasted no time in getting down to work.

Hoag: “What comes to mind first are recollections of the eight o'clock meetings in Dick Neal's office (in the A&E building), with (usually) the sun streaming in through the east-facing glass wall. I enjoyed the job very much, and felt honored to be chosen as one of the four editors of the voluminous and significant work contemplated. (I was low man on the totem pole, with Greg being my boss and, of course, Dick being the Head of the Division, with Doug on the Administrative and Public Information side).”

Loew: “The fairly regular editing meetings at 8:00 AM started in Dick's office around the summer of 1967 and went on through December of that year. Sometimes they had to start even earlier because Dick also had to keep his regular 8:30 AM departmental meetings, which he scheduled at least 3 or 4 times per week, and I attended several of those as well.”



Greg Loew (1975)



Neal: “We didn’t keep a fixed schedule or keep a logbook of events, probably because we were so busy producing sections of the book that such formalities seemed counter-productive or superfluous. Remember that these efforts regarding the book coincided with the regular duties of the writers and reviewers in the Laboratory. Almost all of those involved with the book were forced to devote many night hours to this task. I would guess that the writing and review of the sections of the book perhaps required 6 to 9 months.

In general, the authors of the sections and chapters were selected in a natural way, i.e., they were the individuals who had earlier designed and/or created the items that were covered in the corresponding sections and chapters of *The Blue Book*. For example, in the chapter of the book devoted to klystrons, the authors

of that chapter were members of the Klystron Department in the Technical Division. The Editor of that chapter was J. V. Lebacqz who was the Head of that Department. The authors of several of the sections in that chapter were R. W. Bierce and J. Jasberg, members of the Klystron Department, who had worked on the items covered in those sections prior to the origin of the book.”

Hoag: “It seems to me that the chapters followed a natural progression, starting with background and objectives, then leading to descriptions of all the major component systems - and who better to write all this than the group leaders (and their lieutenants) responsible for the design, construction and testing of those systems?”

Neal: “Some of the sections of the books were completed early so that the Editorial Committee ... were able to begin their reviews on those sections before other sections which took longer to produce were available. In many ways, this was a fortuitous circumstance since it spread out the review process more uniformly in time... After each section was reviewed, it was returned to the author(s) with suggested changes and/or additions if needed. Then the Committee would review the section again. Some sections required three or more reviews.

Members of the Editorial Committee were doubly busy because each of them was an author of one or more chapters or sections of the book in addition to his duties as a reviewer of parts of the book written by other authors.”

Challenges and Rewards

Members of the Editorial Committee agree that assembling the book was not an easy task.

Neal: “Probably the most difficult tasks involved in creating *The Blue Book* were the assignments of the Editorial Committee associated with the reviews of the many chapters and sections of the book. The easiest parts of the process were the assignments to those individuals who were given the tasks of creating simple or brief portions of the book.”

Hoag: “For me, the most difficult (and also the most rewarding) part of the process was having the privilege of taking the words of a technically clever (even brilliant) engineer or scientist, and re-shaping them so that the prose was at once more elegant and easier to understand. Perhaps, on the other hand, the same process was at times the easiest, when one had especial empathy with the writer.... Some chapters came from the authors in much worse shape than others.”

Loew: "As usual, when four people work together on a single-minded effort for a long time, we developed a tremendous amount of camaraderie, which made the whole thing more fun. Also, we could share our frustrations which had to do with a small number of engineers who were excellent from a technical point of view, but were no Shakespeares and often ran way behind in submitting their drafts. Doug Dupen was a master at getting around some of their weaknesses and creating sentences where they didn't exist!"

Neal: "Doug Dupen handled the regular important contacts with the publisher, The Benjamin Company, including the original contract negotiations. (For example, Doug induced the company to provide a free copy of the completed book to each of the approximately 90 authors following publication) As the company completed each section sent to them by Doug, they returned the printed version of the section to Doug for a follow-up review by the Editorial Committee. In some cases, the sections had to be returned to Benjamin more than once."

Dupen: The most difficult task was "wrenching finished texts from the authors." Harry Hoag "did ALL the work of detailed coordination, assembly of zillions of parts, checking and rechecking. I think he spent a full full-time year out of his career on this project."

(Hoag notes: "Doug Dupen is overly generous in crediting me with "ALL the work of detailed coordination". In truth, I did a lot, and burned some midnight oil, but Greg helped a great deal (I can't remember much about the detailed apportionment of the work). I had my regular Accelerator Physics duties to attend to (the phasing system, beam- position monitors and, of course, accelerator re-tuning to mitigate beam break-up). The latter job entailed many perspiring hours in the accelerator housing, during which time I allowed myself to be photographed threatening to strike the accelerator with a hammer. The photo caused me a degree of good-humored notoriety, especially at the hands of Greg!")

Community Reaction

Hoag: "As I recall, the reaction of the SLAC community to *The Blue Book* when it first came out was generally very favorable. People were pleased to see their achievements documented, and to know that the new design and construction techniques were being made available to the world-wide high-energy physics community."

Neal: "Altogether, it seemed that the reactions of most of the staff members were highly favorable. The reactions of those involved in writing and reviewing the book consisted of thankfulness that the creative job was finished and that the

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results were apparently very successful. Those writers who received free copies of the new book appeared to be very appreciative.”

Panofsky: “I had been concerned about adequate documentation since my Berkeley days. At that time, I was very displeased with the fact that none of the major Berkeley accelerators had been documented comprehensively, and I broke that tradition by organizing a complete report on the 32 MEV 40-foot long proton linear accelerator which was later published in a long article in the *Review of Scientific Instruments*. One interesting fact about *The Blue Book* is that I’m not aware of any similar effort documenting subsequent accelerators or colliders. There are, of course, numerous summary articles on various technical topics, summary status reports at conferences, and monographs on specific technologies; the publication most relevant to our topic is Lapostolle and Septier’s large volume, Linear Accelerators.



The infamous photo of Harry Hoag threatening to “adjust” the accelerator with a hammer. (1969)



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