

LETTERS

Micromanaging DOE Labs from Washington

Readers should not think that Alan Burnham's description (January 1991, page 13) of bureaucracy and micromanagement from on high at Lawrence Livermore Laboratory reflects an isolated situation. The entire DOE weapons complex is embroiled in an endless process of procedure writing, documenting that the procedures will be followed, documenting that the DOE orders are obeyed, self-appraisals, self-assessments, "technical safety appraisals," MESH (Management, Environment, Safety and Health) team inspections, Tiger Team inspections and pre-inspections from all levels of DOE. We have become so obsessed with safety that we have become unable to do at all the jobs we are supposed to do safely. The answer to every perceived safety or environmental problem is to stop operations. Many DOE operations have shut down for this reason. The danger is that someday when we have to be productive, safety will be thrown to the winds, because we never learned to combine safety with getting something done.

In one instance an inspector visiting an experimental facility at a national laboratory reported a number of minor violations—such as a written procedure for a standard experiment that did not have a recent date, and a radiation self-monitoring instrument left on a $\times 10$ setting (which doesn't affect the alarm point)—and concluded that these revealed a "casual attitude toward safety," the most damning accusation that can be made. In an atmosphere where one accusation carries more weight than a dozen explanations or denials, the facility management did not dare present its side of the matter, nor did the angry overseers in the Washington headquarters ask for it. Only after $1\frac{1}{2}$ years of procedure writing and inspections did the management receive permission to resume operations.

Management at another facility, to avoid the remote possibility of creating "mixed waste," banned the use of mercury in the laboratory. It required mercury thermometers to be removed from the drawers and mer-

cury barometers to be taken off the walls. Both were then sent to a hazardous-waste disposal facility.

Really, we need to recover some faith that we know what we are doing, and that each minor mistake is not the end of the world.

JOHN E. TANNER JR
Idaho Falls, Idaho

4/91

GRE: Pointers and Another Pan

Recently a letter appeared in *PHYSICS TODAY* (January 1991, page 97) from a student who felt that his graduate school prospects had been injured by the Graduate Record Exam in physics. As members of the current committee for the GRE physics test, we feel it might be worthwhile to reiterate some basic points.

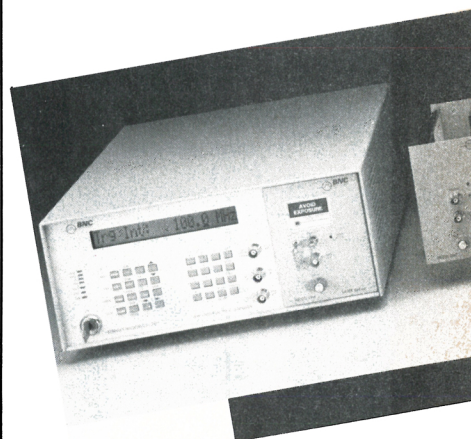
No one would claim that the score on a single exam should be used as the sole predictor of graduate school success, and indeed the schools that use the GRE scores do so as only one component of the admission process. However, a uniform test is one way to compare the physics knowledge of students from vastly disparate places. For example, it gives students from less-well-known undergraduate institutions an opportunity to be evaluated on the same basis as other students.

One can always argue that the type of test or its content might be different. Changes of this nature are frequently discussed at our committee meetings. There are some drawbacks no matter what the format of the exam. For instance, a hand-scored exam would include fewer problems and would be less likely to measure the breadth of a student's training. In addition, a hand-scored test would cost much more than the present, machine-scored version. (The Advanced Placement physics test for high school students, which has some hand scoring, now costs almost twice as much as the GRE physics test.) This would be a severe problem for foreign students, who often have great difficulty paying the current exam fee. For the immediate future, no great change in the format is contemplated.

Having said this, there *are* ways for students to prepare for the GRE

150 pS

New Modular Pulse Generator



BNC's budget stretching system of unprecedented versatility provides you with:

- Both optical and electrical modules
- 100 MHz rep rate, 1 ns resolution
- 150 ps rise time, 5 V pulses
- 300 V, 5 ns rise time pulses
- Optical signals at 850, 1064, 1300 and 1550 nm
- Both GPIB and RS232

Ask for free application notes.



Berkeley Nucleonics Corp.

1121 Regatta Square
Richmond, CA 94804
Telephone (415) 234-1100

Circle number 10 on Reader Service Card

LETTERS

physics exam to optimize performance on the current test. The purpose of this letter is to remind the physics community of these steps, in the event that they are not well known.

▷ It is possible to purchase a copy of one of the old physics tests. They are on sale in many bookstores. Alternatively, the book *Practicing to Take the GRE Physics Test* can be obtained from Graduate Record Examinations, Educational Testing Service, P. O. Box 6014, Princeton NJ 08541-6014. (The price is \$9.00 per copy for four or fewer, \$6.30 per copy for more than four.) This contains a full-length test that was actually administered. It is worthwhile to have such a test on hand so students can study it at their leisure. This will give them time to brush up on subjects that they have forgotten and to devise some strategies for skipping questions on topics they never studied.

▷ Read the free booklet describing the physics test; this gives an approximate breakdown of the topics on which questions will be asked. The representation of topics is continually adjusted to reflect both the desires of graduate schools using the scores and the material covered in the core of the undergraduate curriculum in the US. A substantial fraction of the questions pertain to material that is covered in the first two years of the four-year physics program at most institutions.

▷ Students should apply early for the desired exam date. This will ensure that they get to take the exam at the nearest testing center; late applicants may be sent to inconvenient spots.

▷ Some students retake the test in an attempt to increase their scores. Normally, scores do not increase greatly between tests taken a couple of months apart, so this is not a particularly useful strategy unless the student was ill the first time. However, students who have completed additional courses or gained additional facility through grading or teaching may have learned enough physics to increase their scores a great deal; it is probably worthwhile to retake the test in this case.

▷ The scoring of the exam discourages random guessing, as points are lost for wrong answers. However, if the student can narrow the choice down to two (of five) answers, guessing may be worthwhile. Questions frequently focus on the dependence of some quantity on a particular variable; answers may, for instance, include $\sqrt{x}$, x and x^2 or may differ in order of magnitude. Students will have to use some physics knowledge to reduce the choices, so they shouldn't feel they are engaged in

mere "guesswork."

As we stated above, the exam cannot possibly test all aspects of a student's knowledge or preparedness for graduate study. It is intended to be only one component of the student's profile; used in this way, many schools find it helpful. Our goal as a committee is to maximize its usefulness within the admitted limitations. Suggestions are welcomed at any time; it is probably best to send them directly to the GRE Physics Test at the Educational Testing Service, P. O. Box 6000, Princeton NJ 08541-6000.

NEAL ABRAHAM

Bryn Mawr College

Bryn Mawr, Pennsylvania

RONALD EDGE

University of South Carolina

Columbia, South Carolina

JOSE D. GARCIA

University of Arizona

Tucson, Arizona

J. WOODS HALLEY JR

University of Minnesota

Minneapolis, Minnesota

LORELLA M. JONES

University of Illinois

at Urbana-Champaign

RICHARD OLENICK

University of Dallas

Irving, Texas

6/91

I read the letter from Douglas Orsini on the Graduate Record Exam in physics with great interest. I could empathize with him completely because I too had a 3.5 GPA as a senior in college. I had 2½ years of academic lab research experience, and I had excellent recommendations from all of my professors at Amherst College. Yet when I took the GRE, I too ranked in the lower 50% of the country—to this day I'm not sure why. I was subsequently rejected from every school I applied to that required GRE scores except the University of Massachusetts, which made a small exception because it respected the rest of my academic record.

Well, 1½ years after entering graduate school, and coincidentally 5 minutes after reading Orsini's letter, I found out that I had passed my PhD qualifying and comprehensive exams, which I had taken the previous weekend. To say that these exams had significantly more difficult questions than the GRE would be an understatement. I agree with Orsini that the GRE needs to move away from multiple choice and speed.

I could give you a long list of people from my undergraduate institution with so-so scores who went on to be successful at some very good graduate schools. I could also name some very able people who were discouraged

Gateway for Coincidence Experiments

GG8010

Octal Gate and Delay Generator



For adjusting the delay and width of coincidence and gating pulses

- Eight, independent, duplicate channels in a compact package
- TTL outputs and NIM-standard fast negative outputs
- Output delay adjustable from 70 ns to 10 μ s
- Output width adjustable from 50 ns to 10 μ s

Get Out of the Gate

Fast . . .

EG&G ORTEC

100 Midland Road, Oak Ridge, TN 37831-0895 U.S.A.

USA HOTLINE 800-251-9750

Circle number 12 on Reader Service Card

altogether, as I almost was. That is a real shame: We could be missing out on the next Einstein. There is no guarantee that at age 20 he would've done well on the GREs.

I don't think that a few students with lousy scores can do much, but if departments were to speak out against the present form of the physics GRE, maybe it could be changed.

PETER SHELDON

University of Massachusetts
at Amherst

2/91

A Telescope Overlooked

We appreciate the brief mention of the Spectroscopic Survey Telescope, which our institutions are building jointly, in the article entitled "The New Ground-Based Optical Telescopes," by Buddy Martin, John M. Hill and Roger Angel (March 1991, page 22). However, since the funding for the telescope is more than 75% complete, since construction is expected to begin this year, and since its effective area of 57 m² is larger than those of five of the telescopes listed in the table on page 24, we might have hoped for inclusion of the SST in that table and a few more words about its unusual features.

FRANK N. BASH

McDonald Observatory

University of Texas at Austin

FRANCE CORDOVA

Pennsylvania State University

University Park, Pennsylvania

3/91

MARTIN, HILL AND ANGEL REPLY: We agree that the Spectroscopic Survey Telescope should have been included in our list of major new ground-based optical telescopes, and we apologize to Frank Bash, France Córdova and their colleagues for its omission. Nearly all the planned large telescopes are designed for maximum versatility; they are intended to cover the whole sky and a broad range of wavelengths with high angular resolution and wide field of view. Our article concentrated on these telescopes and the enabling mirror technology. The SST represents a unique and exciting departure, aiming for dramatic simplification and cost reduction by restricting the goal to spectroscopy and by limiting sky access. Such specialized telescopes have an important scientific role.

BUDDY MARTIN

JOHN M. HILL

ROGER ANGEL

Steward Observatory

University of Arizona

Tucson, Arizona

5/91

A Question of Mind over Measurement

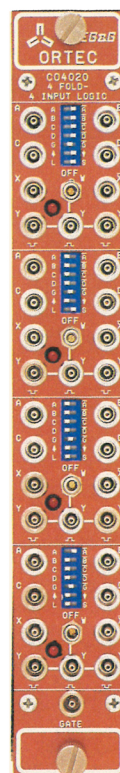
In his Reference Frame column "On the Nature of Physical Law" (December 1990, page 9) Philip Anderson undertakes to reassure us regarding the epistemological integrity of the "seamless web" of science and to dismiss categorically any anomalous observations that seriously threaten to "rip the fabric to shreds." In a rather pejorative tone poignantly reminiscent of the prequantum Maxwellian era, he disparages those "who call themselves physicists" yet are foolish enough to attempt systematic study of the interface between human consciousness and physical mechanics. As one of the primary, if unnamed, targets of Anderson's blunderbuss, I would simply like to correct a few errors of fact and inference on which his case is based. In so doing, it may not be irrelevant to note that although his office is only a few hundred yards from my own, he has not visited our laboratory, discussed any of his concerns with me directly or apparently even read with care any of our technical literature. Had he done so, he would not have made several misstatements in his representation of our work:

▷ The credibility of our results, like those of several other serious scholars of this topic, does not rest on "statistical deviations at the few- σ level." We have in hand several prodigious data bases, acquired over 12 years of continuous, intensive experimentation, that clearly establish the existence, scale and primary correlates of certain anomalous influences of human consciousness on a variety of physical systems and processes. In our Micro-electronic Random Binary Generators experiment, 95 unselected human operators attempted to shift the output distribution means to either higher or lower values than the chance mean, in accordance with their prerecorded intentions. In 3 850 000 experimental sequences of 200 binary samples, the overall results were that means in high-intention runs exceeded means in low-intention runs by 4.38σ . (The probability of chance occurrence of this outcome is less than 6×10^{-6} .) In our Macroscopic Random Mechanical Cascade study, 26 operators attempted, in 4170 experiments, to influence the output distributions of 9000 $\frac{3}{4}$ -inch spheres trickling downward through an array of 330 pegs. Right-intention means exceeded left-intention means by 4.43σ (probability of chance occurrence less than 5×10^{-6}).

What Could Be More Logical?

CO4020

General-purpose logic module for AND, OR, Veto, Fan-Out, and Gating functions



- Four independent channels
- Overlap outputs and adjustable-width outputs
- 3-ns overlap resolution
- TTL and fast negative NIM outputs

For Logical
Coincidences . . .

EG&G ORTEC

100 Midland Road, Oak Ridge, TN 37831-0895 U.S.A.

USA HOTLINE 800-251-9750

Circle number 14 on Reader Service Card