

for precision measurement & control of GAS FLOW—

Hastings Mass Flow Meter/Controller

featuring Stainless Steel construction.



Mass Flow Meter/Controller

Optional
Power Supply/
Readout

- 7 ranges from 0-10 sccm to 0-10 slpm
- 0-5V inherently linear output signal
- Fast response
- 316 S.S. standard, monel optional

Request Specification Sheets 530 & 531.

- Local or remote set point pot
- Completely self-contained
- Programmable start, stop, automatic, and soft start
- Control to $\pm 2\%$ typical
- Flowmeter without controller also available

TELEDYNE
HASTINGS-RAYDIST

P.O. BOX 1275
HAMPTON, VA 23661 U.S.A.
TELEPHONE (804) 723-6531

Circle number 54 on Reader Service Card

How many years experience does your superconducting magnet supplier have?

We have over 14!

American Magnetics, Inc. has been supplying laboratory magnets for over 14 years. Our success is based on quality, innovation, and excellence in both product design and manufacture. The professional staff at AMI will assist you to design and build an integrated magnet and dewar system to match your experiment. If you need assistance or just want to do business with the leading U.S. supplier of superconducting magnet systems, then telephone (615) 482-1056.

AMERICAN MAGNETICS, INC.

P.O. Box 2509, Oak Ridge, TN 37831-2509 USA, TLX 557-592



Circle number 55 on Reader Service Card

letters

computer codes may ultimately rival Galileo's telescope in providing insights and solutions to astrophysical phenomena.

Puzzles in the study of auroras; planetary magnetospheres; comets; the solar atmosphere; in such generally inaccessible subjects as double radio galaxies; the evolution and morphology of peculiar and spiral galaxies; the large-scale structure of the universe—all these appear decipherable when a large computational resource is available.³ The need for an astrophysical computation center to provide more universal access is apparent.

It is important to emphasize that while some computational astrophysics is possible at 300 or 1200 baud over voice-grade telephone lines, this mode of operation is severely handicapped in light of the many scientists, physical and computational, usually required to maintain and validate a large MHD or plasma code. Furthermore, the logistics of handling the many tens of setup, debug, controller, historian and data files are aggravated when a calculation is carried out in all three dimensions. In this regard, a numerical astrophysical observatory might operate in a mode similar to that of the National Magnetic Fusion Energy Computer Center,⁴ tying far-flung research centers together with wide-band 56-kilobaud or 256-kilobaud satellite links.

References

1. O. Buneman, C. W. Barnes, J. C. Green, and D. E. Nielsen, *J. Comp. Phys.* **38**, 1 (1980).
2. A. L. Peratt and J. C. Green, *Astrophys. Space Sci.* **91**, 19 (1983).
3. A. L. Peratt, *Sky Telesc.* **66**, 19 (1983); A. L. Peratt, to be published in *Sky Telesc.*
4. Energy and Technology Review, Livermore, UCRL-52000-83-4, April 1983, page 27.

ANTHONY L. PERATT

Los Alamos, Scientific Laboratory

3/84

Los Alamos, New Mexico

Worth of a BS

I read with great interest the news story, "Department chairs confront issues in education of physicists" (February, page 57). We have been wrestling with some of these problems for many years. It is still difficult to find a young promising physicist who is interested in a teaching career when he or she could command a considerably higher salary in industry. And of course it is not a simple matter to direct a young physicist towards the teaching profession under these conditions.

I know of a department chair who,

Algebra will never be the same again



Our new computer mathematics program solves problems in minutes that used to require days or weeks

Spending too much time struggling to derive equations, verify approximations, or generate numerical and graphical representations of a model or equation? Putting important problems aside because they are too time-consuming or complex to solve?

Our new Symbolic Manipulation Program (SMP) takes the drudgery out of mathematical problem-solving. It is a powerful computer mathematics program for the technical professional that can be used to solve the most complex problems faster than any other program of its type. SMP solves many problems in closed form that were previously intractable. It helps you generate the approximation schemes needed to solve problems that have no exact so-

lutions, even writing out code for number-crunching in Fortran or C. With SMP, you're assured that your answer will be correct the first time.

Sophisticated, yet easy to use

SMP is designed so that, no matter what level of computer expertise you have, you will quickly become a skilled user. For example, at any point during a calculation, you can, using ordinary words and phrases, ask for information about features of SMP. This is an interactive process designed to make problem solving simple using SMP.

Algebra Plus

SMP performs all the usual operations of algebra and calculus, including integration

and differentiation, solution of linear and non-linear equations, matrix and tensor manipulation, and has powerful facilities for numerical evaluation and two-dimensional and three-dimensional graphics. Moreover, SMP is not limited to standard mathematical techniques and operations. SMP was designed to be extendable by you, in notation of your choice, to handle new and unusual problems at the cutting edge of all fields of science and engineering.

To take the problems out of mathematical problem-solving, contact Computer Mathematics Group, Inference Corporation, 5300 West Century Blvd., Los Angeles, CA 90045. Phone is (213) 417-7997.

© 1984 Inference Corp.



INFERENCE CORPORATION

IBM is a registered trademark of IBM Corporation.

DEC is a registered trademark of Digital Equipment Corp.

Circle number 20 on Reader Service Card

SMP is currently available on DEC VAX, Apollo Domain and Sun Microsystems computers, and will soon be available on the Hewlett-Packard 9000 and on IBM mainframe computers.

Double Your Pleasure

with a
Single
Crystal



You will be very pleased when you install our new Model 2100/97 Frequency Doubler and extend the lower range limit of your Dyescan™ Tunable Dye Laser from 360 nm to 260 nm. Like the Model 2100, our Doubler automatically scans under microprocessor control, keeping the output beam stable. Due to its unique cylindrical design, no crystal changing is necessary.

Write or call for your FREE brochure today

EG&G PRINCETON APPLIED RESEARCH

Now on loan 18-21 at the CLAS/IBRC Exhibition in Rochester, N.Y. Booth 305, 307

Circle number 56 on Reader Service Card

AC-RESISTANCE BRIDGE ELIMINATES THE ERRORS



Do not allow contact potentials, changes in lead resistances and sensor self-heating to limit the accuracy of your low resistance measurements or resistance thermometry. Use the AVS-45 Automatic Resistance Bridge to eliminate these error sources. AC-excitation, 4-wire measurement and ultralow sensor dissipation are the basic features of this new instrument. The AVS-45 provides resolution, accuracy and stability very near to what has been achieved only using expensive inductive dividers. With the AVS-45 you will get excellent results conveniently and quickly — at a reasonable price.

- Range from 100 $\mu\Omega$ to 2 M Ω (optionally from 10 $\mu\Omega$ to 200 k Ω).
- 4 1/2-digit display. Resolution of $5 \cdot 10^{-6}$ is possible in resistance deviation mode.
- Stability 10 ppm/ $^{\circ}\text{C}$ and 35 ppm/year. Performance specified down to 10^{-13} W sensor power.
- Manual or autoranging. Programmable excitation source.
- Two accurate analogue outputs for external DVM, chart recorder or temperature controller.
- Remote control possibility. Up to 7 sensors may be scanned using the multiplexed input option.

rv-elektroniikka oy

Veromiehentie 14, SF-01510 VANTAA 51, FINLAND

Circle number 57 on Reader Service Card

letters

while interviewing a candidate for a faculty position, describes the conditions in his department and university, then asks: "Why do you want to teach here? What is wrong with you?"

The problem is grave. It requires serious consideration, tremendous efforts and a much-needed national and public awareness; but above all it requires a solution.

I thought the notion of introducing a series of mini-courses on "hot" topics in modern physics would be valuable, not only because it would acquaint students with current topics and eliminate the perception that physics is neither new nor exciting, but also because it would tend to reactivate and rejuvenate some of the faculty in institutions where research is not the prime function. It is certainly an idea that deserves serious consideration.

I strenuously disagree with the statement that "the physics BS is not seen as a particularly useful degree, either by employers or by students." The active recruitment of our graduating seniors by the local industry practically depleted our graduate program and forced us to offer all our graduate courses in the evenings. The problem is compounded by the fact that the salaries of these young scientists are generally higher than what we offer to a PhD seeking a faculty position at the assistant professor level.

I have another illustration of the worth of a BS in physics: Recently, while celebrating the successful conclusion of an industrial associate contract between TRW and California State University, Long Beach, the master of ceremonies, Berry Yolkin, an engineer himself and the Manager of TRW Ground System Development, introduced one of our recent BS graduates by saying, "And our best engineer is a physicist." There were at least twenty engineers in the audience.

S. I. SALEM

California State University
Long Beach, California

3/84

Editorial changes

Burton Brody (March, page 11) is not alone. Those of us who are merely authors are often infuriated by editorial changes. We, too, have an ear for good English. Rejoice in individuality, and let our prose be. (I ceased reading *Scientific American* because every article sounded just like all the others I had read.)

Nowhere have I seen the issue put more clearly than in Arthur Plotnik's *The Elements of Editing* (Macmillan, 1982, page 32):

All too true. The first impulse we