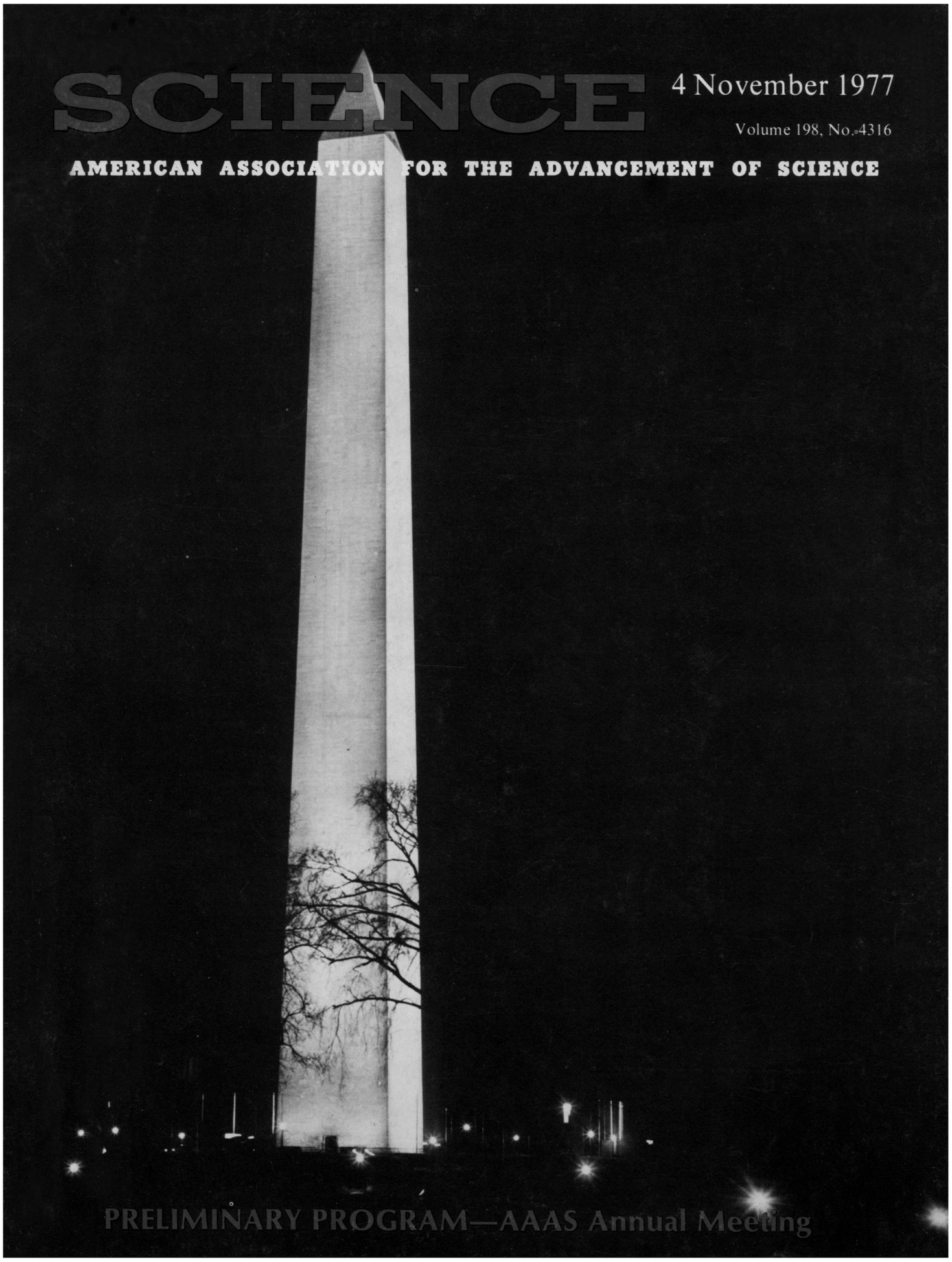
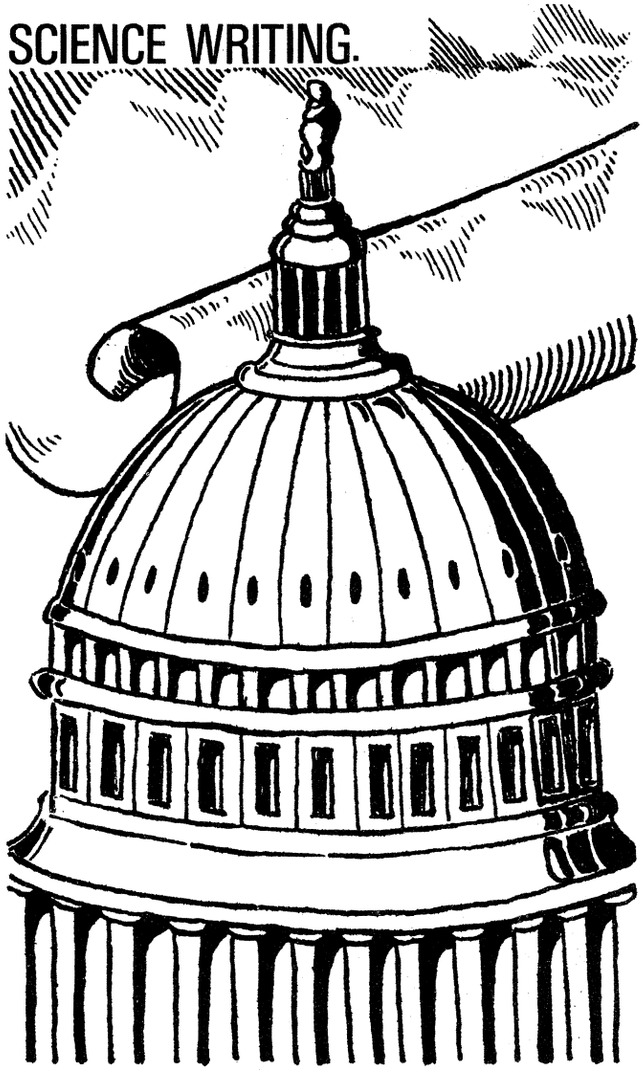
SCIENCE
4 November 1977
Volume 198, No. 4316
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



PRELIMINARY PROGRAM—AAAS Annual Meeting

1977 AAAS-Westinghouse SCIENCE WRITING AWARDS FOR NEWSPAPERS AND MAGAZINE SCIENCE WRITING.



RULES

1) The aim of this competition is to encourage and recognize outstanding writing on the sciences and their engineering and technological application in newspapers and general circulation magazines. The following categories are not eligible: articles on the field of medicine, articles published originally in AAAS publications, articles by employees of the AAAS or Westinghouse Electric Corporation.

2) Each entrant in a newspaper award competition and each entrant in the magazine award competition may submit three entries.

3) An entry for a newspaper competition may be any of the following: a single story; a series of articles; or a group of three unrelated stories, articles, editorials, or columns published during the contest year. A magazine entry may be a single story or series published during the contest year.

4) A completed entry blank must be submitted together with five copies of each entry in the form of tear sheets, clippings, reprints, or syndicate copy (not over 8½" x 11"), showing name and date of the publication. ENTRIES MUST NOT BE ELABORATE.

5) Each entry must have been published in a newspaper or general circulation magazine within the United States during the contest year — 1 November 1976 through 31 October 1977. (In the case of a series, more than half of the articles comprising it must have been published during the contest year.) Date on the issue in which an article appeared will be considered as the date of publication. All entries must be postmarked on or before midnight, 15 November 1977.

6) Persons other than the author may submit entries in accordance with these rules. Entries will not be returned.

7) Winners of the 1976 awards are not eligible for the 1977 awards. Persons winning three times are no longer eligible.

8) The Judging Committee, whose decisions are final, will choose the winners. There are three awards of $1000: for the winning entry in the over-100,000 daily circulation newspapers competition, for the winning entry in the under-100,000 circulation newspapers competition; and for the winning entry in the general circulation magazine competition. For award purposes, newspaper circulation will be sworn ABC daily circulation as of 30 September 1977. The Judging Committee may cite other entries for honorable mention.

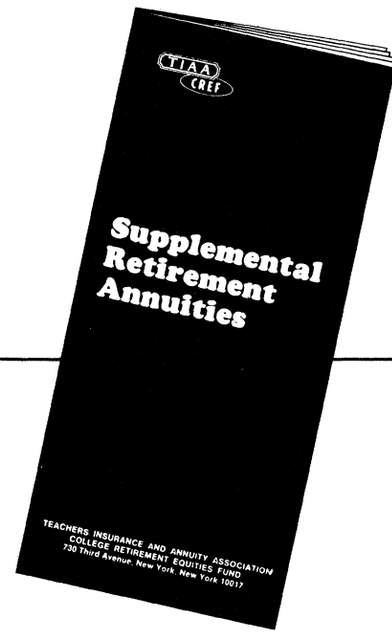
9) The awards will be presented at the dinner meeting of the National Association of Science Writers, during the 1978 meeting of the American Association for the Advancement of Science in Washington, D.C. Travel and hotel expenses of the award winners will be paid. Entrants agree that, if they win, they will be present to receive their awards, unless prevented by circumstances beyond their control.

Grayce A. Finger

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

1515 Massachusetts Avenue, N.W. Washington, D.C. 20005

TIAA-CREF Supplemental Retirement Annuities



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Supplemental Retirement Annuities (SRA's) are new forms of TIAA and CREF contracts designed expressly for use by persons who want to set aside tax-deferred retirement funds over and above amounts being accumulated under their institution's basic retirement plan. They are available for employees of colleges, universities, private schools and certain other nonprofit educational organizations with tax-deferred annuity (salary-or-annuity option) programs. Through a properly drawn agreement with their institution, staff members may divert part of their compensation before taxes to the purchase of these new contracts.

And SRA's are cashable at any time. This means that if the money accumulated by salary reduction is needed before retirement, the SRA contracts can be surrendered for their cash value. Benefits, whether payable in cash or as income, are taxable as ordinary income when received.

For more information and answers to questions send for your copy of the booklet on Supplemental Retirement Annuities.

Send me a booklet describing TIAA-CREF Supplemental Retirement Annuities.

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WS

4 November 1977

Volume 198, No. 4316

SCIENCE

SCIENCE is published weekly, except the last week in December, but with an extra issue on the third Tuesday in September, by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with **The Scientific Monthly®**. Second-class postage paid at Washington, D.C., and additional entry. Member rates on request. Annual subscriptions $60; foreign postage: Canada $10; other surface $13; air-surface via Amsterdam $30. Single copies $2 (back issues $3) except **Guide to Scientific Instruments** $6. School year subscriptions: 9 months $45; 10 months $50. Provide 6 weeks' notice for change of address, giving new and old addresses and postal codes. Send a recent address label, including your 7-digit account number. **Postmaster: Send Form 3579 to *Science*, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005.** ***Science*** is indexed in the **Reader's Guide to Periodical Literature.**

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

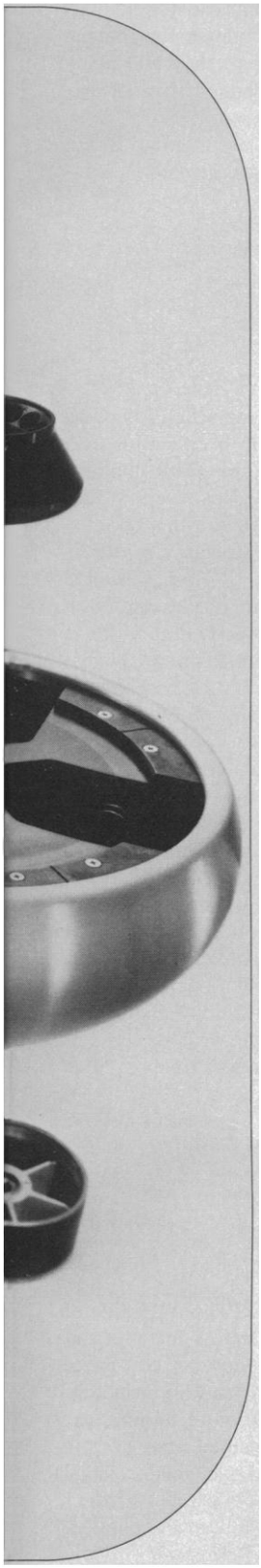
COVER

Washington Monument [Abbie Rowe, National Park Service, Washington, D.C.] See page 487. Preliminary program of the AAAS Annual Meeting, 12–17 February 1978.

Latest in


Du Pont Instruments
Sorvall RC-5B Refrigerated Superspeed Centrifuge

an evolutionary line:



Versatility, high performance and reliability make the new Sorvall® RC-5B the best-buy superspeed centrifuge.

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*U.S. Patent 3,998,383

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DuPont Instruments

DUPONT
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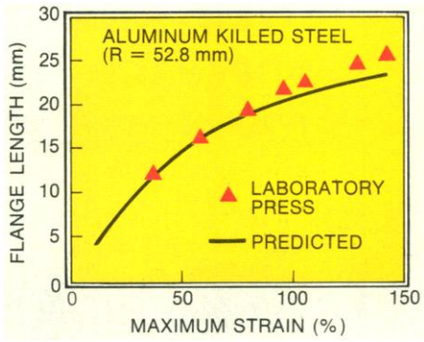
A request comes in to mathematicians here at the General Motors Research Laboratories. "How do we determine if this panel can be stamped without tearing?" it asks.

Wait a minute. Can't a half century of manufacturing know-how provide the answer? No, because in making cars lighter, designers are using new alloys that are often more difficult to form.



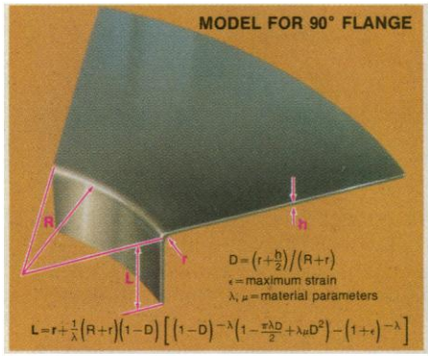
But why turn to mathematics? Well, our mathematicians have been devising models that describe the complex behavior of sheet metal during various forming operations. And the models work.

It's an interesting challenge, predicting panel formability. You start with the theory of plasticity, attempting to build a general model on this bedrock.

The model must take into account press forces, the resulting stresses on the metal, die-metal friction, the rate and direction of permanent deformation, and the work hardening and physical limitations of the metal.

Then comes the critical step of dovetailing all these elements into a comprehensive model that can predict with accuracy.

So far, we've developed models for several stamping operations. In use they give results that agree with laboratory and plant experience.

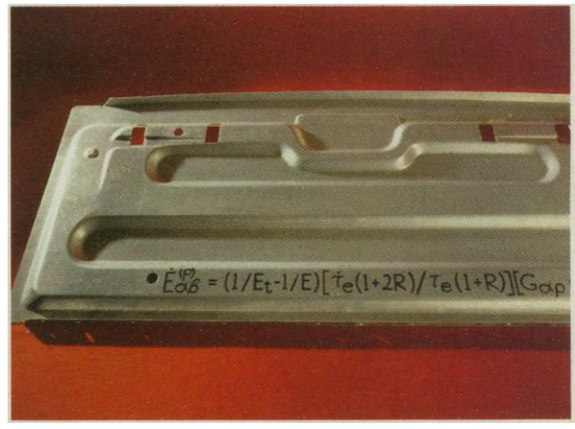


One, for example, computes the longest flange length possible on a curved panel without splitting. It told designers they could use length-radius combinations previously considered unworkable.

Another computes maximum pocket depth. It guided the design of a 1977 station wagon load floor panel (far right), permitting aluminum to replace steel and save 34 kilograms.

Mathematical modeling: Helping to improve designs and cut car weight... by the numbers.

forming sheet metal... mathematically.



General Motors Research Laboratories
Warren, Michigan 48090

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How Much More Oil?

One of the major battles fought on Capitol Hill this year has been over pricing and taxing of crude oil. Part of the petroleum industry has taken the position that given sufficient incentives, they could find and produce much more oil. Conversations with veteran oil geologists and exploration managers reveal a sharp division of opinion. Some are sincerely and deeply optimistic about finding much more oil, but another group with equal conviction holds the opposite view. The optimists cite the fact that most of the area of the continental shelves and part of Alaska remain undrilled. They also believe that they will find much more oil within the contiguous 48 states. They assert that improved methods of recovery will bring out more oil from formations where it is currently unproducible.

The pessimists point to the poor results obtained during the past 5 years in drilling in the contiguous 48 states. They concede that more oil will probably be found in the frontier areas, but they point to disappointments in drilling on the continental shelves. Major oil companies spent nearly $1 billion to obtain the right to drill dry holes in the Destin Anticline located in the Gulf of Mexico west of Florida. Results of drilling the first hole off the mid-Atlantic Coast were also not encouraging.

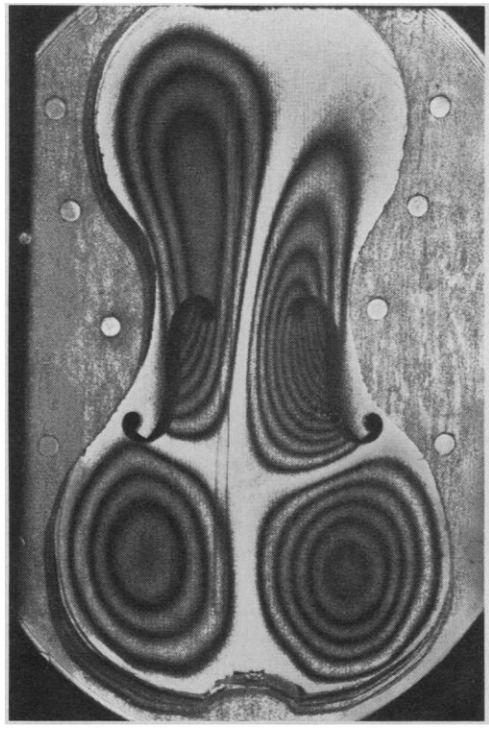
The National Energy Plan projected that domestic petroleum production (including condensate) will total about 11 million barrels per day in 1985, or about 1 million more than current levels of production. This estimate is optimistic. Under present leasing policies and federal regulations, there is no possibility of substantial additional oil from the outer continental shelves by 1985. A useful contribution will come from Alaska, but if the Plan's target is to be met, most of the production must come from the contiguous 48 states. Moreover, to sustain the production rate, a large amount of oil must be discovered—about 3 billion barrels per year. During the past 4 years, discoveries averaged only 1.2 billion barrels and little of that was in new fields.

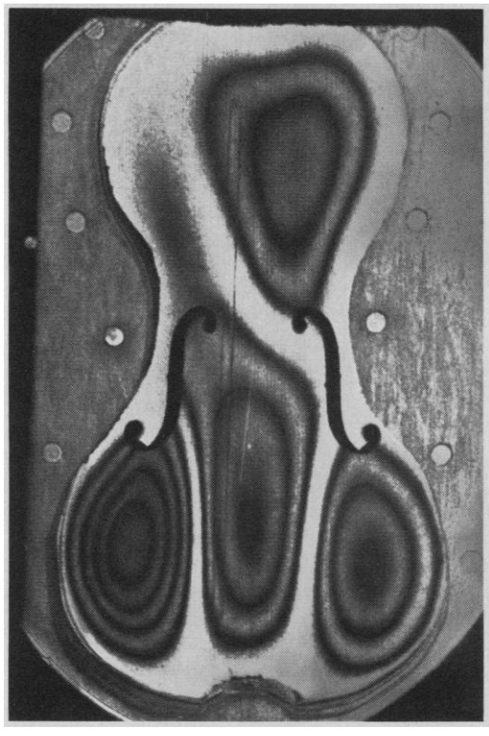
A recent release by the Federal Energy Administration, now part of the Federal Energy Organization, provides a historical perspective. In 1976 there were 30,000 oil fields, but half of the total production came from only 100 fields. Among these large fields, 76 were found before 1955. Only eight large fields came into production in the period 1966 to 1975 and they yielded only 3.9 percent of the total oil. Thus domestic production in 1976 was largely obtained from discoveries made decades ago. An example is the great East Texas field discovered in 1930. It still ranks high with respect to both reserves and production, but only 20 percent of its original reserves remain.

There is another reason for the view that large new reserves will not be found in the contiguous 48 states. Nearly 2.5 million holes have already been drilled, many of them spotted by a combination of expert judgment, experience, and geological, geophysical, and geochemical information.

By far the best prospects for major discoveries are in the frontier regions. In one frontier field alone at Prudhoe Bay, Alaska, reserves match the total found in 29,900 fields in the contiguous 48 states. But some 40,000 additional holes a year are being drilled in the unpromising territory. At the same time, vast areas of the outer continental shelves go untouched. The total area that has not been drilled is about equal to that of the well-explored sedimentary basins on shore. As Hollis Hedberg and others have pointed out, we will have no basis for an estimate of oil potential until we have drilled. With luck, an amount equal to five times our present reserves might be found. However, on a bitterly cold day in winter, one cannot heat a house by burning hopes. Prudence dictates that this country should have a better basis for estimating how much more U.S. oil.—PHILIP H. ABELSON

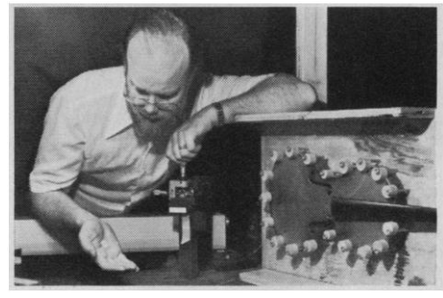
SO-115
a new universal b&w film for the sophisticated user





These are hologram reconstructions, photographs made with a camera receiving images originally recorded as time-average interference holograms. The dark fringes connect all points of common amplitude on the inside of the vibrating top of an experimental viola. It's part of an effort to improve the loudness, dynamic range, and playing ease of the viola.

Time-average interference holography is widely used by engineers to analyze vibration in lots of things besides violas. One of the two people who devised it is Karl A. Stetson (*J. Opt. Soc. Amer.* 55:1593 [1965]). These images are Dr. Stetson's work.



For both the holograms and the reconstructions he used He-Ne laser light, here seen impinging on his palm. He made the holograms on KODAK High Speed Holographic Film SO-253 and the reconstructions on KODAK Technical Pan Film (ESTAR-AH Base) SO-115.

Stetson gives two reasons for using SO-115 in this application: 1) high attainable contrast* to bring out the higher-order Bessel fringes for counting; 2) hardened emulsion permitting superproportional reduction of the negative with ammonium persulfate to accentuate the fringes by suppressing detail in the high-density areas that represent absence of vibration.

Other technical users may have quite different reasons for liking SO-115. With KODAK WRATTEN Filter No. 58 for photomicrographic contrast enhancement in phase contrast or Normarski illumination, as in chromosomal studies, it is about 2/3 stop faster than KODAK Photomicrography Monochrome Film SO-410 and KODAK Solar Flare Patrol Film SO-392, which are now discontinued. Addition of a dyed-gel backing against halation and curling has slightly reduced red sensitivity but not enough to bother those who need it to study the sun or the night skies. Red sensitivity still takes its plunge only around 690 nm. Extremely high resolving power. Extremely fine grain. Good latent-image stability. Stocked in 36-exposure magazines, 35 mm x 150 ft, 4 x 5 in. Ask Scientific and Technical Photography, Kodak, Rochester, N.Y. 14650 about other formats and about "POTA" developer for pictorial quality with this film rather than high contrast.

The standout characteristic of SO-115 is its extremely wide range of contrasts. Elaine Stetson, writer on early Americana and director/curator of the Noah Webster Foundation of West Hartford, Conn. likes the way the low-contrast end of its performance range and the extended red sensitivity bring out detail in antique furniture. The Stetsons are here shown photographing the traveling trunk used extensively by the young author of the famous American speller, who was also to become arbiter of the American language. Both pictures of the Stetsons on this page were taken for us by photographer Frances L. Funk at E. I. 25 on the very same SO-115 film. Karl processed them for 5 minutes in POTA developer, made up of 1.5 g of KODAK Balancing Developing Agent BD-84 and 30 g of sodium sulfite per liter of deionized water.

Kodak

*Like gamma 4 with 5 minutes in KODAK Developer D-19 at 20°C, for which exposure index is about 100.