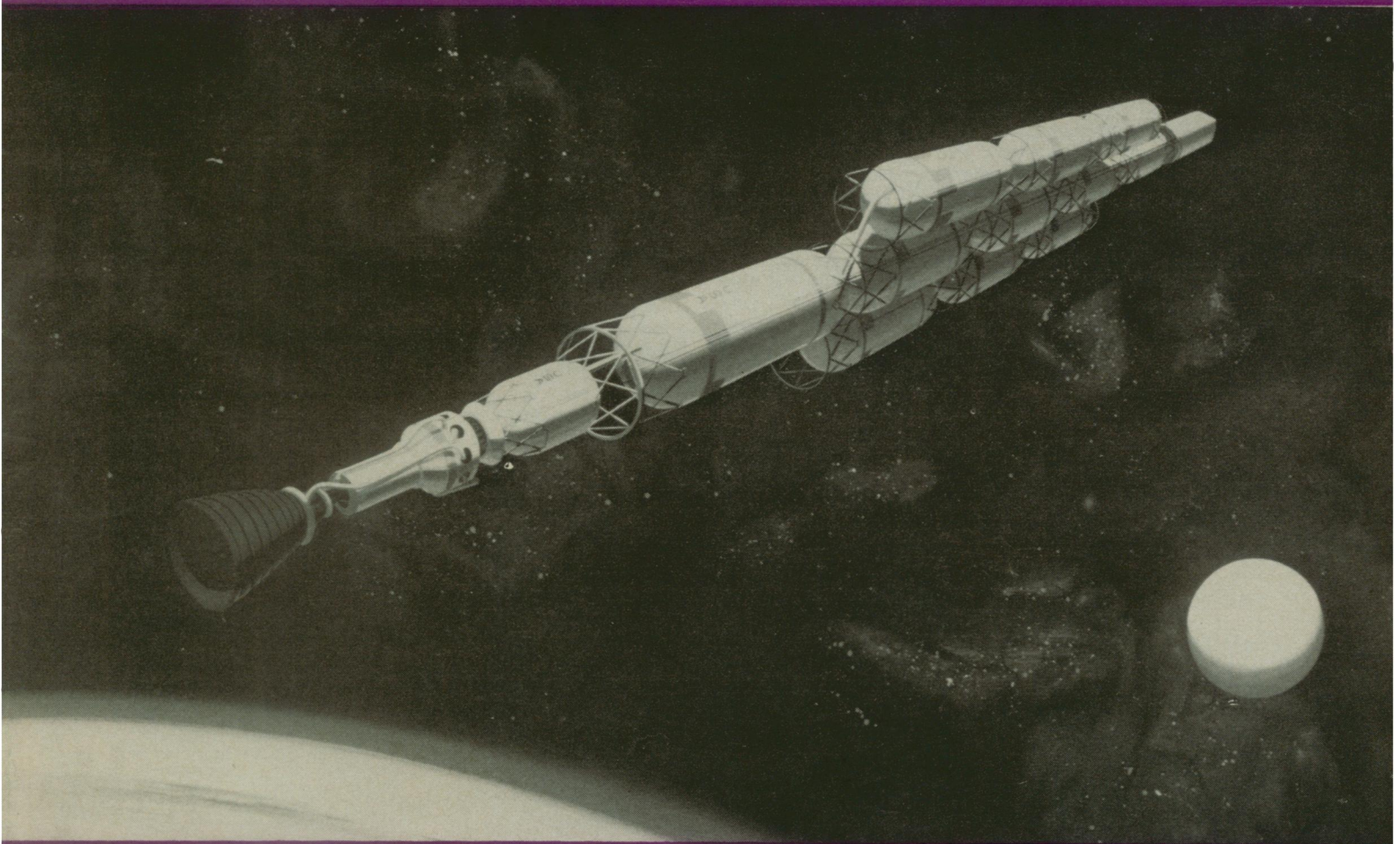


# science news

Jan. 9, 1971 **25c**  
vol. 99, no. 2, pp. 17-36

Ocean-floor granite



## What future for the nuclear rocket?

# What are the engineers doing?

**An uncomfortable number of them are doing nothing but look for work, of course:** "As I slipped on my coat on my last day at Boeing, I stood beside a conference room where a new leader was addressing the decimated remains of my old group. The survivors were being told that they were the nucleus on which the company would rebuild. What he didn't tell them was that a third of them would be out the door in three months."

**Some, undaunted, would still like to try their hand as bosses of strange new enterprises.** A veteran compiler of data on Route 128 thinks that, even in these troubled times, the best of today's new venturers have a better-than-80-per-cent chance of success. But who are the best? "... I know several very successful Ph.D. entrepreneurs. So we are not saying that if you have a Ph.D., give up. We are saying instead that if you have a Ph.D. you ought to think your motivations through more carefully, ask yourself if you are really going to be willing to sacrifice the time, energy and other commitments."

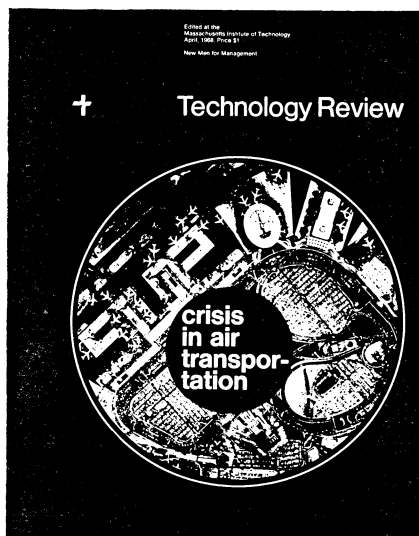
**More and more engineers are seriously considering careers in medicine.** For example, it is widely believed that the time-wasting chaos in our hospitals and clinics can be somewhat ameliorated by electronic data handling. A Boston clinic this year received \$480,000 from H.E.W. for work on reducing the wastage of patients' and physicians' time. The thinking behind that clinic's innovations is set forth, by a leading participant, in the form of an analogy between a clinic and a machine shop – the interest lying in the 17 respects in which the former fell short of the standards of the latter. "In the job-shop, routing is a well-defined process, with very high certainty that each 'appointment' is an appropriate one. This is not true of the clinical situation. . . . Some categories had error rates – that is, inappropriate appointments – as high as 33 per cent . . ." (The story has a happy end.)

**The past, too, has its problems.** In York, England, the great cathedral is cracking up in a fashion so complicated that the Surveyor of the Fabric required 2,000 man-hours just for visual inspection and record. The Minster is one of the largest Gothic buildings in Europe, and parts of it were built as early as 1225 A.D. The basic trouble is subsidence – about a foot in places, but generally only some four inches, which explains the cracks. The engineers for the \$5 million restoration are modest about it: "Our work at York Minster is not an intellectual tour de force, nor will it be spectacular when it is finished; but it is nevertheless engineering. What makes it particularly interesting is that the problems are four-dimensional. Time enters into the technical arguments very much, and we cannot understand what has happened to the structure without studying its history."

# And what difference will it make?

"We have had a process of abstract analysis as the basis of highway planning. But this has resulted in significant bias in the decisions made, because this analysis has been isolated from social and political life. How do you put a market price on displacement of families, or jobs?" The highway engineer, because he has been a client and user of such analyses, is now "not a respected professional but the personification of the evils of technology."

In Washington, an automated plan has been designed to give the prosecutors in high-volume misdemeanor courts a clearer picture on which to base their choice of cases to be heard. (Because the case load is heavy, only about half the cases scheduled for a given day can be heard.) The program gives the prosecutor information on the status and history of each case and each defendant, and on the probability of conviction. When this scheme was described to the Association for Computing



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Machinery, it was reviled as reinforcing a system that should instead be overhauled – a judiciary in which the question of whether or not an individual is given a trial rests in part on the opinions of prosecuting attorneys.

... The state of the art is entirely adequate. The buyer wants to have his automobile quiet – and it turns out that he is willing to pay the cost (including the cost of new-car tires especially designed and made to be quieter than the tires which will replace them after 25,000 miles). . . . But nobody is willing to pay for silencing trucks or subway trains, and some motorists (and perhaps even truck drivers?) don't want to be quiet anyway.

... If you choose to locate such a generating plant at sea, so as to remove its environmental effects from man's immediate vicinity, the geophysical effects will remain, increased costs will add 0.2 to 0.4 mills per kilowatt-hour to the price of power, and transmission costs will add another 0.2 mills to the price of energy delivered to its consumers. "You can keep fixing up the environmental problems one by one where they arise, but finally you come to the conclusion that growth must stop."

# These are two of our favorite questions

And these are fragments of some answers which appeared in a single issue of M.I.T.'s national magazine

(nine times yearly) called *Technology Review*. (Not *Technical*

– a review of technology, as it

were.) The December issue of *Technology Review* also contained much that we have not mentioned. For example, we have a couple of pages of advice and explanation for any scientist who has ever complained of the sensationalism of the press. And this year we covered Pugwash. Join us for 1971. Use the coupon.

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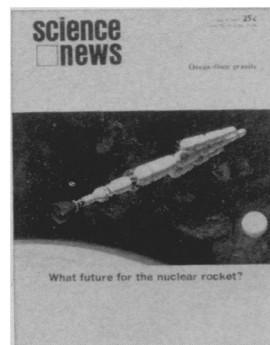
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The nuclear reactor rocket engine, NERVA, could be used to power space stations in the next decade, among other missions. Its propulsion efficiency is twice that of the best chemical rocket developed so far. But the project, which needs about \$750 million more before completion, faces competing projects and a budget squeeze. See page 32. (Drawing: NASA)

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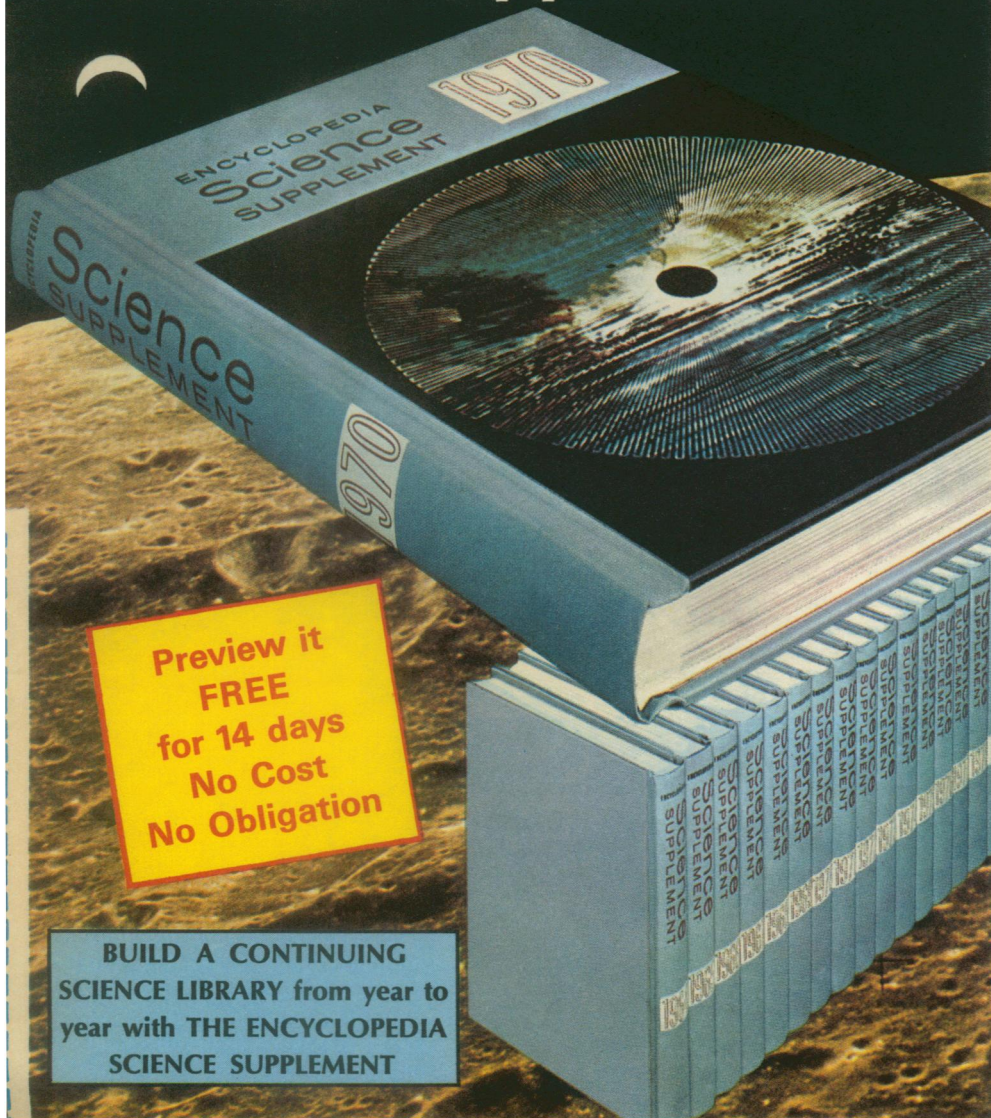
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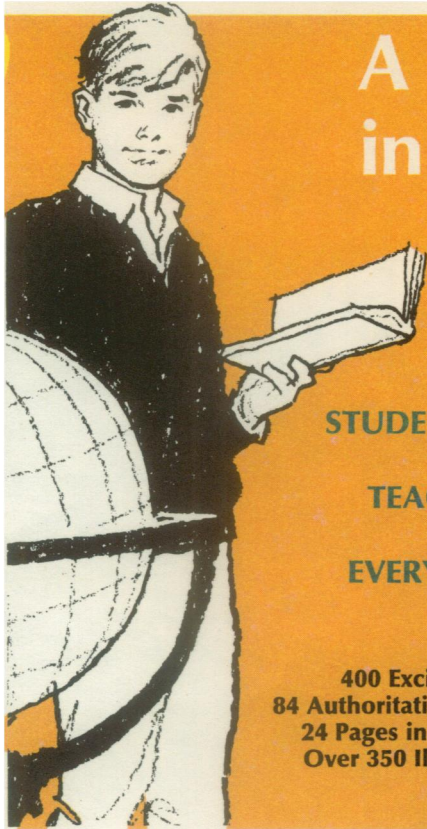
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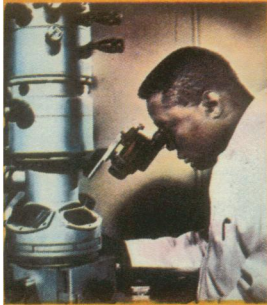
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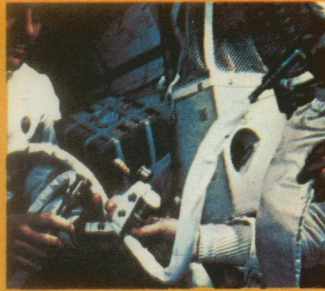
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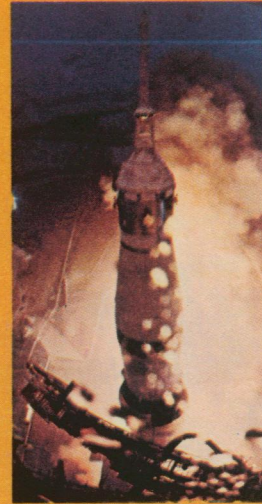


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