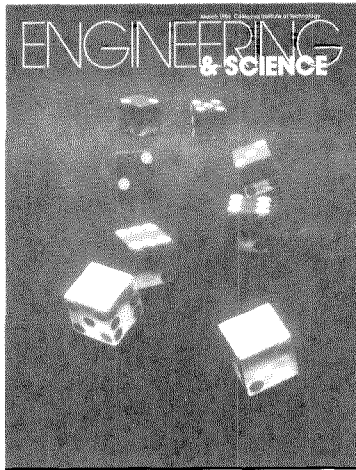


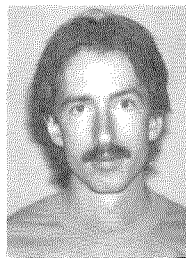
In This Issue



The Die Is Cast

On the cover — a couple of three-dimensional particles interacting with a flat plane in the presence of a gravitational field. Understanding how such particles behave is a fundamental problem in the dynamics of granular materials.

Grad student Brad Werner is interested in the physics of such systems and fortunately is fond of exploring and hiking in deserts where many granular systems reside. But rolling boulders (large particles) into canyons turned out to be harder work than rolling cubes on an office floor, so Werner turned his attention to dice. His article, "Particles in Motion: The Case of the Loaded Die," begins on page 20. Although Werner used dice from a worn-out Monopoly game for his study, the ones on our cover are "perfect dice" such as gambling establishments use — square to a tolerance of about 1/5000 of an inch (and they are not loaded). The dice were lent by Big Al's Game Rentals.



Werner received his BS from Caltech in 1981 and his MS in 1982. He works with Tom Tombrillo, professor of physics,

and Peter Haff, senior research associate.

Caltech Communicates

At the IEEE International Symposium on Information Theory held in Brighton, England last June, Caltech was a dominating

presence — Robert McEliece was co-general chairman, Rod Goodman was chairman of the host committee, and Ed Posner, the program chairman. The three are members of the communications research group in Electrical Engineering, which is making significant contributions in both traditional and new areas of a field that has impact on just about everyone's day-to-day activities — from telephones to computers.

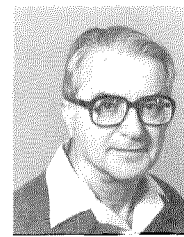
Posner, a visiting professor at Caltech from JPL's Telecommunications and Data Acquisition Office, earned his degrees at the University of Chicago (BA '52, MS '53, PhD '57) and has been at JPL or on campus (or both) since 1973. Goodman came to Caltech as associate professor last year with a B.Sc from Leeds University (1968), a PhD from the University of Kent (1975), and a background in British revue theater. McEliece, professor of electrical engineering, graduated from Caltech in 1964, earned his PhD in 1967, and returned to his alma mater in 1982 from the University of Illinois. Their article, "Speaking of Communication," starting on page 25, gives an overview of some of the group's varied research projects.

Martian Chronicle

Norman Horowitz, professor of biology, emeritus, has long been interested in the biochemical aspects of the origin of life and the possibility of its existence on other planets, Mars in particular.

His evolving views have been chronicled in *E&S* over the years [March 1961, "Is There Life on Other Planets?" (maybe microbial life on Mars); April 1971, "Life on Mars? Possible, but Still Improbable"]. In a soon-to-be-published book, *To Utopia and Back: The Search for Life in the Solar System*, Horowitz recounts the history of that search and submits his latest conclusions. "Mars: Myth and Reality," a chapter from the book, is published here with permission of the publisher, W. H. Freeman and Company. It begins on page 4.

Horowitz himself has not been merely a bystander in the search for life on Mars. As chief of the Bioscience Section at JPL from 1965 to 1970, he was deeply involved with the scientific aspects of all the Mars missions and had biological experiments on *Mariners 6* and *7* and the *Viking* landers. (The "Utopia" in his title was the site of the *Viking 2* landing on Mars.)



Horowitz earned his BS from the University of Pittsburgh in 1936 and his PhD from Caltech in 1939. He returned to

Caltech from Stanford with George Beadle in 1946 as associate professor of biology. He was named full professor in 1953, was division chairman from 1977 to 1980, and became professor, emeritus, in 1982.

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