spect to each other. An interface between the plates acts as a seal for separating fluids. A lower cuvette can be aligned with as many as 15 upper cuvette stations for fraction collection during processing.

A two-phase stepping motor drives the rotation system, causing the upper plate to rotate for the collection of each fraction of the sample material. The electromagnet generates a magnetic field across the lower cuvette, while the translation system translates the electromagnet upward along the lower cuvette. The current supplied to the electromagnet, and thus the magnetic flux density at the pole face of the electromagnet, can be set at a programmed value between 0 and 1,400 gauss (0.14 T). The rate of translation can be programmed between 5 and 2,000 μm/s so as to align all sample particles in the same position in the cuvette.

The capture magnet can be a permanent magnet. It is mounted on an arm connected to a stepping motor. The stepping motor rotates the arm to position the capture magnet above the upper cuvette into which a fraction of the sample is collected.

The electronic unit includes a power switch, power-supply circuitry that accepts 110-Vac input power, an RS-232 interface, and status lights. The personal computer runs the MAGSEP software and controls the operation of the MAGSEP through the RS-232 interface. The status of the power, the translating electromagnet, the capture magnet, and the rotation of the upper plate are indicated in a graphical user interface on the computer screen.

This work was done by Ken Barton, Mark Ainsworth, Bruce Daily, Scott Dunn, Bill Metz, John Vellinger, Brock Taylor, and Bruce Meador of Space Hardware Optimization Technology, Inc., for **Johnson Space Center**.

In accordance with Public Law 96-517, the contractor has elected to retain title to this invention. Inquiries concerning rights for its commercial use should be addressed to:

Space Hardware Optimization Technology, Inc.,
5605 Featherengill Road
Floyd Knobs, IN 47119
Phone: (812) 923-9591

Refer to MSC-23124, volume and number of this NASA Tech Briefs *issue, and the page number.*

Elastic-Tether Suits for Artificial Gravity and Exercise

Lyndon B. Johnson Space Center, Houston, Texas

Body suits harnessed to systems of elastic tethers have been proposed as means of approximating the effects of normal Earth gravitation on crewmembers of spacecraft in flight to help preserve the crewmembers' physical fitness. The suits could also be used on Earth to increase effective gravitational loads for purposes of athletic training. The suit according to the proposal would include numerous small tether-attachment fixtures distributed over its outer surface so as to distribute the artificial gravitational force as nearly evenly as possible over the wearer's body. Elastic tethers would be connected between these fixtures and a single attachment fixture on a main elastic tether that would be anchored to a fixture on or under a floor. This fixture might include multiple pulleys to make the effective length of the main tether great enough that normal motions of the wearer cause no more than acceptably small variations in the total artificial gravitational force. Among the problems in designing the suit would be equalizing the load in the shoulder area and keeping tethers out of the way below the knees to prevent tripping. The solution would likely include running tethers through rings on the sides. Body suits with a weight or water ballast system are also proposed for very slight spinning space-station scenarios, in which cases the proposed body suits will easily be able to provide the equivalency of a 1-G or even greater load.

This work was done by Paul Torrance of **Johnson Space Center**, *Paul Biesinger of Science Applications International Corp., and Daniel D. Rybicki of Lockheed Martin Corp. For further information, contact the Johnson Technology Transfer Office at (281) 483-3809.*
MSC-23145

Multichannel Brain-Signal-Amplifying and Digitizing System

Lyndon B. Johnson Space Center, Houston, Texas

An apparatus has been developed for use in acquiring multichannel electroencephalographic (EEG) data from a human subject. EEG apparatuses with many channels in use heretofore have been too heavy and bulky to be worn, and have been limited in dynamic range to no more than 18 bits. The present apparatus is small and light enough to be worn by the subject. It is capable of amplifying EEG signals and digitizing them to 22 bits in as many as 150 channels. The apparatus is controlled by software and is plugged into the USB port of a personal computer. This apparatus makes it possible, for the first time, to obtain high-resolution functional EEG images of a thinking brain in a real-life, ambulatory setting outside a research laboratory or hospital.

This work was done by Alan Gevins of SAM Technology, Inc., for **Johnson Space Center**. *For further information, contact the Johnson Technology Transfer Office at (281) 483-3809.*
MSC-23084