

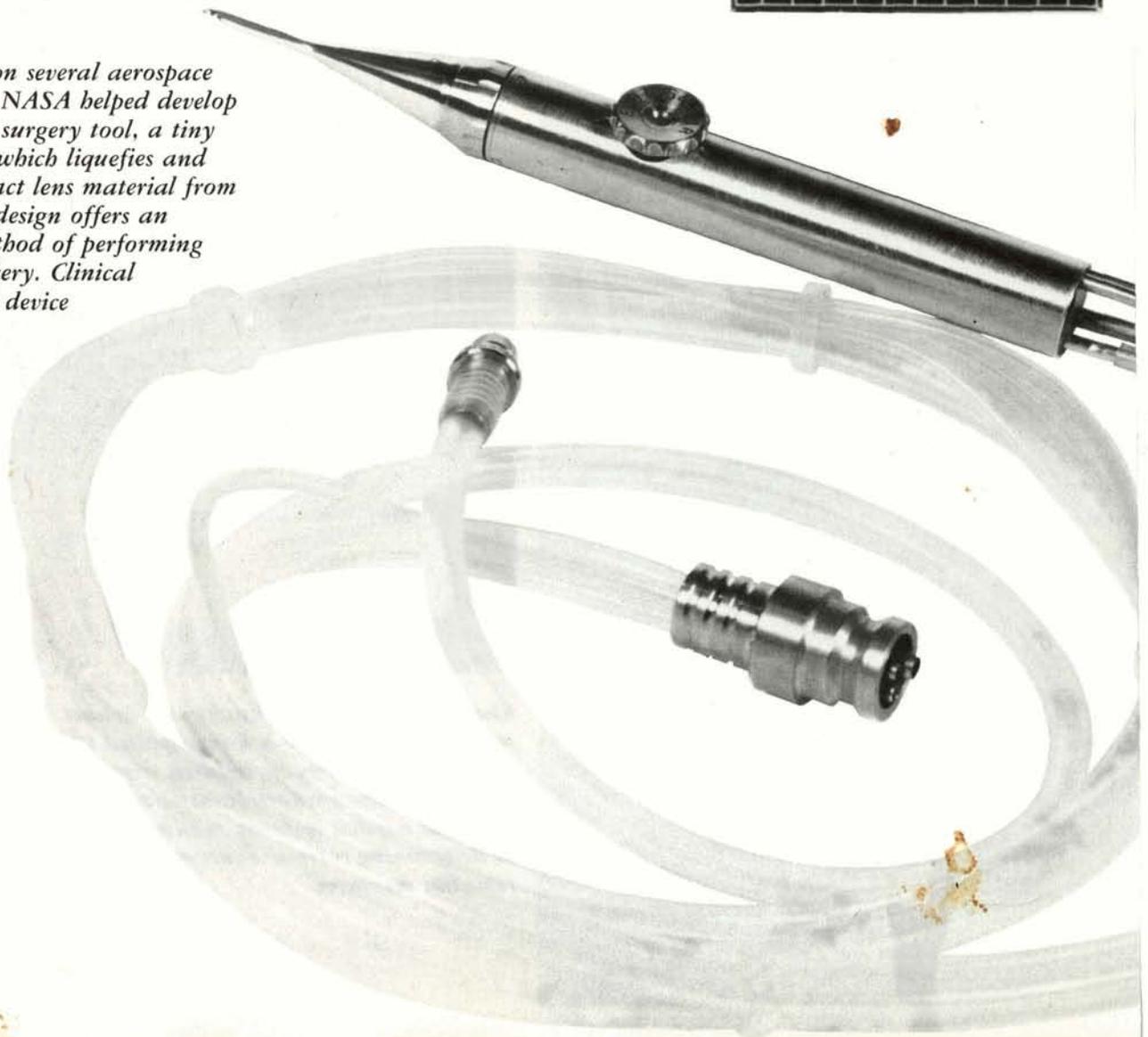
Used extensively throughout the space program to observe astronaut vital functions from the ground, biotelemetry is the monitoring of physiological signals sent by radio wave. In the cerebral palsy application, the signal is the "EMG"—for electromyogram—which indicates the activity of the leg muscles. Biotelemetry's advantage is that it needs no wires; other methods of monitoring EMG involve wires connecting a sensor on the patient to a recorder, thus interfering with the subject's normal walking pattern.

Freedom of movement is very important to the child with cerebral palsy, who frequently has an impaired sense of balance and lacks the muscle control necessary to protect himself when he falls. Telemetry offers a means for unencumbered recording of the child's true gait pattern, information extremely helpful to the physical therapist and the orthopedic surgeon in determining the need for corrective surgery, evaluating various types of braces, and deciding whether certain muscle-relaxing drugs might prove effective.

With the help of L&M Electronics Co., Daly City, Cal., NASA and Children's Hospital at Stanford introduced an improvement which eliminates the waist pack and the connecting cables previously used. Miniature transmitters, about the diameter of a half dollar, are affixed directly over the muscle group being studied. Each transmitter has its own battery and a pair of sensing electrodes. Because they are small and lightweight, several transmitters can be used to broadcast EMG signals from both legs simultaneously.

This important advance is now in active use by the Children's Hospital at Stanford for the cerebral palsy application. It appears to have broader potential, because it could be used for monitoring other types of physiological signals where biotelemetry offers clinical advantage.

*Drawing upon several aerospace technologies, NASA helped develop this cataract surgery tool, a tiny cutter-pump which liquefies and pumps cataract lens material from the eye. The design offers an improved method of performing cataract surgery. Clinical testing of the device is underway.*



## Cataract Surgery Tool

A cataract is a condition in which the lens of the eye becomes opaque, restricting vision and leading to potential blindness. Surgery to remove the cloudy material is necessary to restore vision. More than 400,000 people a year need such surgery in the United States alone. Traditional surgical technique requires a 180 degree incision, and then numerous stitches to close it. Since the possibility of infection is high, patients are kept in the hospital 10 days after surgery.

Seeking to improve this technique, Cleveland eye surgeon Dr. William J. McGannon, the Retina Foundation of Boston, and NASA-Lewis joined to apply advanced technology in the fields of fluid mechanics, high-speed rotating machinery, miniature mechanisms, pumps, seals, and bearings.

The resulting NASA-McGannon cataract surgery tool is a tiny cutter-pump which liquefies and pumps the cataract lens material from the eye. Inserted through a small incision in the cornea, the tool can be used on the hardest cataract lens. The cutter is driven by a turbine which operates at about 200,000 revolutions per minute.

*Duke Lumsden, blind concession operator in Tacoma, Washington, can identify denominations of American bills with the help of his Paper Money Identifier. The device is a spinoff from space-developed optical-electronic scanning technology.*

Incorporated in the mechanism are two passages for saline solutions, one to maintain constant pressure within the eye, the other for removal of the fragmented lens material and fluids. Three years of effort have produced a design, now being clinically evaluated, with excellent potential for improved cataract surgery. The use of this tool is expected to reduce the patient's hospital stay and recovery period significantly.

## New Help for the Sightless

Duke Lumsden operates a candy shop in Tacoma, Wash. Duke is blind, yet he has no trouble differentiating between the values of currency he handles in the course of business. He is aided by a spinoff from space-developed optical-electronic scanning technology known as the Paper Money Identifier. The PMI is manufactured by EMR Ltd., Los Angeles.

