A line of biomedical devices based on aerospace expertise leads a sampling of spinoffs in the field of medicine

Space Technology for Medical Aids

Among the earliest contracts awarded in the Apollo lunar landing program was one to Parker Hannifin Corporation, Cleveland, Ohio, the world's primary supplier of fluid system components. Parker's assignment was to develop and produce equipment for controlling the flow of propellants into the mammoth engines of the Saturn moonbooster. That marked the beginning of the company's long association with NASA and the U.S. space program; today, Parker is supplying the huge valves that control propellant flow from the Space Shuttle's external fuel tank to the engines of the Shuttle Orbiter.

During the intervening two decades, Parker worked on many other space projects, often producing equipment at the opposite end of the size spectrum—for example, subminiaturized pressurization systems and small attitude control valves for satellites. A development of particular note was the "peanut valve," named for its small size. These miniature controls were part of the experiment packages in two NASA Viking spacecraft that landed on Mars in 1976. In a search for life experiment, automated equipment on the Viking Landers scooped up Martian soil samples and introduced nutrients to see if the nutrients were absorbed by some form of organism in the soil. The peanut valves, which Parker officials call the company's "crowning achievement" in miniaturizing fluid controls, metered the nutrients into the soil samples in precisely controlled amounts.

The broad expertise the company acquired in its aerospace developments is now being put to work in an entirely different field. Recently, Parker's Aerospace Group formed a Biomedical Products Division, located in Irvine, California, to apply aerospace technology, particularly miniaturized fluid control technology, to devices for medical treatment.

Parker's biomedical effort began in 1977. Recognizing the company's special expertise in miniature systems, NASA asked Parker to participate—with Marshall Space Flight Center and Rochester (New York) General Hospital—in the development of an implantable artificial sphincter for control of urinary incontinence. The Parker-developed pressure control valve and the artificial organ have been successfully tested in animals and human tests are planned for this

year. Parker has joined with Medical Engineering Corporation, Racine, Wisconsin, to commercialize the development. Additionally, the system is being further developed for control of fecal matter in persons who have undergone certain kinds of surgery.

The company's peanut valve experience provided an ideal technology base for another biomedical project. In 1979, Parker was invited by NASA to join a team—composed of Johns Hopkins University's Applied Physics Laboratory, Goddard Space Flight Center and several commercial firms—which was developing a Programmable Implantable Medication System (PIMS) for continuous, computer-directed delivery of medication—insulin, for example—within a patient's body. Parker's key contribution was a tiny pump capable of metering medication to target organs in precise doses—about a millionth of a liter at a time. Animal tests of the PIMS system have been conducted and clinical testing should begin late this year.

The company's work on PIMS inspired development of a related programmable medication device for external, rather than implantable, use. Called Micromed™, it is smaller than one previously available device; it is in initial use by diabetics who are dependent on insulin.

The Biomedical Products Division has also applied its fluid handling expertise to a drugless therapy system called Cryomax™ for treatment of such disorders as rheumatoid arthritis and lupus. Developed in cooperation with the Cleveland (Ohio) Clinic, Cryomax is a plasma filtration system which removes from the blood certain substances believed to contribute to progression of these diseases.

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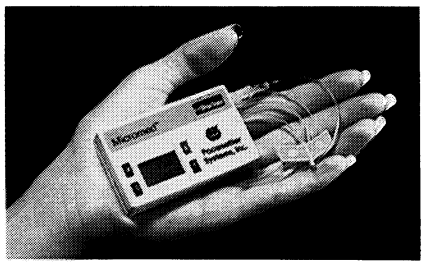
In addition to its space work, Parker Hannifin Corporation has long been a leading supplier of actuators which position the flight control surfaces of commercial transport aircraft. This technology, in miniature form, is being applied to new devices designed to aid surgeons in arthroscopic procedures, which allow knee and other surgery without protracted recuperative time.

Some of Parker Hannifin's new biomedical devices trace their genesis directly to technology developed for NASA; others do not. But, says the company, it was NASA's encouragement and guidance that provided the impetus for its entry into a new field where its technology and expertise can be applied for human benefit.



Parker Hannifin Corporation, a large industrial firm long identified with the U.S. space program, has created a Biomedical Products Division (opposite page) to apply its aerospace-acquired expertise to development of medical devices. Among the company's products, being developed in cooperation with other organizations, are an artificial sphincter for control of urinary incontinence (top); an implantable device about the size of a woman's compact for continuous delivery of medication (above); an external medication delivery system now in use by insulin-dependent diabetics (left); and a blood filtering system for treatment of such disorders as rheumatoid arthritis and lupus (below).