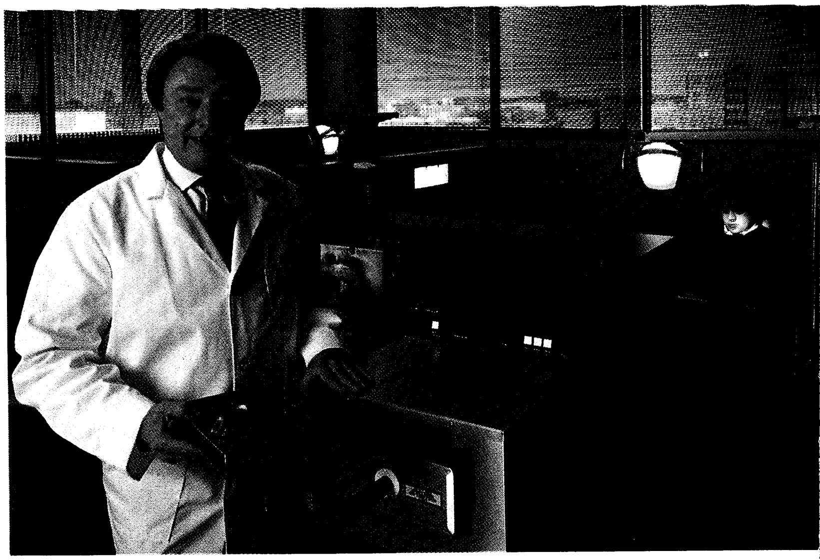
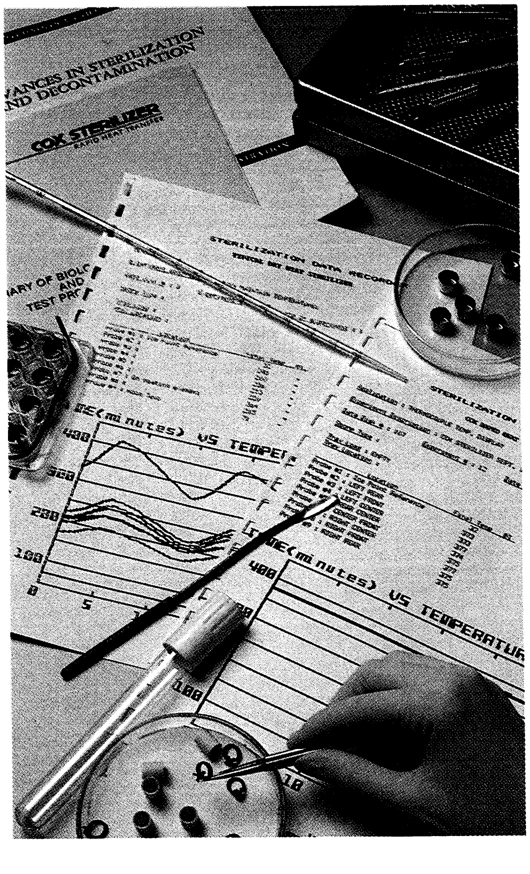
Sterilization System





At right, dentist Dr. M. Keith Cox, president of Cox Sterile Products, Inc., Dallas, Texas, displays the Cox Rapid Heat Transfer Sterilizer™ he developed with the help of NASA technology. Intended for fast, effective, economical sterilization of dental and medical instruments, the system employs dry heat technology that NASA used to sterilize and decontaminate two Viking Lander spacecraft that sought evidence of living organisms on Mars in the 1970s.

The sterilizer's big advantage, according to Dr. Cox, is reduced sterilization time—as little as six minutes, far less time than steam autoclave and chemical vapor sterilizers need and about one-tenth the time required by a conventional dry heat oven. Rapid sterilization eliminates excessive heating, the prime cause of instrument damage, and allows sterilization between patients. That makes possible a reduction of more than 80 percent in instrument inventory, says Dr. Cox, which can mean savings of thousands of dollars.

Dr. Cox became interested in sterilization when he worked his way through dental college as a scrub nurse in a hospital operating room. That experience, coupled with the dentistry profession's emphasis on infection control, prompted him to consider development of an improved instrument sterilization system for the dental office.

Much of the information he needed was available in a NASA publication. In planning the Viking Mars missions, NASA had gone to extraordinary lengths in studying ways to sterilize the Viking Landers and thus protect the Mars environment from contamination by Earth organisms or particulate matter that might erroneously influence the Lander's analytical instruments. NASA explored and evaluated every form of thermal and chemical sterilization before settling on the dry heat approach, which offered minimal corrosion and obviated the use of toxic chemicals.

This exhaustive research was summarized in a 1978 survey entitled *Advances in Sterilization and Decontamination*, prepared for Langley Research Center by The Bionetics Corporation,

Hampton, Virginia. Dr. Cox used the survey as the primary information source for his sterilizer development. He credits as particularly useful a chapter on heat sterilization, which aided development of his own technique; a chapter on sterilization materials and compounds, which identified manufacturers of compatible products; and a chapter on analytical models, which helped him develop computer programs for efficacy testing in conjunction with the Food and Drug Administration (FDA). The lower photo, opposite page, illustrates the varied tests involved in certification by the FDA and the American Dental Association, principally tests of microbe survivability after a sterilization run.

The Cox Rapid Heat Transfer Sterilizer that emerged from the R&D program and went into production in 1988 employs a heat exchange process that induces rapid air movement—to 3,000 feet per minute—and the air becomes the heat transfer medium, maintaining a uniform temperature of 375 degrees Fahrenheit. It features pushbutton controls for three timing cycles for different instrument loads as pictured at left above: a six-minute cycle for standard unpackaged instruments (low corner of the photo), eight minutes for certain specialized dental/medical instruments (top corner) and 12 minutes for packaged instruments (right center), which can then be stored in a drawer in sterile condition.

The system will stay at 375 degrees all day, so there is no need to wait for temperature buildup on each cycle. An insulated jacket keeps heat within the unit and prevents its radiation into the room. Continuous operation is not expensive, says the company, because of the sterilizer's very low power requirements, which provide a bonus advantage: the system can operate for long periods off a generator such as the one contained in the disaster relief vehicle shown at left. This allows use of sterile techniques in disaster areas where they are not otherwise possible, because electric power service is usually disrupted in major emergencies such as floods or earthquakes.

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