

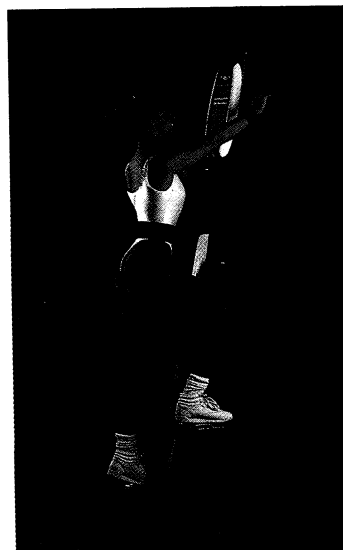
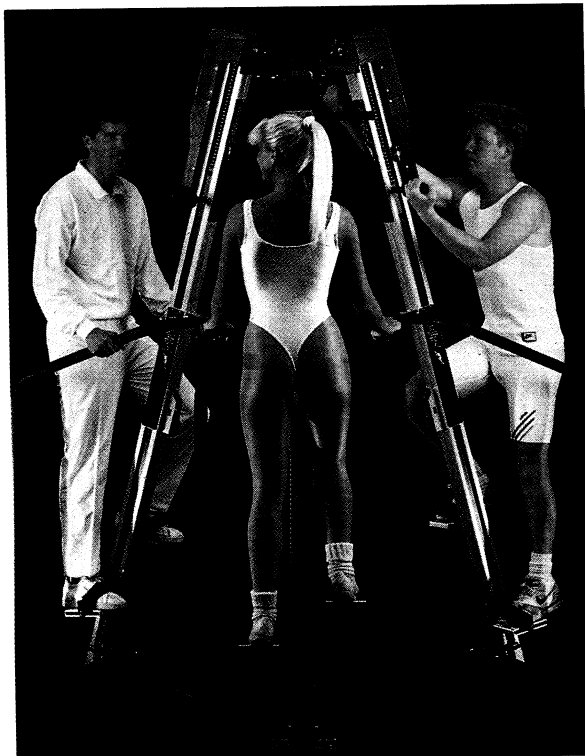
Heart Rate Monitors

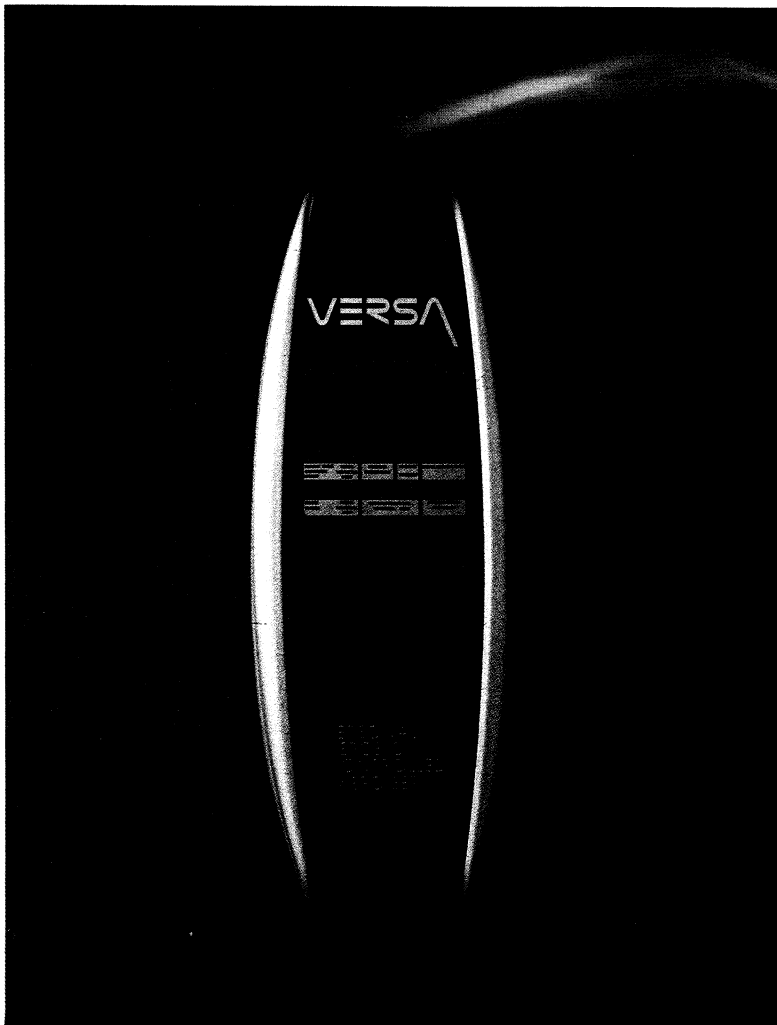
In the mid-1970s, looking ahead to the era of very long duration space flight, NASA saw a need for a new type of electrode for astronaut monitoring. The conventional conducting electrode, which made contact with the skin through a paste electrolyte, had disadvantages for long term use. For example, the paste can irritate skin and it eventually dries, causing unacceptable distortion of the data sensed. Other types of electrodes, which directly contact the skin without paste, posed different problems for longtime use in space, principally the "motion artifact," wherein movement of the subject causes electrode movement and signal-distorting noise of the conductively acquired signal.

Under a NASA grant, Dr. Robert M. Davis and Dr. William M. Portnoy of Texas Technical University came up with a new type of electrocardiographic electrode that would enable long term use on astronauts. Their invention was an insulated capacitive electrode constructed of a thin dielectric film. The dry reusable electrode functions immediately on contact with the skin and is not affected by ambient conditions of heat, cold or light, nor by perspiration, rough or oily skin conditions; the insulative film prevents motion artifact during exercise.

NASA subsequently licensed the electrode technology to Richard Charnitski, inventor of the VersaClimber, who founded Heart Rate, Inc., Costa Mesa, CA, to further develop and manufacture personal heart monitors and to produce exercise machines using the technology for the physical fitness, medical and home markets.

At right above is a Hi-Tri Health Club Model VersaClimber, one of eight models of a stepping/full body climbing exercise machine designed to make use of all the major skeletal muscle groups during aerobic and strength conditioning. Therapy models, with a built-in seat for pedaling, are used for cardiac rehabilitation and orthopedically impaired patients. These machines, along with models for professional sports, schools, hotels, firemen, and the military services, incorporate the heart rate monitoring system based





on NASA electrode technology. At lower left, opposite page, is the Home Model VersaClimber 108H; the display module, which shows such information as calorie burn rate, exercise time, climbing speed and distance climbed, is shown in closeup at left.

The same technology is on both the Home and Institutional Model VersaClimbers. On the Home Model an infrared heart beat transmitter is worn under exercise clothing. The transmitted heart rate is used to control the work intensity on the VersaClimber... using the heart rate as the speedometer of the exercise. The ability to accurately read heart rate and set work intensity levels offers advantages to a full range of users from the cardiac rehab patient to the high level physical conditioning requirements of elite athletes.

The company manufactures and markets five models of the 1*2*3 HEART RATE™ monitors that are used wherever people exercise to accurately monitor their heart rate (bottom). They permit periodic or constant readings of heart rate to assure that the person exercising is within his proper heart rate training zone.

The company is developing a talking heart rate monitor that works with portable headset radios. The person exercising will be able to hear his heart rate announced in the headset without interrupting his exercise activity. A version of the heart beat transmitter will be available to the manufacturers of other aerobic exercise machines.

™ 1*2*3* Heart Rate is a trademark of Heart Rate, Inc.

