

Physical Therapy Machine

At right are the LIDO® Active (left unit) and the LIDO Digital computerized physical therapy machines, used by clinics, medical research centers, sports medicine facilities and sports teams for evaluation and rehabilitation of wrist, elbow, shoulder, hip, knee and ankle musculature.

The machines are produced by Loredan Biomedical, Inc., Davis, California. The LIDO Digital system is employed in isokinetic concentric exercise programs. The LIDO Active builds on the capabilities of the LIDO Digital and offers four additional exercise modes. Both Loredan's systems use LIDOSOFT highly interactive software package, the spinoff element of the LIDO systems.

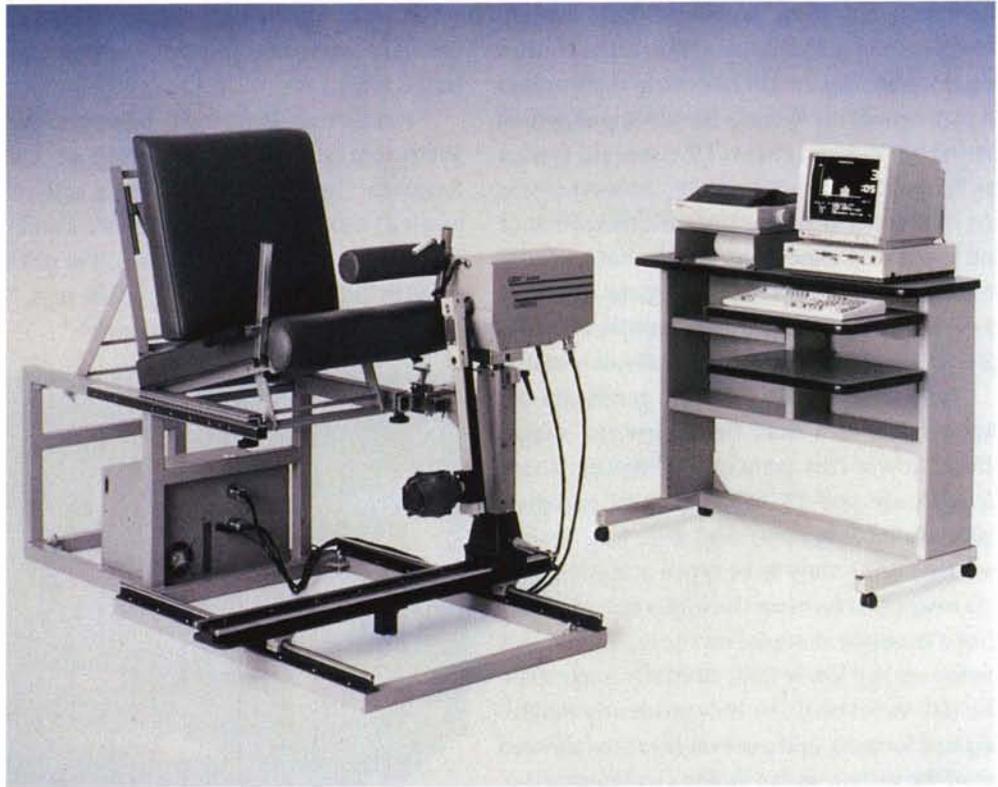
The systems were developed by Malcolm L. Bond, Loredan chairman and chief executive officer, who holds a doctorate in physiology from the University of California-Davis and who conducted post-doctorate research at the University of Padua (Italy) Center of Muscle Pathology. Bond spent a decade studying muscle and tissue diseases before he developed the technology for his LIDO systems. Loredan designs the systems, farms out the manufacturing work on components, and assembles the systems at the Davis facility.

In 1985, as part of its preliminary planning for the Space Station *Freedom*, NASA bought a LIDO system, along with a number of muscle therapy devices designed by other manufacturers, for evaluation as a Space Station aid. Living extended periods under the weightless

conditions of orbit, astronauts could suffer muscle and tissue deterioration unless they conduct regular exercise programs with the help of specially designed physical therapy equipment.

In 1986, Ames Research Center conducted a muscle conditioning project in which a large number of volunteers, bedridden 24 hours a day for 30 days to simulate the effects of weightlessness, were rehabilitated by various exercise programs and physical therapy devices. This project provided an informational base for selection of the exercise programs and equipment to be used aboard the Space Station.

Malcolm Bond's LIDO and Bond himself participated in the program. To meet NASA requirements, Bond designed an advanced software package that became the basis for the



LIDOSOFT software used in the commercially available Loredan systems.

The LIDO systems employ a “proprioceptive” software program, meaning one capable of perceiving internal body conditions, such as the angle and rate of speed at which a patient uses his muscles. The computer program can also induce perturbations to human muscular effort — changes in force, joint angular velocity, joint position — and it can measure and evaluate the response. Real time biofeedback, presented on a screen in easily understood graphics, allows a patient to observe his own performance.

At far right, a patient is using a LIDO Active, which is changing the exercise load, tailoring it to the patient's changing capabilities and fatigue level during an extended exercise “bout.” The upper right photo shows Loredan's patented sliding cuff, which helps decrease the compressive forces on the joints and thereby significantly improves patient comfort during an exercise program. At right center, a patient is using a Loredan WorkSET, employed for simulation, evaluation and training/rehabilitation of work-related injuries.

