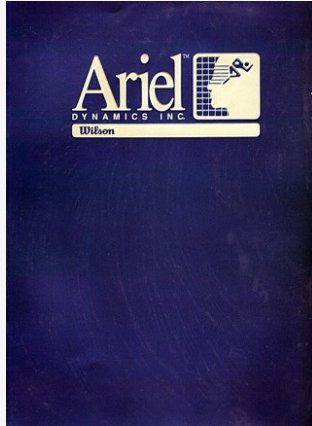




Wilson-Ariel Products

Brochure from 1986



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The Ariel Computerized Exercise System (CES) is a revolutionary tool in the fields of rehabilitation and fitness. Developed by Ariel Dynamics, Inc. and Wilson Sporting Goods Co., the system uses a state-of-the-art microcomputer to monitor, control, and modify resistance and velocity during exercise. The system is designed to accommodate each individual's unique capabilities or limitations, providing accurate measurements of movement and strength. The Ariel CES also offers extensive programming capabilities, allowing therapists and trainers to design customized exercise routines. The system is user-friendly and can boost productivity in a facility, as it allows patients to follow prescribed programs without constant supervision. The Ariel CES is comprised of exercise stations, a computer console, a monitor, and optional printer. The system software includes four different programs, each offering different features and capabilities. The Ariel CES is a significant advancement in the practice of resistive exercise, offering a broad range of possibilities for applications in health care, athletics, fitness, training, and education.

Ariel Dynamics: Revolutionizing Fitness and Exercise with Technology

This article discusses the significant contributions of Ariel Dynamics, Inc., a company founded by Dr. Gideon Ariel, a former Israeli Olympic discus thrower and a Ph.D. holder in Exercises and Computer Science. Ariel Dynamics specializes in the integration of fitness, exercise, and computer science, offering innovative solutions in these fields with a team of expert analysts, mechanical designers, and software engineers.

The company's flagship product, the Ariel Computerized Exercise System (CES), has been recognized and utilized by prestigious organizations worldwide, including NASA, the U.S. Olympic Committee, and various hospitals and fitness clubs. The Ariel CES is a programmable modality that provides necessary exercise to counteract the effects of zero gravity, making it an essential tool for NASA's research in space. It is also used in studies at Harvard Medical School to understand human adaptation to physical stress and lack of sleep.

In 1985, Ariel Dynamics entered into a licensing agreement with Wilson Sporting Goods Co., a global leader in sports equipment. This partnership has allowed Ariel Dynamics to manufacture, sell, and service the Ariel CES worldwide while continuing to develop new features and models. Wilson provides marketing, financial, manufacturing/quality assurance, and consulting support to Ariel Dynamics.

The article concludes by highlighting the innovative and safe sports equipment developed by Wilson's research and development laboratories, which have been the choice of professional athletes and consumers for over 70 years.

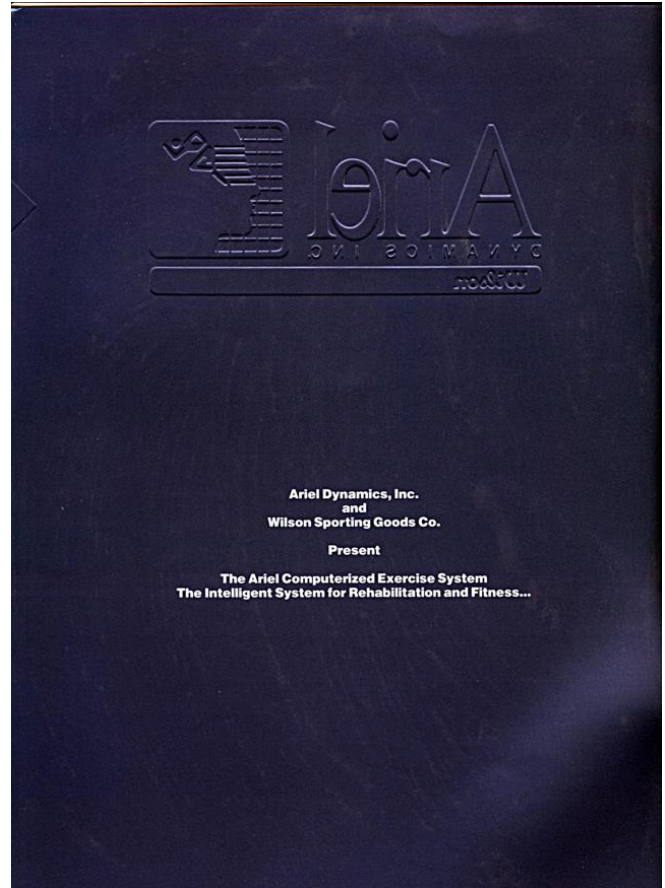
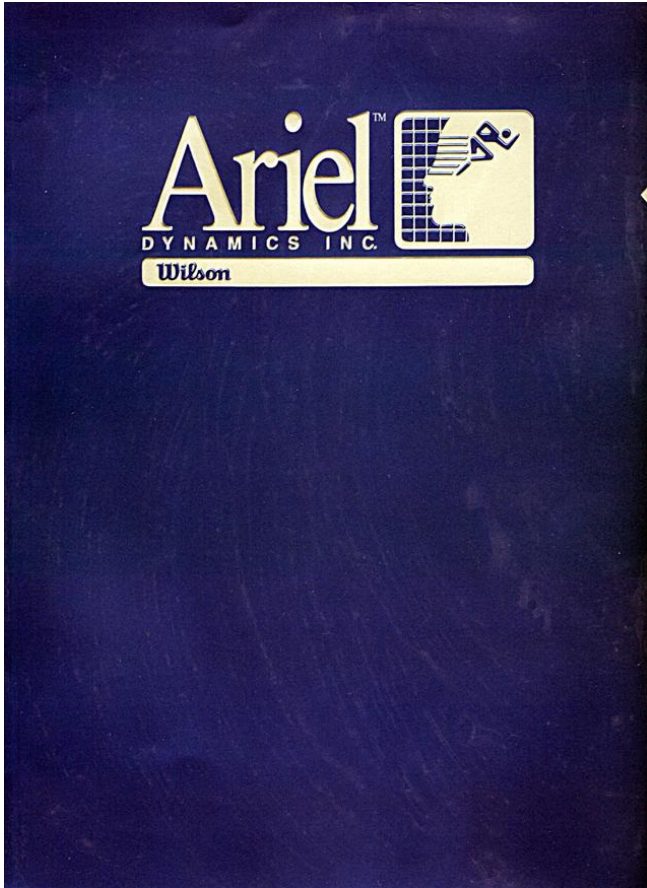
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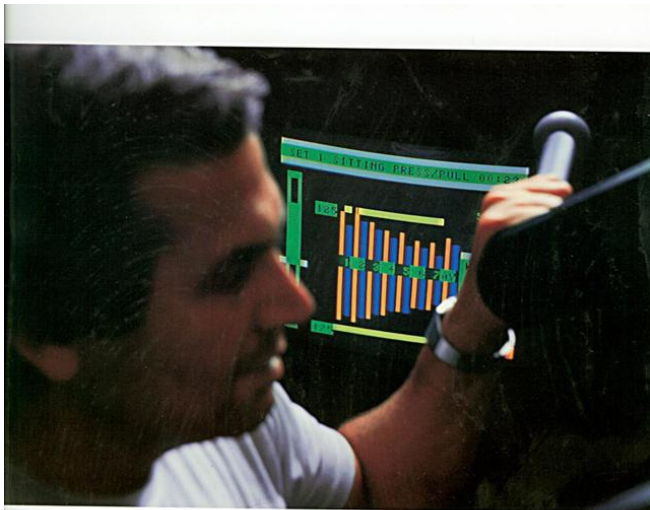
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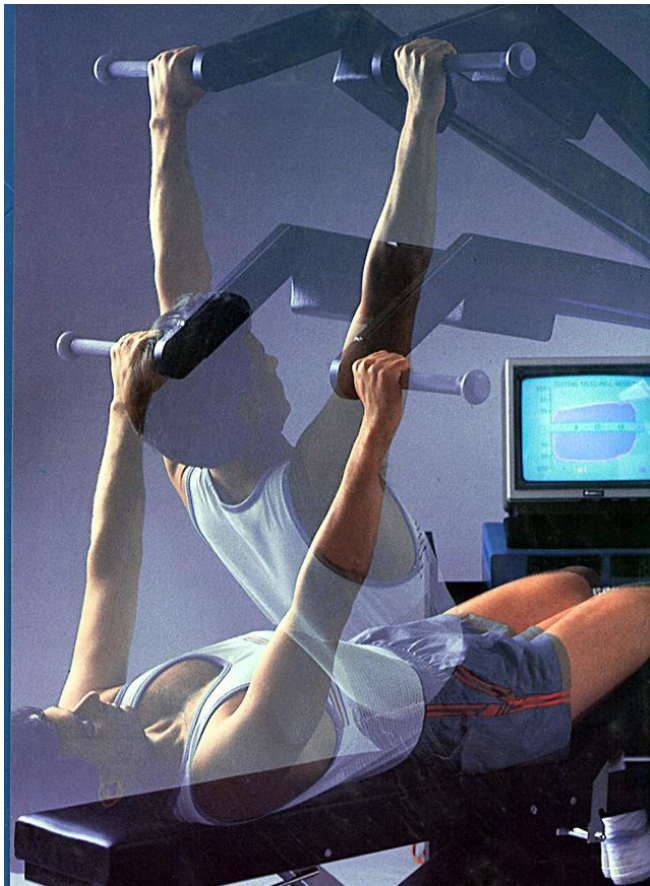
Below find a reprint of the 14 relevant pages of the article "Wilson-Ariel Products" in "Wilson-Ariel Brochure":





The skilled hand... the trained eye... traditionally these have been the most valuable tools for experts in the fields of rehabilitation and fitness. However, even these tools cannot help the therapist or trainer evaluate the exact amount of resistance or velocity needed to strengthen or rehabilitate an injury. Although these professionals have the benefit of many years of experience, objective measurements and comparisons with previous performance have often been unavailable.

Over the years, many machines have been developed to provide general exercise and strength training. More recently, equipment that measures and records precise levels of muscular strength and range of movement has become available. But there has been no machine that could intelligently simulate, respond to, and analyze human movement... until now.



The Ariel Computerized Exercise System (CES), invented by Dr. Gideon Ariel, heralds a new era in physical rehabilitation, research, and conditioning. Ariel CES is the only system available that automatically monitors, controls, and modifies resistance and velocity while the person is exercising. It does this safely and efficiently, constantly adjusting itself to accommodate each person's unique capabilities or limitations. Ariel CES also provides extensive and accurate measurements of movement and strength with the capability for storage and subsequent comparison and analysis of the individual's performance.

Intelligent System

That's why we call it the "Intelligent System" for rehabilitation and fitness. Ariel CES senses and responds directly to an individual's performance in real time. In other words, the computer is able to control your movement and adjusts to your effort WHILE YOU EXERCISE. And not only does the Ariel CES sense and respond to specific motions, it also interacts with the individual, providing immediate audio and visual feedback during exercise.

At the heart of Ariel CES's "Intelligence" is a state-of-the-art microcomputer system. The computer and its unique software assume the responsibility for controlling the precise force level, speed of movement, and temporal sequence to achieve a specific pattern of exercise. Unlike other systems, Ariel CES has the ability to adjust and modify its assignment throughout the entire exercise session.

"User-friendly" screen instructions permit anyone to operate the system, even individuals who have never used a computer.

Flexibility of Use and Function

Key to the Ariel Computerized Exercise System is the flexibility it offers. Isometric, isokinetic, or isometric exercise, or any combination of these exercise modes can be performed... In addition, the Ariel CES can control and measure velocity, resistance, work output, fatigue level, duration of exercise, or combinations of all five.

Another major value of the Ariel CES is its ability to run standard and pre-programmed sequences of exercises as well as customized individual exercise sequences. A physical therapist can follow prescribed testing or training protocols for patients or can create and pro-

gram unique procedures for specifically desired routines. An athletic coach can design specialized exercise routines for each member of the team or a specific protocol for a particular team position, such as for the quarterback or the defensive lineman.

In fact, Ariel Computerized Exercise System encourages innovation and creativity. Because the Ariel CES can adjust the speed or the resistance of an exercise throughout its range of motion... Because the Ariel CES allows the application of an isometric contraction at a selected point within a movement... Because the Ariel CES response can be controlled throughout the entire range of motion... the possibilities for a truly customized personal exercise program are unlimited.

Productivity

While the most attractive feature of the Ariel Computerized Exercise System is its unique ability to create and control exercise, the Ariel CES can also boost your facility's productivity. Because the Ariel CES is truly interactive and easy to use, many patients can follow the program prescribed by the therapist without constant supervision. This situation allows the therapist time to supervise other patients or to analyze and prepare reports of prior patient sessions.

For the Coach or the Fitness Expert, the same freedoms apply. Once the team or class has been assigned an exercise program, the instructor can use his or her time more effectively to attend to individual needs or to examine results.

The computer system interfaces with a video recorder if a facility wishes to use prepared instructional tapes for exercise, Club news items, or save an individual's performance display curves or tables shown on the monitor.

A variety of business management software programs, such as accounting, billing, and data base management systems are also available. An additional option allows the transfer of Ariel CES data to IBM PC compatible computer systems for more extensive data treatment.

Thus, the personal computer approach to the practice of resistive exercise is a quantum change in both thinking and application. The Ariel CES puts resistive exercises into a broad new realm of possibilities for applications in health care, human services, athletics, fitness and training and education.

Ariel CES Component Description

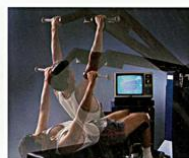
The Ariel Computerized Exercise System is comprised of the following major components:

Exercise Stations

The stations consist of a movable exercise bar and a comfortable, adjustable multiposition bench or seat equipped with stabilization straps. Attachments are available for specialized exercises. The exercise bar provides resistance by a computerized hydraulic mechanism rather than by weights, springs, pneumatics, or fixed-flow hydraulics. This design automatically adapts to individuals of different sizes and strength levels and eliminates the need to manually adjust the machine.

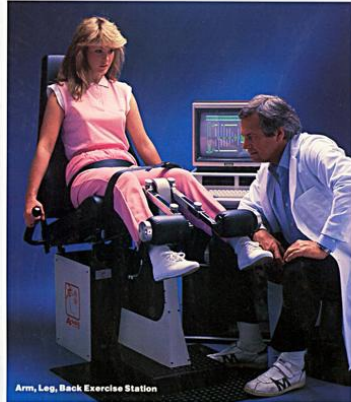
Resistance can be applied in both the "up" and "down" direction of the bar (bi-directional resistance) so that more than one muscle group can be strengthened in a single exercise. Of course, uni-directional as well as bi-directional exercises can be performed.

The exercise stations assure exceptionally safe operation. Since resistance is provided through passive hydraulics, the bar will immediately stop when released. There is no possibility of falling weight stacks and if the individual should suddenly stop exercising, perhaps if pain or discomfort is felt, he or she can do so without having to lower heavy weights. Since the bar movement is inertia-free, the risk of injury from the force of weights moving at high speed is minimized. In addition, the system is inherently quiet.

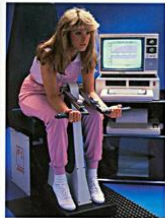


▲ The multifunction exercise station can perform over 20 different exercises, including those pictured above: incline bench press, bench press, sit-ups, squat and arm curls/extensions.

▼ The arm, leg, back exercise station can perform over 20 different exercises including those pictured below: leg extensions, arm curls/ extensions and sit-ups.



Arm, Leg, Back Exercise Station



What the CES Can Do

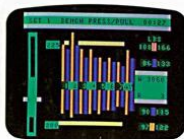
For the rehabilitation clinician as well as for the athletic trainer or Coach, the Ariel Computerized Exercise System performs many critical functions, including the ability to:

- Rehabilitate and condition
- Measure and diagnose
- Record and evaluate results
- Control and monitor velocity in each direction independently
- Control and monitor resistance in each direction independently
- Program the pyramiding of resistance or speed in each direction

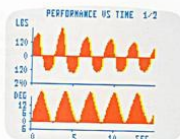
- Program the range of motion in each direction
- Accommodate resistance until the individual reaches a prescribed level of fatigue during endurance training
- Display performance goal target as an incentive during exercise
- Store and retrieve performance data
- Compare current and previous performance data in color graph, chart, or tabular form
- Generate performance profile of average and maximum exercise results for each repetition and for both up and down directions
- Illustrate in graphic format the force, work and power in relation to time, bar position, and lifting pace
- Dynamically calibrate through the entire range



Exercise results are measured and reported in up to nine different formats.



The monitor provides complete performance information on a continuous basis during exercise. Running totals of work, repetitions, and elapsed time are maintained.



The rehabilitation curves show the measured exercise value and the bar position on a continuous basis as a function of time.



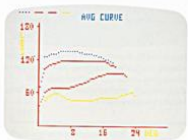
Rehabilitation statistics report, in numerical format, the average measured values for a number of parameters of exercise and motion.



Rehabilitation ratios report, in numerical format, a number of exercise performance values expressed as ratios of performance to body weight, or upstroke to downstroke.



Fatigue curves report the average (solid) and maximum (red line) exercise values for the upstroke and downstroke of each repetition.



4 The plotting and report capabilities allow the trainer, therapist, or clinician to examine and compare exercise performance data from any number of individuals and exercises. Reports are produced from exercise results saved on individual user diskettes.

Computer Console

At the heart of the Ariel Computerized Exercise System is a powerful microcomputer housed in the System console. The console also contains two diskette drives for the storage and access of programs and data, plus specialized electronics that monitor and control the exercise station.

Monitor

A standard television receiver displays information from the microcomputer. During exercise, it continuously displays performance, both numerically and through graphs. In addition, an audio signal sounds at the end of each stroke which indicates the end of the range of motion and, therefore, it is not essential for the person to watch the monitor during the exercise.

Printer (Optional)

The printer is used to make copies of exercise results displayed on the monitor. Additional tabular and graphic results can also be selected and printed. The Ariel CES can accommodate a number of different printer types. An optional printer buffer is available which allows the person to continue exercising without having to wait for the printer to complete a copy.



Computer console with optional printer, video recorder and stand.

System Software

Specialized System software is provided with each Ariel Computerized Exercise System. Each software program permits the basic exercise routines. However, the software programs differ in the number and types of results they report and save, their programming capabilities, and their support of advanced clinical, diagnostic, and exercise functions. The standard software programs available include the following:

Ariel 1000

Used to run the "Trainer" model, the Ariel 1000 software allows all basic types of exercise and permits the use of preprogrammed diskettes. You cannot program exercise diskettes on it nor does it report or save results at the end of a session. Printing capabilities are not available with the Ariel 1000.

Ariel 2000

Used to run the "Super Trainer" model, the Ariel 2000 software provides all the features of the Ariel 1000. Additionally, it reports an Average Performance Curve and allows comparison of results at the end of each set. The Ariel 2000 has basic exercise programming capability. Copies of exercise results can be printed if the printer option is purchased.

Ariel 3000

Used to run the "Rehabilitation" model, the Ariel 3000 is designed especially for rehabilitation facilities. The Ariel 3000 software has full programming capabilities and includes extensive rehabilitation data calculations which can be viewed, stored, and printed for the evaluation of performance.

Ariel 4000

The Ariel 4000 software is used to run the "dtxx" model. This software has all the features of the Ariel 3000 plus additional results data, including endurance analysis, fatigue curves, and wave form analysis.

The Ariel 4000 also has a data transfer feature that allows you to create yet another element of a sophisticated data base system utilizing commercial software packages such as Lotus 1-2-3™ or dBASE-III™ to assist in managing a total clinical or research operation. The most exciting aspect of this feature is the subsequent combination and examination of data for individual subjects or for all of the members in a particular group. Specific data for the range of movement, force curves, velocity curves, and numerous statistical calculations become easily available for analysis and reference.

Accommodating Resistance

Biomechanical experts know that natural movement does not occur at a constant rate of force. Human beings use varying degrees of muscular exertion even within one motion. The Ariel Computerized Exercise System, when operating in programmed velocity mode, allows a person to perform the exercise motion at varying levels of force. The Ariel CES provides an accommodating resistance of up to 1,000 pounds in each direction... that is, the machine's resistance is directly proportional to the person's effort. As the individual's strength level varies throughout the range of motion of an exercise, Ariel CES responds instantly, varying its resistance to match the force applied. Thus, the individual is always challenged but never overtaxed.

Accommodating Velocity

Just as a continuously varying force output is characteristic of natural movement, so too is varying velocity. In any type of human movement, the body's limbs accelerate and decelerate during the motion in a coordinated pattern. These patterns of acceleration and

deceleration can be affected by training but there is no normal human activity that occurs at a constant speed. Thus, varying velocity exercises are essential. With accommodating velocity, the Ariel CES can provide varying velocities in both directions throughout a range of motion (up to 1,000 degrees per second)... ensuring the computerized training or rehabilitation of the neural component of movement as well as the muscular component efficiently and effectively.

Specificity of Movement

Contemporary scientific evidence suggests greater therapeutic and training value with exercise patterns that duplicate the natural movements of a particular joint or muscle group. Because of the ability to program and control velocity, force, and range of motion, the Ariel Computerized Exercise System can simulate natural movement patterns in ways unattainable with conventional resistance exercise systems. This allows the instructor, therapist, or coach to expand or create new exercise or treatment protocols.



The Ariel CES is unatched in the number and type of exercise and rehabilitation modes that may be selected.



The Ariel CES provides extensive programming capabilities for creating customized individual exercise and rehabilitation programs.



When programming, the Ariel CES allows customized results selection for individual exercise programs.



Selection of exercise parameters and options is computer-assisted for easy use.



The Ariel Computerized Exercise System allows you to create programs, perform computer-assisted calibrations and diagnostics, and generate special data plotting and reports.

