Ariel Dynamics Inc. Media Library - Article

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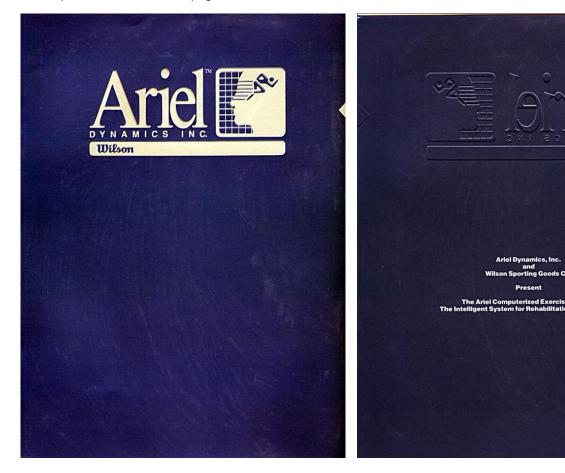
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Below find a reprint of the 14 relevant pages of the article "Wilson-Ariel Products" in "Wilson-Ariel Brochure":





he skilled hand ... the trained eve. The skilled hand... the trained eye... the skilled hand... the trained eye... valuable tools for experts in the fields of rehabilitation and firness. However, even these tools cannot help the therapist or trainer evaluate the exact amount of resistance or velocity needed to perform any the herafit of many years of experience, objective measurements and comparisons with previous performance have offen 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 model in the strength and results. could intelligently simulate, respond to, and analyze human movement...until now.

he Ariel Computerized Exercise System (CES), invented by Dr. Gideon Ariel, treads a new era in physical rehabilitation, research, and conditioning. Ariel CES is the only system available that autoancially monitors, constrols, and modifier resistance and velocity while the person is exercising. It does this address and efficiently constantly adjusting itself to accommodate each person's wide exclusive on Initiations. Ariel CES also pro-vides extensive and accurate measurements of movement and strength with the capability for storage and sub-sequent comparison and analysis of the individual's performance.

Intelligent System

Intelligent System That's why we call it the 'Intelligent System' for reabilitation and fitness. Ariel CES senses and responds directly to an individual's performance in real time. In other works, 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 feed-back during exercise. back 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 artimeter throughout the state assumed theorem of the section 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. Isotonic, 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 Automation maps value of the Arter CES is its about you run standard and pre-programmed sequences of exer-cises as well as customized individual exercise sequence A physical therapist can follow prescribed testing or training protocols for patients or can create and proences gram unique procedures for specifically desired routines. An athletic coach can design specialized exercise routines for each member of the team or a specific pro-tocol for a particular team position, such as for the quarterback or the defenisve lineman.

The activation of the control of the

Productivity

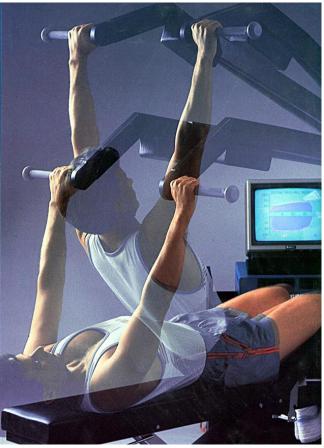
Productivity While the most attractive feature of the Ariel Compu-trized Exercise System is its unique ability to create and control exercise, the Ariel CES can also boost your facility's productivity. Because the Ariel CES is truly interactive and easy to use, many patients can follow the program prescribed by the therapist without constant supervision. This stantion allows the therapist time to supervise other patients or to analyze and prepare treative superso 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 per-formance 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 extenisve 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

Exercise Stations The stations consist of a movable exercise bar and a confortable, adjustable multiposition bench or seat equipped with stabilization straps. Attachments are available for specialized exercises. The exercise bar pro-vides resistance by a competized hydraulic mechanism rather than by weights, springs, permutantise, 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, un-directional as well as bi-directional exercises can be performed.

The exercise stations assure exceptionally safe operation The exercise stations assure exceptionally side operation. Since resistance is provided through passive hydraulics, the bar will immediately stop when released. There is to possibility of falling weight stacks and if the individual should suddenly stop exercising, perhapsi f pian or di-comfort 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. inherently quiet.





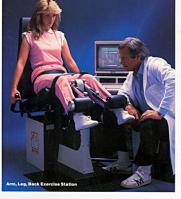
▲ The multifunction exercise station can perform over 20 different exercises, including those pictured above: incline bench press, bench press, sit-ups, squat and arm curls/extensions.





he arm, leg, back exercise station can per-n over 20 different exercises including those tured below: leg extensions, arm curis/











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 provious performance data in cooler graph, clarat, or tabular form
 Generate performance profile of average and maximum previous performance marking and finance

maximum exercise results for each repetition and for maximum exercise results for each repetition and ion 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

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120

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
- 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







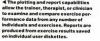
on statistics report, in ormat, the average alues for a number of



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



unning totals of



10 500 The rehabilitation curves show the measured exercise value and the ba position on a continuous basis as a function of time. BENCH PRESS-PULL FATIGUE

PERFORMANCE US TIME 1/2



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

Computer Console

At the heart of the Ariel Computerized Exercise System is a powerful microcomputer housed in the System con-sole. 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.

Monito

6 5

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.

Accommodating Resistance

Biomechanical experts know that natural movement 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 vary-ing levels of force. The Ariel CES provides an accom-modating 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 through the most of most of the account of the person's flort. 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 velovity. 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



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



of exercise parameters and computer-assisted for

System Software

Specialized System software is provided with each Ariel Computerized Exercise System. Each software program permits the basic exercise routines. However, the softpermise the basic exercise routines, However, the soft-ware 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 incude 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 pro-gram 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 cap-ability. Copies of exercise results can be printed if the printer option is purchased.

Ariel 3000

Used to run the "Rehabilitation" model, the Ariel Used to run the "Kenhabitation" model, the Arte 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 "deluxe" 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 The Ariel 4000 also has a data transfer feature that allows you to create yet another element of a sophisticated data base system utilizing commerical soft-ware packages such as Lotus 1-2-3" or dIBASE-III" to assist in managing a total clinical or research operation. The most exciting aspect of this feature is the subsequent combinenties on descriptions of them for a faithfund 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.

deceleration can be affected by training but there is no 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 Arid CES can provide varying velocities in both directions broughout 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 com-ponent efficiently and effectively.

Specificity of Movement

Contemporary scientific evidence suggests greater therapuic 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 unatainable with conven-tioned meintemene memory memory. tional resistance exercise systems. This allows the instructor, therapist, or coach to expand or create new exercise or treatment protocols.



When programming, the Ariel CES allows customized results selectio individual exercise newspace



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

Exercise Design

Exercise Design The Aricl Computeride Exercise System can also greatly simplify the design of a training program or a prescribed therapois treatment. While the therapoist, coach, or trainer an older an overall pattern of exercise, the Arid CES will adjust the precise force level, speed, and temporal sequence to achieve that pattern. In this way, Arid CES actually produces sequential or patterned progressions, such as the pyramiding of resistance or speed, for maximum theraputic effect.

Because the Ariel CES can be programmed to detect the fatigue occuring during an exercise set, the risk of stress or reinjury is minimized. The Ariel CES will immedi-ately remove all resistance when an individual reaches a predetermined level of fatigue, for example, when the person's strength level falls to some fraction of his or her maximum.

Measurement and Diagnosis

Accurate measurement of human performance is essen tial for analysis and diagnosis and the Ariel Computerized Exercise System provides this capability. Ariel CES allows assessment of a person's condition rapidly and

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efficiently during testing. For the therapist, patient data can be made available on the screen, in real time. Some of the information available is the average force,

velocity, power, work, and fatigue for each repetition performed. In addition, during exercise, the average and

the maximum performance values for both the upstroke

displayed on the monitor in brightly colored bar graphs At the end of each set, a number of rehabilitation

and downstroke of each repetition are immediately

statistics are available, including:

 Peak velocity Average force Peak force Peak powerPeak hold time

Range of motion
Total work performed

Position
Right vs. left performance ratios

Flexors vs. extensor performance

Endurance Report F/E

Ariel Dynamics, Inc.

Ariel Dynamics, Inc. was founded in 1968 by Dr. Gideon Ariel. Dr. Ariel is a world renown authority Dr. Gideon Ariel. Dr. Ariel is a world renown authority in biomechanics, the science linking the physics of motion to the human body. Coupled with his expertise in computer science, Dr. Ariel has been the driving force behind 18 years of research and development leading to the Ariel Computerized Exercise System.

In Proto Comparison to Construction Optimize In 1978, Dr. Ariel, together with tennis pro Vic Braden, founded the Coto Research Center at Coto de Caza, California. An Independent laboratory devoid to hiv-mechanical research relating to human performance, the Research Center is the base from which Dr. Ariel and his staff apply the principles of biomechanics to athliets training, product testing and development, fitness, and sports medicine. In addition to the Ariel CES, Dr. Ariel hap septenced a sophisticated computerized Performance Analysis System through which human motion can be recorded, measured, and analyzed.

Preview, measures, and annyced. Dr. Ariel's talents have been sought by many organiza-tions around the world, including IBM, NASA, and the U.S. Olympic Committee Mwere he founded and chaired the Biomechanics committee. In founding Ariel Dynamics, Inc. he was able to contribute expertise in the areas of fitness, exercise, and computer science with a powerful staff of analysts, mechancial designers, and software engineers.

A former discus thrower for the Israeli Olympic team in 1960 and 1964, Arid completed his graduate and post-doctoral work at the University of Massachusetts. He holds a Ph.D. in Exercises and Computer Science, has published many sicentific papers, holds patents on several devices, and served as consultant to many of the country's leading companies.



Wilson Sporting Goods Co.

Wilson Sporting Goods Co. is a world wide leader in equipment for golf, racket sports and team sports. In 1985, as a natural extension of their involvement in athletic performance. Wilson entered into a licensing agreement with Ariel Dynamics, Inc. Wilson provides agreement with Ariel Dynamics, Inc. Wilson provides marketing, financial, manufactirning/quality assurance and consulting support. Ariel Dynamics, Inc. manufac tures, sells, and services the Ariel Computerized Exercise System worldwide while continuing the development of new features and models.

Wilson's commitment to providing innovative, safe equipment that would improve athletic performance began more than 60 years ago with the creation of its "Professional Advisory Staff," through which promi-ments and field test new equipment. For more than 70 years, Wilson products have been the choice of both professional athletes and consumers.

Today, at Wilson's research and development laboratories, state-of-the-art technology has led to a new generation of sports equipment, designed for both maximum effectiveness and safety.

Wilson

Recording and Evaluation of Results With the Ariel Computerized Exercise System, the

operator can record and save a wide range of informa-tion about a patient's performance. The system has the ability to generate reports in chart, numeric, or easy-to-read graphic formats.

For example, a comparison of one limb to another, one

patient to another, or any type of consecutive perfor-mance comparisons are readily attained, including:

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04-30-55 IDEAL The average curve plot (solid graph) shows the average exercise values measured for both the up and down strokes. Optional comparisons to pre vious performance (red line), or to an



ual's exercise performance ver a number of consecutive changes ove



The enduran an individual changes with

Present vs. previous performance
Pre-injury vs. post-injury
Actual vs. ideal performance

speed, or any combination of each.

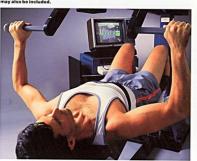
available options on the Ariel CES.

These comparisons can be measured in force, power.

In addition, you have the capability to record and

evaluate a patient's endurance...by repetition or by

time. Fatique curves and wave form analysis are also





Waveform analysis presents th exercise performance for an av repetition in terms commonly u describe the parameters of a p curve or wave by scientists and





In a laboratory at Harvard Medical School, studies are being conducted with the Ariel CES to determine human adaptation to physical stress, lack of sleep, and exercise on various biochemical processes.

The United States Olympic Committee purchased the Ariel CES to assist in research for appropriate alternate to anabolic steroids or other ergognic aids for athletes.

Hospitals and rehabilitation centers have purchased the Ariel CES to enhance the traditional methods of diagnoses, research, and rehabilitation protocols.

Health and fitness clubs have selected the Ariel CES because it allows both instructors and members to assess performance levels, follow changes, a well as tailoring special exercise regimens.