



## Cardio-muscular Conditioner

**S**hown below is the Shuttle 2000-1 physical therapy and athletic development conditioner, an exercising device that traces its technological lineage to studies performed in the 1960s on "cardiovascular deconditioning," the potential loss of integrity of an astronaut's cardiovascular system due to prolonged exposure to the microgravity environment of space.

The Shuttle 2000-1 was designed and developed by Gary Graham, founder and president of Contemporary Design Company, Glacier, Washington, which manufactures and markets the device.

cardiovascular fitness and muscular strength development through both closed-chain kinetic and plyometric exercises (plyometrics are designed to stress the body in such a way that it produces faster and stronger muscle contraction).

The athlete (or rehab patient) lies on a cushioned carriage that glides between two rails, propelled by the user as he pushes off a kick plate. Resistance is provided by elastic cords running the length of the machine; the user can add or remove elastic cords to increase or decrease resistance. The elastic cords provide a rebound effect by returning the user

Shuttle independently or simultaneously. Internal stress occurs when the user pushes off the kick plate. The accelerated load caused by the rebound system induces a movement of the diaphragm, which can cause a change in chest cavity volume. When the diaphragm moves downward, a negative pressure develops in the chest cavity, thus attracting blood toward the heart.

Gary Graham's initial work in this area came in the mid-sixties when, as an employee of The Boeing Company, he was a member of a design team responsible for developing a cardiovascular conditioner for

a then-planned — but never built — Air Force orbiting laboratory. After the Air Force project was cancelled, Graham participated in space station conditioning studies during NASA's Apollo Applications (later Skylab) program. The expertise thus acquired lay dormant until 1985 when Graham decided to revive



Used by the National Football League's New York Giants and Jets, university strength coaches, operators of sports clinics and medical rehabilitation centers, the exerciser is, in effect, a "horizontal trampoline." Originally conceived as an exerciser for use aboard a space station to avoid cardiovascular deconditioning, the Shuttle 2000-1 promotes

to a neutral position after a push-off. The rebound feature, says designer Graham, is the principal difference between the Shuttle 2000-1 and other exercisers, because it combines internal and external induced stresses.

External stress comes from the full range of motion of the arms and legs during exercise; all four limbs may propel the

the conditioner as an Earth-use system. He enlisted the aid of Gary Chase, an exercise physiologist who had also been a member of the Boeing design team. In 1987 Graham patented a first generation system known as the CMC Shuttle 2000, which was refined and introduced to the market as the Shuttle 2000-1 in 1991. ●

SPACE STATION

STUDIES GENERATED

TECHNOLOGY FOR

AN ADVANCED

CONDITIONING MACHINE

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