

SHUTTLE[®] MVP

CLASSIC & PRO MODELS POWER TRAINING SYSTEM MANUAL

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Patent pending

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SECTION 1.0

Shuttle MVP (Classic & MVP Pro)

History, Utilization, and Maintenance



1.1 INTRODUCTION

This Shuttle MVP Power System Training Manual has been prepared to help you make full functional use of all the capabilities of the machine, whether for efficient rehabilitation or high-tech training and conditioning. The manual contains instructions about how to adjust the machine properly, use it appropriately, and maintain it so that it provides years of dependable service. Please read the entire manual carefully to learn about the basics of safe Shuttle MVP operation and use. With this knowledge and your own imagination, the extraordinary features of the Shuttle MVP will allow you to design a customized workout program to reach all the fitness or rehabilitation goals you have set for yourself and your clients.

Your Shuttle MVP is constructed of the most durable materials available using the latest functional engineering design concepts. The high-grade anodized aluminum components are punched and formed for precision and accuracy, and the upholstery is top-quality Boltflex vinyl, sewn with Old World craftsmanship.

Much of the following information applies both to the Shuttle MVP Classic and Shuttle MVP Pro models. When necessary, specific features and instructions about each are noted.

1. FEATURES AND BENEFITS

While exercising, the user is comfortably supported by the padded backrest of the carriage. The Shuttle MVP comes equipped with six vertical and four lateral ball bearing wheels to control the movement of the carriage along the rails. The Shuttle MVP also features a variety of resistance adjustments through the use of "elasticords," which are custom-made from surgical quality latex specifically chosen for elasticity and durability. The heart of the Shuttle MVP, the rebound system, was designed to withstand vigorous use. The large sturdy kickplate allows for plyometric activities, or jumping and landing, to be included in conditioning and rehabilitation programs. With the addition of the Proprioceptive Neuromuscular Facilitation (PNF) Pulley System Accessory, controlled range of motion (ROM), flexibility and a variety of upper body exercises are also possible.

VERSATILITY OF APPLICATION

The Shuttle MVP provides a platform for simulating nearly every type of rehabilitation protocol and sports-specific activity in a controlled environment. Many physical therapists tell us it is their most useful single tool.

REHABILITATION

The Shuttle MVP provides a safe and controlled, micro-gravity environment, which allows the user to become increasingly active and partially weight bearing with his or her movement. During rehabilitation, exercise-involving acceleration along the horizontal axis of the body increases circulation, which can facilitate the healing process.

POWER TRAINING

The Shuttle MVP offers a range of exercise options, from closed kinetic chain to high intensity plyometrics. Whether the user is recovering from reconstructive ACL surgery or is an elite athlete training to enhance his or her physical strength and power, the Shuttle MVP is up to the task. See Section 2 of this manual for different exercise options.

AEROBIC AND NONAEROBIC CONDITIONING

2. SHUTTLE TERMINOLOGY

Two terms are used in this manual to describe the different ends of the Shuttle. When the text refers to the *head* or *head-end* of the Shuttle, it is referring to the direction of the high end of the Shuttle frame. The *foot* or *foot-end* of the Shuttle refers to the lower end where the kickplate is located. As a result, *head-ward* refers to movement toward the head and away from the kickplate, and *foot-ward* refers to movement toward the feet, or toward the kickplate.

3. SHUTTLE MVP HISTORY

In 1965, the U.S. Air Force proposed the creation of a secret Air Force Space Station named the Manned Orbiting Lab (MOL). The Boeing Company Aerospace Group joined in the competition for the MOL contract.

Bioscientists at the time were concerned that prolonged exposure to the zero gravity environment of space might substantially decrease the integrity of the astronauts cardiovascular system hampering their ability to withstand the high forces of reentry without blacking out. They were also worried that zero gravity conditions might encourage the onset of osteoporosis.

To avert these dangers of cardiovascular de-conditioning, a group of Boeing scientists proposed subjecting the crew to intermittent positive and negative acceleration forces parallel to the long axis of the body. They surmised that a movement like bouncing back and forth between two trampolines would stress the cardiovascular system in a way similar to earth's gravity and thus maintain the crew members' level of physical conditioning. The Boeing test report submitted to the Air Force in October 1965 indicated that such a device showed great potential for resolving the fitness problem in space.

The report concluded that when exhausting physical work is preceded by passive trampoline use, there is:

- Increased endurance.
- Reduced oxygen consumption during work.
- Reduced pulmonary ventilation during work.
- Higher maximal heart rate at exhaustion.
- Lower heart rate during sub-maximal work.
- Lower maximal oxygen intake.

The report also determined that when a tilt table test is preceded by passive trampoline use, there is:

- Lower heart rate.
- Improved orthostatic tolerance.

Findings suggested that passive trampoline use redistributes the blood volume centrally and shifts the oxygen dissociation curve.

The assignment for transforming Boeing's prototype cardiovascular conditioner into a space-born version that could fit inside the crew compartment of the space station was given to Gary Graham, a member of the preliminary design team. Unfortunately, due to changing Department of Defense priorities, the MOL program was terminated, and Boeing discontinued the work of the design team and placed the documentation in storage.

Twenty years later, Gary Graham decided to revive the concept of the MOL cardiovascular conditioner and bring it back to earth. Further research and development during the 1980s ultimately resulted in a patented horizontal cardiovascular exercise device, which he named the CMC Shuttle 2000. Concurrently, Gary and Heather Graham formed the Contemporary Design Company to manufacture the machine. Gary refined the design further and eventually released an improved version, the Shuttle 2000-1. In November 1993, a second and completely new model was introduced, the Shuttle MVP (now called the MVP Classic). The popularity of low impact plyometrics among coaches of professional teams required our providing the capability of additional jump length to the rails.

The MVP Pro was later developed to increase the total resistance load capacity for the strength and conditioning user and offer a greater range of adjustable flexion control for the rehabilitation user, and add length to the frame and rails to accommodate the taller and larger athlete.

Research and development continues to improve the design, materials, and utilization protocols. Many of the improvements in the past have been the direct result of suggestions from physical therapists, athletic trainers and strength and conditioning coaches throughout the world. All of these improvements have culminated in the current Shuttle MVP series, the most advanced system yet created to maintain and improve the health and fitness of the widest variety of users.

4. SHUTTLE MVP THEORY

The Shuttle MVP exercise system combines internally and externally induced stresses.

INTERNAL STRESS

Unlike other exercise devices, the Shuttle MVP has a rebound system built into the moving carriage assembly. In theory, the acceleration load, or internal stress, caused by this rebound system induces a movement of the diaphragm, which in turn results in a change in the chest cavity volume. When the diaphragm moves downward, a negative pressure is developed in the chest cavity, thus pulling blood toward the heart. Subsequently, the change in direction at the head-end of the Shuttle MVP carriage “stroke” causes the blood mass to surge toward the head, which irrigates the heart cavity. The horizontal orientation of the body during Shuttle MVP exercises results in the elimination of the hydrostatic head in the cardiovascular column, which in turn adds to the ease of blood flow throughout the body.

EXTERNAL STRESS

The Shuttle MVP is designed to allow a full range of motion (ROM) of the legs, and sometimes the arms, during exercise. While the backrest and headrest support the back and neck, the legs and arms are free to propel the carriage along the rails. The “Elasticord” resistance system provides a variable method of stressing the extremities and the trunk. Exercising in this way progressively strengthens the musculoskeletal system.

The combination of internal and external stresses—while the body is in a supine position—may explain why the Shuttle MVP exercise system has such a dramatic effect on improving the condition of the cardiovascular system, while providing a safe, controlled means of exercising specific joints and muscle groups.

1.2 ADJUSTMENTS TO THE SHUTTLE MVP

The information contained in Section 1 of this Power System Training Manual outlines the general adjustment capabilities of the Shuttle MVP and various methods of ensuring safe use of the machine. Familiarity with attaching elasticords, positioning the headrest, using the lateral support handles, and changing the ROM control limiter will permit adjustment of the Shuttle MVP to fit nearly all body sizes and physical abilities. A correctly adjusted Shuttle MVP will provide a challenging workout to anyone.

1. ATTACHING ELASTICORDS (MVP CLASSIC)

Beginning with either of the outside most T-handles and working across to the other side, attach the desired number of elasticords by holding each T-handle solidly in your hand and pulling it ***straight*** out toward the slotted plate.

Insert the metal collar of each T-handle into the slot directly in line with the hole from which the Elasticord stretches. The Elasticord is then firmly secured. By working from the outside toward the middle, adequate space is available for your fingers to maintain a secure grip on the T-handles.

Warning: *Individuals who experience any reaction to latex products should avoid contact with the elasticords.*

2. ATTACHING ELASTICORDS MVP PRO

The Shuttle MVP Pro contains 12 elasticords, 8 of which are located within the Shuttle frame, as shown in the photo to the right. These elasticords attach to the Shuttle carriage by pulling them head-ward and lifting them up into the slot provided at the lower edge of the head-end of the carriage. These are the ones most commonly used. The additional 4 elasticords of the MVP Pro are housed within the carriage itself and hooked up at the foot-end of the frame. These additional 4 elasticords are intended to be used for maximum load.



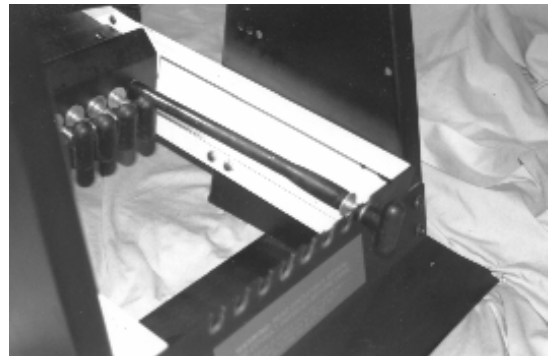
To adjust these 4 elasticords, use one hand to lift the middle of the webbed lanyard attached to the Elasticord and press down at the foot-ward end of the lanyard with the other hand (see photo above). Using both hands, pull the lanyard away from the carriage until the white plastic connector appears. Then guide the connector into the slot provided.

Warning: *Never attempt to attach or detach elasticords when the Shuttle MVP carriage is in motion.*

3. DETACHING ELASTICORDS MVP Classic

Begin with either of the outside most T-handle and working across to the other side, pull back on each T-handle, lift each one out of its slot, and one at a time, gently returning it to its housing.

Note: *Elasticords should be disconnected when the Shuttle is not being used. This will help the Elasticords retain their resistance and length and increase longevity.*



4. ELASTICORD MAINTENANCE

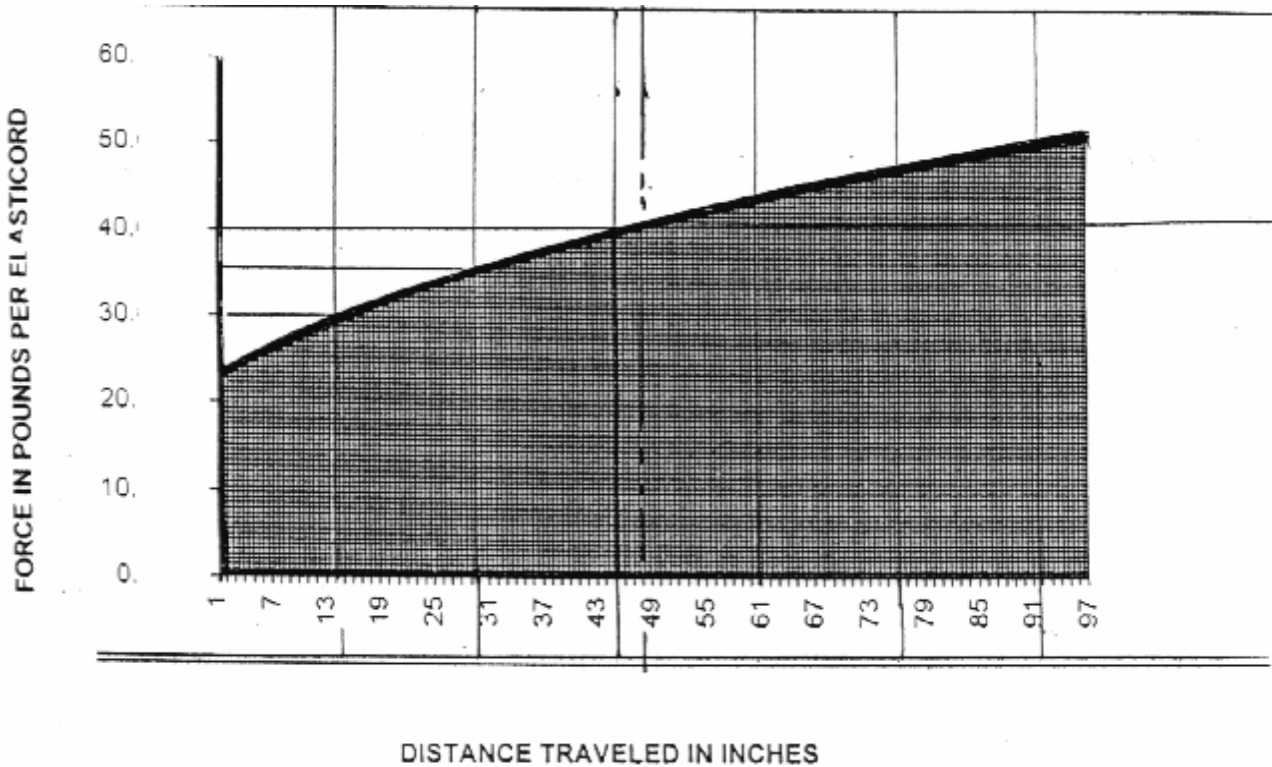
Disconnect all elasticords whenever the Shuttle MVP is not in use. This helps the elasticords retain their resistance and increase their longevity. Elasticords left attached to the hook-up plate for extended periods will stretch prematurely and eventually diminish the original full resistance load. Lubricate the ends of the elasticords with silicone gel periodically, especially if the elasticords appear checked, or if you hear a squeaking noise when using the machine (this squeaking occurs when un-lubricated elasticords rub against metal parts as they pass). When the elasticords become checked, air enters the small openings, which causes oxidization and decreases their normal life span. A thin coat of silicone gel seals these openings and helps preserve the elasticords.

Warning: *Do not use silicone that contains petroleum-based thinners or extenders on the elasticords as these will deteriorate the latex. We recommend the type included with your machine. Exposure to sunlight, fluorescent light and chlorine found in swimming pools or hot tubs will also accelerate the deterioration process.*

5. ELASTICORD LOAD (FORCE) VS. DISTANCE (STRETCH) CURVE

The graph below indicates the force required to extend one attached Elasticord a specified distance. Each Elasticord attached to the hook-up plate with the carriage at rest provides approximately 25 lbs of resistance. The increasing load over distance can be read along the curve in the graph for any distance up to the maximum carriage travel of 48 inches. For example, one Elasticord, when stretched 18 inches (about the length of one extended leg) will provide 32 lbs of resistance

LOAD VS. DISTANCE GRAPH



ELASTICORD LOAD (MVP CLASSIC)

The Shuttle MVP Classic has 8 elasticords that attach at the foot-end of the machine. Determining the total resistance for an individual user follows a simple formula: the number of elasticords multiplied by the load of each one. The amount of the load, or resistance, for each Elasticord may be determined from the Load vs. Distance Graph, with the “distance traveled” equaling the distance traveled away from the kickplate. For example, if all 8 elasticords are attached and the stroke length is 13 inches (8 x 30 lbs), the total load at that point will be 240 lbs.

ELASTICORD LOAD (MVP PRO)

The Shuttle MVP Pro has 12 elasticords altogether, 4 of which are attached at the foot-end of the machine and 8 attached at the head-end of the carriage for easier access. The ability to adjust the range of motion with the ROM handle on the MVP Pro results in a variable starting load depending on how much the elasticords are “pre-stretched.”

For example, when the ROM handle is in the top position, the elasticords are not pre-stretched. In this position, each attached Elasticord provides approximately 25 lbs of force (with the carriage at rest). With the ROM handle in this top position, the total resistance of all 12 attached elasticords thus becomes 300 lbs. Moving the ROM handle to the bottom position pre-stretches each Elasticord 7 inches, which is the equivalent of 7 inches of distance on the graph. This increases the force provided by each attached Elasticord to 27 lbs (with the

carriage at rest). Thus the total force with all 12 elasticords attached and the handle in the bottom position increases to approximately 325 lbs.

Note: *One of the MVP Pro elasticords is smaller in diameter than the others. This red Elasticord has one-half the resistance of the others and is useful when minimal resistance is required early in the rehabilitation process.*

6. RANGE OF MOTION (ROM) ADJUSTMENT: FLEXION

FLEXION RANGE OF MOTION ADJUSTMENT (MVP CLASSIC)

There are three methods of adjusting the body position on the carriage backrest to determine the angle of flexion of the lower limbs:

1) Adjusting the position of the headrest. This allows the user to move either closer to or further away from the kickplate. To move the headrest, pull straight up on either end and lift it free of the backrest Velcro. Secure it where desired by pressing it back down onto the Velcro.

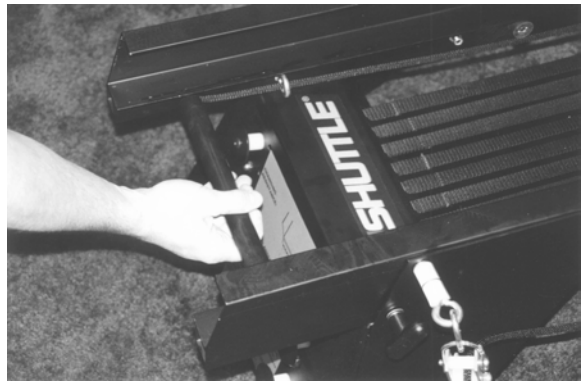
2) Adjusting the height of the kickplate. This allows the user to increase or decrease the height of the feet on the kickplate (see Kickplate Height Adjustment, 1.2.5).

3) Gripping a different lateral stabilization handle. This also allows the user to move either closer to or further from the kickplate.

FLEXION RANGE OF MOTION ADJUSTMENT (MVP PRO)

ROM adjustment with the MVP Pro includes all of the above methods plus the possibility of moving the ROM handle to one of four possible settings. The MVP Pro donut ring rebound rope extends to the head-end of the frame and is snubbed there by passing through the transverse rubber-covered ROM handle. This assembly functions as the ROM control for the MVP Pro. The photo to the right shows the ROM handle being moved. When in the top position the Shuttle carriage will be closest to the kickplate. When in the lowest position the Shuttle carriage will be furthest from the kickplate.

(See Maintenance of the Donut Ring Rebound Assembly, (1.4), for more details).

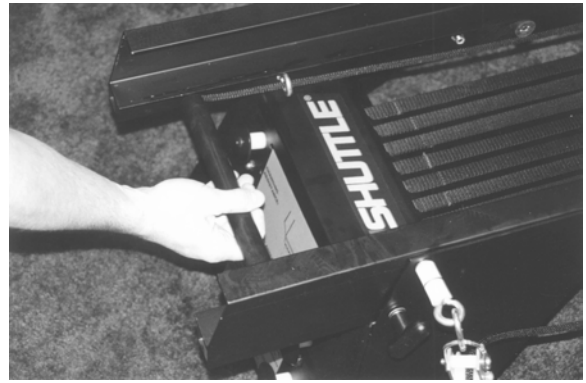


Warning: *Never attempt to move the ROM handle while the elasticords are attached or the Shuttle is in use, as the handle may move too quickly to control.*

The ROM handle may be pulled head-ward and secured in any of the four positions on the head-end stand, as shown in the photo to the right. Moving the ROM handle down the surface of the head-end stand draws the carriage head-ward up the rails. This adjustment will decrease the knee flexion angle of the user.

7. JUMP DRILL SETTING ON MVP Pro

The ROM handle should always be kept in the top position when performing jumping exercises on the MVP Pro, whether soft plyometrics or full-scale jumping. This setting provides the user with a full stroke length of 48 inches. The donut ring rebound system is designed to provide a soft stop, even during the most aggressive plyometric drills. An over-run of the rebound assembly cannot occur because the MVP contains a failsafe back-up system in the form of foot-end cone bumpers that provide a solid end to carriage movement.



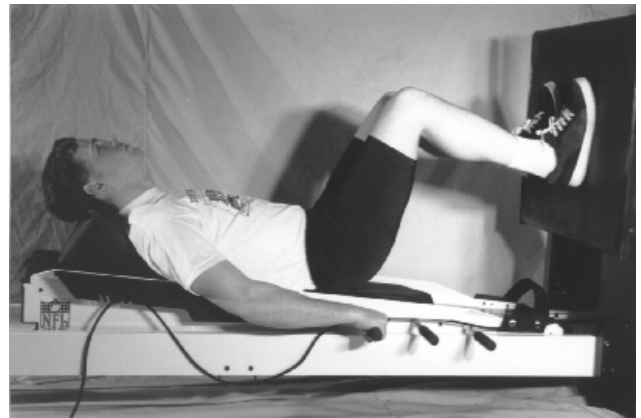
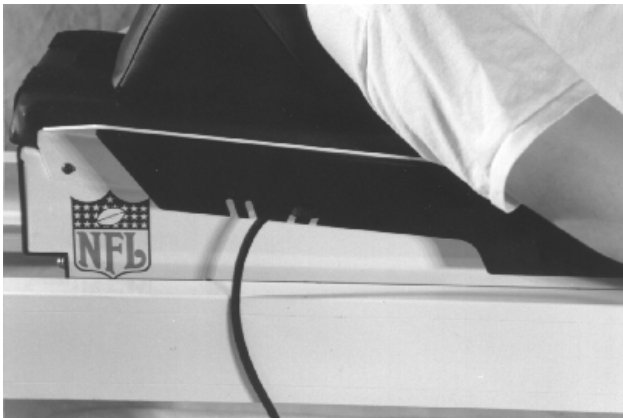
NOTE: To protect the rubber-covered bar and make it easier to release, add a thin coat of silicone gel to each end of the bar where it nests in the 2-inch round mount brackets.



Warning: Never stand at the head-end of the Shuttle MVP when it is in use, since the carriage may extend beyond the end of the rails.

8. EXTENSION ROM ADJUSTMENT (CLASSIC & PRO)

Use of the 8-foot long ROM control rope limits the travel of the Shuttle carriage up the rail. It prevents the patient from hyperextending the knee. Attach the rope between the inside lower slot inside the kickplate base and the forward slots on the rear wing of the Shuttle carriage as shown in the figure below.



9. KICKPLATE HEIGHT ADJUSTMENT

The 24" (H) x 30" (W) kickplate adjusts to three vertical positions. To adjust the height, begin by removing the four T-handles as shown in the figure to the right. Move the kickplate board away from the kickplate base and raise or lower it to the desired position. Line up the bolts on the back of the kickplate board with the appropriate holes in the kickplate base and replace the T-handles to complete the process.



The vertical position of the kickplate can be positioned as follows:

High: The upper edge of the kickplate is 37.5 inches above the rails. This is the best position for 90-degree flexion of very tall individuals (6' 4") and unsupported heel activities.

The lower edge is 12.5 inches above the rails.

Middle: The upper edge of the kickplate is 34.5 inches above the rails; the lower edge is 9.5 inches above the rails.

Low: The upper edge of the kickplate is 31.5 inches above the rails; the lower edge is 6.5 inches above the rails.

This position is best for direct body alignment activities.

The kickplate's durable padded rubber nonskid surface increases the traction and may be cleaned with alcohol. It may also be removed, inverted, and in the event of substantial wear, replaced.

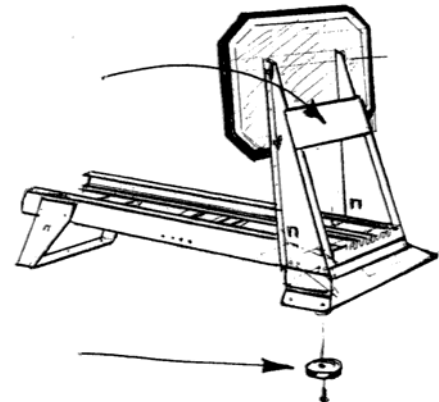
Warning: Before lowering the kickplate to the lowest position, be sure there is adequate clearance between the user's resting leg and the lower edge of the kickplate.

10. KICKPLATE STORAGE COMPARTMENT

The welded steel box on the back of the kickplate base can be used to store the manual, tools, and various spare parts.

11. RUBBER NON-SKID DISKS

Rubber non-skid disks located on the bottom of the kickplate base and the head-end stand help prevent migration of the Shuttle MVP on carpeted or smooth surfaces. During vigorous exercise, the Shuttle MVP may still gradually creep along the floor. Placing a 24" 2x8 board between the kickplate base and a wall will control this movement.



12. DUEL-DENSITY UNIVERSAL HEADREST ADJUSTMENT

The position of the headrest determines the angle of flexion of the lower body in relation to the kickplate. The closer the headrest to the kickplate the more flexion at the knee and hip.

To adjust the headrest, pull either end straight up and lift it free of the backrest. Secure it to the desired location by pressing it back down onto the Velcro.

Two head placement options are offered using the headrest. The forward position places the head tilted slightly forward with the shoulders secured in the curved forward end of the headrest. The second option involves rotating the headrest 180 degrees, which allows for a greater angle of tilt of the head. (Not recommended for “neck problems”)



13. LATERAL STABILIZATION HANDLES

Three rubber-handled aluminum bars, or stabilization handles, project from each side of the carriage. These handles should be used at all times to maintain stability when working out on the Shuttle MVP. Choose the appropriate set for a comfortable body position. As noted earlier, shifting to different handles allows the user to adjust the flexion angle of the lower limbs.

Note: Safe operation of the Shuttle MVP requires the use of these handles, especially when performing high-load squats or jumping exercises.

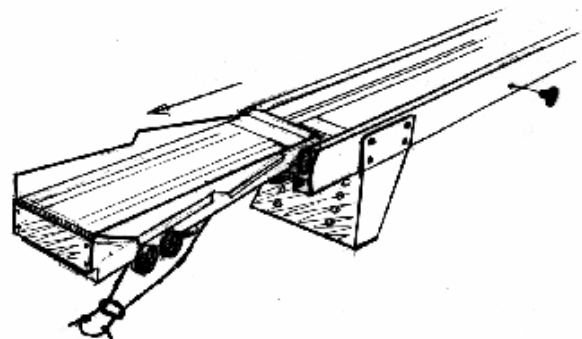


1.3 SHUTTLE CLEANING AND MAINTENANCE

1. CLEANING AND LUBRICATING THE MVP CLASSIC

Cleaning the rails and wheels of the MVP Classic is best accomplished by the removal of the carriage. To do this:

1. Detach all elasticords.
2. Remove the two T-handles, located on the side rails 40 inches from the head-end of each rail, as shown in the figure to the right.
3. Remove the eyebolts by pulling them out from inside the rails.
4. Place a large towel or cloth on the floor or table.
5. Slide the carriage out of the head-end of the rail frame as shown in figure at right.
6. Carefully lay the carriage upside down on the towel or cloth.



To clean the rails, spray WD-40, Clear Guard, Fantastic, or other equivalent cleansers (soap and water may also be used) on the inside surface of the rails where the wheels ride, including the side surface of the rail where the lateral wheels make contact. With a clean cloth, wipe the rails free of any dust, built-up deposits, and cleaning fluid. Lubricate the wheels and the ball bearings with WD-40, TriFlo, or machine oil.

To replace the carriage, follow these steps:

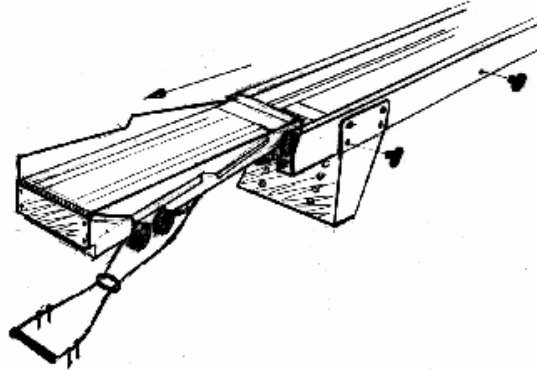
1. Turn the carriage right-side up and feed the carriage wheels back into the head-end of the rails while keeping the rebound rope, eyebolts, and donut ring from tangling with the wheels. Be sure to keep the donut rebound ring ahead of the eyebolts on the rebound rope, as shown in the figure above.
2. Thread the eyebolts back through the appropriate holes in the rails, being careful to keep the rebound donut ring ahead of the eyebolts.
3. Replace the T-handles and snug tight.

2. CLEANING AND LUBRICATING THE MVP PRO

As with the Classic, cleaning the rails of the MVP Pro is best accomplished by the removal of the carriage. To remove the carriage of the MVP Pro, follow the same basic steps as described above. With the Pro, however, there are four T-handles to remove, one at each of the eyebolts which secure the rebound rope assembly. They are located on each side of the rail frame at 8" and 40" foot-ward from the head-end of the rail frame. Remove the eyebolts and then slide the carriage out the head-end the rail frame.

Thoroughly clean the rails with WD-40, Clear Guard, Fantastic or other Silicone-based cleaners. Wipe them thoroughly clean with a dry cloth. Lubricate the wheels and the ball bearings with WD-40, TriFlo, or machine oil.

The easiest way to replace the carriage of the MVP Pro after adding the donut ring is to put the forward two eyebolts and T-handles in first. Then re-attach the two eyebolts and T-handles at the head-end.



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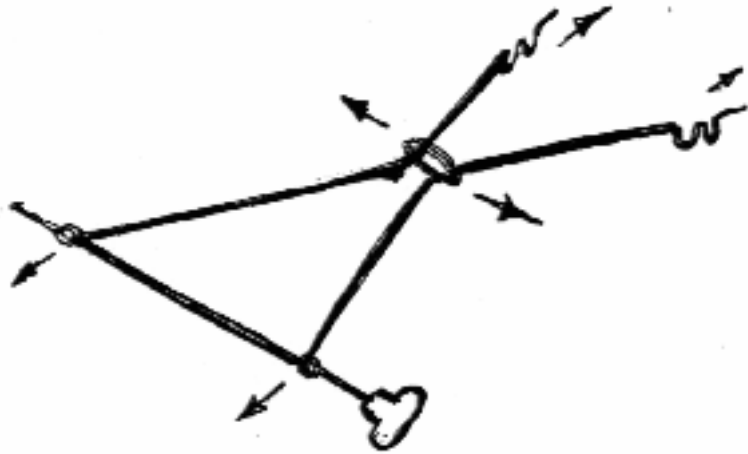
3. CLEANING THE KICKPLATE

The kickplate's durable padded rubber nonskid surface increases the traction. The surface is also suitable to be cleaned with alcohol. It may also be removed, inverted, and in the event of substantial wear, replaced.

1.4 MAINTENANCE OF THE DONUT RING REBOUND ASSEMBLY

1. THE REBOUND SYSTEM

The Shuttle MVP rebound assembly consists of a rope that connects to the Shuttle carriage on each side and a small elastic donut ring through which the rope passes. With the MVP Classic, this rope passes through an eyebolt on each side rail at a point 40" from the head-end of the rails. With the MVP Pro, the rope also passes through two eyebolts on each side of the carriage, which helps equalize the load on each side of the donut ring. As the Shuttle carriage rolls to either end of the track, the donut ring keeps the two ropes from spreading apart. The high



degree of mechanical advantage created by the orientation of the donut ring relative to the ropes provide a soft stop at each end of the carriage stroke with very a small amount of stretching force exerted on the donut ring. If the donut ring ever becomes damaged, it can be easily replaced by removing the T-knobs and sliding on a new donut ring. The donut ring rebound system is designed to snub the carriage movement before the carriage contacts the two large rubber cone bumpers. These two bumpers act as the final stop, although the donut ring stop should engage about four inches before the front edge of the carriage makes contact with the rubber bumpers.

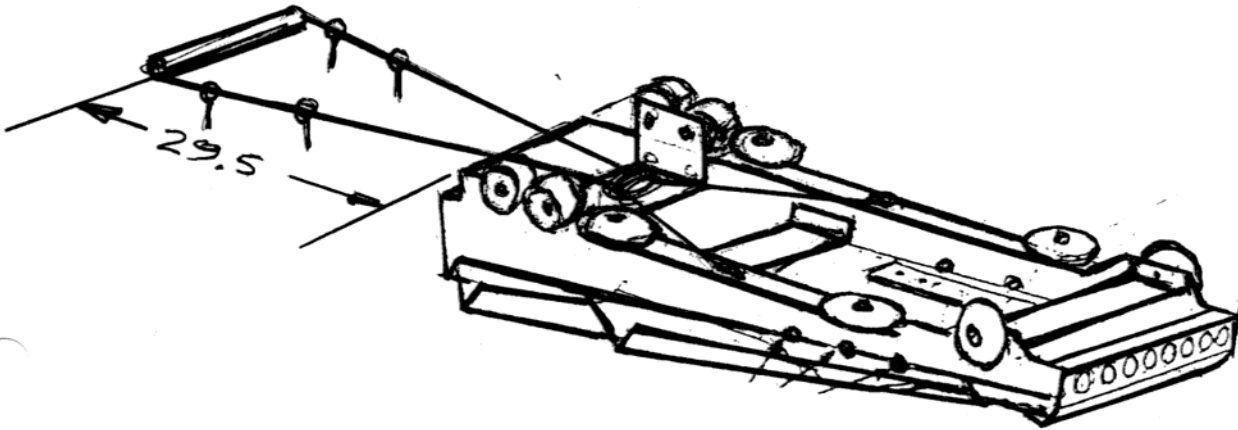
2. ADJUSTING THE REBOUND ROPE (MVP CLASSIC)

The 6 foot long rebound rope assembly with the rebound donut ring in place should just touch the edge of the bend above the Elasticcord attachment nuts on the black plate at the head-end of the Shuttle carriage.

When the carriage is at rest with the donut ring in place, the carriage should stop about four inches from the black rubber cone bumpers at the foot-end of the rail frame.

3. ADJUSTING THE REBOUND ROPE (MVP PRO)

When properly installed on the MVP Pro, the 11.5 foot rebound rope assembly with the rebound donut ring and handle in place should extend 29.5 inches from the lower vertical surface at the head-end of the Shuttle carriage (see figure below). The Shuttle carriage at rest with the ROM handle in the top position and the donut ring in place should stop about four inches from the black rubber cone bumpers at the foot-end of the rail frame.



4. REPLACING REBOUND ROPE

In the event that you adjust or remove the rebound rope and wish to re-install it, follow the instructions below:

1. Attach the anchor ends of the rebound rope to the carriage side rail using the two nylon bushings.
2. Bring the eight-inch end of the rope around the outside of the rear bushing and then "inboard" between the two bushings. It may be necessary to loosen the bolt holding one of the bushings in order to fit the rope between them. Then pull the rope forward around the front of the forward bushing and back through the middle (over the first rope) and tie a knot at the end of the rope.

1.5 SHUTTLE MVP ACCESSORIES

1.5.1 PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION (PNF) PULLEY SYSTEM

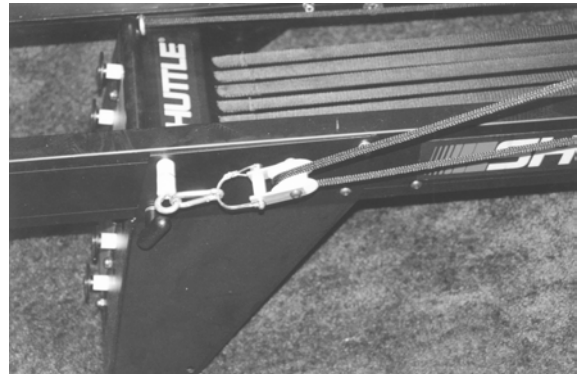
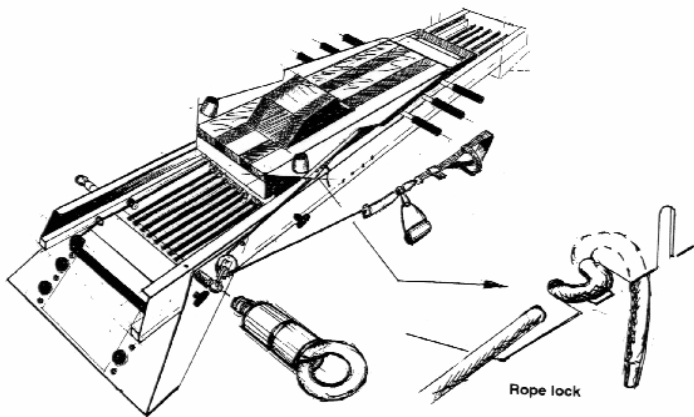
The PNF Pulley System expands the uses of both the MVP Classic and MVP Pro by permitting a variety of upper body exercises and lower extremity stretches. It is especially helpful for upper body rehabilitation.

Parts List:

1. Eyebolts (5/16" x 2") – 2
2. Locking nuts (5/16") – 2
3. Washers (5/16") – 4
4. White plastic bushings (5/16" x 3/4") – 4
5. Pulley assembly with Carabiner – 2
6. 9 1/2 foot black nylon rope with rope disk lock and steel O-ring – 2
7. Set of loop handles with carabiners – 1
8. Set of foot baskets with carabiner – 1

Attachment Instructions:

1. Thread a 5/16" x 3/4" white plastic bushing onto the 5/16" x 2" eyebolt, followed by a 5/16" washer and another plastic bushing, as shown in the figure below left.
2. Thread the eyebolt through the 5/16" hole in the side of the rail above the head-end stand, as shown in the figure below left.
3. Secure the eyebolt to the rail using the 5/16" lock nut provided and tighten.
4. Attach the pulley assembly to the eyebolt as shown in the photo below right.
5. Repeat steps 1 through 4 to attach the other eyebolt to the opposite side of the rails and add pulley assembly.
6. Thread the end of the black nylon rope, without a loop, through the pulley at the head-end and back toward the carriage wing as shown in the figure below left.
7. Thread the same end of the rope through the hole at the head-end of the carriage wing and wrap it through the two slots as shown on the figure below left.
8. Repeat steps 6 through 8 to thread the rope through the pulley and secure it on the opposite side.



Preparation for Use:

1. The unattached end of the black nylon rope has a loop with a steel O-ring.
2. For upper body exercises, snap the carabiner with the loop handle to the O-ring.
3. Using the carriage wing lock system and the rope disk lock, adjust the length of the rope appropriate to the type of exercise the user plans to do.
4. If the exercise requires both arms, repeat step 3 for the opposite side.
5. For lower extremity exercises, remove the loop handle and snap on the foot basket.
6. Using the carriage wing lock system and the rope disk lock, adjust the length of the rope appropriate to the type of exercise the user plans to do.
7. If the exercise requires both legs, repeat steps 5 and 6 on the opposite side.

Note: The carriage wing lock system has quick release capability: simply pull the loose end of the rope straight away from the wing slots.

1.5.2 20" WOBBLE BOARD AND WOBBLE BOARD ADAPTER

Purpose:

The Wobble Board (from Fitter International, Inc.) expands the versatility of the Shuttle MVP by facilitating any number of proprioceptive, balancing, and strengthening exercises for the user in a micro-gravity condition. The Wobble Board adapter attaches the Wobble Board to the kickplate base and allows the board to be moved to any location on the face of the kickplate.

Wobble Boards are ideal for use on the Shuttle MVP. The tri-level design and ease of adjustment allows a variety of slope angles available to the therapist or trainer.

Note: The Wobble Board may be cleaned with soap and water and should be dried thoroughly before using again or storing.

Attachment Instructions:

1. Unscrew all parts of the plastic nose cone on the backside of the Wobble Board
2. Thread the Wobble Board adapter strap on the bolt that protrudes from the center of the Wobble Board.
3. Replace the base of the nose cone and tighten so the adapter strap is secure.
4. Replace the rest of the nose cone parts.
5. Loop the adapter strap around the structural brace on the backside of the kickplate.
6. Secure the adapter strap with the Velcro on the straps.



Adjustment Instructions:

1. Vertical adjustment is made by shortening or lengthening the adapter strap.
2. Horizontal adjustment is made by moving the adapter strap along the lateral structural brace on the back side of the kickplate board.
3. Maximum slope angle adjustment is made by resetting the nose cone segments on the back of the Wobble Board

1.5.3 PROPRIOCEPTION DISK

The proprioception disk expands the capabilities of the Shuttle MVP by providing an unpredictable surface in a micro-gravity condition for proprioceptive, balancing, and strengthening exercises.

Attachment Instructions:

1. Place the proprioception disk cover on its face and insert the proprioception disk and secure the strap
2. Separate the long attachment straps and hold one in each hand.
4. Place the proprioception disk in the desired location on the kickplate with the cover facing out.
5. Wrap the upper attachment strap over the top of the kickplate and secure on the Velcro edges of the kickplate board.
6. Pass the lower attachment strap under the kickplate board and secure to the Velcro edging.



Adjustment Instructions:

Vertical and horizontal adjustments are made by loosening the attachment straps and moving the disk to a new position.

Note: *The rubber cover of the proprioception disk may be cleaned with alcohol.*



1.5.4 LOWER EXTREMITY ISOLATION BELT (LEIB)

The LEIB expands the usefulness of the Shuttle MVP by securing the user to the carriage at the hips, which ensures that the entire compression load is resolved between the hips and the kickplate. This allows the spine to remain unloaded during exercise. The LEIB may be attached at either front or rear points giving either an upward or downward tilt to the pelvis. Being secured to the carriage also frees the hands and arms to perform other tasks, such as catching and throwing a medicine ball or basketball. See section 2.5.2 for usage.



Belt Preparation Instructions:

1. Separate the straps and spread out the LEIB out flat.
2. Take the LEIB in both hands, with the fleece facing the body, and put it on like an apron.
3. Secure the straps across the back by passing them through the O-rings as shown in the photo above right, and press the straps together against the Velcro. The LEIB should fit snug against the body without being uncomfortable

Attachment and Adjustment Instructions:

1. Lie supine on the carriage with the hips close to the kickplate.
2. Hook the security ropes, hanging from the O-Rings on the front side of the LEIB, over the lowest lateral support handle.
4. Move to the desired position on the carriage.
5. Adjust the headrest to the appropriate location.
6. Use the rope disk lock to adjust the security ropes to the proper length. The security ropes should be taut without causing undue stress.

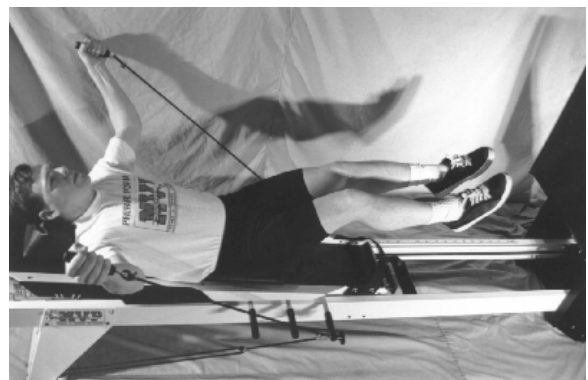


1.5.5 JUMP HANDLE

The jump handle allows the user to train the arms to move upward during jumping exercises. This increases vertical inertia forces, which contributes to an increase in vertical jump heights. The jump handle expands the versatility of the Shuttle MVP by simulating in a micro-gravity condition a full jumping motion with legs and arms. This technique can improve jump techniques on a neuro-muscular and physical level without the potential for injuries that full gravity practice generates.

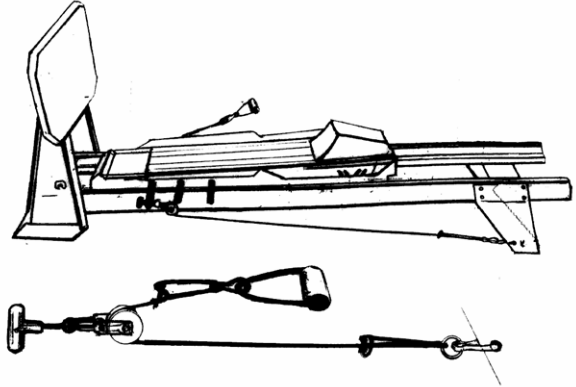
Parts List:

1. Jump handle pulley and eyebolt assembly – 2
2. Lock nuts (5/16") – 2
3. Drilled Lateral handle bar – 1
4. Carabiners – 2
5. Length of black nylon rope (9 1/2 feet) – 2
6. Set of loop handles with carabiner – 2



Attachment Instructions:

1. Remove carriage from rail frame (see Shuttle MVP Cleaning and Maintenance, 1.3, for instructions).
2. Place a large cloth or towel on the floor and set the carriage on the cloth upside down.
3. Loosen the two foot-end 1/4 20 nuts (using a 1/2" wrench) that hold the handle bar retainer plate down and remove the foot-end lateral handle bar.
4. Substitute the drilled lateral handle bar so that it protrudes equally on both sides.
5. Snug the retainer plate down to hold the bars, but leave sufficient room so they can still be twisted.
6. Align the drilled hole in the lateral handle bar so that by peering through the hole from the foot-end of the carriage, you can see the middle lateral handle bar.
7. Tighten all bolts on the retainer plate.
8. Locate the eyebolt on the jump handle rope assembly and remove 5/16" lock nut.
9. Thread the eyebolt through the hole in the lateral handle bar, as shown in the figure above.
10. Secure the eyebolt to the bar using the 5/16" "T" handle and tighten.
11. Repeat Steps 8–10 to secure the jump handle rope assembly to the other end of the lateral handle bar.
12. Attach a carabener to the hole in the lower side plate of the head-end stand as shown in the figure above.
13. Attach the jump handle rope assembly to the carabiner on the head-end stand with the O-ring as shown in the figure to the right.
14. Using the carabiner on the loop handle, snap it to the O-ring on the unsecured end of the rope.
15. Repeat steps 12 through 14 to secure jump handle rope assembly to the head-end stand on the opposite side.

**Adjustment Instructions:**

1. Lie supine in the desired position with both feet on the kickplate.
2. Locate the headrest to a comfortable position.
3. Take the loop handles in each hand.
4. Using both rope disk locks, adjust the ropes to the proper length for the loop handles to be located near the pulley and ready to be pulled upward during the jump sequence.

1.6 SHUTTLE MVP CLASSIC SPECIFICATIONS & PARTS

Shuttle MVP Classic

**PNF Pulley system
Accessory**

(Not included in Classic or Pro package)

Pelvic Stabilization Handles

**Universal
Headrest**

**Padded
Rubber Jump
Surface**

**Eight Elasticcords
@ 25 Pounds Each**

24" x 30" Kickplate



**Danger
Zone**

Pulley Rope Locks

Backrest

Kickplate Base

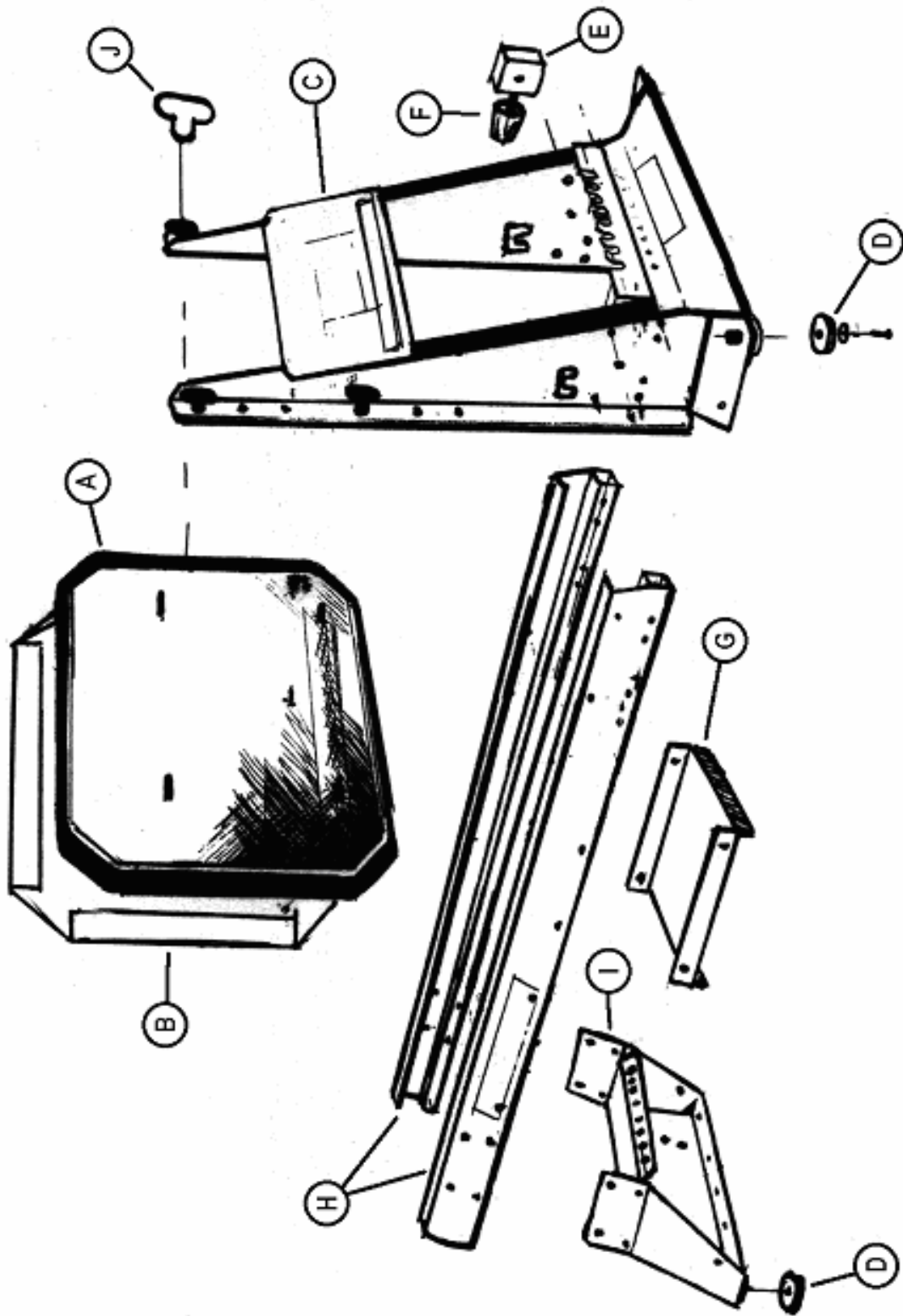
Jump Distance Strip

**Lateral Stabilization
Handles**

1.6.1 MVP CLASSIC FRAME PARTS LIST

PART	PART NAME	CUSTOMER PART #
A	Kickplate Board	
B	Padded Rubber Jump Surface	
C	Kickplate Base Weldment	
D	Rubber Non-Skid Disks	
E	Rebound Blocks	
F	Cone Bumper	
G	Frame Mid-Point Connector Plate	
H	Rails (Right/Left)	
I	Head-End Stand Weldment	
J	Kickplate 1/4 / 20 T-Handle	

1.6.2 MVP CLASSIC FRAME EXPLODED VIEW



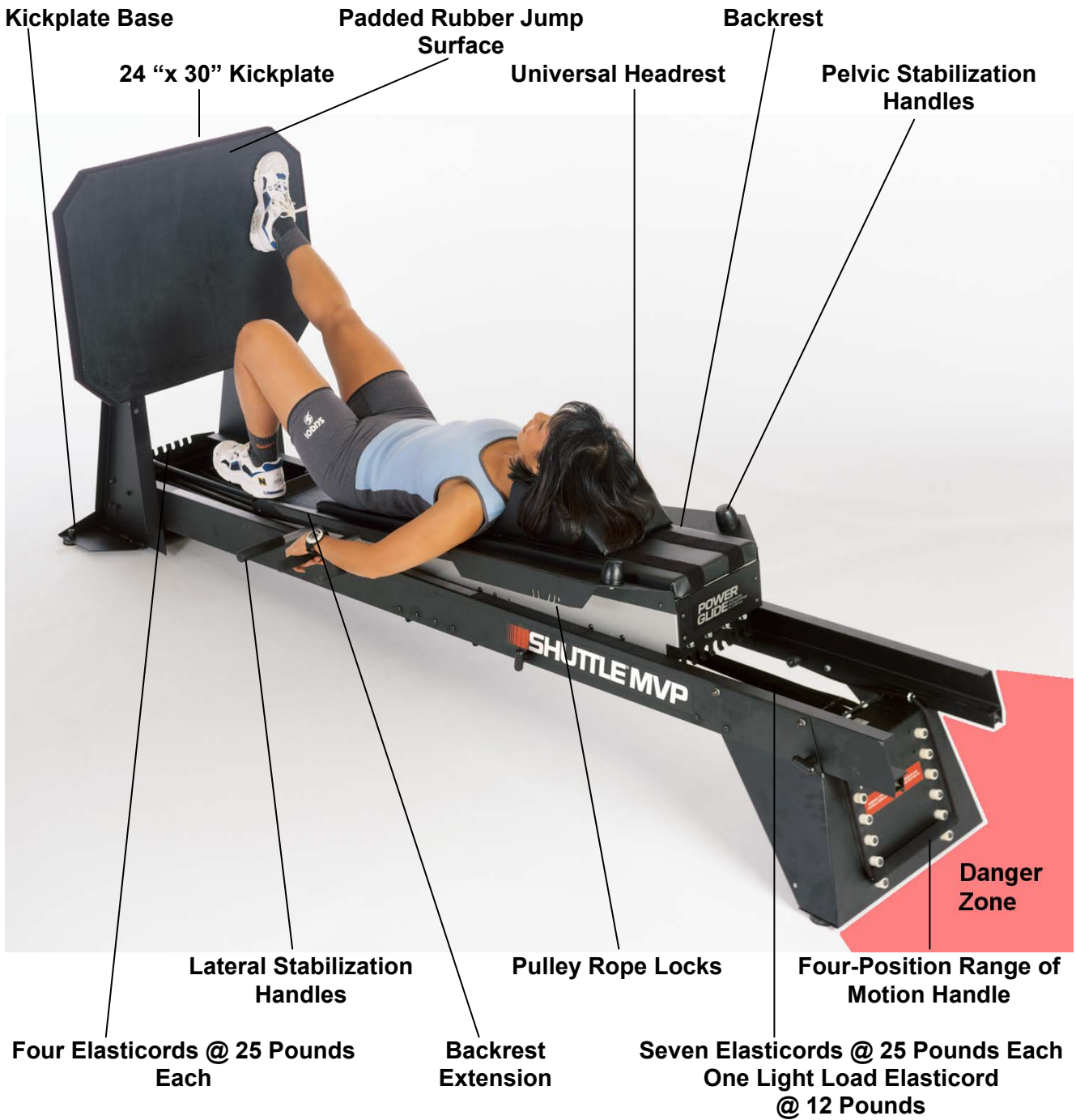
MVP Classic Frame Exploded View

1.6.3 MVP CLASSIC CARRIAGE PARTS LIST

PART	PART NAME	CUSTOMER PART #
A	Main Carriage Frame Side Panel (R/L)	
B	Foot-End Connector Plate	
C	Head-End Connector Plate	
D	Head-End Elasticord Mound Bracket	
E	Head-End Wheel Mount Bracket	
F	Forward and Center Wheel Bracket	
G	Lateral Handle Bar Retainer Plate	
H	Lateral Handle Bar	
I	Lateral Handle Bar Grip	
J	Bumper Bar Doubler	
K	Steel Bumper Bar Angle Bracket (R/L)	
K1	Rubber Bumper	
L	Backrest Assembly	
M	Universal Headrest Assembly	
N	Pelvic Stabilization Knob	
O	Body Support Wings	
P	Head-End Vertical Wheel Assembly	
Q	Foot-End Vertical Wheel Assembly	
R	Lateral Wheel Assembly (2 3/4" dia.)	
R1	Lateral Wheel Assembly (1 3/4" Dia.)	
S	22 MM X 5/16 Ball Bearing	
T	Plastic Footrest Insert	
U	Eight-Hole Elasticord Guide and Footrest	
V	Elasticord with T-Handle (25 lb load)	
V1	Elasticord with T-Handle (12 lb load)	
W	Rebound Rope (70" long)	
X	Rebound Rope Donut Ring	
Y	Rebound Rope Eyebolt (5/16" x 2")	
Z	Rebound Rope Eyebolt T-Handle	

1.7 SHUTTLE MVP PRO SPECIFICATIONS & PARTS

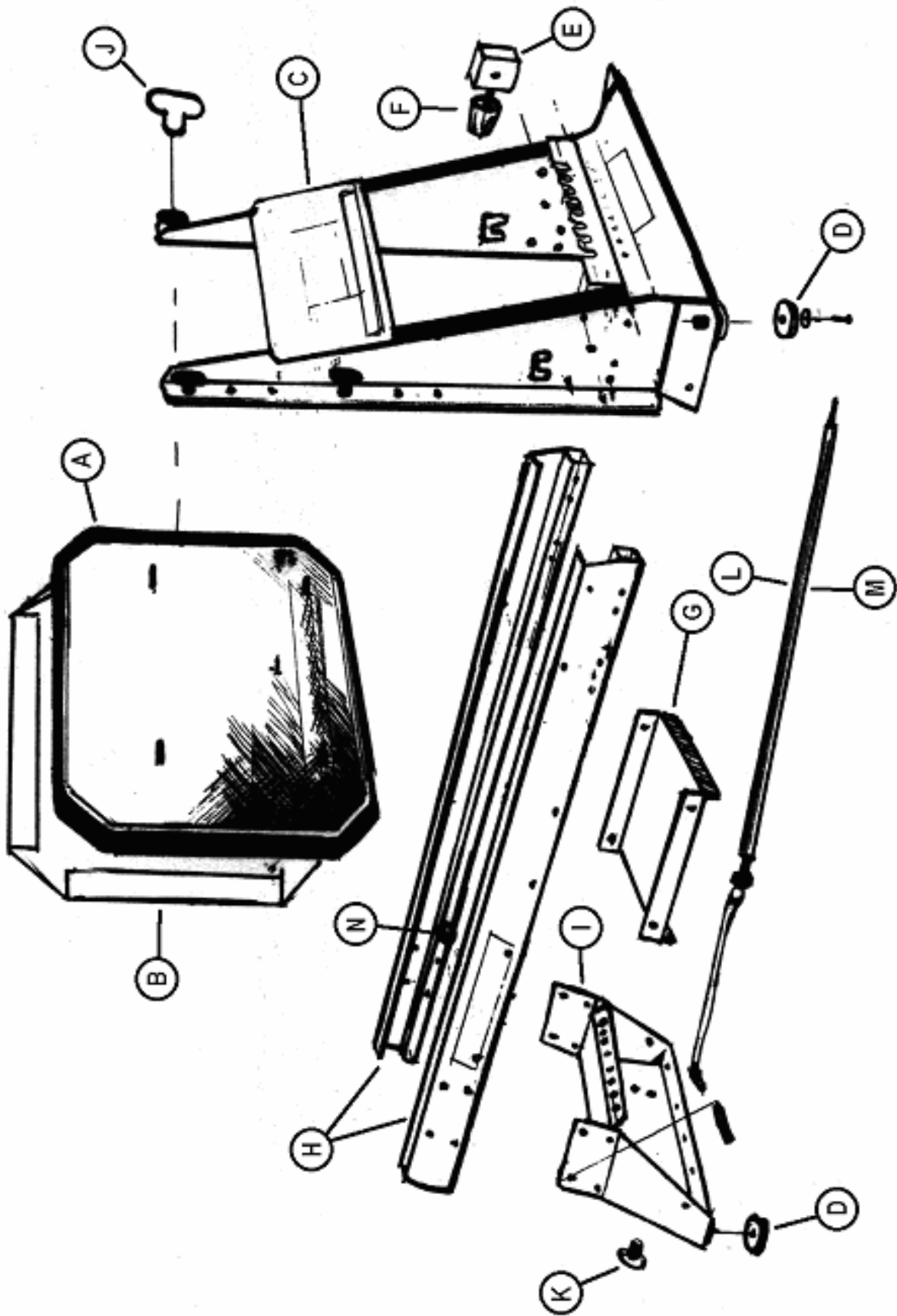
Shuttle MVP Pro



1.7.1 MVP PRO FRAME PARTS LIST

PAR T	PART NAME	CUSTOMER PART #
A	Kickplate Board	
B	Padded Rubber Jump Surface	
C	Kickplate Base Weldment	
D	Rubber Skids	
E	Rebound Blocks	
F	Cone Bumper	
G	Frame Mid-Point Connector Plate	
H	Rails (Right/Left)	
I	Head-End Stand Weldment	
J	Kickplate 1/4 / 20 "T" Handle	
K	Head-End Stand Range of Motion Detent Bolts, Bushings, and Disks	
L	Elasticord with Lanyard (25 lb. load)	
M	Elasticord with Lanyard (12 lb. load)	
N	Rebound Rope Noise Attenuation Loop	

1.7.2 MVP PRO FRAME EXPLODED VIEW

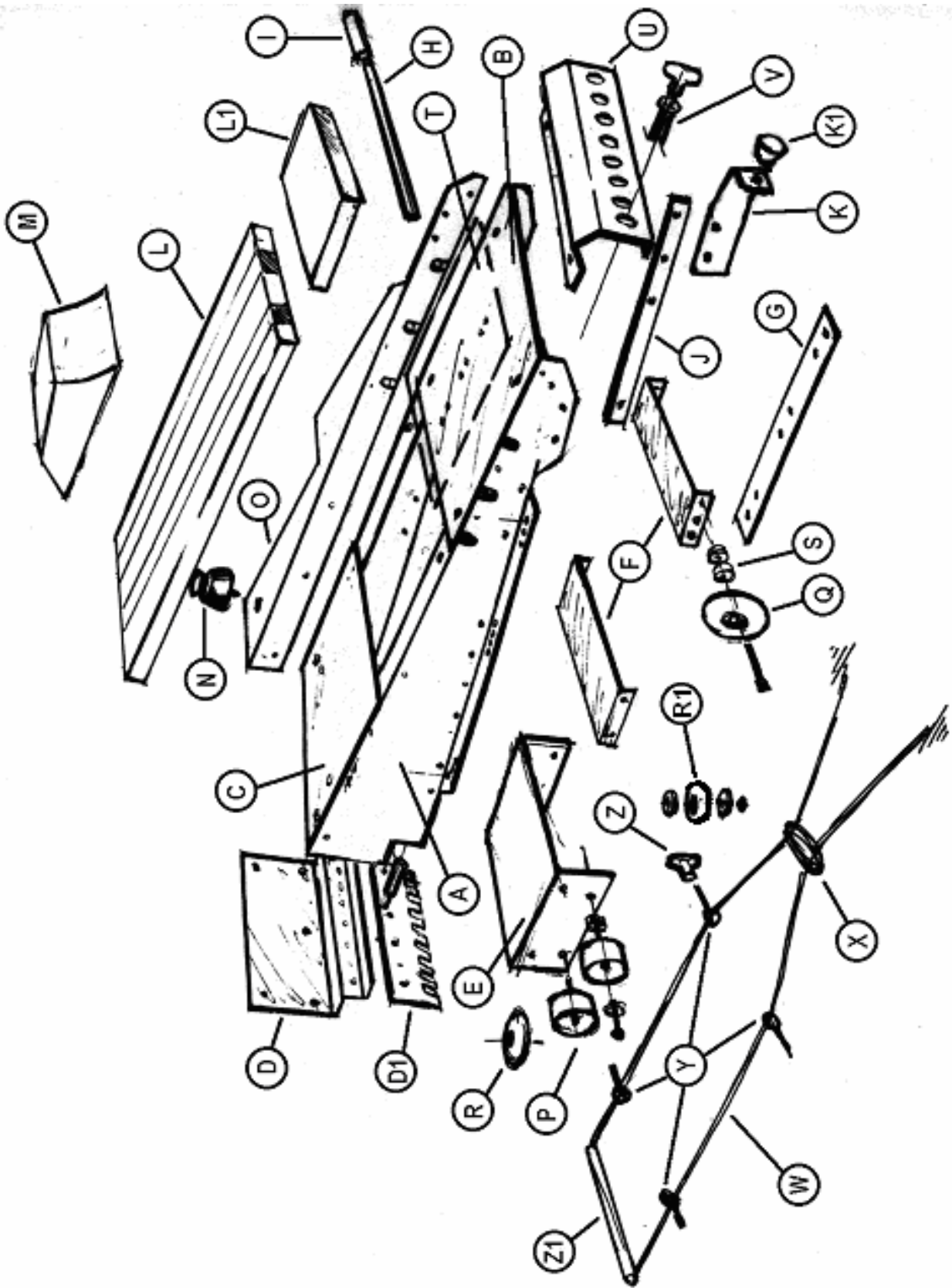


MVP Pro Frame Exploded View

1.7.3 MVP PRO CARRIAGE PARTS LIST

PART	PART NAME	CUSTOMER PART #
A	Main Carriage Frame Side Panel (R/L)	
B	Foot-End Connector Plate	
C	Head-End Connector Plate	
D	Head-End Elasticord Mound Bracket	
D1	Eight-Slot Head-End Elasticord Hook-Up Plate MVP-2	
E	Head-End Wheel Mount Bracket	
F	Forward and Center Wheel Bracket	
G	Lateral Handle Bar Retainer Plate	
H	Lateral Handle Bar	
I	Lateral Handle Bar Grip	
J	Bumper Bar Doubler	
K	Steel Bumper Bar Angle Bracket (R/L)	
K1	Rubber Bumper	
L	Backrest Assembly	
L1	Backrest Extension Pad	
M	Universal Headrest Assembly	
N	Pelvic Stabilization Knob	
O	Body Support Wings	
P	Head-End Vertical Wheel Assembly	
Q	Foot-End Vertical Wheel Assembly	
R	Lateral Wheel Assembly (2 3/4" dia.)	
R1	Lateral Wheel Assembly (1 3/4" dia.)	
S	22 MM X 5/16" Ball Bearing	
T	Plastic Footrest Insert	
U	Eight-Hole Elasticord Guide and Footrest	
V	Elasticord with T-Handle (25 lb. load)	
W	Rebound Rope (11.5' long)	
X	Rebound Rope Donut Ring	
Y	Rebound Rope Eyebolt (5/16" x 2")	
Z	Rebound Rope Eyebolt T-Handle	
Z1	ROM Pull Bar with Rubber Cover	

1.7.4 MVP PRO CARRIAGE EXPLODED VIEW



MVP Pro Carriage Exploded View

1.8 ORDERING PARTS AND ACCESSORIES

To assist you in ordering replacement parts and accessories for your Shuttle MVP Classic or MVP Pro, please refer to the appropriate exploded view diagrams and parts lists on the preceding pages to obtain the part name and customer part number. You may give this information to the Shuttle Systems sales or staff person when placing your order. If you are unclear about which part you need, refer to the diagrams to help you in communicating your needs to our staff.

Please be prepared to include the following details when you order parts:

- Serial number of your Shuttle MVP (the location of the serial number on the MVP Classic and the MVP Pro is on the lower edge of the head-end stand.)
- Part name and customer part number.
- Name, address and telephone number of your facility (the name of a contact person would also be helpful).
- Method of payment (purchase order number or credit card number, including name and expiration)

2.3 ACKNOWLEDGEMENTS

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SECTION 2.0



Using the Shuttle MVP Classic and Pro

2.1 USING THE SHUTTLE MVP

1. GETTING STARTED

Cautions: Consult your physician, trainer, or physical therapist before using the Shuttle.

Read the manual thoroughly before using the Shuttle.

Keep hands free from under the carriage and long hair contained while using the Shuttle.

Keep children and pets at a safe distance.

As with any workout routine, stretching exercises are recommended before you start your workout on the Shuttle MVP. When using the Shuttle MVP for stretching, begin with a 3–6 minute routine using one or two elasticcords and gently work up as your body adjusts. See section 2.3 regarding stretching techniques.

Your heart rate is the measure of how hard you are working. We recommend using a pulse meter to monitor this level. The most accurate pulse meter for a horizontal rebound system such as the Shuttle MVP is a chest monitor rather than an ear or fingertip monitor. This is because the variation of the hydrostatic load in the cardiovascular system induced by the acceleration load of the Shuttle MVP is transmitted to finger or ear monitors. Remember, even the most seasoned athletes find the Shuttle MVP a challenge to use at high resistance settings for extended periods of time.

Both a warm-up and a cool-down are recommended and easily accomplished on the Shuttle MVP by using lower resistance or gently alternating legs every few cycles. After completing your workout routine, you may leave your feet on the kickplate or rest your heels on the top of the kickplate until your pulse rate has returned to normal.

It is recommended that you consult your physician, trainer, or physical therapist before you begin this or any other exercise program. These experts will help you determine your training heart rate range and exercise duration parameters.

DO NOT DO TOO MUCH TOO SOON!

It is common for a person beginning any new exercise program to attempt to do too much too soon. With the Shuttle MVP, we highly recommend that you begin at a lower resistance setting and gradually increase as you become accustomed to using the machine and your fitness level improves.

The following list includes, but is not limited to, those individuals who should refrain from using the Shuttle MVP without a physician's consultation.

- Individuals with severe injuries to the shoulder, neck, lower back, or spine
- Pregnant women
- Individuals with heart or lung complications
- Individuals with a joint that cannot distribute weight sufficiently without compromising the status of the joint (for example, severe joint instability, significantly impaired motor or joint sensory function, or advanced cases of degenerative joint disease)
- Individuals affected by epilepsy or vestibular disorders

A given activity on the Shuttle MVP should not be performed if the activity:

- Causes pain.
- Results in swelling.
- Causes undue apprehension on the part of the patient.
- Requires abnormal movement patterns.

INSTRUCTIONS FOR CHILDREN:

To prevent accidental injury, children should be instructed to:

- Never play on the Shuttle.
- Use the Shuttle only under adult supervision.
- Stay clear of the Shuttle when others are using it.

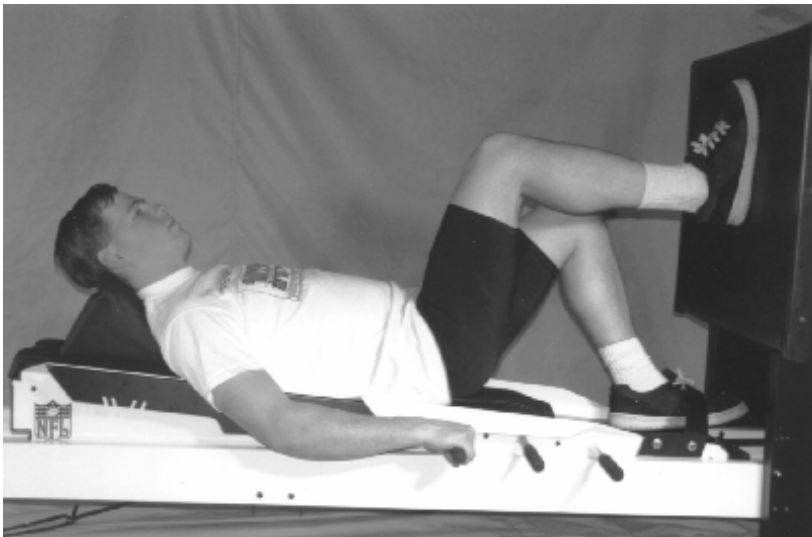
In addition, pets should always be kept clear of the Shuttle when in use.

2.2 BODY FORM AND TECHNIQUE

1. BACK PLACEMENT

Keep the spine pressed flat against the backrest by slightly tilting the pelvis upward while flattening, or elongating, the abdominal muscles. You might imagine a magnet pulling your abdomen and lower back comfortably down onto the backrest.

When you are doing exercises with only one foot on the kickplate, move the uninvolved leg back toward the chest or place that foot on the footrest of the Shuttle carriage to decrease any stress on the lower back. This position also helps to stabilize the pelvis.



2. FOOT PLACEMENT

Lie down on the Shuttle carriage with your head resting comfortably on the headrest. Place the feet parallel and shoulder-width apart on the kickplate. By raising or lowering the position of the feet on the kickplate you can determine the initial ankle, knee, and hip degree of flexion. The lower the feet on the kickplate, the larger the degree of flexion at the knee and ankle.



3. SQUATS

When doing squats, keep the spine and lower back pressed flat against the backrest with the pelvis tilted slightly upward. When pressing head-ward into full leg extension, be careful not to snap your knees into a locked or hyper extended position. Concentrate on executing a smooth motion and keeping the knees aligned with the feet. Avoid twisting at the knee or bending the knee past 90 degrees.

4. JUMPING

When doing any jumping or plyometric exercises, keep the spine pressed flat against the backrest and the pelvis tilted slightly upward. Absorb the load of deceleration on returning to the kickplate by using the legs rather than the Shuttle's built-in stop system, which will jolt the body. To do this, mentally mark the angle of ankle and knee flexion at the starting position. When you jump away from the kickplate, the legs and hips should be fully extended and the toes pointed. When the feet make contact with the kickplate on the return, absorb the initial load into the ball of the foot, bend the knees, and rotate the foot to the heel as you "descend" into the kickplate. As long as the legs are more extended than they were in the starting position, the legs will be absorbing the load. Concentrate on keeping the knees aligned with the feet, shoulder-width apart. (See Plyometrics, 2.4, for more details about jumping exercises.)



2.3 INTEGRATED TECHNIQUES

1. STRETCHING TECHNIQUES

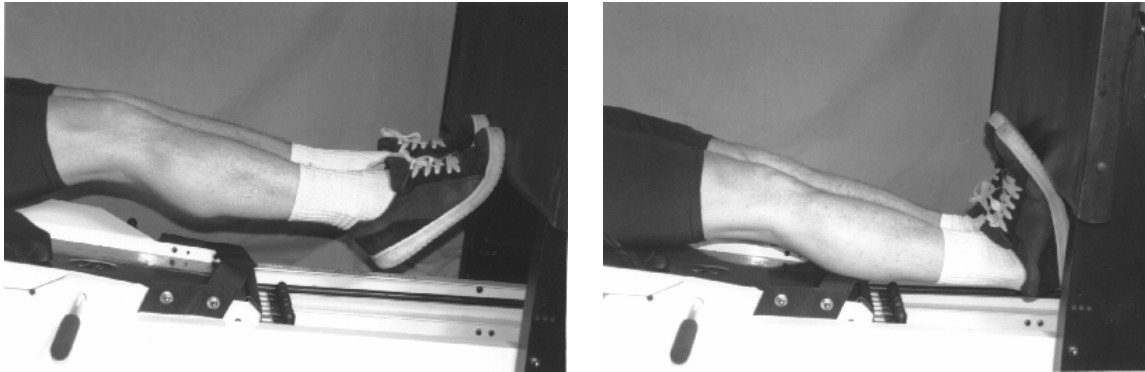
Flexibility is a critical component of any successful physical performance, whether in simple daily activity or athletic competition. It also helps prevent injury and increase the overall power of the athlete. Greater flexibility increases the range of motion of a given joint by increasing the extensibility of the musculotendonous junction responsible for joint articulation.

The Shuttle MVP can be used for stretching within the limits set by the nature of an injury or of the activity for which an athlete is training. Typical stretching activities include:

- Ballistic stretching (repetitive bouncing).
- Static stretching (stretching a muscle or tendon to the point of discomfort and then holding it at that point for an extended period of time).
- Proprioceptive Neuromuscular Function (PNF) stretching (alternating contractions and stretches).

HEEL CORD STRETCH

Place the feet parallel and shoulder-width apart on the upper area of the kickplate and fully extend the legs. Slowly walk the feet down the kickplate until the heels are hanging unsupported beneath the bottom edge of the kickplate. Keep the ankles relaxed and “neutral” with the weight equally supported on the balls of both feet.



Gently push the heels toward the foot-end of the Shuttle until you feel a stretch.

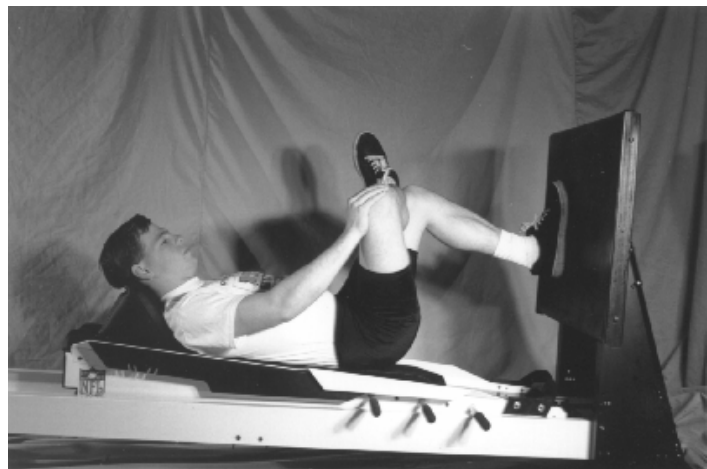
Hold for 5–10 seconds and return to the neutral starting position. Perform 5 sets. Rest for 30 seconds between each set.

VARIATIONS:

- After starting at a slow speed, gradually increase the speed of the return to the neutral position.
- Gradually increase the speed of pushing the heels toward the foot-end of the Shuttle.
- Shift the weight from one foot to the other until you're using one leg at a time.
- Gradually increase resistance, repetitions, and sets.
- Gently jump off of the kickplate with little jumps (approximately two inches of travel along the track) and minimal load. Be sure to bend the knees slightly on impact.

PIRIFORMIS STRETCH

Move the carriage and/or the headrest as close as comfortably possible toward the kickplate. The more flexible the individual, the closer the position can be toward the kickplate. Place both feet up on the kickplate, shoulder-width apart, and extend the legs. Keeping one foot in place on the kickplate, cross the other ankle over the extended leg so that the outside of the ankle rests just above the knee. The crossing knee should point outward as much as possible as the hip rotates externally. While maintaining a natural lordotic curve, gradually flex the extended leg until you feel a stretch in the lower buttocks region. Hold for 5–10 seconds and return to the starting position. Repeat the stretch 5 times. Repeat on other side.

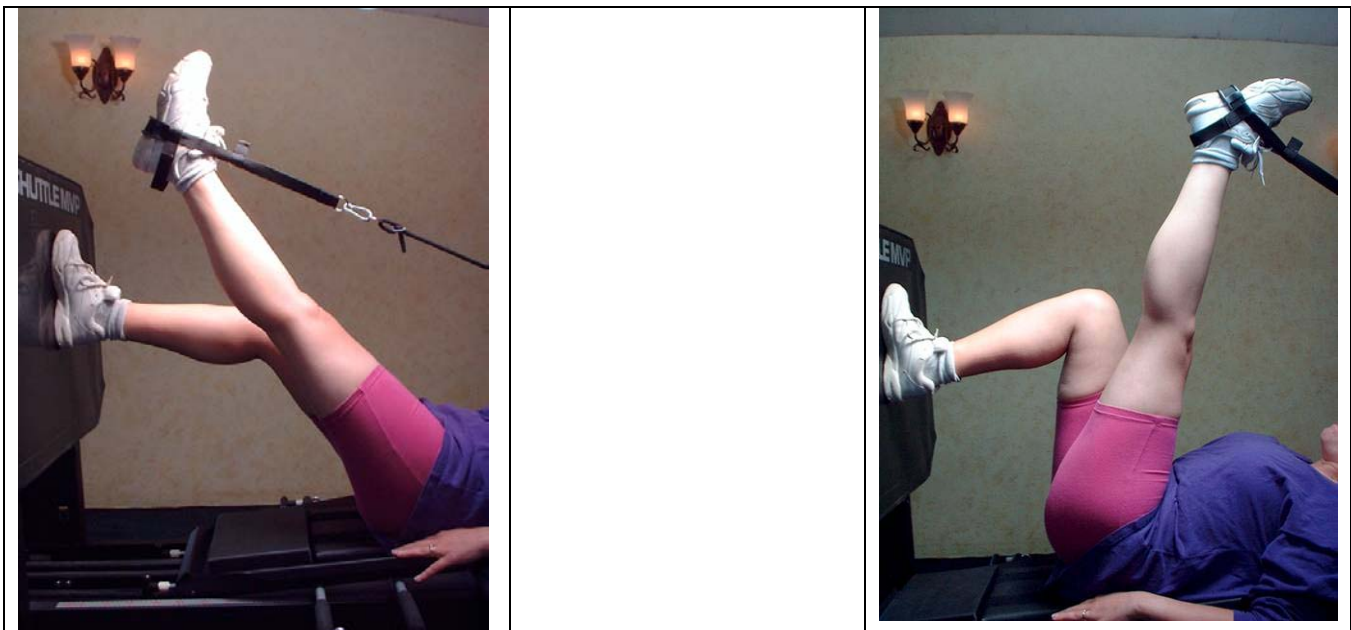


HAMSTRING STRETCH

This stretch requires the PNF pulley system accessory and the attachment of 1–3 elasticcords. Position the headrest so that you can hold a 90-degree flexion angle at the knees and hips. Keeping both knees bent, place one foot in the stirrup of the PNF pulley system and leave the other foot flat on the kickplate.

Now slowly extend the kickplate leg while raising the other foot in the stirrup up toward the ceiling until that knee is straight. (You may need to take up slack in the rope connected to the stirrup using the aluminum rope lock.) You can control the hamstring stretch of the leg in the stirrup by slowly bending the other knee. To increase stretch control, you may also attach the handle assembly to the O-ring of the foot stirrup and gently pull down on the handle. Be sure to keep the hips square and the back flat on the backrest. Hold for 10–15 seconds and release. Repeat 5 times with each leg.

You may ask a therapist about the contract/relax method of stretching. In this method, the patient first pushes the antagonist muscle isotonically against the resistance of the therapist. The patient then relaxes the antagonist muscle while the therapist moves the limb passively through as much range of motion as possible to the point where limitation is felt. If you increase the Shuttle resistance so the carriage won't move, when the patient lowers and raises the leg, then the hamstring will either contract or relax. You can also increase the hamstring stretch by using the handle on the stirrup to pull down on the rope.



BENT KNEE STRETCH FOR THE SOLEUS

Attach 2–3 elasticcords. Position the lower back as close to the foot-end of the backrest as possible, and, bending at the hips, draw the knees into the chest. Place one foot on the upper part of the kickplate. Press back, extending the leg. Now place the other foot toward the bottom edge of the kickplate. The feet should be shoulder-width apart and parallel, with approximately one shoe length between the heel of the upper foot and the toes of the bottom foot.

Keeping both feet flat on the kickplate surface, bend both knees. As you slowly return toward the kickplate, you will feel a stretch in the soleus of the lower leg. The gastrocnemius should stay relaxed. Hold for 30–40 seconds and repeat three times. Reverse legs and repeat.

2. STRENGTHENING TECHNIQUES

Below you will find some basic strengthening techniques using the Shuttle MVP (Classic and Pro models). It is possible to modify these exercises to suit a wide range of individual treatment and training goals, as many of the exercises have multiple applications. For example, a squat can be performed either to strengthen the lower extremities or to assist with pelvic stabilization for the back.

Warning: *These exercises may be harmful if done with too great of a load or intensity.*

FUNCTIONAL CLOSED CHAIN MOTION

The Shuttle MVP has become an integral part of closed chain therapy. Closed chain motion occurs when both the proximal and distal bone segments are fixed, and there is movement on both sides of a given joint. In other words, when performing a squat or other exercises on the Shuttle, the feet remain in contact with the kickplate. The bone segments on either side of the joints move as the joints extend and bend. This form of exercise is “functional” in the sense that most of our daily activities involving the lower extremities are done with our feet in contact with the ground.

The advantages of closed chain exercises on the Shuttle MVP include the following:

- Exercises for an unstable joint can be performed more safely with the feet in contact with a stable surface. The inherent stability of the joint is greater when it is in a weight-bearing position as opposed to being unsupported and free to move.
- Closed chain activities stimulate mechano-receptors responsible for the joint’s sense of proprioception.
- There is greater muscle activity through muscle co-contraction around the joint than in open chain movements.

BASIC QUAD STRENGTHENING

Attach the number of elasticcords that level of injury and conditioning will allow. Place your feet on the kickplate, parallel and shoulder-width apart, and flex 90 degrees at the hip, knee, and ankle.

Extend the knees, sliding the carriage head-ward away from the kickplate. Be careful not to lock or hyperextend the knees. Slowly return to the starting position.

As strength and conditioning improve, you can gradually increase the degree of initial flexion by lowering the position of the feet on the kickplate or by positioning the body on the backrest closer to the



kickplate. If one leg or one side of the body is weaker than the other, the stronger one will compensate until the weaker improves.

Perform three sets of 10–15 reps. Gradually increase the load and range of motion.

VARIATIONS

- After beginning with bilateral (double-leg) squats, progress to unilateral (one-leg) squats.

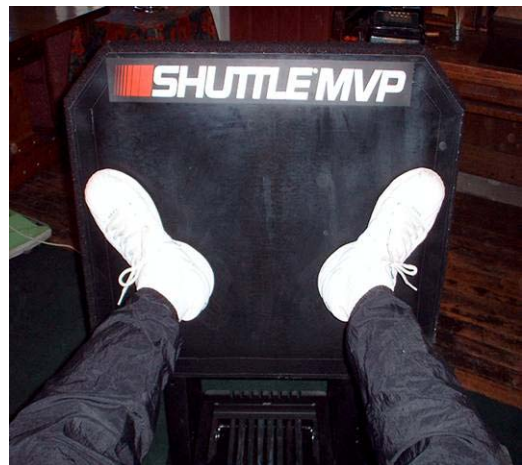
BALL SQUATS FOR VASTUS MEDIALIS (VMO)

Place a 6–8 inch rubber ball between the knees. Keep the ball from rotating while doing squats. Any compensation or favoring of one leg over the other will show up as a rotation of the ball.

SQUATS WITH FEET TURNED OUT

Place each foot on the outside edge of the kickplate. Turn the feet outward by externally rotating from the hips and tucking the buttocks under. Do squats while keeping both feet in contact with the kickplate and both knees in line with the feet.

This exercise strengthens the adductor muscles. The degree to which the feet may be safely turned outward is related to each individual's ability to keep the knees aligned with the feet and to the height at which the feet are placed on the kickplate.



DEEP SQUATS

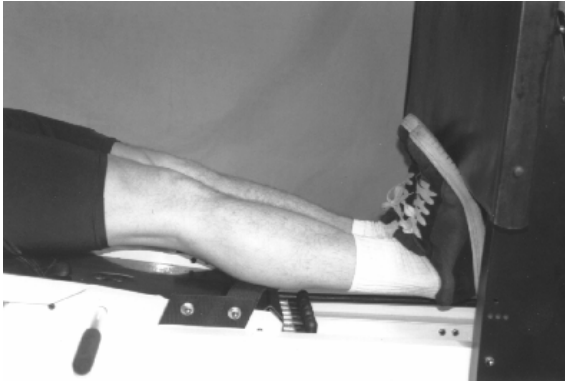
Pull the hips as close to the kickplate as possible. Place the feet flat on the kickplate, parallel and shoulder-width apart. Press and extend the legs while lifting the toes slightly. Feel the work on the quads.



TOE RAISES WORKING THE CALF

Place the feet, parallel and shoulder-width apart, on the middle area of the kickplate and fully extend the legs. Then walk the feet down the kickplate until the heels are hanging unsupported beneath the bottom edge of the kickplate surface. Ankles should be neutral and relaxed, and the weight equally supported by the balls of both feet. Rise up on the toes, then lower the heels back to the starting position.

This exercise is for strengthening the calves. Perform three sets of ten repetitions with a 30-second rest between each set.



VARIATIONS:

- Shift the weight from one foot to the other until you're using just one leg at a time.
- Gradually increase resistance, repetitions, and sets.
- Combine toe raise and heel cord stretch to form a complete range of motion.

EIGHT- INCH BALL TOE GRAB

Place a small rubber ball on the kickplate and hold it in place by utilizing the muscles of the foot. Set the load relative to the ability of the user. This will work the muscles in the foot, ankle, and calf.



DEEP SIDE PRESS

Lie on your side and move toward the kickplate, keeping your upside leg raised, extended, and in contact with the kickplate. Keep your opposite leg flat on the kickplate surface, bending at the hip and knee.

The foot in contact with the kickplate will be forced into dorsiflexion. Tuck the lower leg up comfortably out of the way. If necessary, place pillows under the waist and head for comfort.

Propel the Shuttle carriage through a series of complete strokes. End each stroke with the raised leg straight and the foot in plantarflexion. The Elasticord load may be quite low since the primary function of this drill is to evaluate movement form.



PELVIC LIFT AND THRUST

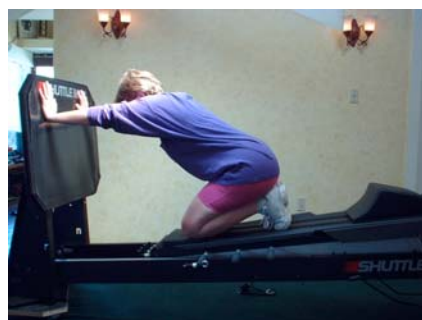
Lying on the backrest, place one foot on the carriage footrest and the other on the kickplate. Press down on the carriage handles with the arms and lift the buttocks. With the buttocks raised, perform either closed chain exercises with the foot remaining on the kickplate or propel your self off the kickplate surface in a plyometric variation. (See section 2.3.4)



BILATERAL HIP EXTENSION

Kneel on the backrest facing the kickplate while keeping the back straight, arms outstretched, and elbows locked.

Propel the carriage along the rail away from the kickplate by opening the angle at the hips and knees. Keep the back aligned and straight above the waist. This exercise is for core strengthening and should be done in a slow, controlled manner.



FORWARD BILATERAL HIP EXTENSION ON A PROPRIOCEPTION DISK

This exercise is similar to the one above, with the addition of the Proprioception Disk. Place the disk on the carriage backrest, and kneel on the disk facing the kickplate. Keeping the back straight, support the torso by placing one outstretched hand, with the elbow locked, on the opposite, outer top edge of the kickplate. Place the other hand either on this outer edge of the kickplate or on the hip.

Propel the carriage along the rail by opening the angle at the hips and knees. Keep the back aligned and straight above the waist. Reverse the position of the hands to the other side of the kickplate and repeat.

Do this exercise in a slow, controlled manner. The eccentric loading (returning towards the kickplate) will require (and increase) core stability to maintain correct body alignment.



While sitting cross-legged on the carriage with the arms straight, press against a theraball with one or both hands. Work the arms up and down or side to side, work the wrists and fingers against the ball. Do scapular stabilization drills (squeezing your shoulder blades together) against the theraball. Plyometrics or push-ups may also be done against the theraball.

FORWARD UNILATERAL HIP THRUST

Facing the kickplate, bend at the waist and place one shoulder against the kickplate. Keep one foot on the ground with a slightly bent knee. Press the other foot against one of the lateral carriage handles. Thrust this leg backward, pushing the carriage out along the track.

While keeping the grounded leg and upper body stable and the spine straight, perform concentric (pressing back) and eccentric (returning forward) motions. Stop the carriage before it reaches the built-in rebound stop at the kickplate end of the carriage.

See 2.3.6 ([Sports Specific Training Techniques](#))



REVERSE UNILATERAL HIP THRUST

Kneel on the carriage backrest facing away from the kickplate. Place the hands on the pelvic stabilization handles near the head-end of the carriage and leave one knee resting on the backrest. Lift and extend the other leg toward the kickplate until the foot presses against the kickplate surface. Flex and extend the knee of this raised leg while maintaining a balanced torso. Reverse legs.

This exercise builds kinesthetic awareness and strengthens the pelvic structure while working the quads, gluts, abdominals, and lower back muscles. You may simulate a sprinter stance to imitate bursting out of the starting blocks. This may also be done using a rubber ball or Proprioception Disk in an advanced version of this exercise.



In addition, you may hold this exercise in the extended position for 5 – 60 seconds to develop core and spinal stabilizer muscular endurance. Alternate right and left sides of the body, while holding the opposite arm and leg parallel to the floor.

REVERSE UNILATERAL HIP THRUST WITH PROPRIOCEPTION DISK

This exercise is similar to the previous one, with the addition of the proprioception disk. Place the disk on the carriage backrest and kneel on it while facing away from the kickplate. Hold onto the pelvic stabilization handles with both hands. While leaving one knee on the disk, lift and extend the other leg toward the kickplate until the foot presses against the kickplate surface. Flex and extend the knee of this raised leg while maintaining a balanced torso. Reverse legs.

This exercise aids in balance, core strengthening, and pelvic stabilization, while strengthening the quad, gluteus, abdominal, and lower back muscles.



SWISS BALL HIP THRUST

Kneel on the Shuttle carriage backrest and place a Swiss ball under the abdomen. Place one or both feet on the kickplate. Perform a controlled press while balancing on the Swiss ball. Alternate exercise with either right or left arm extended.



3. PROPRIOCEPTION TECHNIQUES

Proprioception is the awareness and control of one's body in space. Specifically, it refers to the ability of a person to direct the movement of a particular limb to a predetermined point. The following exercises offer a variety of ways to use the Shuttle MVP to improve proprioception.

LATERAL JUMPING

Keep the spine pressed flat against the backrest with the pelvis tilted slightly upward. Always absorb the load of deceleration upon returning to the kickplate by using the legs rather than the Shuttle's built-in stop system, which will jolt the body. As you jump away from the kickplate, extend the legs and hips fully and point the toes. When landing, aim for a predetermined point on the kickplate. As soon as the feet make contact with the kickplate on the return, bend the knees. Absorb the initial load into the ball of the feet and then descend, rotating the feet back toward the heels. As long as the legs are more extended than they were in the starting position, the legs will be absorbing the load.

VARIATION

- Perform a one leg jump. Vary the location of the landing from the take-off. You can put tape or chalk marks on the kickplate surface to serve as targets. Concentrate on landing properly at a predetermined sequence of targets. Rotate legs.

WOBBLE BOARD

The Wobble Board is useful for developing strength in the ankle and lower legs. It can be attached to the kickplate surface in a variety of positions. See section 1.5.2 for more attachment instructions. By placing one or both feet on the Wobble Board as you do leg presses, early increases in proprioception can begin. Exercises using the Wobble Board can be done while remaining in contact with it or while doing light load jump drills.



PROPRIOCEPTION DISK

Like the Wobble Board, the proprioception disk can be moved and secured anywhere on the kickplate surface (see Section 1.5.3 for attachment instructions). The disk offers another alternative to build stabilization in the ankle joint during proprioception drills.



WOBBLE BOARD COMBINED WITH A BALL

By combining a small ball placed between the knees with a wobble board on the kickplate, it is easy to compare muscle strength from one leg to the other. A weak leg will lag behind and thus cause the ball to roll. Properly done with both legs of equal strength the ball will not roll.



THERABALL APPLICATIONS

A theraball may be used for both legs from a supine position. With the legs straight and your back flat against the back rest and holding on to the lateral handles securely, roll both legs from side to side, up and down, or twisting at the waist. This works the obliques, external stabilizers, abdominals, hamstrings, hip flexors, and hip abductors.



Continue to roll the ball up the kickplate with the legs straight while keeping your back on the back rest until your legs are vertical to your torso. Roll your legs down the ball to the horizontal extended position. This becomes a strength exercise working the hamstrings, gluts, external stabilizers.



VARIATION

This drill may be accomplished using one leg through full range of motion, up and down or side to side. In addition, this application can be used as a passive – assisted hamstring stretch by gently rolling the ball up the kickplate.



SEATED UPPER BODY CHEST PRESS WITH A SWISS BALL

Upper extremity strengthening is obtained by stabilizing the trunk and locking the shoulders, while working through bilateral scapular protraction and retraction on an unstable theraball platform. Roll the ball up and down and side to side or rotate the ball clockwise and counter clockwise while maintaining a vertical body alignment. It may be done as a light chest press without elasticcords or with a load. A plyometrics exercise from this position may be done as well. See section 2.3.4.

This exercise provides upper extremity and core strengthening, and works scapular stabilizers as well as chest muscles. The use of a larger theraball increases the upper extremity reach for shorter and younger users.



VARIATION

This exercise may be performed with a smaller ball and or with one arm.



SIDE SITTING PROPRIOCEPTION DRILLS WITH THERABALL

While sitting on the carriage backrest, stabilize the torso with one arm extended to a theraball. Control the torso and forearm muscles while working the arm up and down and side to side. Perform arm oscillations up and down or side to side for a varied effect.

This exercise works and strengthens the scapular stabilizers, shoulder and core muscles.



2.3.4 PLYOMETRIC TECHNIQUES

Power and control are the ultimate goals in nearly all athletic endeavors. Plyometrics is a proven technique used to achieve these goals. The principle is simple. In response to rapid loading or stretching of a muscle, a subsequent powerful muscular contraction occurs. This reactive change within the neuromuscular system can be conditioned, through plyometric exercise, to facilitate faster and more powerful changes in the direction of movement.

Plyometric training is used to increase the overall power output of a particular muscle. This is achieved by decreasing the time between the concentric (shortening) and eccentric (lengthening) phases within the stretch/shortening cycle of a particular muscle. In conjunction with the strength of the muscle, the power output of the concentric contraction is increased. Another way of describing this relationship is:

$$\frac{\text{FORCE X DISTANCE (RANGE OF MOTION)}}{\text{TIME}} = \text{POWER}$$

The Shuttle MVP is an ideal tool for sports-specific, plyometric training. The horizontal positioning and body weight support allows for greater total quantity of exercise within the plyometric sessions, more accurate speed and sports-specific exercises, and greatly reduced potential for injury.

Moreover, the horizontal position makes it easier for the cardiovascular system to work in support of the plyometric activity, because it supports better blood return to the heart, thus achieving more efficient payback of the oxygen debt created by anaerobic plyometric activity. By supporting the body weight, the Shuttle also minimizes stress on joints and in conjunction with the Elasticord bands allows for more appropriate speed control and “overspeed” training. In fact, the Shuttle’s ability to enhance the speed of muscular contraction is one of the features that make it unique. Sports-specific movement skills are also easier to refine with the controls available using the Shuttle. Finally, the kickplate vantage point affords the coach an excellent view for skill correction.

Whether the Shuttle is being used for rehabilitation following an injury or for performance enhancement of a fit athlete, the Shuttle MVP provides a safe, micro-gravity environment in which to execute plyometric exercises

Note: *The plyometric exercises outlined in this section are to be executed with maximum effort while avoiding any jarring or unnecessary impact with the rebound stops located at the head-end and foot-end of the rail. The resistance of the elasticords should be set initially to minimize the stress of impact to the shoulders at the head-end of the stroke. Conversely, the stress of impact at the foot-end of the stroke should be absorbed by the active leg(s), through controlled contact with the kickplate as the user returns to the foot-end of the stroke, before the carriage reaches the rebound stops.*

PREPARING FOR PLYOMETRICS

The following are recommended guidelines for determining one’s ability to do plyometrics exercises on the Shuttle MVP. You may choose a preparatory program of closed chain exercises for several weeks before starting a plyometrics training program.

LOWER BODY PLYOMETRICS

As a general guideline, before starting plyometric training you should be able to push your body weight on a leg press, jump rope for 30 seconds continuously, and perform a horizontal jump from a standing start a distance equal to your body height.

UPPER BODY PLYOMETRICS

The ability to perform five military push-ups is a reasonable guideline for readiness to commence upper body plyometrics.

GENERAL RULES TO FOLLOW

In plyometrics, the progression factor is of extreme importance, as is the placement of the plyometric section within the context of the overall workout. Warm-up prior to plyometric drills is essential. The plyometric component should also not be placed at the very end of a training session as muscles may already be too fatigued. For maximum benefit, rest at least one day between plyometric sessions. Overweight users should also be especially careful when adding plyometrics to a workout routine.

Warm up thoroughly (see section 2.3.4) by using closed chain exercises on the Shuttle MVP or by riding a stationary bike followed by low-level plyometric drills and stretching. You are now ready to start more vigorous plyometric activity on the Shuttle. The number of sets and repetitions will depend largely on your fitness level and sports-specific needs.

For most beginners, 3–4 sets of plyometric exercises of about 30 seconds each, is adequate for the first session. Rest between sets as needed. Progression over the next few workouts might include a lengthening of time for each set followed by a successive increase in the intensity of the workouts. Once the basic technique of using the Shuttle for plyometric training and the overall level of conditioning has been achieved, you are ready to start more sports-specific routines. After each plyometric session, finish with stretching while the muscles are warm. This is an opportune time to improve flexibility.

Caution: *If you do too much too soon, it can lead to muscle injury or tendonitis. If you have any discomfort within two hours after training, you have done too much. Decrease the intensity of your next session.*

PLYOMETRIC SETTING ON THE MVP PRO

The ROM handle should always be kept in the top position when performing plyometric exercises on the MVP Pro, both for soft plyometrics or the more aggressive variety. This setting provides the user with a full stroke length of 48 inches. Stop before hitting the donut ring stop. The donut ring rebound system is designed to provide a soft stop, even for the most aggressive plyometric drills. However, in the event an overrun of the rebound system does occur, the MVP contains a fail-safe backup system of foot-end cone bumpers that provide a solid end to carriage travel.

Warning: *Never attempt to move the ROM handle while the MVP is in use, as the handle may move too quickly to control.*

PLYOMETRIC DRILL PROTOCOLS

Plyometric drills for increasing jump height are generally done in five 30-second intervals, with an increasing then decreasing pyramid style of load. For example, after starting with two elasticords in the first interval, you would then use three, then four, then three again, and finally back to two. Perform a series of short, ballistic jumps using the ankles, knees, and hips in a coordinated, intense, controlled drill.

When landing, the knees should be slightly bent and directly over the balls of the feet. Keep the feet shoulder-width apart and allow the ankles to rotate backward distributing the impact to the heel. As soon as the heels make contact with the kickplate, instantly recoil and make the next jump. Between workout sessions, muscles should be allowed to rest for a day.

Controlled studies have shown jump height increases of up to 6 inches and response time improvements from 120 milliseconds to 70 milliseconds using plyometric techniques on the Shuttle MVP. These techniques can be directed to specific sports; for example, double-leg jumps for volleyball and basketball, single-leg jumps for long jump, high jump, or sprinting. Jump technique variations range from short ballistic jumps, which predominantly stress the ankles, to greater depth jumps with much deeper flexion of the knees and hips. Other variations

include isolating a particular component of a sports skill movement to correct a problem, such as an inappropriate foot strike. This kind of correction can contribute to the overall improvement of an athlete's performance.

IMPROVING SPEED

The combination of alternating feet and decreasing foot contact time on the kickplate while involving the hips, knees, and ankles equally in a kinetic chain can be important factors in improving speed.

OVERSPEED PLYOMETRICS

Add several elasticcords and perform high speed running drills on the kickplate. Bring the knees up to the chest as high as possible while still holding the carriage position constant during your high speed running drill. Gradually decrease the contact time with the kickplate while keeping the back flat on the Shuttle carriage. The faster the movement, the more the carriage will stay in one position.



UPPER EXTREMITY PLYOMETRICS

Due to the proximity of the backrest relative to the kickplate surface, upper body plyometrics are best done with the aid of a theraball on the Shuttle MVP.

UPPER EXTREMITY PLYOMETRIC DRILLS WITH A THERABALL

While seated keep the back and abdominals rigid and perform upper body plyometric drills off the kickplate. Either use no load or add load as your ability dictates.



2.5 ATHLETIC DEVELOPMENT TECHNIQUES

AGILITY TRAINING

The following drill is excellent for injury prevention because it involves rapid adjustment to change in direction. This type of unilateral jump training with random eccentric loading helps prepare the user to handle unexpected or emergency conditions.

First, mark five or six locations on the kickplate with tape or chalk. Jump away from the kickplate and select a landing target as you descend back toward it. Land on alternating legs and choose a different target each time, drawing the non-landing leg up toward the chest as you do so. This exercise helps train proprioception skills and speeds up the response of the lateral support muscles of the legs.



JUMP TRAINING WITH PLYO-BALL

This exercise includes the use of the Lower Extremity Isolation Belt (LEIB). The LEIB may be attached to the Shuttle carriage by the two forward rings, which provides a rearward pelvic tilt, or by the two rear rings, which forces the spine more into the backrest. The rope may be adjusted by the use of the round three-hole rope locks. (See Section 1.5.4 for more information about the LEIB.)

By having the arms free during plyometric exercises, the user can conduct upper body proprioception drills. With a partner or trainer, conduct right and left-side ball tosses and intercepts drills with a Plyo-ball or Medicine ball to improve hand-eye coordination.



2.3.6 SPORTS-SPECIFIC TRAINING TECHNIQUES

By understanding your sports-specific needs, it is possible to replicate the movements, duration, and intensity of nearly every sport on the Shuttle MVP. You can use the various exercises described in this manual or replicate even more specific movements of any particular sport. With a little creativity, the Shuttle MVP is extremely adaptable to a wide variety of sports training needs.

Studies have shown that as many injuries occur during practice sessions as they do during actual competition. The potential for injury during both practice sessions and competition may be greatly reduced by preseason training on the Shuttle MVP. When used to develop sports-specific skills, the Shuttle can actually reduce the need for practice time while lowering the risk of injury.

SPRINT TRAINING

A combination of forward unilateral hip thrust drills, overspeed plyometrics, and stretching exercises on the shuttle MVP offer valuable benefits for all sports that require the ability to accelerate quickly, such as soccer, football, tennis, basketball, and baseball. Overspeed plyometric drills on the Shuttle MVP can also augment a traditional sprint training program.

IMPROVING ENDURANCE

The techniques of overspeed training and jump training can build endurance for all sports. Boeing studies conducted in 1965 in the bioastronautics laboratory showed an increase of up to 30% in endurance after horizontal bounding exercises. Controlled studies using the Shuttle to verify this assertion have not been accomplished as of yet.

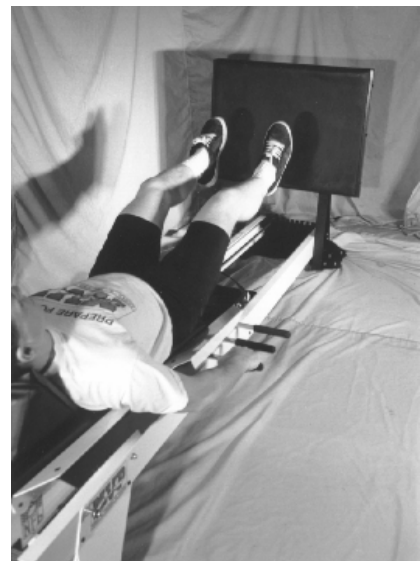
BILATERAL JUMPS

Set the Elasticcord resistance to a level that allows for a maximum of 18 inches of travel when jumping. Position both feet on the kickplate, parallel and shoulder-width apart. The height of the feet on the kickplate will depend on the desired degree of ankle and knee flexion.

Grasp the lateral support handles that are most comfortable. Jump headward, extending fully at the hips and straightening the legs. Keep the back flat and the head in a relaxed position on the headrest.

Upon returning to the kickplate, bend the knee only slightly when the foot makes contact with the kickplate, then, without further bending the knee, immediately jump off the kickplate.

Perform 6-8 jumps of maximal effort, rest 45 seconds, and repeat for 5 sets.



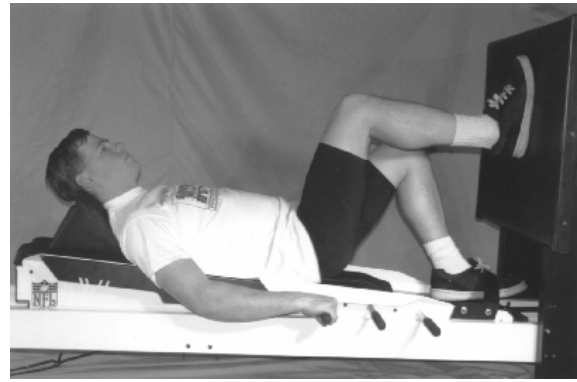
UNILATERAL JUMPS

This exercise involves performing jumps with one leg at a time while resting the other on the carriage footrest or pulled into the chest.

Grasp the lateral support handles that are most comfortable.

Jump head-ward, fully extending at the hips and straightening the jump leg. Keep the back flat and the head in a relaxed position on the headrest.

Upon returning to the kickplate, bend the knee slightly when the foot makes contact with the kickplate, then, without further bending the knee, immediately jump off the kickplate.



Perform 6-8 jumps of maximal effort, rest 45 seconds and repeat for 5 sets. These exercises may be performed in conjunction with others as they relate to a specific sport in intensity and duration.

BILATERAL JUMPS, UNILATERAL LANDINGS

The following drill is useful to increase eccentric strength and control, which improves landing safely in sports activities (as well as in everyday life).

Jump with two legs, then at the top of the jump, tuck one leg in and land on the opposite leg. When the contact foot touches the kickplate, slowly decelerate to a full squat position. At full squat, return the other foot to the kickplate and repeat the bilateral jump, followed by the unilateral landing with the other leg.

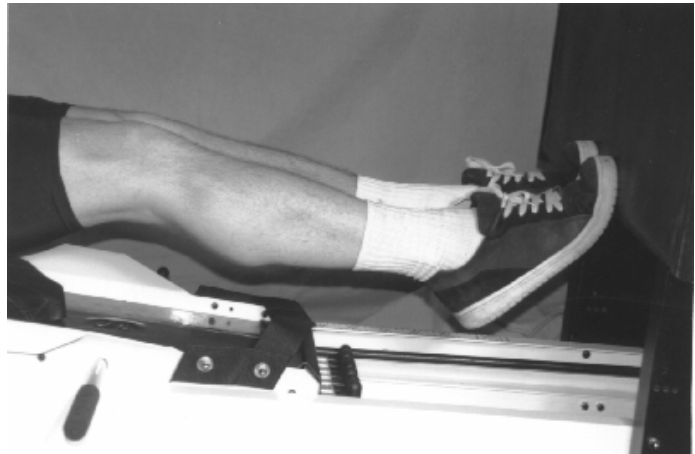
CALF PLYOMETRICS

This exercise isolates the gastrocnemius (calf) and soleus muscle's and reduces the involvement of the quadriceps.

Place the balls of the feet on the very bottom of the kickplate, parallel and shoulder-width apart. Extend the legs fully, without locking the knees.

Concentrating on using only the feet and ankles, push off the kickplate with the toes.

Land on the toes when the feet return to the kickplate, and rotate the feet back to flat. Repeat the whole movement.



JUMP HANDLES

Fully simulating a vertical leap can best be replicated by using the jump handles accessory (see 1.5.5 for assembly information).

Start by holding the jump handles along the axis of each handle so that the hands are positioned as they might be during normal jumping. As you jump off the kickplate with arms outstretched, pull the handles upward toward the head as you move away from the kickplate. This exercise builds upper body power that can result in a higher vertical leap.



ANKLE STABILIZATION

This exercise provides an excellent closed chain proprioception drill.

Remove your shoes and place a five- or six-inch rubber ball between one foot and the kickplate. Grip the ball with the toes by curling them down over the ball. Push head-ward against the ball while maintaining control of it between the foot and the kickplate. This exercise can also be performed while keeping the leg straight and balancing the ball at a lower position on the kickplate.

The Wobble Board and the proprioception disk are also excellent for increasing ankle strength and stability during closed chain exercises or during light plyometrics on to an unstable surface .



PLYOMETRIC FORWARD UNILATERAL HIP THRUST

This exercise is similar to the Forward Unilateral Hip Thrust (see 2.3.2), with the addition of a plyometric component. It may be accomplished by rapidly thrusting the Shuttle carriage rear-ward with one leg, while remaining in contact with the horizontal bar. As the carriage returns catch it with the free foot as it returns back by virtue of the Shuttle rebound system. Keep your foot in contact with the Shuttle handle bar during this exercise.



2.3.7 FITNESS CLUB APPLICATIONS AND TECHNIQUES

AEROBIC CONDITIONING

The Shuttle can be used as an aerobic conditioning element by taking quick, small jumps from foot to foot, as if running in place on the kickplate surface. Be sure to keep your lower back flat during the small jumps and when preparing for landing. Two to three sets of 30 seconds each will provide a dynamic drill for developing strength, power, and aerobic endurance.

You can also use any of the previous, sports-specific exercises as part of a circuit-training routine. Or you can create other exercise programs by experimenting with your goals and applying the whole range of information and suggestions in this manual



FOOT PLACEMENT

Aerobic exercise for a prolonged time can also be done on the Shuttle in the form of closed chain movements; i.e. by remaining on the kickplate without jumping. Changing the foot placement on the Shuttle kickplate to include up, down, center, as well as external and internal rotation, will provide a variety of muscle recruitment options and help avoid local muscular fatigue.

Caution: *It should be noted that for some individuals, internal or external rotation of the feet may be uncomfortable and should be avoided.*

LOAD SELECTION

The number of elasticcords will depend on the body weight and conditioning of the user and the intensity of the exercise necessary to achieve the desired target heart rate. It may be necessary to experiment with various load and intensity levels to achieve a balance between training heart rate and working muscle comfort. Pick a combination that can be sustained for the prescribed time.

Caution: Remember, it is easy to over-train on the Shuttle MVP. Begin your exercise program on the light side, gradually increasing the intensity and duration every other day. If you feel especially tired or sore, give yourself an extra day or two to recover before continuing your exercise program.

SUSTAINED AEROBIC CONDITIONING

Sustained aerobic conditioning on the Shuttle MVP involves using a large muscle mass at a low to moderate work output over a minimum period of 3–5 minutes, followed by resting intervals of 15–90 seconds, depending on the individual.



CIRCUIT TRAINING

The Shuttle MVP is ideal for circuit training as one exercise station that can be used in conjunction with a versa climber, rower, stationary bike, or Stairmaster. If used in this way, the user should spend approximately three minutes at each station sustaining a constant heart rate and blood pressure within his or her individual target-training zone.

BEGINNERS AND OLDER USERS

For older or untrained individuals, the Shuttle is ideal for use as an aerobic exercise machine. The user should perform aerobic conditioning or interval training using closed-chain movements, and low-to-moderate workloads while maintaining a constant heart rate and constant blood pressure. If choosing aerobic interval training, the recovery period between each interval should be comfortable for the user. When training for cardiovascular health, the total time may be as little as 15–20 minutes a day. As fitness improves, the total workout time may increase to 30 minutes or longer, depending on the individual.

WEIGHT LOSS AND FAT BURNING

Those users whose goals include weight loss will need to sustain moderate workload for at least 40 minutes to attain any significant level of fat burning. The time necessary to begin significant fat burning will decrease as the fitness level and work intensity increases.

In the beginning, it may be necessary to sustain a closed chain format (keeping both feet on the kickplate at all times) to allow the individual to reach the overall exercise workload required. As fitness improves, the user could progress through small bilateral (double leg) jumps to performing unilateral (single leg) drills. To reduce any potential build-up of lactic acid or stress on a particular joint or muscle group, the aerobic intervals should be made up of a variety of movements.

Achieving lean muscles in the legs and gluteus is also possible using the above format; however, this may require a workout every day, or at least six times a week.

AEROBIC TRAINING FOR ATHLETES

For athletes, the length of the aerobic intervals on the Shuttle MVP should be tailored to the specific sporting event for which they are training. For example, a boxer might choose a vigorous aerobic interval of three minutes with a 30-second rest between intervals.

To further mimic the energy expenditure required in the ring, the boxer might include short, random anaerobic bursts throughout the three-minute interval.

A middle-to-long distance runner might sustain anaerobic threshold throughout each interval with very short recoveries, or possibly choose nonstop exercise for 30 minutes at a time.

A basketball player might choose a 3 to 5 minute interval made up a series of anaerobic plyometric bursts with very short, low-level activity recovery periods.

The goal should be to stress the cardiovascular system in a similar way that mimicks the actual sport. Constant same-pace aerobic activity, for example, will actually work against the goal of improving anaerobic power. Interval periods consisting of anaerobic bursts followed by short active recovery periods is more comparable to the way the cardiovascular system actually performs during a typical game.

TRAINING FOR SKIING

This exercise will simulate a vigorous downhill mogul training program for building dynamic strength and endurance. It is especially useful as a preseason training drill but can also be performed during the season.

Place the feet on the left side of the kickplate, parallel and slightly less than shoulder-width apart. Weight the left foot more than the right, and jump across to the right side of the kickplate, keeping the knees in alignment with the feet and landing with the feet parallel.

Upon impact with the kickplate, immediately jump off again, this time weighting the right foot more than the left. Repeat, jumping back and forth from one side of the kickplate to the other, each time weighting the outside foot more than the inside.

Start this exercise at a low load and gradually work up to near body weight over a period of sessions.



VARIATION

- While lying on the backrest with your legs in a flexed position on the kickplate, have a helper push against the head-end of the carriage toward the kickplate with varying loads in a random pattern. Absorb and push back against the load, as if skiing over moguls.

2.3.8 REHABILITATION PROTOCOLS

Physical therapists both in the U.S. and abroad have shared many of the following advantages of using the Shuttle MVP for rehabilitation:

- Ease of getting on and off
- Full functional foot contact with neurological input through the bottom of the foot
- Range of motion control
- Resistance control
- Active venous and lymphatic return due to elevation of limbs
- Reciprocal motion patterns
- Eccentric loading
- Core stabilization

ACL REHABILITATION PROTOCOL INCORPORATING THE SHUTTLE MVP

The following is an example of a specific rehabilitation protocol using the Shuttle MVP. This protocol is for post-surgery ACL rehabilitation.

Stage One

From 2–14 days post-op (partial weight bearing to full weight-bearing stage).

Warm-Up

- Quad sets while standing, sitting in a chair or lying on the shuttle (flickers, not a hard or sustained hold). Tense and relax muscle at a rate of 2–3 per second, trying to isolate the VMO for proprioceptive input. Electrical muscle stimulation may be of value in teaching this.
- Free, easy ROM (flexion and extension) on a smooth surface. The Mini-Clinic works well for this exercise.
- Stationary cycling, either rocking back and forth or full cycle rotation, but not forced.
- Ball on wall (see below).
- Hamstring pulls on ball (see below).

- Do each of the above exercises 10 times. Repeat 4–5 sets. Ice massage 20–30 seconds (no longer) between each set.

Position on the shuttle with shoes off

- Splinted¹, double-leg (bilateral) position, with feet parallel and centered on the kickplate surface (shallow squat position).
- Non-operative leg splinting the operative side
- Stop extension and flexion 3–5 degrees short of full ROM. We are not using the Shuttle at this stage to stretch tissues for increase in ROM.

Goal

- Free, easy movement to reduce effusion and swelling.
- Control of joint movement with confidence (proprioception)².
- Neurological stimulation through bottom of foot.

Benefits

- Focus on closed chain movements.
- Maximum control of resistance.
- Exercise with legs in elevation to aid circulation and control swelling.
- Core stabilization initiated at this stage in a supported position.
- Early movement patterns to stimulate collagen tissue formation.

Sets

- Using the Shuttle MVP or Shuttle 2000-1

	MVP	2000-1				
	Set	Elasticords	Elasticords	Exercise	Reps	Rest
1.	½ to 2		1 to 4	Partial squats	5–15	1-2 minutes
2.	½ to 2		1 to 4	Partial squats	5–15	1-2 minutes
3.	½ to 2		1 to 4	Partial squats	5–15	End exercise

Options

1) Dorsiflexion.

Do sets of 5–10 dorsiflexion movements between squat sets with the leg on the MVP using only gravity from the sloped rails as resistance.

2) Bilateral squats followed by unilateral squats.

Do 3–5 sets of 10 reps with double leg, 3–5 sets of 5 reps with single leg (right, then left).

Ice massage for 20–30 seconds between sets.

Progressions

1. Work into full extension as range improves. Do not lock or hyperextend the knees.
2. Keep flexion to 90 degrees or less.
3. Eccentric loading (push out with two legs and return with one, alternating from left to right).

Make sure that the quadriceps is contracting and the movement is not coming from the hip extensors only.

Caution: Do not use the Shuttle MVP for meniscus repairs at this stage. It may be 2–3 months before it is appropriate to use the Shuttle. Communicate with the surgeon regarding ROM

¹Splinted position: keep the knees and ankles together so that the good leg is splinting the operative leg at all times throughout the exercise

² Proprioception is the awareness and control of our body in space.

	Set Elasticords	Elasticords	Exercise	Reps	Rest
1.	4	8	Calf raise	10–15	
2.	3	6	Calf raise	10–15	
3.	4	8	Calf raise	8–10	
4.	3	6	Calf raise	10–15	
5.	2	4	Calf raise	10–fatigue	

Progressions

1. Add more elasticords.
2. Bilateral (double-leg) jumping.
3. Jumping and jump targeting (see below).
4. Split jumps.
5. Alternate unilateral (single-leg) jumps.
6. Add Sissel pads, Dyna Disc, or balance board under feet with squats.

ACL STRENGTH TESTING

The following test can be modified by the therapist. Simply be sure to follow the same protocol for all subsequent tests.

Starting with Week 8 (and beyond). Goal is 110° of flexion.

Unilateral (Single-Leg), 20-Repetition Test

Using the MVP and 2000-1

	MVP	2000-1			
	Set Elasticords	Elasticords	Exercise Leg	Reps	Rest
1.	2	4	R	20	60 sec.
2.	3	6	R	20	60 sec.
3.	4	8	R	18	60 sec.
4.	5	8	R	10	End R test.
5.	2	4	L	20	60 sec.
6.	3	6	L	20	60 sec.
7.	4	8	L	12	60 sec.
8.	5	8	L	X	End L test.

Stage Three

Continue squats up to the 6 to 8 Elasticord levels. After Week 8, start to bring in jumping and jump targeting.

Jumping

Using Shuttle MVP or Shuttle 2000-1

	MVP	2000-1			
	Set Elasticords	Elasticords	Leg	Reps	Rest
1.	2 to 3	4 to 6	Double/Splinted	15–20	60 sec.
2.	+1	+2	Double/Splinted	15–20	60 sec.
3.	+1	+2	Double/Splinted	10–15	60 sec.
4.	-1	-2	Double/Splinted	10–15	60 sec.
5.	-1	-2	Double/Splinted	10–15	End exercise

Calf raises and/or calf stretching can also be added between jump sets.

Jump Targeting

The following sets can be substituted as the individual gets stronger.

MVP

2000-1

	Set Elasticords	Elasticords	Exercise	Landing Position	Reps	Rest
1.	2	4	Double/Splinted Mogul Jump	30°L, 0°, 30°R	6	60 sec.
2.	2	4	Double/Splinted Mogul Jump	30°L, 0°, 30°R	10	60 sec.
3.	2	4	Double/Splinted Mogul Jump	30°L, 0°, 30°R	8–12	60 sec.

Stage Four

After 15 weeks, use normal training protocols for strengthening and endurance

WALL WEIGHT STACK COMBINED WITH LEG PRESS

The Shuttle MVP has been found to aid in the rehabilitation of the spine when combined with two weight stacks. The following technique was developed by Michael Moore, who offers a course on this treatment using the Shuttle (see contact information below).

The Shuttle MVP is placed between two weight stacks, one at either end of the Shuttle. The cable from the weight stack at the foot-end of the Shuttle is attached to the ropes extending from the Lower Extremity Isolation Belt worn by the user lying supine on the backrest. A second weight stack is placed at the head-end of the Shuttle Frame with the cable extending toward the head-end of the Shuttle. This head-end cable should be adjusted to extend three feet beyond the Shuttle carriage. The patient presses on the kickplate with the feet as he or she pulls downward starting with the arms extended at 120 degrees to the torso over the head and ending at 60 degrees. Load is added to the Shuttle in addition to the load from the weight stack. Squats and overhead pulls are conducted in this loaded condition. This places the spine in distraction as well as facilitates abdominal strengthening.

Michael Moore can be reached at Folsom Physical Therapy, 115 Natoma St., Folsom, California. Contact him at 916-355-8500 for prices and schedules of classes.

DEFINITION OF TERMS

Abduction

Lateral movement of the limbs away from the median plane of the body.

Adduction

Movement of a limb toward the median plane of the body.

Anterior

Before or in front of; in anatomical nomenclature, refers to the ventral or abdominal side of the body.

Bilateral

Pertaining to, affecting, or relating to two sides.

Dorsiflexion

Movement of a part at a joint to bend the part toward the dorsum, or posterior aspect of the body. Thus, dorsiflexion of the foot indicates movement backward, in which the foot moves toward its top, or dorsum; the opposite of plantar flexion. Dorsiflexion of the toes indicates a movement of the toes away from the sole of the foot. When the hand is extended, or bent backward at the wrist, it is dorsiflexed.

Extension

1. The movement that pulls apart both ends of any part. 2. A movement that brings the members of a limb into or toward a straight position, opposite of flexion.

Flexion

1. The act of bending or condition of being bent in contrast to extension. 2. Decrease in the angle between the bones forming a joint.

Foot-ward

Towards the kickplate end of the Shuttle.

Gastrocnemius

The large muscle of the posterior portion of the lower leg. It is the most superficial of the calf muscles. It plantar flexes the foot and flexes the knee.

Hamstring

Any one of three muscles on the posterior aspect of the thigh, the semitendinosus, semimembranosus, and biceps femoris. They flex the leg and adduct and extend the thigh.

Head-ward

Towards the head end of the Shuttle; Away from the kickplate.

Intensity

A state of increased force or energy.

Lower extremity

The lower limb, including the hip, thigh, leg, ankle, and foot.

Piriformis

A muscle in the buttock region.

Plantarflexion

Extension of the foot so that the forepart is depressed with respect to the position of the ankle.

Plyometrics

A stretching and shortening exercise technique that combines strength with speed to achieve maximum power in functional movements. This regimen combines eccentric training of muscles with concentric contraction.

Posterior

1. Toward the rear or caudal end; opposite of anterior. 2. In humans, toward the back; dorsal. 3. Situated behind; coming after.

Proprioception

The awareness of posture, movement, and changes in equilibrium and the knowledge of position, weight, and resistance of objects in relation to the body.

Proprioceptive Neuromuscular Facilitation

ABBR: PNF. An approach to therapeutic exercise directed at relaxing muscles, increasing joint range of motion, and regaining function by using spiral-diagonal patterns of movement. PNF uses a developmental sequence of mobility, stability, controlled mobility, and skill; it emphasizes precision in patient position, manual contacts, verbal cueing, and timing.

Quadriceps Femoris

ABBR: Quad. A large muscle on the anterior surface of the thigh composed of the rectus femoris, vastus lateralis, vastus medialis (VMO), and vastus intermedius muscles. These muscles are inserted by a common tendon on the tuberosity of the tibia. The quadriceps femoris is an extensor of the leg.

Range of Motion

ABBR: ROM. 1. The amount of excursion through which a joint can move, measured in degrees of a circle. 2. An exercise that moves a joint through the extent of its limitations. This exercise can be active, active assisted, or passive.

Soleus

A flat, broad muscle of the calf of the leg.

Unilateral

Affecting or occurring on only one side.

Upper extremity

The upper limb, including the shoulder, arm, forearm, wrist, and hand.