Power Cycling

2019 Edition

POWER CYCLE TABLE OF CONTENTS

NATIONAL AEROBICS & FITNESS TRAINERS ASSOCIATION
POWER CYCLING INSTRUCTOR CERTIFICATION
COURSE OBJECTIVES

Participation in the NAFTA POWER CYCLING INSTRUCTOR Certification program is intended to provide the instructor with the knowledge to develop and instruct participants through a safe and effective group class.

INTRODUCTION TO POWER CYCLING INSTRUCTOR

- Review the history of POWER CYCLING classes as a conditioning tool and its introduction into the POWER CYCLING format.

ANATOMY & KINESIOLOGY REVIEW

- Review major muscle groups of the body and joint actions as they apply to POWER CYCLING class.

PHYSIOLOGY REVIEW

- Examine the physiological aspects and methods used by researchers to assess training effectiveness.
- Review the physiological benefits of interval training.
- Understand the concept of aerobic training and the benefits to the exerciser.

BIOMECHANICCONSIDERATIONS

- Examine the modifications needed to make the movements safe for the general public.

PROGRAMMING RECOMMENDATIONS AND CLASS FORMATS

- Examine program design and intensity variations for POWER CYCLING classes.
- Review training benefits of different class formats

WARM-UP

- Review purpose and components of a warm-up.
- Learn to create a warm-up specific to POWER CYCLING .

AEROBIC TRAINING

- Learn to develop a sound cardiovascular workout.
- Practice combining movements with traditional aerobic movements
- Learn and practice choreography development for combination and freestyle class types.
- Define and understand the various methods for modifying exercise intensity.
- Practice combinations
- Practice cueing the basic movements along with more complex choreography.
- Learn and understand modifications and how to cue proper form.
- Learn the training benefits, proper form and class formats.
- Review equipment use, including appropriate users, proper form and injury potential..

COOL-DOWN FLEXIBILITY

- Review recommendations for flexibility training specific to an aerobic workout.

SAFETY AND INJURY PROTECTION

- Learn guidelines for pre-exercise screening
- Identify coronary risk factors
- Recognize clients at risk and provide appropriate recommendations
- Identify hydration recommendations.

BODY ALIGNMENT AND PROTECTION OF JOINTS

- Review proper body alignment
- Learn how to protect joints when executing each movement.

TEACHING SKILLS

- Practice building combinations
- Learn to cue combinations, modifications, safety and alignment techniques.
- Learn to teach in mirror image to improve class awareness.

CHOREOGRAPHY

- Familiarize class with different class format.
- Practice teaching combination style and freestyle.
- Learn to break down combinations.

MUSIC USAGE

- Understand the beat and phrase of the music and how they are used in a class.
- Practice teaching to the beat and phrase of the music.

LEADERSHIP ROLE

- Review basics of professionalism and instructing.
- Understand the importance of continuing education.
- Review methods of correction.

EXAMINATION CRITERIA

WRITTEN EXAMINATION

I. Format and Scoring

A. The written examination consists of 50 multiple choice, true/false and matching-type questions. The examination is monitored by a certified instructor that verifies the validity of the exam. Examinees will have one hour to complete the exam. The successful candidate must correctly answer at least 80% of the questions.

II. Content

A. The written examination covers material from the following subject areas:
   1. Choreography and Professional Responsibility.
   2. Basic anatomy.
   3. Biomechanics.
   4. Exercise physiology

PRACTICAL EXAMINATION

I. Standard of Correct Performance

A. All eligible examinees shall be judged on their ability to correctly demonstrate POWER CYCLING class as would be the appropriate for a healthy adult population. The standards by the NAFTA Power Cycling Manual.

B. Correct performance shall be generally defined as demonstrating the required exercises in such a way as to provide training potential, without known physiological risk to the average class participant.

II. Content

A. Examinees shall be evaluated in the following categories:
   1. Warm-up (6 minutes)
   2. Cycling (5 minutes)
   3. Equipment Safety (3 minutes)
   4. Cool-down/Flexibility (3 minutes)
   5. Posture
   6. Instructional Technique
   7. Presentation

III. Examiners and Scoring

A. Examiners
   Candidates shall be evaluated by a panel of one to three Examiners, all of whom are proficient in the examination process. All examiners shall evaluate each examinee in every category.

B. Scoring
   Each examinee shall receive a score of either 1,2, or 3 in each of the categories listed above.
   3 = Satisfactory-Examination criteria was met for that category, and Standards and Guidelines were adhered to.
   2 = Unsatisfactory-Examination criteria was not met for that category, and/or Standards and Guidelines were not adhered to.
   1 = Unacceptable-Same as a score of2, but with such severity that exercise(s) would likely result in injury.

C. Score Tabulation
   1. In each category of exercise, the scores of all examiners are considered. The high and low scores are discarded, thus establishing the final score for that category.
   2. A candidate will not pass the practical examine under the following circumstances:
      - One or more final scores of 1
      - Two or more final scores of 2

IV. Testing Descriptions and Admittance

A. Duration and Admittance
   The practical component of the examination is approximately one hour and 20 minutes in duration. Late arrivals shall not be admitted once the examination has begun. No observers other than NAFTA staff shall be allowed in the examination area.

B. Attire
Examinees should wear tights and leotards, or shorts and t-shirts. No sweat pants or other bulky or restrictive pants or shirts will be permitted. Athletic shoes must be worn. Black-soled shoes are not allowed.

C. Music

D. Practical Examination Format
Candidates shall be evaluated in groups. The lead examiner shall announce the category to be demonstrated. All examinees shall then demonstrate simultaneously without verbal explanation. Examinees should continue demonstrating movements from that category until requested to change to the next category. Time allotments will vary.

V. Examination Results

A. Examination report
Examination results for both written and practical components shall be mailed to each examinee. If passing score in the practical component is not achieved, unsatisfactory performance areas shall be noted. No telephone inquiries are accepted. No further explanation of scores will be provided. Please allow 4-6 weeks to receive examination results.

B. Retesting
Examinees not achieving a passing score are encouraged to retest that portion they did not pass (either written or practical or both). Retesting may occur during any regularly scheduled POWER CYCLING INSTRUCTOR Certification program. Retesting must be scheduled in advance through the NAFTA office. There is a fifty dollar administration fee for retesting. Retesting must be within one year of original testing date. After one year, participant must retake both portions of the exam for a challenge fee.

C. Certification
Upon successful completion of the written and practical components of the examination, and having provided proof of current CPR and First Aid certification the candidate will receive a wall certificate and a wallet card acknowledging his/her attainment of NAFTA's POWER CYCLING INSTRUCTOR Certification. This certification is valid for two years, after which time it may be renewed upon showing proof of completion of at least one NAFTA course or home study, a minimum of 15 approved continuing education units (CEUs) and current CPR and First Aid certification. A complete description of continuing education requirements for recertification will be sent along with certificates.

NATIONAL AEROBICS & FITNESS TRAINERS ASSOCIATION

COURSE: POWER CYCLE™ INSTRUCTOR & STUDY GUIDE

LOCATION: Gym or Fitness Club setting.

PURPOSE: This one day course is designed for the participant who wants to lead group exercise class in Power Cycle (indoor cycling) formatted class. Participants will be provided training in leadership and technical skills necessary to offer group style fitness programs which are SAFE, EFFECTIVE and MOTIVATIONAL.

OBJECTIVES:

*To define Power Cycle.
*Compare Power Cycle with other indoor cycling classes.
*Benefits of Power Cycle.
*Proper Set Up and Beginner Information.
*Types of Rides
*Heart Rate Zones.
*Motivating Your Students Through Visualization
*Demonstrate the Above Topics in an Advanced Ride

NATIONAL AEROBICS & FITNESS TRAINERS ASSOCIATION

POWER CYCLE™ OUTLINE SCHEDULE

(*Note times may change per location)

8:00am -8:30am : Introduction & Overview of Course

8:30am -9:30am : Benefits of Power Cycle

9:30am -11:30am : Proper Set Up and Beginner Information

11:30am -12:30pm : Lunch

12:30pm -1:30pm : Types of Rides

1:30pm –3:00pm : Heart Rate Zones
Motivating Your Students

3:00pm -3:45pm : Review

4:00pm -4:30pm : Practical Exam

4:45pm -6:00pm : Written Exam

NATIONAL AEROBICS & FITNESS TRAINERS ASSOCIATION

POWER CYCLE™ COURSE GUIDE

1. **Introduction & Overview**
   Introduction of the instructor and qualifications. Overview of the workshop according to the outline and purpose of the course. Instructor will distribute any additional handouts. Also, at this time the instructor will check everyone for identification and current CPR/First Aid card.

2. **Benefits of Power Cycle**
   *Define Power Cycle
   *Define the purposes and the goals of Power Cycle
   *Use of Training
   *Group Environment
   *Mental Benefits
   *Physical Benefits

3. **Proper Set and Beginner Information**
   *Proper set up of the bike.
   *Proper Alignment and comfort zone
   *Safety cues before and during class

4. **Types of Rides**
   *Recovery Ride
   *Endurance Ride
   *Strength Ride
   *Interval Ride
   *Race Day
   *Creative Rides

5. **Heart Rate Zones**
   *How to figure THR for each student
   *Know your students
   *How to incorporate THR into class
   *How to format your class around the zones.
   *Plan your classes at the beginning of the week

6. **Motivating Your Students Through Visualization**
   *Music-You can use music to motivate, for themes, to drive students to other limits or no music at all.
   *Tricks-give your students outside information or competitive tasks

7. **Demonstrate the above topic in an Advance Ride**

8. **Closing Comments/Practical and Written Exam**
   *Go over Continuing Education Requirements

*Practical Exam
*Written Exam & Course Evaluation
*After all exams are completed, the participants may leave or ask any further questions they may have in reference to the workshop or any other questions they may have.

Chapter 1
LET THE JOURNEY BEGIN

Believe it or not, mountain biking has increased 512% from 1987 to 1994. However, during the same time period, stationary biking has only shown a 16% increase. The next question, of course, is why? The simple answer can be summed up in one word – **BORING.** Research has also shown that individuals work at lower intensities on stationary bicycles than they do on either treadmills or stair-climbing devices. *Left on our own, we lack motivation for indoor cycling.*

POWER CYCLING will provide a highly motivating, vigorous training program for those choosing either an indoor cycling program or those who need an alternative program in preparation for their outdoor program. **POWER CYCLING** will also provide significant gains in the health related arena. The specific fitness training principles will lead you to the health benefits you need and deserve.

For those committed outdoor cyclists, **POWER CYCLING** acts as an excellent bad weather training substitute, counterbalances the repetitive stresses encountered through outdoors cycling alone and provides additional techniques to enhance comfort, effectiveness and injury prevention.

POWER CYCLING is a popular aerobic training program because it is definitely non-impact. Unlike running and high-impact aerobics, **POWER CYCLING** assumes a supportive position without undue impact stress on feet, shins, knees or lower back. It is a very friendly training program! Sports medicine physicians actively support stationary cycling as their choice for rehabilitation of their injured athletes. A cycling-based training program is ideal for both young and old alike. In fact, when performed together, it can provide companionship in addition to the known health related benefits. **POWER CYCLING** does not require complicated footwork like traditional group exercising; yet it is athletic and sport specific. Classes can create an environment whereby participants can make a connection between the body and the mind.

One can not help but to remember the old saying about never forgetting how to ride a bicycle. Most people retain adequate levels of proficiency and skill from their childhood days so they have minimal, if any, difficulty in mastering **POWER CYCLING.** We can immediately learn the choreography necessary to perform the complex movements in the cycling-based training program. Subsequently, it is relatively easy for most healthy adults to learn this safe and effective form of training.

POWER CYCLING can be adapted for a whole, broad-based spectrum of ages and fitness levels. Those who are already aerobically fit will find **POWER CYCLING** a challenging way to push their anaerobic threshold while mastering a new activity. Newcomers will find **POWER CYCLING** new and refreshing from the old cycling programs. The instructor has the power to set the variations for each class depending on the target audience.

POWER CYCLING BENEFITS

There probably still exist skeptics who may recall the several drawbacks once associated with previously promoted stationary cycling programs. **POWER CYCLING** has confronted these issues while developing their program; but let's review these concerns:

1. Difficulty in maintaining intensity in order to achieve optimum training results.
2. Maintaining static cycling positions for long periods of time result in orthopedic stresses in the lower back, neck and shoulders.
3. Difficulty in maintaining high motivational training levels and interest.

These drawbacks have been resolved through appropriate prescription programming and intense instructor training programs. A strong focus is placed on commitment in helping participants in achieving their personal fitness goals. **POWER CYCLING** incorporates cueing and instructional techniques which minimize orthopedic stress and increase comfort. Instructors are trained to enhance their leadership and motivational skills.

Cycling techniques enhance the enjoyment of the indoor activity, prepare the cyclist for outdoor activities with varying road conditions and prevent injuries and undo stress.

Injury prevention is a vital component of any training program. In the past, a drawback to cycling has been minimizing localized muscle and joint discomfort at the beginning of the training program. Mechanical stresses can result from the mere fact that cycling is very repetitive and muscle-specific. The lower body muscles experience localized intensity while the upper body and torso experience inherent static positioning. Initial discomfort must be minimized in order for newcomers to continue with the program and train effectively.

POWER CYCLING maximizes injury prevention through a combination of appropriate equipment, training techniques, and apparel. **POWER CYCLE** goes one step further by enhancing functional training of the torso and upper body. This enhancement improves postural alignment and endurance not only during the training session but also throughout activities of daily living. Specific exercises are incorporated that relieve fatigue and stress of the lower back, upper back and shoulder girdle, neck and shoulders.

As we know, it is extremely difficult to maintain a high level of motivation during a repetitive activity for any length of time. **POWER CYCLING** encompasses many of the motivational techniques used by coaches and sports psychologists to provide a unique training environment to help all riders achieve their fitness and training goals.

Chapter 2
EQUIPMENT SELECTION

Effectiveness and safety are the two most important considerations in any fitness training program. **POWER CYCLING**'s effectiveness is derived from its scientifically based format and content which addresses all the components of a physical fitness program. By adhering to sound, proven training practices and the use of reliable, safe equipment, safety no longer is a negative concern or a preoccupation during the training program. A well-designed, well-constructed stationary cycle and suitable footwear and apparel are the only needed equipment.

FOOTWEAR GUIDELINES

Ideally, there exists lightweight cycling shoes especially designed for the sport Such shoes attach directly on to the pedal, but can not be used for every day walking or any other type of physical activity. A low cut shoe that allows for unrestricted ankle motion is recommended. Lateral support is not an issue since the foot has no medial-lateral stress. Since cycling is non-impact by nature, fore and rear foot cushioning is not essential.

To obtain the most effective results from pedaling, place the ball of the foot on the pedal not the middle of the sole of the foot. It is in this position that the greatest pressure on the foot is under the first and fifth metatarsal heads and under the big toe. It is important to avoid shoes with soles that are thin and flexible. Soft soles absorb too much of the pedal force and makes pedaling inefficient.

The heel of the foot is not directly supported by the pedals during cycling, so the midsole of the shoe should be relatively stiff under the arch of the foot. A shoe that resists bending will provide good support for the arch of the foot and provides stability for the unsupported heel.

The weight of the shoe is not usually a critical issue especially if the shoe provides the needed support. Weight is only a factor during acceleration. Once the pedals are revolving at a constant rate, the effect of weight is negligible. The best shoe must also be comfortable and fit. Most cyclists prefer to wear socks. Shoes should be snuggly strapped into the foot cages to prevent the feet from coming out during class. Shoe laces should be tucked in to prevent tangling with the pedals.

If clipless pedals are used, check the cleat tension on the pedals and make sure that the cleats are aligned properly on the shoes. Improper cleat alignment may cause muscle and tendon strain and lead to serious injury over a period of time.

APPAREL GUIDELINES

One must consider four main factors when selecting appropriate cycling apparel. These four factors include:

1. The cooling effect for thermoregulation of the body must be enhanced.
2. Skin abrasions must be prevented and friction minimized along the inner thighs during constant motion against clothing and/or bike saddle.
3. Pressure must be minimized from the saddle and handle bars.
4. Loose clothing must be avoided so that they do not become entangled in the moving parts of the bicycle.

ENCHANCED COOLING

Exposing a large area of skin surface to the surrounding air takes advantage of the body's heat-regulating mechanism. There is no reason to wear clothing except for modesty's sake and to avoid areas of potential abrasion or pressure.

Vigorous cycling will quickly elevate the body temperature and promote sweating. Outdoor cycling on a moving bicycle has the advantage of body cooling due to the evaporation by the wind and air passing over the body as it moves forward. During stationary cycling, the sweat does not evaporate as readily and the cooling process is much less. This is even truer in a room full of people who help create a hot, humid environment. It is advisable to assist air circulation by providing room fans or cross-ventilation.

Much of the heat generated by the body during cycling is dissipated when the water content of sweat evaporates on the skin's surface. An increased peripheral blood flow is created by the vasodilatation of the skin's capillaries. This vasodilatation also produces the redness or flushing of the skin's surface during exercise. The increased peripheral blood flow transport a greater volume of blood to the surface for cooling by the process of evaporation. In a well-ventilated environment in which the air is dry, sweat will evaporate rapidly so that the skin appears dry. Perspiration is then said to be "insensible." In a poorly ventilated room, humid environment evaporation is very slow or non-existent resulting in the sweat droplets seen on the skin's surface.

Reduced cooling prevents the body from maintaining its optimum, safe temperature and the rider feels hot and uncomfortable. Women may be placed at a disadvantage in heat due to certain gender differences. This is attributed to relatively low muscle mass and blood volume, higher skin temperatures in hot environments and a higher core and skin temperature to initiate sweating. Both children and elderly people share the same set of circumstances and, thus, do not cool off as efficiently as do male adults.

In contrast to outdoor cycling in which a helmet is absolutely essential, a helmet while indoor cycling is actually considered non-essential. In fact, head covering may interfere with heat dissipation.

There usually is also a noticeable difference in the rider's heart rate. This elevation in rate is independent of and not due to any aerobic training effect. The elevation is an attempt to enhance the cooling process. Any significant reduction in the body's capacity to thermo regulate can become a life-threatening event under extreme conditions. On a less serious note, it certainly does adversely affect one's performance. "Working up a sweat" continues to be a goal of many fitness programs. Unfortunately, this is a lingering myth – visible sweating as an indication of exertion – persists among the misinformed.

Sweating is an important aspect of the body's thermoregulatory mechanism. Insensible perspiration is indicative of efficient cooling. Excessive, visible sweating is evidence of inefficient thermoregulation. There are absolutely no known health benefits from dripping sweat all over the exercise environment.

SKIN ABRASION PREVENTION

Body parts that come in direct contact with the saddle require protection from constant rubbing, particularly in the inner thigh area. Specialized cycling shorts without bulky seams are the most comfortable. These shorts extend to the knees. The fabrics glide easily over the saddle to prevent rubbing between the shorts and skin. Abrasions can also be reduced by the use of talcum powder or by applying a thin layer of petroleum jelly to the areas covered by the shorts.

There is always potential for skin infections since a fertile environment exists from the combination of abrasions and sweating. Laundering of cycling garments is imperative after each outing to reduce this occurrence.

PRESSURE PREVENTION

Constant weight bearing on the saddle due to the static positioning of the body can create an uncomfortable pressure. The goal is to have the legs bear more of the upper body weight. This goal is achieved by strengthening the lower body, increasing endurance, and mastering specific cycling techniques.

Concentrated pressure can be dispersed by wearing specialized padded cycling shorts and using gel-filled saddle covers. Specialized saddles are designed to accommodate the female anatomy and may be quite beneficial.

The use of gloves during a health-related training program is solely the preference of the rider. They basically are non-essential. If the rider has extremely sensitive hands, they may prefer the gloves. The beginning cycler may experience some degree of soreness or numbness on the palms of the hands. This is due to the resulting pressure of

weight being shifted from the legs or saddle to the hands to relieve lower body fatigue. The skin will adapt to the pressure against the handlebars after a few weeks of training. The rider actually becomes more proficient in transferring and maintaining full body weight on to the seat and lower extremities.

SAFETY VERSUS LOOSE CLOTHING

Loose, baggy clothing must be avoided at all costs. It is an accident waiting to happen. Baggy clothing can potentially get caught on the seat or even worse, entangled in the moving parts of the cycle. Again, loose shoe laces are an easy target for cycle parts. Be sure to tuck the laces into the shoes prior to each ride. This is one case where safety is more important than comfort. The rider can still be comfortable in properly fitting attire.

WATER BOTTLE

Believe it or not, the water bottle is the most important piece of equipment for a Power Cycling class.

Water intake is essential for successful physical performance. Proper hydration during exercise has many benefits that include regulation of heart rate and core body temperature, improvement of circulation, maintenance of blood volume and sparing of muscle glycogen.

According to the American College of Sports Medicine (ACSM), failing to take in enough water can lead to dehydration, muscle fatigue, energy loss, decreased performance and heat illnesses. Fluid balance is the goal, and you should educate riders on the importance of hydration during a Cycling class. The sensation of thirst occurs after dehydration has already begun, so it is not a good indicator of water balance; instead, fluid must be consumed in a regulated fashion.

The question always arises, is how much water an individual needs to drink during exercise? The water consumption varies according to gender, age, diet, rate of perspiration, environment and health conditions. As a guideline, it is recommended drinking 40 ounces of fluid in total before, during and after each Cycling class. Maintaining proper hydration levels can be especially challenging in older populations, according to the ACSM, because of hormone changes, chronic health conditions or medications that alter fluid and electrolyte balance. Because there can be such a wide variety of riders in Cycling classes, the best method to ensure proper hydration across the board is to suggest that every rider have a water bottle and to schedule water breaks throughout class.

TOWEL

Most of the time we do not think about bringing a towel to class. By bringing a towel to class it promotes safety and cleanliness. Excessive sweat can pose a safety risk if

surfaces, such as the handlebars, become slippery. Also, having a towel on hand provides a convenient way to wipe down the bike at the end of the ride.

SAFTETY RECOMMENDATIONS

Instructor Safety Guidelines:

Prior to Starting a Class:
- Instructors should always introduce themselves.
- Next ask if there are any new students.
- For all new student, set up anyone who is new by determining proper saddle height, saddle fore/aft adjustment, handlebar height and, if applicable, handlebar fore/aft adjustment.
- Next ask all the students to tighten pop-pins and double knot or tuck in shoe laces.
- Once setup is complete and safety checks have been made, briefly explain the design, goals and intensity of the class.

During a Class:
- Always remind the students that they can go at their own pace.
- Always as an instructor, cue intensity and cadence throughout the ride.
- Familiarize new students with all movements at a reduced cadence to encourage control and good form.
- Remind the students to maintain a connection to the flywheel with resistance throughout the ride.
- It is important to cue hydration/water breaks throughout the class.

After a Class:
- At the end of the class, cue the students to disengage from the pedals and exit the bikes.
- Always lead the class through a full-body stretch.
- Follow facility guidelines for resetting bikes for the next class.
- Always thank students for attending, remind them to continue to hydrate and offer to answer any questions.

Student Safety Guidelines:

Safety is a major focus of the of the Power Cycling Class. The following guidelines are reminders to your students:

Prior to Starting a Class:
- Students should consult a physician before beginning this or any other exercise program.
- Wear comfortable clothing made of breathable fabric and cycling-specific shoes or a pair of athletic shoes with a firm sole. Padded cycling shorts are recommended and provide the greatest comfort by reducing the chances of friction and chafing.
- Bring a water bottle and a sweat towel to every class.

- Let the instructor know if you are new so he or she can set you up on your bike and offer modifications or other accommodations.
- Become familiar with the bike and how it functions. This includes turning the resistance knob, pushing down on the knob to engage the brake, placing the feet on the center of the pedals and tightening the foot strap to properly use the cages, or clipping in toes first and out of the pedals with only a sideways movement of the heel.
- Make sure to tighten all pop-pins and adjustments on the seat post, handlebars and saddle.

During a Class:

- Start with lower resistance and a slower cadence to support safe and effective cycling technique and smooth transitions.
- Focus on the form cues the instructor gives you, remember to breathe and take water breaks.
- Always listen to your body. If you begin to feel faint or dizzy, slowly stop pedaling and carefully dismount the bike. Inform the instructor immediately.

After a Class:

- If cycling is a new activity, riders will likely have sore muscles after a class.
- This will decrease over time. Remind riders to stretch off the bike after each ride to improve flexibility.
- Commit to attending two or three classes per week to build a good aerobic base.

Chapter 3
THE SCIENCE OF POWER CYCLING

POWER CYCLING combines the physiological, biomechanical and psychological aspects of a cycling program into a comprehensive, complete prescription.

PHYSIOLOGY OF POWER CYCLING

Localized muscular endurance must be developed before a true aerobic training effect can be achieved. This is especially true in cycling which is such a muscle-specific activity. The challenge of cycling is to accurately monitor appropriate training parameters. These parameters are the same as those outlined by the American College of Sports Medicine for those running, jogging or aerobic dancing. However, a distinction must be made between localized muscle fatigue and endurance and systemic fatigue and endurance. **POWER CYCLING** instructors must understand and apply the parameters of aerobic, cardiovascular training in order for this program to be successful. The goal of the **POWER CYCLING** program as it relates to the physiological component is to provide an environment in which the riders can achieve cardiovascular health and fitness.

WORKLOAD AND CADENCE

In general terms, efficiency is the relationship between the mechanical work accomplished in moving the cycle and the energy expended by the body to produce the mechanical work. Optimum efficiency is a combination of smooth, efficient pedal stroke and a proper combination of cadence and workload. The rider must match workload with the best cadence for the most efficient use of energy.

Cadence and workload both affect efficiency. Cadence is the pedaling rate expressed in terms of revolutions per minute (rpm). Cycling at constant workloads produce U-shaped relationships between cadence and energy cost. The lowest point of the U-shaped curve represents the lowest energy expenditure and the cadence at which the cyclist is most efficient. Pedaling then either faster or slower is less efficient because more energy is expended to achieve the same power output.

Observing stationary cycling programs in health clubs reveals many inexperienced cyclists do not exceed 80 rpm. After a comprehensive training program, pedaling rates rise to excess of 100 rpms. The upper limits of pedaling cadence will be determined by personal preference and genetic factors such as predominant fiber type. The workload provided by the pedaling mechanism affects the efficiency of cycling. An increase in the resistance to pedaling will require more forceful and sustained muscle contractions to rotate the pedals at any fixed cadence. Power output or energy cost increases with increased workload. Workload increases if the cycle needs lubrication and tire pressure is low. Workload decreases with a well maintained bicycle.

Efficiency implies maximum power output from minimum energy output. If the workload is too low and the cadence too high, efficiency may be sacrificed. This can be

demonstrated when the rider bounces in the saddle or appears to be out of control. The rider is spinning too fast and energy is wasted since it is not directed toward force delivered to the pedals. Workload for indoor cycling is varied by the resistance lever that controls the resistance against the fly wheel.

INTENSITY FOR HEALTH BENEFITS

To realize health-related benefits, **POWER CYCLING** minimizes orthopedic stress and maximizes effective pedaling so that muscles are functionally trained and aerobic endurance increases. *Health benefits are accrued by expending energy over time.* The more energy that is expended, the greater the health benefits. That does not necessarily mean that the energy must be expended over a short period of time. A combination of low cadences and high workloads is stressful on the knees of the cyclist. **To maximize health benefits use a relatively high cadence at low to moderate workloads.**

High resistance and slower pedal frequency often leads to early local muscle fatigue and decreased total caloric expenditure. This slow pedaling may be anaerobic for specific muscle groups which eventually lead to increased lactate production. The interference with local blood flow impedes lactate clearance. Low rpms and high workloads lead to increased incidences of knee injuries.

A goal of the **POWER CYCLING** program is to minimize the risk of injury and discomfort to the neck and lower back so that participants will want to ride longer and more frequently. For beginners, choosing a resistance level and cadence that can be maintained for 15-20 minutes in the initial conditioning phase is in their best interests for an effective cycling program. The program prescription should also fall within the guidelines established by the American College of Sports Medicine. To establish an effective training zone for aerobic fitness, first establish an efficient pedaling pattern with very little resistance, and then gradually increase the resistance to the level that can be maintained for 20 minutes without undue orthopedic stress.

A major benefit of enhanced aerobic fitness is a reduction in the risk of cardiopulmonary disease. Anyone who wishes to improve all aspects of fitness should include an improvement in aerobic fitness. This can be accomplished through continuous bouts of exercise that utilizes many of the major muscles of the body. Power cycling and cycle ergometry meet these criteria.

The American College also recommends an activity that does not impose significant orthopedic stress, is accessible, convenient and enjoyable – all factors directly related to stationary cycling. These recommendations can be met by cycling in upright positions rather than streamlined positions.

Three variables determine the amount of exercise necessary to improve aerobic fitness. These are intensity, duration and frequency. The optimum levels of each of these variables depend upon the fitness level of the individual.

Chapter 4
BIOMECHANICS OF POWER CYCLING

A previous drawback to stationary cycling was the difficulty in minimizing initial localized muscle and joint discomfort while providing the duration of activity necessary for an aerobic workout. One must be aware of the mechanical stresses involved in this repetitive, muscle specific activity. Localized, intense lower body and static positioning of the upper body and torso result in this discomfort and must be minimized if newcomers are to continue with their training program.

The biomechanical goals of the **POWER CYCLING** program are to provide an optimum bicycle/rider interface, appropriate equipment, apparel, fitting procedures and training techniques which minimize orthopedic stress and general discomfort. **POWER CYCLING** enhances functional training of the torso and upper body in the static position. This specialized training assists in postural alignment and endurance for not only cycling but also for other every day activities. The program incorporates specific exercises and postural breaks which are designed so that riders can learn and use them throughout their day to relieve fatigue and stress of the lower back, upper back and shoulder girdle, neck and shoulders.

MAXIMIZE PROPULSIVE FORCE

Body motions needed to turn bicycle pedals vary from one individual to the next. The goal is to make the propulsion as effective and as safe as possible. Biomechanical analysis shows the foot, shank, (lower leg); thigh and pelvis act as a set of jointed levers. The muscles provide the force that causes the ankle, knee and hip joints to flex and extend. The amount of force that any muscle can exert varies with its length. This length is determined by the angle of the joint that the muscle crosses. The force of muscle contraction is lessened when the muscle is at its shortest or at its longest functional length. The greatest exertion occurs somewhere between the two extremes. Energy is exerted throughout every part of the pedaling stroke, using a full range of motion and all available muscles to create a full circle while pedaling. This technique generates power, utilizes energy most efficiently and allows for faster "travel."

"Smart cycling" is performed using smooth, synchronized movements of the feet and legs so that the feet "spin" in an efficient circular motion that follows the pedal rotation. This type of cycling is in direct contrast to the jerky, inefficient and potentially stressful movements of an unskilled cyclist who only wants to create propulsion on the pedals when the foot is pushing downward.

Force on the pedals is rarely in a direct, vertical push downward. In the first 130 degrees of the pedal cycle, the force is downward and backward. When the force is close to a 90 degree angle with the crank arm, from that point onward, the force decreases. By the time the pedal reaches the bottom of the stroke, a large force exists but it is not very effective since the cyclist is trying to stretch the crank arm. During the recovery phase of the pedal cycle, (180 to 360 degrees) a force is still pushing down on the pedals. During

the recovery phase you hardly apply any pulling-up force. Pulling up on the pedals only occurs at very high resistance on the flywheel and at low pedaling rates. Both legs are moving in a synchronous motion, but 180 degrees opposite each other. While the right leg is pushing down in the propulsion phase, the left leg will be in the recovery phase. While there is a small downward force from one leg, it is easily overcome by the other propulsive leg.

Even highly successful cyclists are unable to exert significant propulsive force in the upward half of the rotation of the pedal. As humans, we are physiologically incapable of generating propulsion during the upward phase at any realistic cycling speed. At best we can attempt to minimize the counterproductive force created by the weight of the leg and foot.

Smooth, symmetrical pedaling should indeed create equal propulsion except for one minor detail – most people have a decidedly dominant right or left leg, thus deriving considerable more propulsion from one or the other. This may be due to an imbalance in training, different activity patterns of the muscles, structural differences such as leg length or past injuries.

One can perform a simple test to determine any such dominance. Using a fixed gear bike, ride at a fixed cadence and workload using the left leg for 5 minutes. Rest the left leg and use the right leg for 5 minutes. This alternating sequence of pedaling one leg at a time will soon result in leg fatigue of the less- dominant leg if one exists. This can be overcome by focusing on the less effective leg by consciously balancing the contribution of each leg during training, or by including short bouts of training using only the less effective leg. During these short training periods, the workload should be cut in half and gradually increased over time. Repeat the test at different times until the less effective leg has caught up to the other dominant leg. This equal strength and endurance is not only important for cycling but also for injury prevention in other activities.

FITTING GUIDELINES FOR INTERFACING

Although the angles of the ankle, knee and hip joints vary throughout the entire pedaling motion, two adjustable components of the bike affect their positioning. A lower seat position tends to flex the hip, knee and ankle joints. The hip joint flexes more with a lower, more forward position of the handlebars. An increase in crank length tends to increase joint flexion at the top of the pedal rotation and extension at the bottom of the pedal rotation.

Despite ongoing efforts, nobody has successfully predicted the optimum bike adjustments for cyclists in general or for any one cyclist in particular. Recent advances in technology have provided additional insight. There remains, however, much to be accomplished in understanding the correct rider-bicycle interface that optimizes human resources to power the bike effectively.

There are general fitting recommendations. Optimum saddle height seems to be related to leg length. Leg length is defined as the height of the center of the pubic bone (the pubic symphsis) above ground level during erect stance. Successful cyclists recommend that for the greatest efficiency the knee joint should never reach full extension. The knee joint should remain 37 degrees short of full extension when the pedal is close to the lowest point in its rotation – the 6 o'clock position.

Saddle Height

The first step is to establish proper saddle height. As an initial approximation, the seat height can be adjusted to hip level when the rider is standing next to the bike.

Saddle Height Measurement
Side View

Saddle Height Measurement
Front View

When the rider is sitting on the saddle with the feet on the pedals, check the angle of the knee when the foot is in the 6 o'clock position. The knee should not be fully extended in this position. Knee joint angle can be measured by using a goniometer. The optimum angle appears to be greater than 10 degrees and less than 40 degrees of flexion. Full extension is zero degrees of flexion. The rider must dismount if the saddle needs to be adjusted. Before the rider remounts the bike, make sure that the pin clicks firmly into the slot.

Saddle Height cont'd:

Saddle Height in the Saddle

Heel Check

Knee at 25-35 Degrees of Flexion

If the rider's hips are rocking in the saddle, it may be an indication that the seat position is too high.

If the rider is positioned too low, inadequate leg extension may cause undue strain on the knee.

CHECK: the pop-pin is fully engaged and that the seat post is secure.

HEEL CHECK: Heel Check: Instruct the rider to sit in riding position: sitting on the widest part of the saddle, hands comfortably on the handlebars, with a neutral spine. Have the rider place the crank arms straight up and down (12 and 6 o'clock) and then place a heel on the pedal spindle of the bottom (6 o'clock) pedal, keeping the foot parallel to the floor. In this position, the knee should be fully extended and the hips should be level. If not, adjust the saddle up or down as needed.

KNEE 25-25 Degree of Flexion: Once the heel check is complete, request that the rider place the balls of his or her feet over the center of the pedals. This is when the rider should either clip in or be assisted into the toe cages and shown how to pull the strap snug. If the heel check was done correctly, there should be a slight bend in the knee, between 25–35°, on the leg in the 6 o'clock position.

Fore/Aft Position of the Saddle

Adjust the forward-backward position of the saddle according to the length of the rider's torso. The saddle should be closer or forward to the handlebars for a rider with a short torso. The saddle should be positioned further back for a rider with a longer torso. To make sure the saddle is secure after making the adjustments, exert force in both directions. Listen for the click of the pin fitting into the slot. Do not attempt to adjust the saddle unless the rider has completely dismounted. With the feet at 3 and 9 o'clock (both cranks parallel with the floor), a plumb line dropped from the patella (knee) should intersect the shoe strap on the pedal (over the instep of the foot).

A perfect fore and aft position will protect the knees and produce an efficient pedal stroke.

Arms should be a comfortable distance to the handlebars with the elbows slightly bent. This comfortable position will facilitate relaxed breathing and upper body movement.

Have the rider keep his or her hands in the same place on the handlebars and place the pedals at 3 and 9 o'clock. The forward foot is at 3 o'clock and will be used for the plumb line.

Using a plumb line (a string or cord with a weight tied to one end and a loop at the other), place the loop end at the tibial tuberosity, which is the bony protuberance just below the kneecap, and let the weight dangle down to the pedal or just below it. The weighted end should align with the center of the pedal, known as the pedal spindle (bolt that attaches pedal to crank arm). The weight can be slightly behind (up to ½ in), but not in front of, the pedal spindle.

If the saddle is too far forward (fore), it puts undue strain on the patella (knee cap) and compromises the safety of the knee joint.

If the saddle is too far back (aft), it overextends the hamstrings and the IT band. It also hyperflexes the hip flexor group, which can lead to low back pain.

If changes were made to fore/aft of the saddle, the rider needs to recheck the saddle height. If the rider then makes changes to saddle height, it is necessary to recheck saddle fore/aft again as well. Once height and fore/aft are set, have the rider pedal slowly. Watch the legs rotate to ensure proper alignment.

Encourage riders to remember their settings for the next time they take a class.

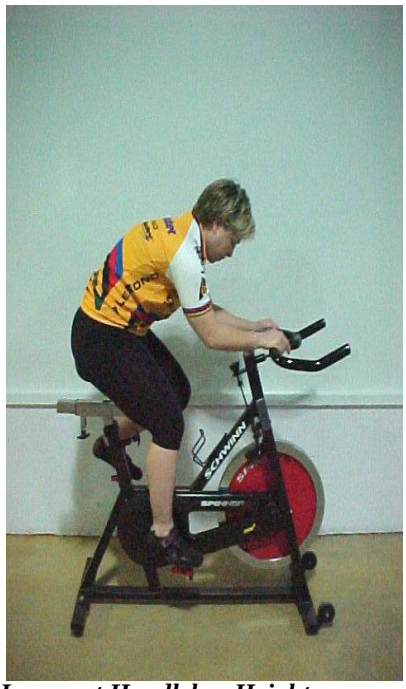
CHECK: With the crank arms parallel to the floor, the kneecap on the forward leg is aligned directly above the center of the pedal.

Handlebar Height

New riders should cycle with the handlebars in the highest position. This position reduces stress on the lower back and neck. Experienced riders may choose to ride with a lower handlebar placement. The handlebar position can be adjusted downward to approximately the same height as the tip of the saddle. Exert force on the handlebars to make sure that the adjustment pin is locked into the appropriate slot. After hearing the click, tighten the screw.

CHECK: Make sure the pop-pin is fully engaged and the handlebars are secure.

Correct Handlebar Height



Incorrect Handlebar Height

PROPER BIKE SET UP:

1. Relaxed Shoulders
2. Slight Bend in the elbows
3. Knee at 25-35 degree of flexion at bottom of the pedal stroke
4. Ball of the foot over the pedal spindle

Pedals

The foot must be secured and the ball of the foot is in the center of the pedal. The toe clip and strap must be snug but not tight, holding the shoe in the toe clip but also permitting a slight left-to-right pivot of the heel. Do not tighten the strap to prevent freedom of heel movement. A low cut shoe which allows such ankle movement and has a stiff sole is preferred. A soft-soled aerobic shoe absorbs too much of the pedal force and makes for pedal inefficiencies. A soft sole will also bend over the pedal when in the standing position.

Shoes should be snuggly strapped into the foot cages to prevent feet from coming free.

Shoe laces should be tucked in to prevent tangling with the pedals.

If clipless pedals are used, check the cleat tension on the pedals to make sure they are properly aligned on the shoes. Improper alignment may cause muscle and tendon strain and lead to injury over time.

Correct Foot Position
Notice Toe in Clip

Incorrect Foot Position
Notice Toes not in Clip

Hand Positions

When one considers hand positions, one must concentrate on safety and comfort. Proper hand positioning will ensure a comfortable ride and will help prevent injuries. All seated hand positions have the thumbs and fingers connected. The hands are over the ends of the bull horns, palms inward, knuckles out, fingers wrapped lightly around the bar with thumbs over the ends of the bar for standing climbing only.

There are 4 Hand Positions in a Power Cycling Class:

HAND POSITION 1:

Hand Position 1

Hand Position 1 is for Seated Flats when the intensity is easy to moderate. This includes warm-up, recovery after intervals, endurance drills and cool-down. Practicing this position teaches riders the skill of relaxation and enables rhythm and connection to the bike.

Cue as directed:

- Rest hands in the center of the handlebars with weight on the outer edges of the hands to maintain circulation to wrists and palms.
- Keep elbows slightly bent, shoulders relaxed and eyes forward.

Note: Do not attempt to mimic the aerodynamic position some cyclists and triathletes use while riding outdoors. Because aerodynamic concerns do not apply to the indoor environment in a tucked position, riding on the forearms is contraindicated. It may over-flex the torso and cause excessive posterior rotation of the pelvis, leading to unnecessary strain in the hamstrings, IT bands, back and neck.

HAND POSITION 2:

Hand Position 2
Hand Position 2 creates more stability and opens up the chest for optimal air exchange. The majority of riding time is spent here.
Hand Position 2 is used for Seated Flats, Standing Flats, Seated Climbs, Jumps, Running on a Hill, Jumps on a Hill, Sprints on a Flat and Sprints on a Hill.

Cue as directed:
- Place palms over handlebars with thumbs resting on the top or inside of
- the curve.
- Point fingers down, point knuckles forward and keep wrists neutral.
- Maintain a soft bend in the elbows, keeping shoulders relaxed and eyes forward.

HAND POSITION 2.5

Hand Position 2.5
Hand Position 2.5 is another option for any movement for which a rider would use Hand Position 2. Those who require a longer reach may slide hands to the outside of the handlebars.

Cue as directed:
- Keep shoulders relaxed, elbows soft, wrists in neutral alignment, shoulders back and eyes forward.
- Lightly grip fingers with the thumbs toward the inside of the bars, maintaining neutral wrists.

HAND POSITION 3

Hand Position 3
Hand Position 3 is used only when standing with heavy resistance, when the intensity is hard to very hard. It is used for Standing Climbs and during the standing portions of Jumps on a Hill, Sprints on a Flat and Sprints on a Hill.

Cue as directed:
- Increase resistance to heavy.

- Stand up and grasp the end of the bullhorns with the palms inward and knuckles out.
- Wrap fingers lightly around the bars with thumbs over the ends.
- Adjust resistance as needed to maintain a smooth pedal stroke and keep a relaxed grip on the handlebars.

MINIMIZE ORTHOPEDIC STRESS

There is virtually no published data that indicates the incidence of injuries to riders during stationary cycling. This leads one to believe that it is so insignificant that it has not attracted any researchers. However, one can review outdoor incidences as they relate to mechanical stresses of cycling and guidelines for injury prevention in stationary cycling.

Knee pain is perhaps cycling's most common overuse problem. Neck and back pain are extremely common occurring in up to 60% of all cyclists. Ulnar neuropathy or pathology of the ulnar nerve, is common in long term enthusiasts. Common symptoms include tingling, numbness and weakness of the hands. Saddle-related injuries including chafing of the skin and pathologies of nerves, pelvic floor and the genitalia are encountered by cyclists who accrue substantial mileage. The following are causes and strategies used to help prevent injuries and areas of discomfort.

Knees

Common causes of knee pain include the following:

1. Mechanical stress caused by pedaling at low cadence and high workload.
2. Incorrect seat height
3. Excessive and prolonged pronation of the foot and ankle
4. Misalignment of the forefoot and rear foot
5. Misalignments of the knees and ankles

The three-dimensional motions involved in pronation during cycling seem to be subtle and complex. Interventions have been successful in controlling motions of the foot. It s apparent that knee pain can be abated within a two week period for 5 out of 9 cyclists who have been fitted with in-shoe orthotics.

A common experience for riders seems to be a "weaving" of the knee. A correction method often used involves training in front of a mirror. Place a dot in the center of the knee and have the rider track the position of the dot. By focusing on the dot's movement, the rider can correct this motion. The rider should attempt to control side-to-side knee movement so that the dot follows an elliptical path or moves straight up and down through the revolution of the pedals.

It is recommended that cyclists who have ongoing knee discomfort or obvious malalignment of the legs and feet should consult a medical specialist in sports medicine.

There are biomechanical implications of using toe clips and cleats while cycling. The purpose of these devices is to reduce the risk of slippage and to maintain the ball of the foot in the optimum location on the upper surface of the pedal. This allows the cyclist to exert consistent forces on the pedals and aids in producing smooth pedaling mechanics. Cycling at a fixed workout and cadence expends more energy when leather-soled shoes on rubber covered pedals are worn versus conventional cycling shoes on metal pedals fitted with toe cleats. The theory behind this was that additional muscular energy was being expended to keep the feet from slipping off the pedals.

The use of cleats and toe clips improve efficiency but also are a potential source of injury. It is imperative that the position in which the foot is fixed permits the knee joint to move in an unrestricted fashion. Toe clips and cleats that are adjusted to meet the anatomical constraint of one cyclist may force another cyclist's feet to toe-in or toe-out. This inflexible cranking and pedaling mechanism will exert a twisting force on the knees during the cycling process. A solution to this potential injury-related problem would be to select a toe clip that allows some side-to-side motion of the heel.

Neck and Back

The cyclist may experience additional neck and back stresses because of the need to compromise between aerodynamics and comfort. A streamlined body position reduces drag (wind resistance) but does create prolonged mechanical stress on the posterior ligaments, discs and facet joints during a crouched cycling position. This position can lead to definite muscular and ligamentous discomfort and in a worse case scenario the uneven loading of intervertebral discs and an imbalance between opposing muscle groups of the spine.

Since aerodynamics is a relatively minor consideration, choosing a more comfortable position is less mechanically stressful. By maintaining a biomechanical beneficial position, the stationary cyclist has the opportunity to build strength and endurance for the postural muscles.

With a more upright cycling position, mechanical stress on the neck and back will be reduced. It is highly recommended that cyclists make frequent changes in the alignment of the spine, counterbalancing the stresses of the forward flexed position by extending the back in the opposite direction. Assume a neutral posture of the spine, head and neck. A neutral, relaxed alignment of the shoulder girth during cycling is also recommended. This can be accomplished safely by releasing the handlebars and cycling for a period of time in an upright position where the spine is neutral.

POWER CYCLING encourages frequent postural breaks during which the rider can sit upright and stretch. This change counterbalances the stresses of riding in the forward position. Riders are taught to distinguish between forward flexing the spine and flexing at the hips which is commonly referred to as a hip hinge. By hinging forward at the hip joints instead of the spine, two things occur to prevent discomfort: (1) the spine remains in neutral throughout the ride without the mechanical overstretching of the ligaments and (2) the torso stabilizers are actively trained throughout the ride. This

training increases the endurance needed to stabilize and protect the spine in everyday life occurrences.

Wrists and Hands

Pain in the wrist and hand areas is caused by too much of a load or overload being placed on these areas. Again, the more erect cycling position is less mechanically stressful than a crouched position. The distance from the saddle to the handlebars should not impose a marked forward lean of the trunk. The handlebars should be set at the highest position.

The goal should be to distribute pressure on the hands over the palm near the base of the fingers. Avoid pressure on the base of the palm with the wrist in constant hyperextension, repetitive flexion and hyperextension of the wrist while gripping the bars. Repetitive motions of a loaded wrist can produce carpal tunnel syndrome.

Pelvic Floor

Discomfort in the pelvic floor and the area of the bony prominences that support the body in a sitting position is common occurrences for inexperienced riders. The discomfort in most cases will lessen over a period of weeks as the body becomes more adapt to the training regime. Pain or discomfort in areas in contact with the seat can often be avoided by making alterations to the texture or the geometry of the actual seat. Padded shorts or a gel-filled seat cover can effectively distribute uneven pressure uniformly over the surface of a rigid seat.

Changing the angle of the seat top so that it either slopes slightly upward or slightly downward towards the front of the bike is an effective way of making the seat more comfortable.

Excess pressure, discomfort and temporary numbness can all result from the static positioning. Frequent postural breaks, changing positions on the saddle and utilizing the standing pedaling technique all contribute to minimizing pelvic discomfort. As the muscles of the legs become stronger through ongoing training, the rider is capable of shifting more weight onto the legs and thus away from the pelvic floor.

Feet

Numbness and pain in the feet can be caused by excessive tightening of the toe straps. The strap should be snug but not tight. Other pain or discomfort may be due to inappropriate shoes. A simple way of correcting this problem is to change footwear.

Chapter 5
PSYCHOLOGY OF POWER CYCLING

Paramount to the success of **POWER CYCLING** is the ability to psychologically motivate the riders. A previous drawback of stationary cycling was the difficulty maintaining motivation during a repetitive activity for the duration needed to make improvements in aerobic fitness. The goal of **POWER CYCLING** is to provide a motivating environment to help riders achieve their fitness and training goals. This activity is unique in that it provides the opportunity to close your eyes and push your limits.

OUTSTANDING LEADERSHIP

Three keys to effective motivation are:

- Commitment to Goals
- A positive, relaxed attitude
- Communication excellence

Commitment to Goals

An individual's commitment is directly related to his/her individual goals. An effective instructor's commitment must be to assist riders in the class to achieve their individual goals. The instructor must be committed to the role of mentor and coach, setting aside their own personal training goals during the class. Both instructional and motivational skills must be mastered and used to help all class members. The work of an instructor is entirely different from the work of the rider.

The instructor must identify the training goals of each rider. It is through this process that the instructor can then determine the actual pace for the class. Both rider and instructor must have these goals clearly in mind and both must understand the specific training parameters necessary to achieve each goal. One visual aid with is quite effective in attaining this goal is the development of a goal setting/injury prevention sheet. The rider can then document each ride and optimize goal achievement and minimize discomfort. These elements can informally be assessed during the initial bike fitting and orientation session. If a rider has a specific weight loss goal, then the instructor must explain the appropriate training regime for those goals and encourage the rider to remain within that regime. That does not mean that the actual class may offer opportunities to go outside of that regime. It does mean that the rider must be committed to perform the training regime that will allow him or her to meet her goals. It also means that the instructor must give appropriate guidance to the rider to stay within the determined regime. The appropriate imagery and motivational cues may be different for that person than for someone who is there for social reasons. The instructor and rider must become skilled at monitoring exercise intensity to most effectively move toward the achievement of specific goals.

Relaxed and Positive

Attitude is associated with the degree to which an individual is realistic and positive towards the task at hand. The instructor's role is to motivate the rider. The rider moves on to explore and expand their initial individual limits. This usually is a necessity if goals are to be realized. In order to attain these goals, the rider must attend class mentally focused on these goals. The rider also needs the knowledge of the training methods that will most effectively achieve these goals.
The key to success may rest in taking the time to relax both physically and mentally. A significant difference in performance is attained when time is taken to focus on the goal prior to the activity or event. For riders, the warm-up period is the opportune time to mentally and physically relax using deep breathing techniques and mild range of motion exercises.

Communication

Effective communication is a two-way process which includes both verbal and non-verbal instructions. Active observation must also be incorporated as a skill since the instructor must have the ability to recognize the signs of impending fatigue. Often times the rider is so focused or so determined that he or she fails to realize his or her own physical state. Unfortunately, sometimes this recognition comes too late and the rider has actually gone beyond the point of beneficial training. It is the responsibility of the instructor to communicate to the rider that is indeed ok to stop or pace down. Likewise, it is the instructor's responsibility to encourage the rider if the rider does not appear to be working hard enough. The instructor establishes a non-competitive atmosphere which promotes the achievement of individual goals in a group setting.

The effective instructor must be heard and understood. Volume of music and background noise inherent to the gym environment plays an important factor in this component. The instructor must be understood in terms of using cues and visual imagery that are meaningful to riders. The instructor should always remember that there are two kinds of learners – those who learn by "telling" but also those who learn by "showing." An instructor can "tell" a "showing" learner the same thing over and over again and make no progress. This rider must be shown, if not, then frustration results maybe to the point of terminating the cycling experience altogether.

The effective instructor must also establish a motivating mood and atmosphere for the class. Boredom can often creep into this activity. It is imperative that the instructor establishes a motivating mood. Creating visual imagery, fluctuating voice tone and volume, and alternating light and music patterns can assist the instructor in preventing boredom.

Many participants can actually participate safely above the anaerobic threshold. This is due to the fact that cycling is a non-impact activity. The mechanical stresses inherent in impact activities such as running make it extremely difficult to work at higher intensities for long periods of time. Orthopedic stresses and physical imbalances result in

injuries long before any significant anaerobic training effect occurs. One of the most exciting experiences for an instructor is their assistance in helping cyclists push through their fears and exploring their upper limits.

Chapter 6
TOOLS FOR EFFECTIVE LEADERS

Four tools that all effective instructors must develop and incorporate into their daily teaching instructions include:

- Music
- Visual images
- Verbal instructions
- Voice tone

Voice Tone

Your voice is one of the most powerful motivating tools. Training regimes consist of many peaks and valleys. The instructor must lead the rider successfully through the highs and lows. There will be times when the rider needs to be inspired to work through the difficult times. The tone and volume of the instructor's voice is a tool which makes this happen. When riders need to relax for a continuous slow climb, a soft tone of voice will be quite effective. Knowing how and when to inspire vocally is an important skill of a strong leader.

The instructor needs to know when to stop talking. This pause gives the rider's time to absorb the instructions and guidelines plus experience the music. Vocal enthusiasm and encouragement should compliment rather than distract from the overall atmosphere of the training session.

A soft vocal tone can provide a calming influence. Riders continue to perceive that they work harder at a low cadence and high workload than at a high cadence and low workload. Softening the tone and decreasing the music volume may help the riders relax as the perception of the workload increases.

Verbal Instructions

General instructions and class reminders must be given in clear, precise verbal cues. Never withhold compliments. These compliments reinforce a positive awareness that the instructor is there for support, education and group motivation. Individual corrections should only be made for situations involving safety for the group setting. Singling one person out result in some adversity. One-on-one feedback before or after the ride is usually much more positively accepted and appreciated. This feedback reflects your genuine concern for them as individuals.

The action of the riders needs to be directed on to five key areas. These areas are thought of as "cueing layers" and assist the instructor in organizing the verbal instructions to be given to the riders.

- **Body Alignment**
  Cueing body alignment helps riders focus attention on their bodies and experience neutral alignment. Cueing also enhances kinesthetic awareness as riders learn to direct their focus to each joint. Learning internal focus and paying attention to alignment helps the rider to raise their awareness more consistently in other daily activities. Re-establishing and maintaining neutral alignment of all body segments helps to decrease existing imbalances and helps to build endurance of the upper body muscles and torso.
  Optimal posture and neutral alignment also impacts the efficiency on the cycle. With correct body position, riders can achieve and maintain balance and decrease muscular compensations and faulty technique. This may also decrease the potential for injury and lead to performance enhancement.

- **Pedaling Technique**
  Cueing pedaling techniques directs the riders in controlling exertion and enhancing performance. Efficiency and intensity can be either increased or decreased by smart cycling techniques. Frequent descriptions and reminders about effective pedaling should be included in the training program.
  Pedaling drills can enhance technique and improve balance between the right and left legs. A good drill cues the use of one leg to drive the flywheel and then switching to the other leg. The rider needs to generate propulsion with the left leg only and emphasize power with the right. Bilateral symmetrical pedaling will be developed as the less dominant leg becomes stronger over time.

- **Muscle Form**
  Cueing muscle form encourages the rider to pay attention to and use specific muscle groups for brief periods of time. To begin a continuous slow climb with resistance, focus attention on the hamstrings and gluteal muscles. The rider's attention needs to be directed and narrowed internally.

- **Breathing**
  Cueing the breath directs the rider into paying attention to their own breathing patterns. Deep, rhythmic breathing promotes relaxation. In return, the rider then exerts effort without tension in muscles not required for effective propulsion. The rider's ability to focus internally on other details such as alignment, pedal stroke and specific muscle focus is increased.
  If the rider is focused on the breathing focus, this acts as a distraction from the intensity of the ride. The rider needs to listen to their breathing as they exert the effort necessary to maintain the intensity of an uphill climb.

Visual Images

Visualization is an important aspect of effective instruction, motivation and successful preparation. Individuals who visualize and mentally prepare for an event are more likely to successfully complete their program. An effective instructor can actually

move the stationary cyclist outdoors to “see” the scenery and “feel” the wind and the thrill of winning a race or cycling downhill.
The riders can visualize a high level of performance. Visualization is most effective during a period of focused relaxation prior to a ride. Similar visualization of the look and feel of high performance can be used throughout the entire class. Completing a long uphill climb with energy to spare, or the feeling of lightness and the sensation of speed can all be described then visualized.
Visualization can also distract from discomfort during an intense segment of a training program. Describing a green meadow or a blue lake or sky on a summer afternoon can be used as relaxation to enhance performance.
Describing a road through a forest or along a cliff overlooking the ocean creates a departure in focus away from the intensity and discomfort.

Music

Music creates a feeling of energy, establishes rhythm and timing and sets the mood of the ride. Thus, the choice of music is an important motivating component of the class.

- **Creates a Feeling of Energy**
  Music is contagious. It has a powerful affect on group dynamics. The instructor should match musical selections to the goals of the ride. The music needs to create the necessary inspiration to meet the challenges of the workout.

- **Establishes Rhythm and Timing**
  Everything in life has rhythm. The way we walk, talk, move and work all reflect our rhythm. Music assists us in maintaining rhythm and timing during a successful training session. It sets the tone of the ride. How the class moves at a fast pace or a slow controlled pace will depend on how well the music is selected. The music must match the desired intensity of the training. If resistance is increased then music should be slow. The rhythm is incorporated into the pedal strokes. If you want accelerated timing then the tempo of the music must be increased.

- **Create a Mood**
  The mood of the training class can actually be felt internally and expressed externally. Music allows the riders to feel very positive and motivated, and in turn express these feelings by increasing effort or output. The mood of the music on a continuous slow ride with resistance should be very strong and powerful. This allows the rider to get caught up in it. Psychology, music will carry the rider through difficult resistance levels and enable the rider to sustain the intense physical effort required to complete the climb.

Chapter 7
MOTIVATIONAL METHODS

Keeping the class focused and motivated throughout the entire workout is one of the biggest challenges. Coaches and sports psychologists have concurred on the following methods to be used in alleviating these concerns.

- **Establish Rhythm and Mood**

The **POWER CYCLING** program will definitely have ups and down Both psychologically and physically. It is important to establish a rhythm with a series of peaks and valleys of effort and recovery. Focus can successfully be channeled and expanded using variations in intensity and attention. It is much more challenging to maintain a rider's interest and focus for goals requiring a steady rate of training versus those that require fluctuations. The mere fluctuation in itself is enough to create motivation. Varying the focus does require skill on the instructor's part. The instructor must be capable of drawing the rider's attention to visual images, suggesting methods to smooth and balance the pedal stroke and enhancing/aligning the upper body.

- **Use "Directors" and "Cueing Layers" for Internal Focusing**

"Directors" are cues that direct action. They can be used in "layers" to channel attention from an external to a more internal focus. The instructor should start with proper body position and pedal stroke and then progress internally into more specific muscle focus, breathing and visualization.

Research has determined four focal components of an individual's concentration. These four are broad external focus, broad internal focus, narrow external focus and narrow internal focus.

- Broad external focus – attention to external events
- Broad internal focus – attention to planning, organizing and mental preparation
- Narrow external focus – specific attention to a single item outside the individual
- Narrow internal focus – attention to one specific thought or idea

Upon arrival to the class, the rider probably in a broad external mode, focused on the external environment and other people in the class. The rider may be in a narrow internal mode focusing on a personal relationship or an event at home. The instructor's first job is to shift this focus to a narrow external mode for a safe, effective ride. The warm-up music and a general greeting are the tools to be used to shift this focus. An effective instructor will then facilitate a broad internal focus to relax mentally and physically to prepare the rider for the experience ahead. Ultimately, the riders must focus on

themselves, both physically and emotionally. The instructor's skills will help the riders explore and expand their personal limits both physically and psychologically.

One of the keys enabling riders to push themselves is effective preparation prior to the beginning of class. In a one-on-one situation, this relaxation/visualization preparation can consume up to ten minutes of the training time. In a group setting, the same end result can be accomplished during the warm-up period. Relaxation of pre-existing muscular tension can be realized by alternating the tightening and relaxing of each muscle group from head to toe.

- **Visualization and Distractions for Coping Strategies**

Relaxation and undesirable tension during the more intense part of the ride can be aided by the use of distracting cues. Visualization and listening to the breath are helpful techniques. By using these cues, the instructor can encourage the riders to relax with good body positioning when the effort is most difficult. There will be less discomfort when increasing the muscle exertion.

The stationary rider does have an advantage over the outdoor rider. Stationary riders can safely close their eyes and push their limits without worrying about an unintentional injury. Also, there is no "opportunity" to collide with another cyclist. There exists then a totally safe environment to perform the prescription training program.

The rider must adapt to the localized muscle fatigue and discomfort from lactic acid build-up. The rider actually builds tissue tolerance to lactic acid which is a somewhat unique aspect of cycling as opposed to other aerobic training programs.

Two psychological techniques can be used to diminish lactic acid concentrations. One is an associative coping strategy whereby the rider uses the discomfort as a motivator. The second is a dissociative strategy whereby the rider focuses on other sensations or images, such as music or colors which serve as distractions from the discomfort.

VISUALIZATION FOR THE RIDE

Visualization techniques can be used for a variety "environments." These techniques are quite effective for riding along flat roads, in valleys on a mesa or plateau. Visualize climbing a relatively steep incline, maybe a mountain or hill. Visualize pedaling against a heavy wind resistance. Visualize riding fast along flat roads while lifted off the saddle, like children often like to ride. Avoid visualizations of "pistoning" in which the rider may shift too far forward and place too much stress on the quadriceps and knees. Visualize hill climbing in high elevations, going up a steep incline to reach a peak. Visualize going over speed bumps seated, then standing, then seated again.

Cues for each position vary depending on what needs to be accomplished. The FAST LIGHT SEATED position is considered the "home" position. It is very important to remember that when other techniques become too difficult, riders should return HOME. This technique allows for flushing, or the clearance of lactate, cardiorespiratory recovery and a way to re-establish basic spinning pedal stroke following a high intensity segment. The "sit bones" should be pressed into the saddle with the hip joints hinged. The pelvis should be neutral, knees slightly bent, feet plantar flexed with shoulder blades back and down. Shoulders should be squared and not rounded. When the rider loses control of the flywheel and begins to bounce in the saddle, fatigue is beginning to set in.

For a steep hill climb, the buttocks need to be positioned further back on the saddle. The pelvis and torso are stabilized in neutral with the leg further extended. The feet should be slightly plantar flexed with toes pointed slightly down. Shoulder blades are again back and down with a lifted sternum. Square shoulders with wide hands on the handlebars. Sign of fatigue include gripping the bars too tightly and rounding the spine.

The standing technique is performed by lifting the buttocks off the saddle while remaining in a strong neutral alignment of the pelvis and torso. A flat back or slight inward curve is desirable. Knees must be kept slightly bent while standing. Shoulder blades are pressed down with square shoulders and feet slightly plantar flexed. If the hips become extended and the buttocks move forward, fatigue is creeping in. The rider may drop the hips side to side, laterally tilting and rotating the pelvis. It is time to resume the "HOME" position.

SPEED PLAY

Speed play is an advanced technique whereby the rider maintains a constant position and workload but alternates the cadence. It is designed to develop power as well as endurance of the leg muscles. Power is defined as the rate of doing work. Power training is designed to improve the rider's capacity for performing a great amount of physical work very rapidly. Acceleration and deceleration of the pedals are key; however, control is the primary focus when using speed. The rider may either be seated or in a standing position. Resistance must be used for the safety of the riders. Speed play is very effective in increasing energy expenditure and can actually develop focus and

timing. It can be used as a platform for anaerobic fitness. Racing to the top to cross a finish line with a burst of energy is appropriate visualization.

CREATING A RIDE

Choose the Purpose and the Mood of the Ride

You must first determine the goals of the ride.

- Where do you want to take the class or where do you want to go?
- What kind of ride do you want to experience?
- Are you "inside" or "outside"?
- What do you feel inspired to teach or learn?

Choose the Music

Select ten songs for a 40-50 ride. Each song should last three to five minutes, averaging four minutes in length. Songs one and ten will be warm-up and cool-down. Songs two through nine compose the body of the workout, each song representing a cycling technique. A postural break should be given at the beginning of each song after the first one.

Select music that helps set the mood for the various cycling techniques and the various purposes you have in mind for the workout.

Choose music that you LIKE, music that motivates you and helps you "see" and feel the visualizations you will create for the riders.

Choose the Ride Elements

New riders probably will not be able to safely tolerate a full hour's class. You may need to design 30-minute classes at first. New riders need to master the basic techniques before they attempt more advanced techniques. Thus, the first two or three classes may need to focus on basic strokes and techniques. These classes may be most challenging since new riders must feel success in the beginning, experiencing minimal discomfort and catch the excitement of the program if they are to return and continue the experience.

When selecting the elements, keep in mind the overall purpose, mood and goals you have already established. Keep the purpose of each individual, ride element and cycling technique in mind, and make sure you are supporting your overall purpose.

SONG	TECHNIQUE	PURPOSE	CUES
1	**Fast light seated**	**Warm-up**	**Welcome new riders** **Non-competitive** **Mental preparation** **Relax, deep breathe** **Alignment cues**
2	**Posture break** **Fast light seated**	**Relieve stress** **Foundation for "smart cycling"**	**Sit upright** **Stretch instructions** **Maintain one cadence** **Eyes closed** **Loose upper body** **Feel the music** **Feel strong** **Work each leg Independently**
3	**Posture break** **Slow heavy seated**	**Stress relief for back and upper body** **Strength and endurance**	**Sit upright** **Hands on handlebars** **Stretch instructions** **Add resistance** **Match my speed** **Focus on change** **Relax upper body** **Watch stress on knees**
4	**Posture break** **Slow moderate standing**	**Relieve stress** **Power and control**	**Upright alignment** **Stretch instructions** **Stand without leaning on handlebars** **Whole body alignment** **Hips stable** **Abs strong** **Full circle pedal stroke** **Focus with eyes closed**
5	**Posture break seated** **Fast light seated**	**Recovery** **Flush**	**Alignment and stretches**
6	**Posture break** **Lifting**	**Relieve** **Counterbalance stress** **Coordination, smooth transitions**	**Sit upright and stretch** **Add resistance** **Control leg speed** **Consistent cadence** **Stand tall over pedals** **Don't lean on bar** **Don't stop cycling while standing**

7	**Posture break** **Slow moderate seated**	**Relieve stress** **Strength and endurance**	**Sit upright and stretch** **More resistance** **Match my speed** **Challenge yourself** **Get stronger** **Listen to your body** **Watch stress on knees**
8	**Posture break** **Fast light standing**	**Relieve stress** **Power and efficiency**	**Sit upright and stretch** **Keep hips over saddle** **Abs strong** **Relax upper body** **Notice your power, intensity and form**
9	**Posture break** **Fast light seated**	**Relieve stress** **Flush**	**Sit upright and stretch** **Lower leg resistance** **Flush out legs** **Enjoy the freedom** **You've worked hard** **Feel the speed** **Feel the peace**
10	**Fast light seated** **On and off bike**	**Cool-down** **Final stretch of cycling muscles**	**Relax** **Breathe deeply** **Stretch** **Notice how your body feels** **Notice how your mind feels** **Instructions for individual stretches**

RULES OF THE ROAD

- **Arrive ten minutes early**
- **Get help for initial fitting**
- **Inform instructor of your goals and limitations**
- **Bring towel and water**
- **Check security of all adjustments**
- **Do not exceed 80 rpm initially**
- **Only stand on the pedals with resistance**
- **Take frequent postural breaks**
- **Learn to handle loss of control**
- **Enjoy, learn train – Don't compete**

TRAINING FOR WEIGHT LOSS

The proportion of fat in the human body is determined by a simple relationship which compares the number of calories ingested from nutrition to the number of calories expended by the body's metabolic processes over a period of time.

Quite simply put:

- If ingested calories exceed caloric expenditure body fat will increase
- If ingested calories are fewer than caloric expenditure body fat will decrease
- If ingested calories are precisely equal to caloric expenditure body fat will remain constant

Anyone concerned about fat loss must focus on both diet and exercise. If an individual has a balanced, adequate and consistent caloric intake, then the number of calories expended by the body will determine the fat content of the body.

Total energy expenditure consists of three different components:

- Resting metabolism
- Daily activity
- Exercise and training

Let us look at each of these independently although we know there is indeed a connection between all three.

Resting Metabolism

Even at rest, muscles are the major consumer of energy. Resting metabolism can be increased by increasing muscle mass. In the beginning, cycling will provide overload to deconditioned muscles. Muscle hypertrophy will inevitably occur. In the late stages, most of the demands will be on the cardiovascular system so long-term cycling will not produce significant gains in muscle mass. Cyclists will not develop the bulging muscles so typical of the weight lifter. The strengthening exercises may increase muscle mass to some extent so the program as a whole can contribute to an elevation of basal metabolism.

Daily Activity

This component is often overlooked. Many people spend part of their day engaged in some typical type of formal exercise only then to spend the remainder of their time as couch potatoes. Consequently, it is difficult for these individuals to lose weight. Other individuals who spend very active, demanding lives, but do not engage in nay form of formal exercise program, may in the long run, be further ahead as far as their appropriate weight.

Exercise and Training

Anyone who wishes to lose fat should understand the importance of an active life style. POWER CYCLING can make an important contribution to fat loss but it is not the only criterion.

This program provides a strenuous but relative gentle way of expending calories. The workload and cadence will dictate the actual rate of expenditure and certainly will vary throughout the training program. Whether the program is aerobic or anaerobic will also influence the caloric expenditure at any point in time. The specific stationary cycle to be used will also influence this expenditure.

It is well within the realm of probability that an individual can expend approximately 300 calories after a 30 minute workout. One pound of fat is equivalent to 3500 kcal, so it would take this individual approximately 10.5 such training sessions to burn a pound of fat. Fat loss can be increased by increasing resistance and cadence and by spending additional pedaling time in a session.

Weight loss and maintenance of a desirable body composition is a long-term commitment. Crash diets and unsubstantiated weight loss programs have led to many disillusioned individuals. Weight loss is only one potential benefit of a comprehensive program. Aerobic and anaerobic fitness, strength, flexibility and the pure enjoyment of the program can all be realized by an enthusiastic participant.

EXERCISE INTENSITY

Effective aerobic training results when the individual trains consistently within his or her aerobic training zone. Two convenient techniques can provide valuable information in determining exercise intensity. However, caution must be used in their interpretation.

The first is heart rate monitoring using the radial pulse rate over a 10 second period during exercise. The second technique is known as RPE or Rating of Perceived Exertion. A Borg scale is used to rate a participant's perception of exercise intensity on a 10-point scale ranging from very, very light to very, very hard. Tests have shown that riders perceived the work easier when they are pedaling 100 rpms than when they were pedaling only 40 rpms while maintaining the same workload. This may be due to the cardiorespiratory response to exercise and the mechanical stresses on the muscles and joints. Mechanical stress is high on the joints at high workloads and low cadence. Stress appears to be lessened if the rider uses lower resistance with a higher rpm. Since newcomers may have difficulty in making the distinction between localized and systemic effort, RPE may not be a reliable tool for monitoring their exercise intensity, especially at higher workloads and lower rpms.

RULES OF THE ROAD

POWER CYCLING has established guidelines for both instructors and riders to be followed in every workout. Instructors should practice for a minimum of three hours per week for four weeks prior to teaching their first class.

GUIDELINES FOR INSTRUCTORS

- Arrive at least 15 minutes early to prepare for the ride. This preparation includes checking the bikes and the sound system as well as fitting and orienting new riders.
- Raise all handlebars to the highest position and engage all resistance levers with light resistance. All bikes must be functioning properly. **DO NOT ALLOW RIDERS TO MAKE MECHANICAL ADJUSTMENTS TO THE BIKES** due to liability reasons.
- Make sure all riders can hear the cues above the volume of the sound system and background noise.
- Teach new riders how to monitor pedaling speed (rpm), count the number of times the right knee flexes during 10 seconds and multiply by 6. New riders should not pedal faster than 80 rpm.
- Remind riders of all safety rules, appropriate footwear and apparel body temperature regulation.
- Discourage riders from comparing themselves to others. Encourage riders to train within their own parameters needed to attain their own goals.
- Remember, you are the guide, motivator and educator. This is not the time to pursue your own training program or compete with the other riders. New instructors should ride with other instructors for a minimum of three times per week for four weeks prior to teaching independently.
- Always insist on a warm-up and cool down period. Riders should sit upright every three to five minutes to allow counterbalance for the forward stresses on the back and neck, relieve pressure on the hands and redistribute pressure over the pelvic floor. Maintain the neutral spine position, lifting the sternum and reverse the forward rounding of the spine.
- Be alert to impending signs of fatigue and adapt your rides accordingly.

GUIDELINES FOR RIDERS

- Arrive ten minutes early to set bike up properly making any needed adjustments. Make sure all participants from the previous class have left before selecting your bike.
- Notify the instructor if you are a new rider and this is your first session. The instructor can assist you in adjusting the bike for your leg length and torso length. The instructor should show you the proper foot position and basic pedaling technique.

- Notify the instructor of any limitations you may have in regard to medications, injuries, or medical conditions. Never train if you have an injury that may be exacerbated by cycling. Do not attempt to ride without an instructor present.
- Indoor cycling raises your body temperature and causes perspiration. Adequate hydration is imperative. Good ventilation is needed for the cooling effect. Bring a towel with each session so that you can wipe down the bike and surrounding area once you have completed your session.
- Make sure that the pin is secured and that the saddle is stable. Repeat the same check for the handlebars. Toe clips and straps should be snug and comfortable, not tight. Light resistance should be on the flywheel.
- Establish smart cycling techniques and control before attempting to increase your cadence. Bouncing indicates that your cadence is too high and a little resistance needs to be added. Pelvic floor discomfort will occur if bouncing on the buttocks continues. To determine your rpms – count the number of times your right knee comes up in 10 seconds and multiply that by 6. This number should not exceed 80 rpm.
- Resistance promotes balance and control while learning the standing techniques and maintains smooth pedaling. Don't attempt to stand on the pedals without resistance.
- Whenever your back feels uncomfortable, sit upright and arch back slightly for a moment, bringing your arms up and back. Postural breaks are recommended every 3 to 5 minutes to relieve back and neck stress as well as undue pressure on the pelvic floor.
- You can decrease the pedal speed by depressing the resistance bar/lever. If your foot slips out of the clip, immediately press the resistance lever all the way down to stop the pedals then replace your foot in the toe clip and strap.

RULES OF THE ROAD

- Arrive ten minutes early
- Get help for initial fitting
- Inform instructor of your goals and limitations
- Bring a towel and water
- Check security of all adjustments
- Do not exceed 80 rpm initially
- Only stand on the pedals for resistance
- Take frequent postural breaks
- Learn to handle loss of control
- Enjoy, learn train-Don't compete

TRAINING FOR WEIGHT LOSS

The proportion of fat is the human body is determined by a simple relationship which compares the number of calories ingested from nutrition of the number of calories expended by the body's metabolic process over a period of time.

Quite simply put:

- If ingested calories exceed caloric expenditure body fat will increase
- If ingested calories fewer than caloric expenditure body fat will decrease
- If ingested calories are precisely equal to caloric expended body fat will remain constant.

Anyone concerned about body fat loss must focus on both diet and exercise. If an individual has a balanced, adequate and consistent caloric intake then the number of calories expended by the body will determine the fat content of the body.

Total energy expenditure consists of three different components:

- Resting metabolism
- Daily activity
- Exercise and training

Let us look at each of these independently although we know there is indeed a connection between all three.

Resting Metabolism

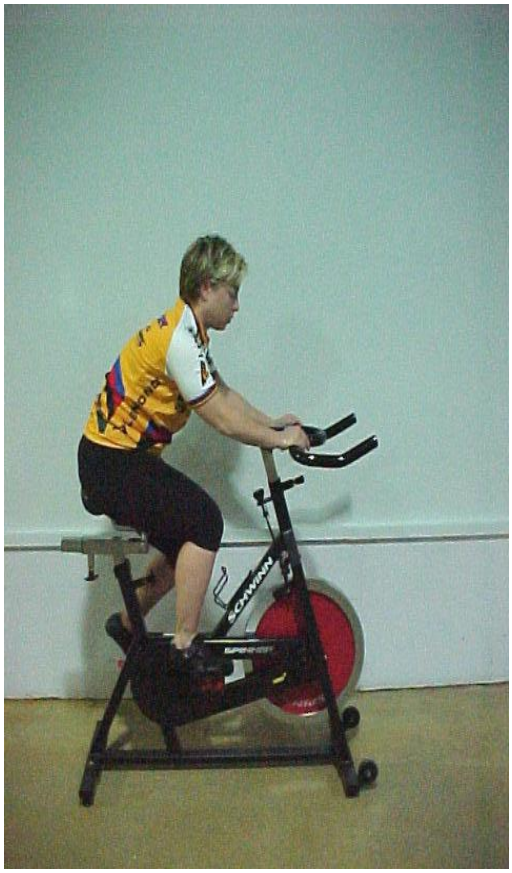
Even at rest muscles are the major consumer of energy. Resting metabolism can be increased by increasing muscle mass. In the beginning, cycling will provide overload to deconditioned muscles. Muscle hypertrophy will inevitably occur.

Chapter 8
POWER CYCLING TECHNIQUE

The Basics

The two basics to the Power Cycling Technique are the Torso and Hand Positions.

Torso Position



Ideal Torso Position/Neutral Spine

Incorrect Torso Position

1. Maintaining a neutral spine while riding is ideal for improving torso function and reducing injuries to the back.
2. Head is held up and the neck is neutral with the spine.
3. Avoid rolling the back through the pelvis.
4. Avoid rounding the low back.
5. Try to rotate the pelvis slightly forward.
6. Sit on the “sit bones” rather than the top of the gluteals.
7. Retract and depress the shoulders.
8. Relax the upper trapezius and arms.
9. Pull elbows in to the body. Elbows are soft and not locked.
10. Keep the head in line with the spine.

11. Wrists are neutral.

Hand Positions

Hand Position for Seated Run

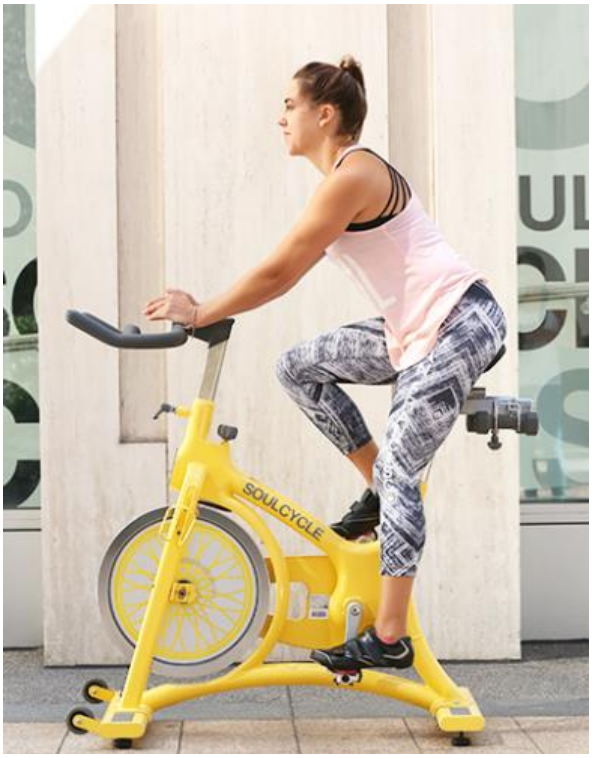
Hand Position for Seated Climb And Standing Run

Hand Position for Standing Climbing

1. Pictured above are the appropriate hand positions for each type of ride.
2. Do not put unnecessary weight in the arms while riding.
3. Keep wrists in a neutral position and do not flex them.
4. It is important to change your hand positions frequently during the ride in order to prevent injuries.

POWER CYCLING RIDING POSITIONS

Seated Climb:



1. This ride is similar to the seated run, however the cadence is slower and resistance is higher.
2. This position is similar to that of climbing a hill outdoors.
3. The sternum is lifted.
4. Elbows are soft and not locked.
5. Wrists are neutral.

Standing Positions

Standing Positions are when a rider needs to take a break from the seated position, to increase power for a limited timeframe, or when the resistance is so high that the body weight is needed to pedal.

Standing Run

Standing Run:

1. Head is held up and the neck is neutral with the spine.
2. This position looks similar to the Seated Run except for being lifted out of the saddle.
3. Hips are position between the crank and the nose of the saddle.
4. Be careful not to allow the hips to slip underneath the body as it increases the sheer forces on the knees.
5. Elbows are soft and not locked.
6. Wrists are neutral. Hands and fingers are relaxed.
7. Abdominal muscles are engaged.
8. Beginners should use light resistance.
9. RPMS is between 70-90

Standing Climb

Standing Climb:

1. Head stays up and the neck is neutral with the spine.
2. This position is similar to the Seated Climb except the person is lifted out of the saddle.
3. Hips are generally between the crank and the nose of the saddle.
4. Be careful not to allow the hips to slip underneath the body as it increases the sheer forces on the knees.
5. Wrists are soft not locked.
6. Arms and fingers are relaxed.
7. Torso and back are neutral and not rounded.
8. Beginners should use light resistance.
9. RPMS is between 50-70

CYCLING SESSIONS, TECHNIQUES

And POSITIONS

A Typical Indoor Cycling Session:

STAGE	# of MINUTES	ACTIVITY
1.	1-4	Instruction and easy pedaling, focus on relaxing upper extremity areas
2.	5-9	Slightly increase cadence every minute. Maintain control. Avoid bouncing.
3.	10-13	Decelerate leg speed. Increase light resistance, alternating sitting and standing for 45-second intervals. Add more resistance when standing and release to light resistance when seated.
4.	14-16	Seated accelerations in 30-second intervals, alternate with 30 seconds of slower cadence.
5.	17-20	Moderate-to-high resistance climb, progress the workload each minute. Start in the saddle and the standing position.
6.	21-25	Standing sprints, high resistance, high cadence for 20-seconds, alternated with 40 seconds of slow cadence seated or standing for recovery.
7.	26-28	Seated, low-to-moderate resistance, max cadence for 20-seconds, alternated with 20 to 40 seconds of decreased cadence.
8.	29-32	Increase to heavy resistance, alternating sitting and standing every eight counts, or after four pedal revolutions on one foot.
9.	33-36	Reduce to moderate resis-tance, seated pedaling with one final 20-second sprint at the end of the stage.
10.	37-40	Reduce to very light resistance, seated cool-down, easy pedaling. Decrease cadence to a gradual stop and finish with a stretch off the bike.

Typical Riding Techniques and Positions

Seated flat. This is the primary sitting position on the bike. Riders will use this position for the warm-up, cool-down and the speed work.

Seated hill. This is basically the same position as the seated flat position. However, when most participants increase the resistance on the flywheel, their buttocks will tend to slide back on the seat to help them apply more force tot heir pedals. Participants should keep their upper bodies relaxed and, perhaps more importantly, should avoid "thrusting" the pedals during the down stroke, but try to pedal with smooth strokes.

Standing hill. Greater amounts of resistance will help simulate the feel of a hill. After increasing resistance, the rider may stand. The pedal cadence may decrease, but the intensity of the workout will still be substantial, since exercisers are pedaling against a high amount of resistance. Not only will cycling in this position allow participants to burn a large amount of calories, it will also provide a significant training stimulus for the major muscles of the lower body.

Sprinting. High speed pedaling is most often initiated in a standing position, but may be performed entirely seated or initiated in a standing position and then carried out seated. Participants should pedal as fast as is safely possible. Sprint exercises are best performed with moderate-to heavy resistance and should only be performed after an extended warm-up.

Jumping. Jumps involve lifting out of the seat and rapidly increasing the pedal cadence to the maximum speed. With resistance applied to the flywheel, participants rise out of the seat with a quick burst of speed, and then maintain a high speed for a brief period. The challenge involved in jumping properly is to maintain a controlled, rapid pedal cadence while keeping the body weight centered over the bottom bracket and to avoid transferring body weight to the arms or handlebars. Jumping, especially repetitive jumping is not appropriate for beginners, particularly when an individual's goals are health-related. Anyone lacking the ability to coordinate the cyclical flexion and extension of the knee joint while simultaneously elevating the buttocks can experience an uncomfortable stress on the knees.

Avoiding or Minimizing Cycling Risks

RISK	SYMPTOM	SOLUTION
Saddle Irritation	**Blocked glands that get irritated/inflamed from prolonged sitting. Appear as tiny, hard, painful bumps that become infected. Irritation of the crouch causes redness, itching. More common in women.**	**Prevention. Wear clean cycling shorts for every class. After class, change out of damp shorts as soon as possible. Allow the affected areas to dry completely. Avoid using harsh soaps.**
Penile numbness/Pubic bone discomfort	**Numbness due to prolonged pressure on the pudendal nerve. Due to a bent over position, low in the saddle, without altering position.**	**Change body positions slightly, stand up and stretch every 5 minutes. Saddles designed for women do NOT seem to alleviate the problem**
Foot/toe numbness	**Pressure on the foot causing pain, burning or numbness in the ball of the foot or toes. Too tight toe straps and shoes or shoes with soft soles and minimal support contribute to pain.**	**Comfortable shoe with snug, not tight , fit and a rigid sole to prevent feet from "sagging" off pedals. Occasionally wiggle toes to increase circulation in feet.**
Foot/knee pain	**Significant tilt at the forefoot creates pressure on one side of the foot. This tilt causes pain from the foot to the knee and even into the hip and back.**	**Wedged-shaped shims placed between the sole of the shoe and the cleat. This alignment will connect the surface of the pedal at its natural angle relieving the pain or pressure.**
Lower-back discomfort	**It takes time to develop strength and flexibility in the lower back. Leg-length differences, poor posture, swayback, muscle tension, stress, fatigue, weak abdominal muscles and lack of flexibility all contribute.**	**A slightly bent forward, extend- ed spine is desirable. Change posture positions; take a break when feeling uncomfortable. Develop range of motion, place handle bars in a higher more upright position.**
Neck, shoulder, wrist discomfort	**Tension due to leaning too far forward on the handlebars while in a standing position or having the saddle too far forward. Placing too much weight on the handlebars cause tension in upper body or wrists.**	**Relax. Let hands rest on, not tightly grip, the handlebars. Keep wrists level with minimal flexion. Balance body weight. Raise the handle bars, change hand positions relieve tension. Keep shoulders in relaxed position.**

Chapter 9
WARM-UP AND COOL-DOWN
MENTAL PREPARATION

WARM-UP

The first five to seven minutes of a class are used to get the group focused on the ride, to create the mood and to teach positioning cues. The resistance should be light and the cadence should gradually increase to a comfortable controlled rate.

The warm-up should be used to take the group through a series of movements to relax the upper body muscle tension and to increase their awareness to body posture and alignment.

There are seven major components to the Joint by Joint Full Range of Motion

Warm Up:
Breathing:
Breathe deeply and let the abdominal muscles push forward to allow air to fill the bottom of the lungs. Lift the chest upward with a slight arch in the back. The neck is positioned to be in neutral alignment to the spine.

Chin-Chest Check:
The chin and chest should be approximately a fist-width apart. The chin is tucked slightly with a tilt in the head right then left, pressing the ear toward the shoulder.

Shoulders:
Elevation and Depression
Lift and lower the shoulders to a downward motion, shoulders are positioned away from the ears.

Protract-Retract
Roll shoulders forward and back, emphasizing the backward retracted position. Shoulder blades are depressed and back, the sternum lifted, with the shoulders square.

Rotation
Roll arms outward from the shoulders so that the crease in the inside of the elbow faces forward and up.

Hip:
Teach each rider to flex forward from the hips and the spine. The spine should stay in the neutral alignment without rounding. **THIS IS A VERY IMPORTANT PATTERN TO ESTABLISH DURING THE WARM UP.** The hip in a forward hinge position allows the rider to keep the lower back protected.

Pelvic:
Tilt the pelvic forward and back through the full range of motion finishing in the middle, neutral position.

Ankle:
While the legs are moving, flex and extend the foot at the ankle, pedaling with toes parallel to the floor or pointed slightly downward.

Posture:
Stretch breaks are vital component of any cycling program. The breaks are designed to reverse the flexed postures of cycling and to counterbalance the orthopedic stresses encountered.

Approximately every three to five minutes take 15-30 seconds to sit upright lean back and fully inflate the lungs and move the shoulders and arms. Also, use this break to breathe deeply, lift the torso and arch the back.

It is recommended that posture breaks be taken at the beginning of each song, while pedaling with light resistance.

WARM-UP

The warm-up is the first important part of the workout. This is the time to get on tot he bike, set the goals, focus your mind, limber up the upper part of your body and get your legs ready. The entire warm-up is done while riding. The following warm-up will prepare you to begin your cycling drills.

Total time: 6 to 8 minutes

- Start by taking a big cleansing breath while bringing your arms up over your head. Then bring them back down while you exhale. Do this about four times. Next, reach for the sky with your right arm and reach for the floor behind you with the left arm, opening up and stretching out the muscles on the side of the rib cage area. Repeat on the other side. Do each side twice.
- Bring your arms down next to your body and begin limbering up your neck. Turn your head slowly from side to side bringing your chin over each shoulder.
- Now tilt the head from side to side brining your ear toward each shoulder.
- Next, tilt your head tot he side and drop your chin down in front of you so you are looking at your naval. Then roll your head to the opposite side by making a half circle. Do not tilt your head back. Repeat this slow swinging motion a couple of times so that you stretch out the back of the neck and release the tension.
- Lift your shoulders up toward your ears and press them back and down several times until you feel your neck muscles tart to relax.
- Roll your shoulders with big circles, moving forward, up, back, and down. Then reverse the direction.
- Rotate your shoulders forward without lifting them up and down. Now rotate them backward, squeezing your shoulder blades together.

- Stretch both arms straight out in front of your chest, lace your fingers and round your upper back, feeling the stretch through the upper shoulder blade area.
- Lace your fingers behind you and stretch them up and back, feeling the stretch through the front of your shoulders and upper chest region. Keep your chest lifted the entire time and do not bend forward.
- Place your hands in an overhand grip, round your upper back, and tuck your hips under so that you feel a stretch throughout the whole spine. Your head should be down with your chin on your chest.
- Keeping an overhand grip, move into a reversed basic riding position as you feel the opposition stretch opening up your chest and abdominals.
- You should perform each movement and exercise a minimum of four times and hold the stretches for at least 10 seconds.

COOL-DOWN

The cool-down is crucially important to the health and safety of the riders. The last ten minutes to a class should be reserved to the cool-down and flexibility stretching.

The flexibility exercises at the end of the ride are very important to avoid muscle imbalance and discomfort.

The stretches are divided into two categories: Upper Body and Lower Body.

The Upper Body stretches include: Chest, Rotator, Upper Trapezius, Wrist and Lateral Torso.

The Lower Body stretches include: Hamstring, Calf, Hip Flexor, Quadriceps, and Adductor.

MENTAL PREPARATION

The mental preparation for **POWER CYCLING** should be just as important as the physical conditioning. The rider should spend time mentally preparing. The following two minute technique is highly recommended. Upon completion of the two minute technique, the goal-directed affirmations should be reviewed.

	MENTAL PREPARATION
	TWO-MINUTE MINI-IMAGERY
1.	Close your eyes and relax for ten seconds
2.	Breathe from your diaphragm. Focus on breathing for 30 seconds
3.	See, feel and experience yourself pedaling for 40 seconds
4.	Enjoy a sensation of perfect balance, control and heightened speed for 20 seconds
5.	Let these feelings reinforce themselves for 10 seconds
6.	Slowly open your eyes for ten seconds
	GOAL-DIRECTED AFFIRMATIONS
1.	Power cycle daily with a clear, uncluttered mind. Leave all distractions behind.
2.	Spend a few moments pedaling in goal-directed relaxation.
3.	Turn the pedals and visualize your ideal self.
4.	Focus on the goals you have set such as becoming faster, healthier or stronger.
5.	Adjust your goals to your capabilities.
6.	Visualize your goals and the training required to reach them.
7.	Evaluate whether you have reached a goal, and then set a new one.

The following is a tool to help you reach your POWER CYCLING goals. Use these affirmations when cycling becomes unbearable.

	CONTROLLING FATIGUE
1.	Fatigue exists in your mind and you can beat it.
2.	Let yourself become part of the music and focus on the beat.
3.	Pushing yourself through discomfort will lead to your goal.
4	An increase in the "burn" is a signal that you are nearing the finish line.
5	Be objective about the burn and fatigue. Observe it. Enjoy it.
6.	You have the power to control your thoughts.
7.	Your mind can focus on only one thing at a time.
8.	When the lactic acid burn and fatigue become unbearable, change your focus.

INTENSITY OF DRILLS AND POSITIONS

BODY POSITION	HAND POSITION	BASIC DRILL	SPEED	RESISTANCE
Seated upright	None	Seated upright	Slow	Light
Seated basic	Overhand	Flushing	Medium	None
Seated basic	Hook	Seated climb	Slow	Light
Seated basic	Hook	Seated climb	Medium	Medium
Seated basic	Hook	Fast hammer	**Fast**	Light
Vertical jog	Vertical jog	Vertical job (moving)	Slow	Medium
Standing basic	Hook	Standing climb	Medium	Medium
Vertical jog	Vertical jog	Vertical jog (still)	Slow	Medium
Standing aggressive	Aggressive	Standing climb	Slow	Medium
Standing aggressive	Aggressive	Standing climb	Medium	Medium
Standing aggressive	Aggressive	Fast hammer	Fast	Light

HEART RATE DIARY AND PACING LOG CHART

Day/date	RHR	Pacing time	Low Zone	High Zone	2-min. recov. HR	Comments
Sun 2/5	70	30 min	15 min	15 min	120 BPM	Felt easy

RECOVERY DRILL

The Recovery drill focuses on calming and cooling the body after vigorous work has been performed. The object is to relax your body by decreasing the speed and resistance of each drill while closing your mind to all thoughts and distractions. Slow ballads, calming instruments or new age music that has flowing water work well for this drill.

RECOVERY DRILL					
BODY POSITION	**HAND POSITION**	**BASIC DRILL**	**SPEED**	**RESISTANCE**	**TIME**
Seated basic	Overhand	Flushing	Slow	None	30 sec.
Seated upright	None	Seated upright	Slow	Light	30 sec.
Seated upright	None	Breathing drill*	Slow	Light	30 sec.
Seated basic	Overhand	Flushing	Slow	None	30 sec.

Repeat these twice for a four-minute song

*Inhale 2 counts and exhale 4 counts

REACHING A PLATEAU

If and when you reach a plateau, change your program by doing one or more of the following:

- Modify the sequence of the routine
- Perform different workout
- Increase your intensity
- Upgrade your diet
- Sleep more
- Decrease the frequency of your workouts

TIPS ON HOME TRAINING

1. Concentrate on your training without distractions
2. Practice specific drills that work for your goals or improve your aerobic power
3. Work on weaknesses you might not normally practice in front of others
4. Practice to music to develop rhythm
5. If you get tired or sloppy, slow down or take a break
6. Sip water between songs

Sample of Progressive Workout Program

This is a start up program that lasts only 20 minutes and is ideal for the beginning level 1 cyclist.

Twenty-Minute Start-Up Cycling

DRILL	TIME	HEART RATE ZONE
Warm-up	4 minutes	Low
Warm-up	4 minutes	Low
Speed Bursts	3 minutes	High
Hill Sprints	3 minutes	High
Speed Play	3 minutes	Low
Cool-down	3 minutes	Low

Feel free to extend the cool-down if you need more time to recover.

This is an intermediate-level workout and would be great for the level 2 cyclist.

Forty-Minute Intermediate Cycling

DRILL	TIME	HEART RATE ZONE
Warm-up	4 minutes	Low
Warm-up	4 minutes	Low
Hill Sprints	4 minutes	High
Lon29-g Hill Sprints	4 minutes	High
Speed Play	4 minutes	Low
Pyramid Climb	12 minutes	High
Race Simulation	4 minutes	High
Cool-down	4 minutes	Low

This is an intermediate to advanced level workout for the level 3 cyclist.

Sixty-Minute Intermediate to Advanced Cycling

DRILL	TIME	HEART RATE ZONE
Warm-up	4 minutes	Low
Warm-up	4 minutes	Low
Speed Bursts	4 minutes	High
Long Hill Sprints	4 minutes	High

Speed Play	4 minutes	Low
Pyramid Climb	12 minutes	High
Recovery Drill	4 minutes	Low
Hill Sprints	4 minutes	Low
Speed Bursts	8 minutes	High
Long Hill Sprints	4 minutes	High
Recovery Drill	3 minutes	Low
Cool-down	5 minutes	Low

This program should be the next workout you try after you have mastered the basic drills. It is a beginning level with a low heart rate zone. You should remain seated and in the basic riding position most of the time.

Twenty-five Minute Start-up Power Cycling

DRILL	**TIME**	**HEART RATE ZONE**
Warm-up	4 minutes	Low
Powerleg/float leg	4 minutes	Low
Speed Bursts	3 minutes	High
Seated push-ups	3 minutes	Low
Lean over leg/digs	3 minutes	Low
Flushing	2 minutes	Low
Cool-down	6 minutes	Low

This program should be performed after the start-up program has been completed two or three times for two weeks in a row. Try standing up more and getting into a more aggressive position. If you feel lightheaded, back off a bit. You may be pushing too hard.

Forty-Minute Power Cycling

DRILL	**TIME**	**HEART RATE ZONE**
Warm-up	4 minutes	**Low**
Warm-up	4 minutes	Low
Hill Sprints	4 minutes	High

Lean over leg/dips	4 minutes	High
Muscle Recruitment	4 minutes	Low
Pyramid Climb	11.5 minutes	High
Seated Push-ups	3 minutes	Low
Cool-down	5.5 minutes	Low

Chapter 10
POWER CYCLING TRAINING HEART RATE

Spinning Training Heart Rate

Just Getting Started?

When you first start cycling or mountain biking, the key to success is to keep it fun! The first aspects of your riding you should develop are your handling skills and learning how to be safe on the bike. Don't push too hard too quickly! Ride when you feel like it, but make sure you vary your workouts. During your first year of riding you should leave most rides feeling like you could have done more.

The most common mistake new riders make is going too easy on hard days and too hard on easy days. You should have rides in your training program that are strictly for having fun and taking it easy and you should have rides in which you really push yourself. The training zones listed below will help you mix up your workouts but still give each one a purpose. Make sure you spend some time each week in each of these zones.

Remember, when you first start training, focus on developing your riding technique and handling skills and above all, KEEP IT FUN!

The intensity levels of your rides should fall into the following training zones. The zones are based on a percentage of your Lactate Threshold (LT) heart Rate. Each heart rate zone has a purpose in your training. Try to follow the heart rate guidelines as closely as possible. If your heart rate drifts more that 5 beats per minute (bpm) above the target range, reduce the intensity until you are back in your range.

Zone 1 – Recovery (65% - 75% LT)

Training in this zone is primarily used for active recovery. This intensity will not produce significant improvements in cardiovascular performance or endurance. Your easy rides will allow you to drop into this zone for limited periods, but it is not the target range for any workouts.

Zone 2 – Time Endurance (75% - 85% LT)

Time spent in this zone will improve cardiovascular performance, endurance, and fat metabolism (using fat instead of carbohydrate for energy). This intensity zone also allows you to get used to being on the bike for extended periods without taking a large toll on your body, hence the name – Time Endurance. Work done in this zone also prepares your body for the more intense workouts.

Zone 3 – Race Pace (85% - 95% LT)

The goal of this zone is to get a feel for pacing yourself. You should feel like you are working hard, but could take on higher speeds or more resistance at anytime. The primary focus of training in this zone is aerobic conditioning. This intensity will train

your body to efficiently use carbohydrates and will significantly deplete stored carbohydrates. In response to this, your body will learn to replenish and increase carbohydrate stores and protect them during lower intensity efforts.

A word of caution about training in Zone 3 and above is that it will take a larger toll on your body and will require more recovery time than training done in the previous two zones. Be careful not to let your Zone 2 workouts drift into this zone.

Zone 4 – LT Endurance (95% LT – LT)

These workouts are designed to make you fast! They are not all out efforts, but you will know you have worked hard when you are done. When training in this zone, you should feel like you want to stop, but you don't have to. The purpose of working in this zone is to train your body to perform more effectively without "going anaerobic." Smart cyclists train their body to handle higher intensities before they start suffering. Zone 4 is where we do that! By training just below your LT, you can bump up your LT heart rate slightly and dramatically increase the amount of work you can do while staying below your LT, thus delaying the necessity to "go anaerobic" (start suffering). These workouts will also improve your body's lactic acid buffering ability.

Zone 5 – LT Tolerance (LT – HR Max)

This zone will be used for interval training. Workouts in this zone will expand your muscles' ability to continue functioning as lactic acid accumulates. Work in Zone 5 will pay-off on the hills and help you open gaps between you and your competition.

Zone 6 – 110% Effort

As the name suggests, these are all out, 100% as hard as you can go efforts! Work at this intensity can only be maintained for around 30 – 40 seconds. There is no need to reference your heart rate monitor here, just go!

Estimating Lactate Threshold Heart Rate

You will notice that the training zones above are based on a percentage of your Lactate Threshold Heart Rate (LT). Your LT heart rate is the intensity level where you are working at your maximum sustainable efficiency. Beyond your LT, your muscles generate huge amounts of lactic acid that will eventually prevent your muscles from functioning at all unless the intensity is decreased.

The most accurate way to determine LT is through laboratory testing. Most colleges and universities with athletic programs have these testing capabilities. You can also take your average heart rate over a non-competition 40 K time trial ride. This should be close to your LT heart rate. Additionally, there is a mathematical formula for estimating your LT. This formula requires you to calculate your maximum heart rate, then multiply maximum heart rate by .85. The formula is written:

220 – (Your age in Years) = HRMax

HRMax x .85 = LT Heart Rate

If you are using this formula, keep in mind that it is only a general estimation and does not account for individual differences. It is a scientifically valid formula and will produce a good estimate for most people, but there are some who will not get an accurate estimate from this formula. The calculation is a good starting place, but you should try as many methods as possible to get a good estimate of your LT heart rate.

After you determine your LT heart rate, round **DOWN** to the nearest 5 bpm (LT = 178 bpm, round to 175 bpm), and use this number as your LT heart rate to calculate your training zones.

Schwinn Heart Rate

How to Control Exercise Intensity

By monitoring your heart rate during exercise, you can scientifically measure with great accuracy the effort your body expends during exercise. Using your heart rate monitor and conducting your Spinning® program workouts according to the guidelines of the Spinning Energy Zones™ will enable you and your students to design a program that balances stress and rest, aerobic and anaerobic exercise, and enables continual improvements in fitness without compromising health.

Following a sensible workout schedule and measuring exertion levels can help to prevent exhaustion, burnout, illness and injury.

Heart Rate Monitored Exercise

Everyone should have some basic knowledge about heart and body functions and response.

Before starting or continuing any exercise program ask yourself some basic questions:

1. What is my current fitness level and physical activity?
2. What are my fitness goals?
3. What is my daily resting heart rate?
4. What is my maximum heart rate?

It is important to answer these questions in order to develop an individualized fitness program.

For a beginning exerciser, a sensible goal is to improve overall health and to adapt to a more active, energetic lifestyle. Beginners should monitor their heart rate every morning and train aerobically (80% of maximum or below) for at least the first three months of their program.

Heart rate zones may be determined by using the 220 or 226 minus age formula. More experienced exercisers may have goals like performance improvement or body composition changes. These entail designing an annual calendar of workouts according to heart rate guidelines and regular performance testing to monitor overtraining and improvement.

Basic Terminology

Resting Heart Rate (RHR) is important to know because it indicates the amount of mental and physiological stress your body is experiencing. For example, if you know that your resting heart rate is usually around 65 beats per minute (bpm) and one day you see it at around 70-75BPM, this indicates elevated stress levels or incomplete recovery.

An elevated resting heart rate suggests that you need to reduce or completely cease exercise until RHR returns to normal levels. If you obtain a reading 10% or more above your normal resting rate you should not exercise.

Heart Rate Monitoring

Your resting heart rate also indicates something about your general fitness level. A low resting heart rate indicates a highly efficient cardiovascular system and a heart with a large stroke volume (amount of blood pumped per beat). You can track your fitness progress by watching for reductions in your resting heart rate. Elite endurance athletes have been known to display resting heart rates as low as 28 bpm!

The method for calculating your true resting heart rate is as follows: Take your heart rate first thing in the morning for five consecutive days before getting out of bed. Calculate the average.

Maximum Heart Rate (MHR) is the highest amount of beats your heart can sustain per minute. This number provides the exerciser with a basis from which to calculate training heart rate zones that are expressed in terms of percentage of maximum heart rate.

One formula you can use to estimate maximum heart rate is 220 (males) or 226 (females) minus age. However, the standard error for this formula is as high as 12-24 beats. The formula implies the average aging process, during which the MHR decreases as age increases -this is not necessarily true. If a person has been exercising for many years he/she can advance MHR capability. Genetics can play a role in your pre-disposition to fitness capacity as well.

This formula, however, is designed and most useful for infrequent exercisers (average adults).

Another way to determine individual MHR is through stress testing, which most health clubs, sports clinics and hospitals have the capability to do. If this is not at your disposal and if you are healthy and a frequent exerciser (regularly three or more times per week for extended periods of time), then it is safe to conduct a MHR self-test using HR monitoring in the “field.”

Another figure that’s interesting to know is your Working Recovery Heart Rate (WRHR). Your WRHR is the number of beats that your heart rate drops upon finishing a portion of an exercise program or completing a workout.

By tracking your WRHR regularly, you will notice your fitness progress expressed in terms of faster recovery time.

Another formula that’s used to determine target heart rate, which is more individual an accurate, is the Karvonen Method. It was developed by Dr. Karvonen, an

internationally respected Finnish doctor. His formula (published 1957) for exercise heart rate determination takes into consideration individual RHR and MHR when determining training zones.

Thus, instead of training at 80% of maximum heart rate, you factor in resting heart rate for a more accurate "80% of max" workout.

80% training heart rate = (MHR - RHR) x 80% + RHR
[ex: (200 - 60) x 80% + 60 = 172]

This athlete will conduct an 80% workout at a limit of 172 bpm. If they were to just use percentage of maximum heart rate, 80% of 200 would be 160. This formula takes into account relatively high resting and maximum heart rates and allows for higher heart rates during exercise.

Notice the same formula when the athlete has a lower resting heart rate of 40:

80% training heart rate = (MHR - RHR) x 80% + RHR
[ex: (200 - 40) x 80% + 40 = 168]

Average heart rate reflects your average heart rate for an entire workout period or portion of a workout period. This number reflects the average intensity that you exerted for an extended period of time. Some heart rate monitors automatically provide this information at the conclusion of your workout.

Heart Rate Monitors

Heart rate monitors are an effective and accurate method of obtaining instant biofeedback about physiological, mental and metabolic responses in your body. Each model has different features and functions and there is one to meet any fitness level and objective.

Heart rate monitors act as your own personal trainer because they can alert you to an increase or decrease in your intensity level during exercise. This generates maximum benefits from your workouts with reduced risk of overtraining and burnout.

In addition, most heart rate monitors are ECG-accurate within one beat per minute. So why guess what your exertion is? Perceived exertion alone is not accurate and can lead to overtraining, frustration and even injuries.

By recording your daily resting heart rate, you will know how much stress you are experiencing and how well your body is recovering. With that information, you can then design your daily workout accordingly and complete it under the prescribed heart rate–based intensity levels.

ENERGY ZONE HEART RATE CHART

ENERGY ZONE™ HEART RATE CHART					
AGE	RECOVERY 50%-65%	ENDURANCE 65%-75%	STRENGTH 75%-85%	INTERVAL 65%-92%	RACE DAY 80%-92%
20-23	100-129	129-149	149-168	129-182	160-182
24-27	98-126	126-146	146-165	126-178	155-178
28-31	96-123	123-143	143-162	123-175	153-175
32-35	94-120	120-140	140-159	120-172	150-172
36-39	92-118	118-137	137-155	118-168	146-168
40-43	90-116	116-134	134-151	116-164	143-164
44-47	88-113	113-131	131-148	113-161	140-162
48-51	86-110	110-128	128-145	110-157	137-157
52-55	84-108	108-125	125-141	108-153	133-153
56-60	82-105	105-122	122-139	105-150	131-150