Spinning® Computer
User Manual

Installation, Service and Instructor Education

SPINNING® **STAR TRAC®**

expect different™.

Table of Contents

FCC Regulatory Statements

1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by Star Trac could void the user's authority to operate the equipment.

Parts List

Part Number for re-order	Quantity	Description	
727-0100 Spinning® Computer Kit	1	Spinning® Computer	
727-0093-KT Mounting Bracket Kit	1	Mounting Bracket	
	1	Spinner® V Mounting Bracket Insert	
	1	Mounting Insert for open handlebars	
727-0084-KT	1	Cadence Sensor	
727-0094	1	Cadence Magnet	
N/A	1	AA Panasonic Batteries	
N/A	1	Spinning® Computer Manual	
N/A	1	M5 Allen Assembly Tool	
N/A	1	M2 Allen Assembly Tool	
N/A	1	M6x30 Computer Clamp Screw for Rhino Horn	

Before installing the Spinning® Computer, verify that all the parts needed for mounting on your bikes are included. If any of the items are missing, call **StarTrac** at 800-503-1221 or 1-714-669-1660 to order a replacement kit.

Marketing Statement Regarding Heart Rate Acquisition on the Star Trac Spinning® Computer:

Star Trac takes the acquisition and accuracy of heart rate very seriously and has developed a system to perform to the best ability that technology will allow. Star Trac has engineered a product that has taken every precaution possible to acquire an accurate heart rate signal as well as eliminate "crosstalk" interference that may be caused by other monitors being placed too close together.

To achieve the best possible results from your Spinning® Computer, please abide by the following important parameters:

1) Users **must** wear either a **Coded Transmitters (such as Polar© T61, Polar© T31C or Polar© WearLink®)** or an Ant+ compatible transmitter when operating the Spinner® bike with the Spinning® Computer. Only will the Transmitter allow a "one to one" relationship with the Spinning® Computer and will minimize potential "crosstalk" interference. If users wear non-coded straps, there is significantly increased potential for "crosstalk" which will cause erratic heart rate display, loss of heart rate display and significantly reduce the consistency of accurate heart rate reporting.

2) Bikes should be spaced so that the side-to-side distance from the Spinning® Computer on one bike and the Spinning® Computer on bikes to the left or right is at least 36 inches (91.4 cm). In addition, the distance from the bottom of the Spinning® Computer on one bike to the seat of the bike in front of it (where another rider and his her transmitter would be seated) should be at least 24 inches (61 cm) in order to significantly reduce chances for interference. See the diagram on page 5 regarding bike layout.

3) In order for the computer to display the user's heart rate the riders must lean into the display (within 10 inches) during the first 30 seconds of the ride. and wait for the HR to display. During this time the computer creates a one to one relationship with the rider's heart rate strap and this insures that no outside signals will interfere with the riders data once they return to their seated position.

4) Calorie calculations are displayed as a summary only.

5) Cell phones, televisions, speakers and other electronic devices can cause interference with the operation if they are in close proximity to the Spinning® Computer and/or transmitter.

If there are any questions regarding operation or usage of the Spinning® Computer, please contact **Star Trac Customer Support** at 800-503-1221 or 1-714-669-1660.

Specifications

Computer:

Heart Rate Range: Approximately 30″ from computer to users HR chest strap
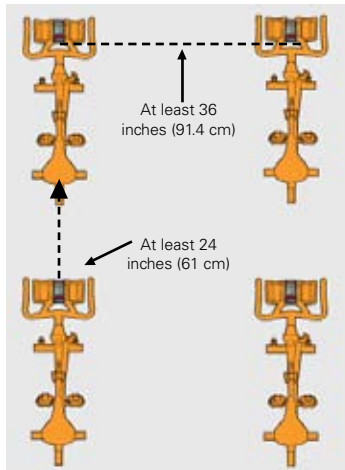**Battery:**   Qty 4 each AA Alkaline
Battery life expectancy: 1 year (depending on use and backlight usage)

Cadence Sensor:

Battery: Lithium CR2032
Battery life expectancy: Approximately 1 year in a commercial enviornment (depending on use)
Distance to magnet: Approximately 5mm

At least 36 inches (91.4 cm)

At least 24 inches (61 cm)

How does the Spinning® computer work?

The Spinning® computer displays heart rate, RPM (speed), total distance and elapsed time.

• The **heart rate** information is received from an Ant+ or Polar® compatible **heart rate strap** worn by the person riding the Spinning® Bike. The HR strap sends a radio signal to the computer and the **computer** displays the person's heart rate. If any other strap is used it will not display the heart rate. The computer and heart rate strap must be within range of each other and no other heart rate strap can be within this imaginary circle. The range is approximately 30 inches from the computer.

• The **RPM** signal is transmitted by the cadence sensor sending the RPM to the **computer**. Each time the **magnet** on the flywheel passes the cadence sensor it records one revolution and as it counts the revolutions it sends this number to the computer.

RPM   **Heart rate**

Computer Window and Buttons

Start pedaling then press any button to turn on the Spinning® Computer; the following data will be displayed:

HR- Displays the Heart Rate of the user when wearing a compatible Polar® HR telemetry strap in beats per minute.

RPM- Shows the pedaling speed of the user in revolutions per minute.

Total Distance- Distance measured in miles or kilometers depending on the setup selection.

Elapsed Time – The length of time in minutes from the time the computer has been activated or reset.

Buttons:

Toggle (right) button - Toggles between: Total Distance and Elapsed Time.

Light (left) button - Turns on the backlight to enable viewing in low light settings.

7

Installing or Replacing Console Batteries

Time required:
  • 5 Minutes
Parts required:
  • 4 new AA alkaline batteries
Tools required:
  • Slotted or Phillips screwdriver

NOTE: The batteries in the computer will last approximately 1 year depending on usage. The cadence sensor battery will last approximately 1 year.

Low Battery Indicator

1. Remove the computer from the handlebar or computer mounting bracket.

2. Loosen the captive screw on the back of the battery cover (screw will not completely come off, it will remain captive.) To remove the cover, pull on the captive screw and lift.

3. Install 4 new batteries. Note: Replace all 4 batteries at the same time.

8

4. Note the directions each battery is to be installed. There is a plus (+) and minus (-) symbol inside the battery compartment. The + sign indicates the positive (+) side on the battery and the - indicates the negative (-) side on the battery.

5. Insert each of the 4 batteries into the battery compartment of the computer.

6. Attach the battery cover and tighten the screw.

7. Attach the computer onto the handlebar or computer mounting bracket and test.

Do I need to Re-sync?

NOTE: Syncing will not improve Heart Rate and is not a calibration it should only be used to Sync (Pair up) the cadence sensor and the computer so that RPM can be transmitted.

Perform the Syncing process after checking all of the following:

- **Is the battery secure in the cadence sensor and the cover is not loose?**
    - **o** A loose battery will prevent the cadence sensor to transmit the RPM signal to the computer.

- **Is the magnet aligned with the cadence sensor?**
    - **o** A missing magnet or one that is not lined up properly will prevent the cadence sensor to transmit the RPM signal to the computer.

- **Does the computer turn on when you press a button?**
    - **o** If the computer does not turn on replace the batteries in the computer.

- **The computer turns on but as you pedal it does not show the RPM.**
    - **o** If you have performed all of the above steps you may now sync the computer and cadence sensor. This will make them a paired set and will be able to transmit and receive the RPM signal.

Time required:
  • Less then 5 Minutes
Parts required:
  • N/A
Tools required:
  • N/A

TEST Procedure:

1. Once the batteries are installed, press **any** button and the display window will turn on in the Workout mode.

2. Test by waving a magnet across the cadence sensor. If you see **RPM** values, then the cadence sensor and computer are synced successfully, there is no need to perform the sync process.

3. If you do not get any rpm reading and the computer turns off you **WILL** need to perform the Syncing process.

NOTE: If the cadence sensor and computer are no longer a pair (i.e. when users swap handlebars with the computer attached.) the Cadence sensor and computer will have to be sync'd again. Do not swap handlebars.

CAUTION: TEST ONE BIKE AT A TIME, the range for the cadence sensor is approximately 30 feet and if you are testing the bike and someone else on the same room is pedaling another bike you may be picking up the wrong RPM signal.

Syncing Mode

Syncing Process:

Time required:
   • 30 seconds
Steps to Syncing:
   1. Turn on computer and boot up to workout mode.

Workout Mode window

CAUTION: SYNC ONE BIKE AT A TIME the range for the cadence sensor is approximately 30 feet and if you are testing the bike and someone else on the same room is pedaling another bike you may be picking up the wrong RPM signal.

2. Activate Sync Mode on the computer by holding down the Light and Toggle buttons for 6 seconds until the window displays **"Conn"**

3. Press the button on top of the cadence model.

4. The red light on the cadence sensor will flash identifying that the cadence sensor is good and has entered pairing mode.

5. The syncing process is complete when the window on the computer displays a random ID number (e.g. ID123).

6. The computer will then automatically reboot.

Wait for 5 seconds.
You must wait for 5 seconds to allow the computer to reset the ID properly.

7. Test for response by turning the computer on then waving a magnet across the cadence sensor. By doing this you are simulating the same motion as when the flywheel rotates and the magnet passes by the cadence sensor. If you see RPM displayed, then the cadence sensor and computer were synced successfully. Proceed with the installation and mounting to the bike.

NOTE: Remember to keep the computer and cadence sensor as a set at all times.

Setup Mode

Your Spinning® Computer is pre-set with a gear ratio of 3.25:1 and a setting display distance in miles. It is also pre-set with recommended default settings for the length of time the backlight will stay on when activated and the length of time summary information will be displayed. You can make changes to these settings by following the steps below. Any time you want to change setting or view information, follow these Setup Mode steps again.

To activate Setup Mode:

1. Press any button to activate computer.

2. Wave a magnet along the right side of the Spinning® Computer until the display window shows all LCD segments flash.

3. Press Toggle (right) button to scroll through available setup options.

4. Press the Light (left) button to change settings on the current display option.

Setup Mode options:

(Default Setting)

- **GEAR** and **Software Version**
     o Gear Ratio, Select 1 (2.875) for V-Bikes, V2 and Spinner® V
     o Select 2 (3.250) for all other models.
     o Software Version displayed (-XX)

NOTE: User will not get the correct RPM values if the Gear Ratio setting is not correct.

Setup Mode - cont'd

• **Units** - MILES or KM

> Note: User will not get the correct distance values if the Gear Ratio setting is not correct.

(Default Setting)

• **BLON** – (Default Back Light On*) The amount of time the backlight will stay on when the left button is pressed. Select between 1 second to 60 seconds using the Light (left) button and press the Toggle (right) button to save and advance to the next setting.

> *Note: Increasing the **BLON** (Back Light On) time will reduce overall battery life. A shorter **BLON** time will result in longer battery life (recommended).

• **BLU** – (Back Light Usage) Total time in minutes that the back light has been on since the last data clearing. Press the Light (left) button to clear data, if desired, then press Toggle (right) button to accept and advance to the next setting.

• **UH** – (Usage Hours) Total operation time in hours of display since the last data clearing. Press the Light (left) button to clear data, if desired, then press Toggle (right) button to accept and advance to the next setting.

   o Usage hours should be reset during battery replacement.

• **ODO** – Total Miles / KM
 Total traveled distance in miles or KM since the last data clearing.
 Press the Light (left) button to clear data, if desired then press the
 Toggle (right) button to accept and advance to the next setting.

• **SON** – (Summary ON Time) Number of seconds the summary will be displayed at the end of the workout.
   o Options: 30, 60, 90, or 120 seconds
    Select by using the Light (left) button and press the Toggle
    (right) button to accept and exit Setup Mode.

5. To exit Setup Mode, press the Toggle (right) button several times until the computer returns to Workout Mode.

6. Once out of Setup Mode and in the Workout Mode, the computer is ready for use.

1. Before the cadence sensor is securely fastened to the flywheel support, it must be adjusted so that it is about 5 mm (.20 in) from the magnet face. Install the magnet on the flywheel so that it aligns with the arrow on the end of the cadence sensor. Note the distance between the end of the cadence sensor and the magnet face. Remove the cadence bracket and adjust the distance by pulling or pushing the cadence sensor bracket.

2. Tighten the set screw on the cadence mounting bracket using the M2 Allen tool

CAUTION
Do not over tighten the set screw.

Magnet Location

3. Remove the backing of the adhesive on the magnet. Mount the magnet with the adhesive tape side onto the flywheel by positioning the magnet so it will line up in front of the cadence sensor as the flywheel turns.

NOTE: Mount the magnet near one of the dots of the Spinning® logo as shown in the figure above.

Time required:
- 15 Minutes

Parts required:
- 727-0100 Spinning® Computer Kit
  NOTE: The thick insert is used on the V-Bikes

Tools required:
- M5 Allen Wrench
- M2 Allen Wrench

1. Place the thick insert inside the bottom part of the Mounting Bracket Clamp. Position the mounting bracket onto the center-curved portion of the handlebars. Once positioned correctly, tighten the 4 M6x20 screws using the M5 Allen tool.

2. Install the computer onto the mounting bracket by sliding the computer clamp over the long portion of the bracket. Tighten computer clamp with the M6 screw and nut using the M5 Allen tool.

NOTE: Use the M6x30 screw for the computer clamp when installing onto the computer mounting bracket.

This setup is also used on the V-Bike and V2.

Time required:
- 15 Minutes

Parts required:
- 727-0100 Spinning® Computer Kit
  NOTE: The thin spacer is used on
  Pro 5800 / 6800 / and Elite 5900 bikes.

Tools required:
- M5 Allen Wrench
- M2 Allen Wrench

1. Place the thin insert inside the bottom part of the
Mounting Bracket Clamp. Then position the mounting
bracket onto the center-curved portion of the
handlebars. Once positioned correctly, tighten the 4
M6x20 screws using the M5 Allen tool.

2. Install the computer onto the mounting bracket by sliding the computer
clamp over the long portion of the bracket. Tighten computer clamp with
the M6 screw and nut using the M5 Allen tool.

NOTE: Use the M6x30 screw for the computer clamp when installing onto the computer mounting bracket.

20

Time required:
- 15 Minutes

Parts required:
- 727-0100 Spinning® Computer Kit
  NOTE: The inserts and mounting bracket are not used on the Elite 6900 or NXT 7000.

Tools required:
- M5 Allen Wrench
- M2 Allen Wrench

1. Install the mounting bracket to the center flat section of the handlebar by slightly prying the computer bracket clamp open.

2. Secure clamp down by tightening the M6x20 screw and M6 nut.

Maintenance Checklist

Star Trac strongly recommends performing the regular daily, weekly and monthly preventive maintenance routines outlined below. If any items need replacement contact the Star Trac Customer Support Department at **800-503-1221** or **1-714-669-1660**.

D= Daily   W= Weekly   M= Monthly

D	W	M	Procedure
√ √ √			**Daily maintenance** of the computer will determine its life of the computer by how consistently it is performed. • Wipe down the computer with a soft cloth after each use. • Dilute Simple Green (1) with water (30) (30:1 ratio) spray onto a soft cloth then wipe the Spinner® Computer. **NOTE**: Never spray directly onto the Spinner® Computer. • Never use abrasive cleaning liquids or oil base, ammonia or alcohol when wiping down the computer.
	√ √		**The weekly maintenance** should focus on the overall performance of the computer. During this portion of the maintenance look for vibration and possible loose assemblies. • Inspect each computer for loose parts, bolts and nuts. Adjust as necessary. • Remove any computers that are not properly mounted and are deemed unsafe.
		√ √ √ √	**The monthly maintenance** check should be a comprehensive inspection of the overall assembly components of the computer. • Inspect all areas for proper adjustments • Inspect all parts to determine damage which will require possible part replacement. • Battery Low will display when the battery needs replacement. Replace the batteries in the computer with 4 high quality AA Alkaline batteries such as Duracell or Energizer. • Inspect the mounting of the cadence sensor and magnet to insure it is intact and working properly.

NOTE: Depending on the amount of use, some procedures may need to be performed more frequently.

• No display

        o Press any button.

        o Pedal the bike and then press any button.

        o Check batteries in computer.

• No heart rate

        o Is the user wearing a Ant+ or Polar® compatible HR chest strap?

        o Moisten the strap and wear it against the skin.

        o The battery in the strap might be low, try another strap.

        o Stay in Syncing position for 15 seconds. Note: It may take 15 seconds (or more) for the
          computer to obtain a heart rate signal from a chest strap.

        o Stop pedaling allow computer to change to summery mode - Hold right key for three (3) seconds,
          to reset display, restart pedaling.

• Heart rate drops out

        o Rider may not have held forward position for 15 seconds.

        o Rider does not have the recommended chest strap or it may not be working.

• Which heart rate strap works with my Spinning® Computer?

        o Any Polar® HR strap. Note: It is suggested to use a Polar® "Coded" series
          chest strap to reduce HR "crosstalk".

        o Any Ant+ compatible HR Strap

• Picking up another riders heart rate

        o Bikes might be too close to each other and receiving HR from another rider. Move the
          bikes so there is more space from the computer of your bike to the chest of the other
          rider (see diagram on page 5).

        o Each rider should wear an Ant+ or Polar® "Coded" series chest strap.

• Battery light does not stay on long enough
- o Change the BLON time (see page 6).

• No RPM
- o Is the magnet on the left side of the flywheel and aligned with the cadence sensor?
- o Sync up the computer and cadence unit and wait 60 seconds.
- o Check the battery in the cadence sensor, replace if necessary.
- o If pedaling exceeds 120 RPM, the computer will flash the 120 value until rpm's decrease.

•What is the battery life?
- o Computer batteries last approximately 1 year depending on usage and backlight use.
  - Note: "Low Batt" will be displayed underneath the Heart symbol, suggesting battery replacement.
    - • Computer batteries: 4 AA Alkaline
    - • Cadence sensor battery: Lithium CR2032
- o Cadence sensor battery lasts approximately 1 year.

•What does the computer display?
- o Cadence = RPM
- o Heart Rate = BPM
- o Total Distance = MILES / KM
- o Elapsed Time = MINUTES
- o Total Calories = kCal (summary mode only)

Cadence, Resistance And Intensity:
Understanding the relationship between cadence, resistance and intensity is the key to Spinning® program classes that meet training goals. By using the Spinner® computer, you will become more proficient at increasing power, gaining efficient leg speed and mastering the relationship between ideal resistance and heart rate intensity.

Heart Rate Monitoring:
Before discussing cadence and how to use the Spinning® Computer effectively, one needs an understanding of heart rate monitoring. Heart rate monitors are used in the Spinning® program for continuous feedback on exercise intensity. For effective training, it is desirable sometimes to exercise at anaerobic intensity and aerobic intensity at some other times. Heart rates are used to tell whether a person is in aerobic or anaerobic intensity. Generally speaking, when heart rate is between 65 % – 80% of one's maximum heart rate (MHR) it is aerobic, and is anaerobic when the heart rate is above 80%. An easy way to estimate one's maximum heart rate is to use the age-predicted formula: 220 – age. Subtract one's age from 220 to get age-predicted maximum heart rate. For example, a 30 years old has 220 – 30 to get age-predicted maximum heart rate of 190 beats per minute (BPM).

Energy Zones™:

The Spinning® Energy Zones are the foundation of heart rate training in the Spinning® program. Each Energy Zone™ is a type of training based on exercise intensity (indicated by heart rate).

Energy Zone™	Intensity Range	Purpose
Recovery	50% to 65% of MHR	Relaxation and energy accumulation.
Endurance	65% to 75% of MHR	Improves muscular endurance and mental stamina.
Strength	75% to 85% of MHR	Raises metabolism, burns fat, increases energy.
Interval	65% to 92% of MHR	Trains the heart to recover quickly from work effort.
Race Day	80% to 92% of MHR	To challenge the well conditioned exerciser.

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

CADENCE FUNDAMENTALS

What Is Cadence?
Cadence is defined as the number of times the pedals revolve per minute, also known as RPM for revolutions per minute. The safest, most efficient and most realistic cadences are 80–110 RPM for a flat road and 60–80 RPM for a hill. These ranges are based on studying the cadences of elite cyclists as well as understanding how the muscles work together to turn the pedals in the most efficient manner.

Cadence Range for Flat Roads: 80-110 RPM.
Pedaling faster than 110 RPM is both unrealistic and counterproductive. The resistance knob on a Spinning® bike is used to increase friction on the flywheel in order to simulate realistic external forces one would encounter on an outdoor bike, such as road surfaces, bike weight and wind resistance.

Pedaling Faster Than 110 RPM Is Unrealistic because:
- It's like pedaling very fast in a very low gear—there's a low power to resistance ratio.
- It's wasted energy. If a person pedaled like this on street bike, he/she wouldn't generate much power or speed.
- A skilled cyclist who has worked on her pedal stroke for many years and has trained their nervous system to react quickly is able to pedal efficiently at 100+ rpm for an extended period. Because of his/her strength and ability to overcome the higher resistance at faster leg speeds, it is said that he/she has a high power to resistance ratio.

Pedaling Faster Than 110 RPM Is Counterproductive because:
- No amount of high-cadence/low-resistance pedaling on a Spinning® bike will succeed at training the nervous system properly. The flywheel is doing most of the work.
- One won't achieve his/her performance and weight loss goals.
- One won't build leg strength.

Is It Good To Pedal Faster Than 110 RPM?

Those who have a high power to resistance ratio may occasionally attain these leg speeds. This means they have the ability to overcome resistance through strength and speed. The rare, highly skilled Spinning® enthusiast (often cyclists) who have mastered a smooth pedal stroke and who understand the dynamics of cadence can pedal faster than 110 rpm for 1-3 minutes. A high performance sprint, used judiciously in ride profiles may require cadences over 110 rpm for 10-20 seconds.

Bouncing In The Saddle:

When riding at cadences of 100-120 rpm with too little resistance, the rider will bounce in the saddle. What causes the bouncing has to do with the pedal stroke. There are four phases to the pedal stroke. Many riders, however, usually have only one phase—straight down. That means that they haven't perfected sweeping the foot back at the bottom of the pedal stroke and pushing the toe forward at the top. As a result, they push down furiously on the pedals and rely on the flywheel to carry their foot the rest of the way. When their foot reaches the bottom of the crank arm, the leg can go no further, and the hip is raised up off the saddle, creating that familiar bouncing. The short-term solution is to add more resistance, but one must also work on pedal stroke technique and cadence drills.

Cadence Range For Hills: 60-80 rpm

Since 1998, Lance Armstrong has amazed the cycling world with his ability to pedal at 90 RPM up some of Europe's toughest climbs. But keep in mind that Lance can ride at 400 watts for several hours and stay aerobic (watts is a measure of power; 400 watts is a lot of power), whereas many skilled cyclists may be lucky to achieve 400 watts for a few minutes. In order to pedal at 90 RPM up a steep hill, one must either be superhuman or must choose a gear that is so low (granny gear), that the bike barely moves. The granny gear is the small cog found on the front chain ring of mountain bikes and some road bikes—it allows the rider to climb hills at a much higher cadence and lower resistance, but his/her power and speed are reduced.

It's not dangerous to exceed 80 RPM on a hill, but for extended periods it will likely raise the rider's intensity too high and won't achieve the strength benefits of climbing. It is all right to exceed 80 RPM for brief periods, such as in a standing climb for the last 10-20 seconds. The rider intensity will increase dramatically, so make sure one has planned for this in his/her profile.

The lower limit of 60 RPM on a hill is for safety reasons. There won't be many situations where a cyclist will pedal slower than 60 RPM. If one cannot turn the cranks at a faster cadence than 60 RPM the resistance is too high. A key indicator is the need to contort the body by throwing his weight into pushing the pedal downward while pulling on the handlebars. This excessive resistance places too much load on the knee joint and puts the hips and low back at risk. One wouldn't perform a bicep curl with a weight that would require the rider to throw his/her hips forward. The same applies to resistance while pedaling. A rider must build the strength in his legs using appropriate resistance at a cadence no lower than 60 RPM. If a steep hill is the goal, find the highest amount of resistance one can maintain while employing good form at 60 RPM without contorting the body to turn the pedals. Remember, 60 RPM is one revolution of the pedals per second.

Tips For Choosing An Appropriate Cadence And Resistance:

- **Warm-Up**. The first ten minutes of a Spinning® ride are critical for establishing proper cadence. With no resistance during warm-up, one may tend to pedal too quickly thus raising the heart rates prematurely. During the warm-up, it's important to work on cadence by keeping intensity under control (65% or less). Use the warm-up to establish a smooth cadence and gradually establish a balanced intensity. Similarly, after the warm-up, be cautious of increasing cadence over 100 rpm with light resistance (this will also cause a potential anaerobic event and one may spend the remaining class time attempting to recover). In other words, if one chooses to climb after the warm-up, ensure that intensity and cadence are increasing equally.

- **Resistance.** Resistance is good. Some riders are afraid to add resistance because they think they'll end up with bulging quadriceps. But in cycling, it is the sprinters who have the larger quadriceps (high cadences, lower resistance), and the skilled climbers generally have the longer, leaner legs (lower cadences, higher resistance).

- **Intensity.** Slower cadence does not necessarily mean lower intensity. Perhaps a rider feels that if he/she slows down the rpm his/her heart rate will drop too low. But in fact, he/she is in control of the intensity because he/she can add resistance as needed. Subtle turns of the knob should eventually generate the required response. Wearing a heart rate strap is critical to monitor ones intensity goals using the right combination of cadence and resistance.

- **Putting it together.** Cadence and resistance are inversely related. The next section will explain how cadence and resistance work together to elicit a given intensity. With this understanding, one can coach others to select the appropriate resistance and cadence for the terrain they have selected.

The Relationship Between Cadence And Resistance:
Cadence, resistance and intensity are interrelated. For any given intensity, there is a correlated cadence and resistance combination. In other words, if one knows the intensity (heart rate) he/she wants to exercise at, and selects the cadence at which to ride, he/she can find the right resistance to get to that intensity. Or if given a target intensity and target cadence, one can dial in the right amount of resistance.

In other words, for every selected cadence parameter combined with a heart rate range, one should be able to find a resistance that will attain that heart rate. The goal is to find that resistance through experimentation. Remember that on some days the resistance may be slightly different than other days due to factors such as fatigue, stress, overtraining, or medication.

Applying The Concept:
The following examples will help the rider to understand and learn to apply this relationship between cadence, heart rate and intensity.

1. Ride at a steady state heart rate of 75% maximal heart rate (MHR) on a flat road, at a cadence in the range of 85–95 RPM. Dial in the amount of resistance necessary to reach that goal.

2. Now find a moderate to hard seated climb at a cadence of 65-70 RPM and at a high-end aerobic HR of around 80% MHR (a range is sufficient). Dial in the right amount of resistance to reach that goal.

3. Now suppose the hill just became a little easier, but one wants to maintain the same HR of 80%. Because it's still a hill, his/her cadence should not rise above 80 RPM. What does one need to do to stay at the same intensity as cadence increases? Answer: reduce the resistance just a little.

4. Find a tough climb without exceeding 85% MHR. Continue adding resistance until one feels the need to rise out of the saddle in a standing climb. (Outdoors, cyclists stand on a climb when the road becomes steeper.) Maintain a cadence of 70–75 RPM. Play with these three variables, finding the right combination to meet the parameters. If cadence picks up too fast, one will have to increase the resistance. If heart rate rises too high, one will need to adjust one or both of the other variables (cadence and/or resistance).

These exercises will help a rider become the master of the road and in control of his/her intensity. Instead of being told to turn the resistance knob a particular number of rotations, one will be able to find the appropriate resistance for the cadence and intensity desired.

CADENCE DRILLS

Now let's look at some specific cadence drills which one can incorporate into his/her rides

Cadence Drill #1: Teaching The Concept Of Cadence Vs. Resistance

This drill introduces the relationship between cadence, resistance and intensity. The goal is to maintain the same intensity even though the terrain changes. An outdoor cyclist would accomplish this by changing gears.

Begin on a flat road and ride at an intensity of 80% MHR and a cadence of 85 RPM for 5 minutes (this will allow you to internalize the feel of the cadence and resistance). Ride at 85, 90 and 95 RPM for 3-4 minutes each, all the while maintaining the same heart rate. If at any point one cannot maintain the intensity, he/she should ride at the last cadence to maintain the desired intensity which could mean to go back down the ladder from 95 to 80 RPM.

Next, add a little hill while maintaining the same intensity. Remain seated and ride a progressively steeper hill by gradually adding resistance every 3-4 minutes. Try to maintain the same intensity of 80%. In order to do so, one will have to slow his/her legs down as the hill becomes steeper. Ride at 80, 75, 70, 65 and 60 RPM. If one cannot maintain the intensity he/she should ride at the last cadence where he/she could.

Now for the hard part—transition to a standing climb. Once standing, ride back up the ladder from 60 to 80 RPM, reducing the resistance slightly each time. It will be difficult to maintain the 80% MHR as the hill becomes less steep because heart rate often rises with faster cadences on a hill. Take caution to find the correct amount of resistance (one that allows the rider to maintain the desired cadence) while at the same time staying connected to the crank arms (no jerky pedal strokes). On this drill, reduce the time spent at each level to 1 minute each.

Bounce Test:
This drill introduces a basic and reliable method for determining your maximum cadence and also helps one determine the highest cadence where one can safely and efficiently pedal without bouncing in the saddle. Skilled riders can achieve a higher cadence, which will help train leg speed. With training and focus, one can improve skill and leg speed.

Select a flat road resistance at an aerobic intensity of 70-75% of MHR. Gradually increase the cadence from 80 to 100 RPM about 3 RPM every minute, all on a flat road. One can make subtle adjustments to his/her resistance if needed. Intensity will undoubtedly increase, but one should hit maximum cadence before reaching an anaerobic intensity. Stay seated deeply into the saddle while pedaling. Pull the feet back at the bottom and push forward at the top of the pedal stroke.

If one start to bounce, reduce the cadence a few RPM to determine the exact point one can ride without bouncing. One will probably need to raise the resistance slightly.

Ladders:

Ladders are a progressive increase or decrease in one of the following variables: cadence, resistance or intensity. This drill is best employed using seated or standing flats and seated or standing climbs. Jumps do not work well for ladders. One can use a combination of the following drills in any profile:

- Constant cadence with increasing resistance in a seated flat or standing flat. The terrain gradually becomes a hill.
- Constant resistance with increasing cadence, in a seated or standing position. Intensity can increase very quickly, so this requires close attention to your heart rate monitor. This drill is also known as spin-ups or accelerations (see below).
- Measured heart rate increases (5 beats at a time) using a combination of cadence or resistance to elicit the increase in intensity. This is an excellent tool to practice control.

Accelerations (Spin-Ups)

Accelerations (also known as Spin-Ups) are a type of ladder where riders progressively increase the cadence over a fairly short period of time. This drill requires a long warm-up. Accelerations are done in intervals and can be quite intense, but they're an excellent way to train leg speed and improve muscle firing patterns in the legs. It also trains muscular endurance on hills. Accelerations help the rider to move beyond the cadence where he/she tends to bounce.

These drills are done in intervals with ample recovery in between. The work to rest ratio should be at least 1:2 or even 1:3. This guarantees that when one begins the next interval, he/she is rested enough to give it his/her all. Insufficient recovery will hamper the ability to perform the work interval.

On the Flats: Establish a flat road resistance at 80 RPM at an aerobic intensity. The first drill will be for 90 seconds, progressively raising the cadence to 110 RPM. Every 10-12 seconds, raise cadence by 2-3 RPM. As one approaches and surpasses 100 RPM, extra effort should be made to stay seated deeply in the saddle without bouncing (if one cannot do this without bouncing, he/she should not go beyond that point—it will defeat the purpose).

Next, try this over 60 seconds, raising the cadence 2 RPM every 4 seconds.

Seated Climbs: Climb at 60 RPM with enough resistance to bring the intensity to 75%. Gradually increase the cadence to 80 RPM over 60 seconds. If possible, use 85% MHR as a ceiling. One may have to try this several times to find a hill that allows him/her to stay within the desired intensity. Once reaching 80 RPM, hold this cadence for progressively longer periods. (15, 30, 45 and 60 seconds).

Standing Climbs: Begin at 60 RPM and gradually increase the cadence to 80 RPM. Intensity will no doubt rise quickly, so limit the intervals to 45–60 seconds.

This page intentionally left blank

Spinning® Ride Profile:

This Strength Energy Zone™ ride takes a rider on three hills, each one a little longer, steeper and therefore more difficult. For the first hill, attempt to keep the heart rate at 80% max. Allow heart rate to rise to 85% with the second and third hills.

Elapsed Time	Duration	Movement/Cadence	Intensity	Technique
0:00 – 5:00	5 min	Seated Flat 80-110 RPM	50-65% MHR	Warm up for 5 minutes and allow heart rate to rise up to 65% MHR.
5:00 – 9:00	4 min	Seated Climb 80 RPM	80% MHR	Settle in to the back of the saddle as you gradually add resistance and take your cadence to 80 RPM.
9:00 – 12:00	3 min	Seated Flat 90-100 RPM	75% MHR	Unload resistance and increase cadence to 90-100 RPM. Find the right resistance to maintain a heart rate effort at 75%.
12:00 – 20:00	8 min	Seated Climb 60-80 RPM Jumps on a Hill 60-80 RPM	80-85% MHR	Add resistance to moderate/heavy and combine the two movements in any combination. Example: 3 min seated climb, 1 min jumps on a hill, repeat

Elapsed Time	Duration	Movement/Cadence	Intensity	Technique
20:00 – 23:00	5 min	Seated Flat 90-100 RPM	75% MHR	Unload resistance and increase cadence to 90-100 RPM. Find the right resistance to maintain a heart rate effort at 75%.
23:00 – 35:00	12 min	Seated Climb 60-80 RPM Jumps on a Hill 60-80 RPM Standing Climb 60-80 RPM	80-85 MHR	Add resistance to moderate/heavy and combine all three movements in any combination. Example: 2 min seated, 1 min jumps, 2 min standing, 3 min seated, 2 min jumps, 2 min standing.
35:00 – 40:00	5 min	Seated Flat 80-110 RPM	50-65% MHR	Decrease resistance to light and allow HR to come down to 50-65%.

FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference
to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
-Reorient or relocate the receiving antenna.
-Increase the separation between the equipment and receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/TV technician for help.
To assure continued compliance, any changes or modifications not expressly approved by the party
responsible for compliance could void the user's authority to operatethis equipment. (Example- use only shielded interface cables when connectingto computer or peripheral devices).

This equipment complies with Part 15 of FCC RF Rules. Operation is subject to the following two conditions:
1) This device may not cause interference and
2) This device must accept any interference, including interference that may cause undesired operation of the device.

Caution!

The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user auhority to operate the equipment.

For IC

Canada Statement
This Device complies with RSS-210 of the IC Rules; Operation is subject to the following two conditions:
(1). This device may not cause interference and
(2). This device must accept any interference received,, including interference that may cause undesired operation.

L'utilisation de ce dispositif est autorisée seulement aux deux conditions suivantes :
(1) il ne doit pas produire de brouillage, et
(2) l'utilisateur du dispositif doit être prêt à accepter tout brouillage radioélectrique reçu, même si ce brouillage est susceptible de compromettre le fonctionnement du dispositif.

39

This page intentionally left blank

For more information on Star Trac products and support visit http://support.startrac.com or call 800-503-1221.

For more information on Spinning® education, events, accessories and apparel log onto www.spinning.com.

Spinning® Computer Manual
620-7654 Rev H

SPINNING®

STAR TRAC®
expect different™.