



# PSIA-Rocky Mountain-AASI ADAPTIVE EXAM GUIDE for **BI-SKI**



The bi-ski is a type of adaptive equipment that is designed for any skier who has significant problems standing and balancing while in motion. These problems could be caused by physical trauma or neuromuscular disorders.

## **Types of Disabilities Common to Bi-Skiers**

These are some of the most common disabilities for which a bi-ski may be used:

- Amputation
- Balance Impairments
- Cerebral Palsy (CP)
- Cerebrovascular Accident (CVA/stroke)
- Epilepsy
- Limb Deficiency
- Mental Retardation
- Multiple Sclerosis (MS)
- Muscular Dystrophy (MD)
- Neuromuscular Diseases
- Paralysis & Paresis
- Polio
- Post Polio Syndrome
- Spina Bifida
- Spinal Cord Injury (SCI)
- Traumatic Brain Injury

In addition, there are some skiers who have progressive or degenerative types of disability. They may have started skiing as a two-, three- or four-tracker but will eventually become a sit down skier due to the progressive nature of their disease.

## **Evaluation of Student**

Treat every student as an individual; the effects of an injury or disability can vary from student to student. A complete and detailed student analysis is needed to determine which piece of equipment is best suited for the student. Determining factors are physical strength, mobility, ability to maintain balance and level of injury. A thorough student evaluation is necessary to determine proper equipment selection.

For spinal cord injuries, a general rule of thumb is that a student with a T-6 and lower level of injury uses a mono-ski. Students with higher levels of injuries usually use a bi-ski. Each injury is somewhat different; the effects of a T-6 injury in one individual may vary from the same level of injury in another individual. In addition, a person may have an *incomplete spinal cord injury*. This means that there is some level of motor and/or sensory function below the level of injury.

Some medical concerns associated with bi-skiers include bladder management devices (e.g., leg bag, catheter, etc.), pressure sores, spinal fusion, sensitivity to hot or cold, and poor circulation.

Another point of concern is autonomic dysreflexia. This is a potentially life-threatening, hypertensive occurrence produced by the body's inability to sense and react to specific stimuli. Possible symptoms include a feeling of impending doom, flushing of the skin, sweating, blurred vision and a sudden change in the ability to comprehend or communicate. Common causes include bladder or bowel distension, pressure sores, severe cold and heat, or severe blows to the body or head. If an instructor suspects autonomic dysreflexia, immediate action should be taken to eliminate the cause. The student is kept upright, straps are loosened and he/she is taken to a warm place. Ski Patrol should be called immediately—this is a medical emergency.

Medications taken by the student can also be a source of concern, so it is important to determine any side effects the student may be experiencing. Additionally, it is valuable to know other activities in which the student participates. Much of this information can be obtained from the student, parent or guardian, as well as from the student's application or evaluation.

The majority of skiers who use a bi-ski have a spinal cord injury, multiple sclerosis, muscular dystrophy, cerebral palsy, severe epilepsy, balance impairments or traumatic brain injuries.

## **Equipment and Set Up**

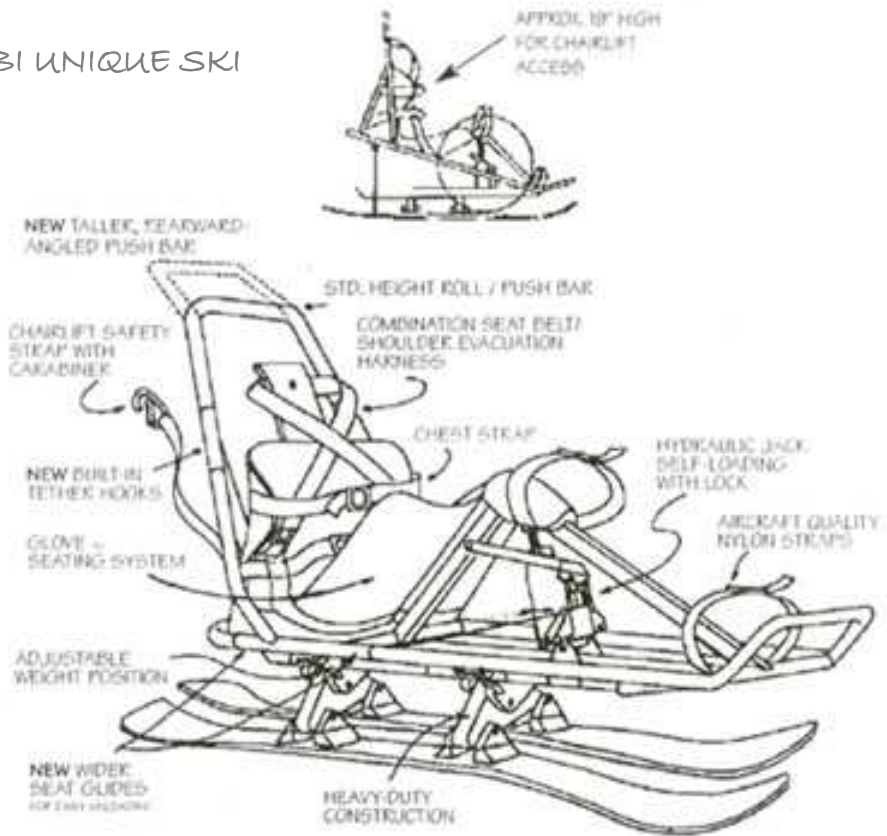
Take time to initially set up and evaluate a student to determine which type of equipment is best. Do not rush the set up for the first time skier! Proper time spent during the initial set up will equal success and enjoyment for the student in the long term.

The bi-ski has a "boot", seat and frame system that is mounted to a suspension system, which is usually mounted on two short skis with a radical side cut. Most bi-skis have fixed outriggers that can be mounted on the frame of the bi-ski. These outriggers can be adjusted as needed or removed. Bi-skis have a tethering system that allows you to assist the bi-skier in turning, speed control and in emergency situations. If fixed outriggers are used, it is **mandatory** to use a tether strap to assist the student and safely control the bi-ski. Some programs also require a safety loop.

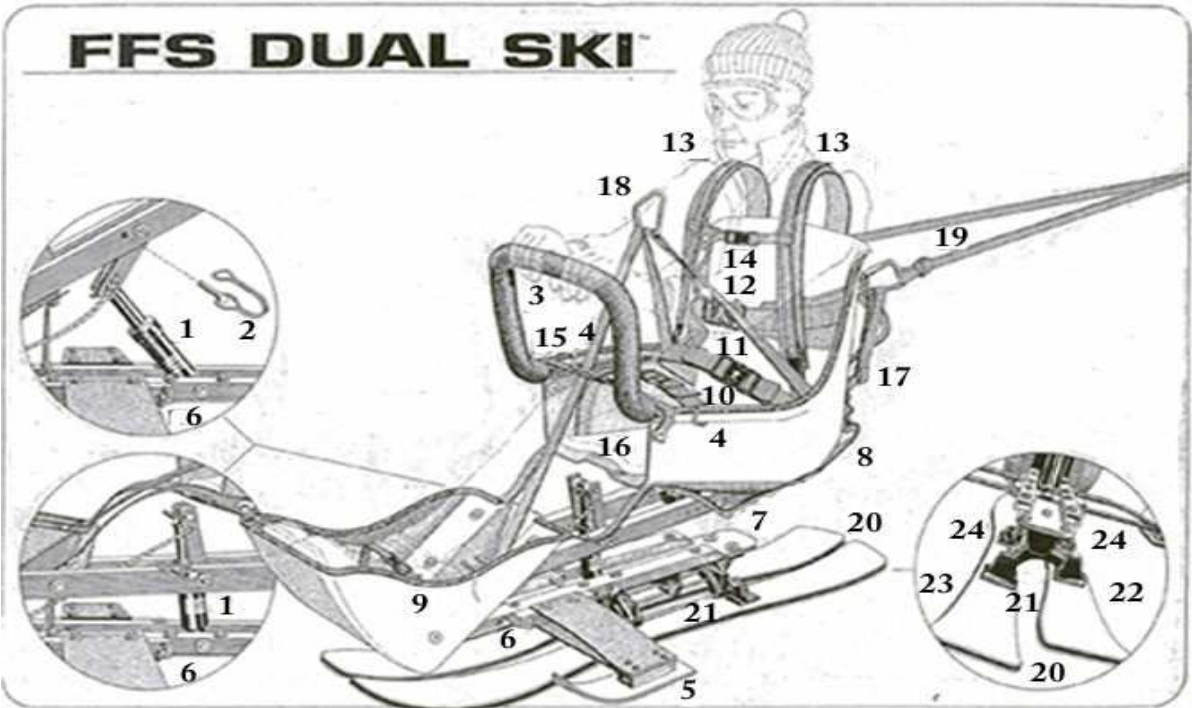
If the skier possess the necessary strength, balance and agility, hand held outriggers may be used in place of fixed outriggers and the skier may be able to ski independently. However, it is suggested that someone using handheld outriggers remain on tethers until he/she has become an upper level intermediate/advanced skier and can safely control turns and speed. Certain bi-skis have a self-loading device that allows strong, well-balanced and agile bi-skiers to load independently but most bi-skiers still need one or two lifting/loading assistants.

A complete physical evaluation can help you determine how the bi-ski should be adjusted. As with the mono-ski, the bi-ski should be properly balanced and the skier should be properly fitted to the seat system.

# BI UNIQUE SKI



# FFS DUAL SKI



## **Safety Issues and Lift Evacuations**

Be aware of these points to keep your bi-ski lessons safe:

- The NSAA *Your Responsibility Code* applies to all bi-skiers.
- Instructors need to understand the hand signals for communication with lift operators (i.e., slow, stop, and maintain speed). Some hand signals may differ by ski area.
- Evacuation straps on the bi-ski should be regularly checked for wear and be replaced or repaired as necessary.
- The National Ski Patrol recommended procedure for a bi-ski lift evacuation is termed a double carabiner with opposing gates. Evacuation carabiners should only be mounted to a manufacturer-suggested evacuation strap (i.e., single- or three-point strap system). The evacuation system should always be ready for evacuation and not intertwined with the bucket straps of the skier.
- Evacuation is always directed by Ski Patrol and it is at their discretion to use an alternate system.

## **General Overview of Lift Loading Procedures**

These are general procedures for instructor-assisted chair loading and unloading of bi-ski students:

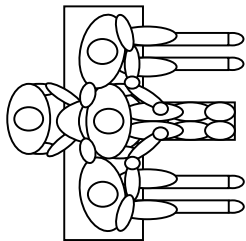
- Lead instructor calls a count or cadence (example: *Ready, 3, 2, 1, lift up and back*) when in the loading zone of the chairlift. For timing and safety concerns, it is a good idea to practice a lift with the assistant instructor and student out of lift lines and before the first load of the day.
- A lift operator should attend the stop button in case of a misload. If a second lift operator is available, that person may assist with the lift loading.
- Once on the chairlift, attach safety strap and carabiner to the chair. Some programs and students put the safety bar down. When using the safety bar, keep it down during entire ride and take care not to lean on it, as this might put extra weight on the student's legs.
- After you have passed the final lift tower before the unloading platform, disconnect the safety carabiner and strap and lift the safety bar. Make sure all straps, clothing and outriggers are free of the chair so that you have a clean unload.
- At the unloading area, the lead instructor calls a count or cadence (example: *Ready, 3, 2, 1, lift up and down*) and he/she continues to guide/bucket assist the student off the chairlift and to the side, out of the unloading area.

## Lift Loading Assists

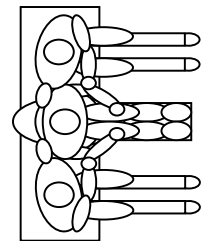
Chairlift loading procedures vary at resorts due to chair or loading area configuration, program parameters and resort parameters. Keep in mind these general guidelines for lift loading assists:

- Always lift with the back straight, in a wide stance and using the legs and biceps.
- Make sure proper communication has occurred between the student, lead instructor, assistant instructor and lift operator.
- There are three assists that may be used with bi-skis: a) lift and pull-back, b) lift with a front push-back and c) lift with a side push-back. **Remember that one lift operator should always attend the stop button in case of a misload!** If a second lift operator is available, that person may assist with the lift loading.

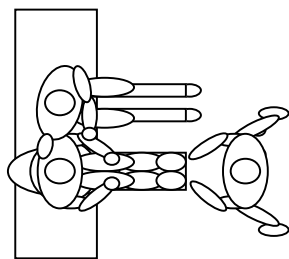
### a) Lift and pull-back



The lead instructor and assistant instructor stand on either side of the bi-ski, with skis pointed in the lift direction, hips and shoulders turned slightly toward the bi-ski and chair. They grab the side handles. While they are lifting up and back from the sides, the lift operator reaches over the chair, grasps the handle on the back of the bi-ski and pulls it back onto the chair. If a lift operator is not available for lift loading assistance, the lead instructor and assistant instructor may perform a lift and pull-back by themselves.



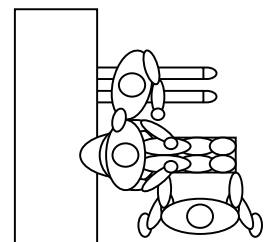
### b) Lift with a front push-back



The instructor stands at the side of the bi-ski, with skis pointed in the lift direction, hips and shoulders turned slightly toward the bi-ski and chair. The lift operator stands in front of the student, looking directly at the student and the on-coming chair and grasping the foot rest with both hands. While the instructor lifts up and pulls back from the side, the lift operator lifts from the front and pushes the seat up and back onto the chair. This assist can be used for a small student in a bi-ski with an instructor who just needs that extra push back.

### c) Lift with a side push-back

The instructor stands at the side of the bi-ski, with skis pointed in the lift direction, hips and shoulders turned slightly toward the bi-ski and chair. The lift operator stands on the other side and at 90 degrees to the lift direction. The instructor and the lift operator grasp the side handles and lift up. The instructor pulls back while the lift operator pushes back.



## **Tethering a Bi-Ski**

When tethering a bi-ski, the instructor's goal is to provide safe, smooth assistance as needed for speed control, turn initiation and stops and obstacle avoidance. Since tethering procedures can vary, it is important that you understand and adhere to the tethering safety protocols of your local program/resort.

### ***Attaching the tethers to the bi-ski***

The design and attachment of tethers varies greatly by ski program and by the structure of the specific bi-ski. Moreover, the ability of the student can affect the tethering techniques. These are some of the variables in design and attachment of the tethers:

- Two tethers versus one single looped tether
- Two points of attachment to the ski versus one point of attachment
- Attachment low on the ski versus high on the ski

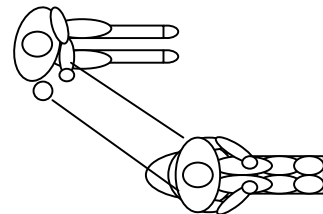
### ***Attaching the tethers to the instructor***

There are several key points to remember when attaching the tether to your self:

- **Never ever drop the tether!** Remember that you are the braking system for the bi-ski.
- Use a girth hitch to attach the tethers to your wrists, not your gloves.
- Do not attach the tethers to your upper arms; doing so risks injury to your rotator cuff.
- Use a back-up safety attachment when required by your local program/resort. One end is fastened to the tether and the other to your wrist, arm or waist. A carabiner is often used for this attachment.

### ***Body position***

Body positioning is very important to the success of tethering. You should be uphill and behind the bi-ski. In most cases, you have a slightly narrower corridor than the bi-ski. If you get too far outside of the bi-ski corridor or below the bi-ski, your ability to guide, control and stop the student is diminished.



Stay in sync with the bi-ski student. Look for subtle cues, such as a head tilt, to time your assistance of the student's turn initiation.

### ***Feet and skis***

Ideally, you can make stem/step turns in sync with the bi-ski. See the [Adaptive Exam Guide for Functional Skiing](#) for details on how to perform this maneuver.

The wedge may also be used to effectively tether a bi-ski, especially when coming into crowded areas or on flat terrain. Beginning tetherers often learn to tether using the wedge in order to master body and hand position. Progressing to stem/step turns is ultimately safer for your hips and knees and it is usually smoother for the student.

Parallel to parallel tethering should only be used by strong, experienced tetherers who have already mastered wedge and stem/step tethering. Use caution with parallel to parallel tethering, as it is easier to catch a downhill edge, potentially causing the tetherer to fall. Unless it is done smoothly and with finesse, it can prematurely pull the student into the fall line, preventing him/her from making complete turns and causing a rough ride.

### ***Hand and arm position***

For maximum control and stability, your hands and arms should be close to your center of mass. This is known as the “power box” and in this position, your hands are between your hips and chest; arms are flexed, with your elbows ahead of your spine (similar to carrying ski poles). When your hands and arms are outside of the “power box,” you may reduce your ability to guide, control and stop the student.

### ***Tether handling***

There are several different techniques that can be employed to initiate turns, including pulling the tether, wrapping the tether in or rotating the tether like a steering wheel. Regardless of what technique you use, practice is critical so that you can develop a feel for what is most effective.

Smooth tether handling is critical for your student’s safety and skiing ability. You should be able to release and gather the tether with ease; there should never be so much slack that you risk tripping over the tethers.

The tightness of the tether lines can vary based on the needs of the student. In general, more advanced students benefit from light guiding of the tether lines, used as ‘teaching tethers’, not a control device. Beginning students, on the other hand, may need the greater instructor control that is available with tighter tether lines.

### ***Emergency stops***

This is a required safety maneuver for all bi-ski instructors. It is used to quickly stop the bi-ski and avoid hazards such as trees, lift towers and other people on the slopes. The movements are the same as the Sideslip to Hockey Stop maneuver of the [Functional Skiing Exam](#). It should be performed precisely and quickly. Poor body alignment can hinder your ability to stop and may cause the bi-ski to flip.

### ***Bucket assists***

Bucket assists are used in a variety of circumstances: in lift lines, on cat roads, when an outrigger is broken and when a student is fearful or fatigued. It can also be used with beginning bi-ski students to help them feel their balance and to give them kinesthetic feedback as they learn how to ski. In general, bucket assists should not be used to “take the student for a ride.” Instead, you are encouraged to promote the student’s independence to the highest possible degree.

When performing a bucket assist, use a wide-stanced, skidded parallel technique. It is best to avoid using a wedge so that your ski tips don’t get caught under the bi-ski tips.

In most cases, bucket assists are used over very short distances. For bucket assists on long runs, remove fixed riggers as a safety consideration. If tethers are not being used during a bucket assist, you should have some other point of attachment (such as a climb loop with a carabiner). Lastly, for the safety and enjoyment of your student as well as other skiers, do not take up the entire width of the slope while performing a bucket assist.

### ***Tethering exercises***

The following exercises may be used to improve your tethering techniques:

- **Develop strong skiing skills.** In particular, mastery of the following maneuvers can improve your tethering skills:
  - Stem/step turns
  - Falling leaf
  - Side slip to hockey stop
  - Synchronized skiing (with visual and verbal cues)

These maneuvers are described in detail in the [Adaptive Exam Guide for Functional Skiing](#).

- **Practice tether management:** At home watching TV, attach tethers to a chair and practice wrapping and unwrapping the tethers. Next, practice smoothly releasing the tether and then gathering it back up. Make sure you don't have slack to trip over.
- **Practice tethering without the bi-ski.** Use a stand-up skiing partner who is skiing in front of you, just as a bi-ski student would be in front of you. This partner should not be attached to the tethers but instead, should hold them loosely (to protect his/her shoulders).
- **Use guided discovery to find the “power box” hand and arm position.** Hold your hands high, low and in-between until the height of the “power box” is established. Then determine the width of the “power box” by holding your hands close together, far apart and in-between. Finally, play with the flex of your arms, moving from straight arms to a tight-angled bend and in-between. As above, this exercise should be done with a stand-up skiing partner, not with a bi-skier.
- **Practice tethering, emergency stops and bucket assists with other instructors.** If possible, practice these maneuvers on people of varying weight and height. Have them role play different levels of ability. Practice until you consistently use effective body position and foot movements. Feel how different techniques affect the bi-skier. Notice the difference between full control and gentle guiding.
- **Be tethered by another instructor.** If you meet the weight restrictions of the bi-ski, have another instructor tether you to understand the experience of your bi-ski students. Notice which tethering techniques are helpful and which techniques hinder your progress.



## **Adaptive Bi-Ski Progression**

The following is based on the PSIA Alpine National Standards and has been adapted for bi-skiing.

### **Beginner / Novice Zone Objectives**

#### **Level 1:** Welcome to skiing / Build the foundation

- Student assessment
- Medical history
- Equipment selection, introduction and set up- fixed riggers or handheld
- Static balance exercises and introduction to effective body movements, indoors
- Student/instructor communication, safety and emergency stop

#### **Level 2:** Introduction to Flats

- Pushing, turning, pivoting on flats – assisted
- Static balance exercises, outdoors on flats
- Assisted fall and getting up
- Introduction to chairlift and green terrain
- Chairlift loading and unloading procedures
- Review lift evacuation procedures
- Student assisted/instructor assisted chairlift load & unload
- Outtrigger position and timing during loading and unloading
- Straight runs – emergency stop
- Outtrigger and body position while moving
- Stopping and slowing

#### **Level 3:** Introduction to Turning

- Turning left & right through balance and edge control movements
- Vary turn shape and size
- Speed control
- Turning to a stop
- Fan progression
- Linked turns
- Master beginner area
- Develop greater skill blending

#### **Level 4:** Explore the beginner mountain experience

- Vary turn shape and size for terrain and condition
- Explore a variety of snow conditions

## Intermediate Zone Objectives

### **Level 5:** Develop and Enhance Intermediate Movement Options

- Appropriate outrigger movements (outrigger lead change)
- Refine effective body movements and position
- Develop long to medium and medium to long radius turns
- Edge control exercises for bi-ski

### **Level 6:** Anchor Intermediate Skills and Movements

- Medium to short radius turns
- Ski varying snow conditions
- Proper body movements
- Upper/lower body separation
- Hip and lower body angulations
- Independent lift loading and unloading
- Skidded hockey stops for bi-ski

### **Level 7:** Exploring Movements and Skills for Upper Level Skiing

- Bump skiing on easy blue terrain
- Short radius turns
- Explore carving sensations
- Spinal cord extension at turn initiation
- Total independence
- Hip check turns for bi-skis

## The Advanced Zone Objectives

### **Level 8:** Refining Advanced Movement Patterns

- Carving medium and long radius turns
- Ski short turns on the steeps
- Ski blue and easy black bumps
- Boot top powder
- Braking, gliding control movements on steep terrain

### **Level 9:** Develop Movement Options for Steep Terrain

- Refine movements in short radius turns
- Develop optional movement patterns for varying speed control and conditions
- Develop optional movements and skiing tactics for advanced bump skiing
- Bumps, racing, off-piste, terrain parks and pipes