The background of the slide features a faded, grayscale image of bicycle gears. The gears are arranged in a cluster, with some overlapping, and are positioned behind the main text. The overall aesthetic is technical and mechanical.

# Bicycle Mechanics and Repair Decal

## Mechanical Engineering 98/198

### Spring 11

## Lecture 4

Aleksey Shepelev

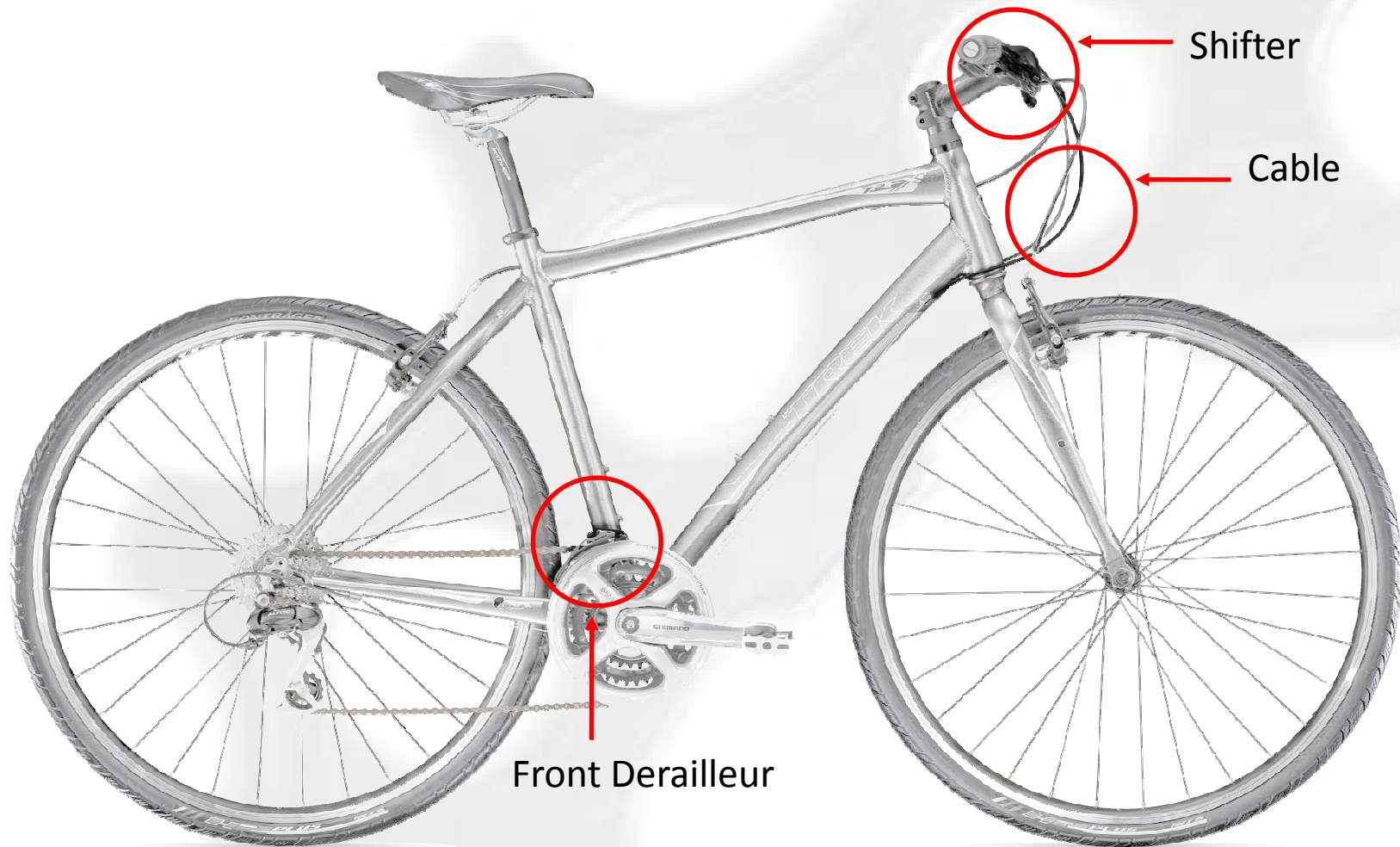
Jim Gao

Nick Koo

Henry Yi

Allen Gurdus

# Components



Shifter

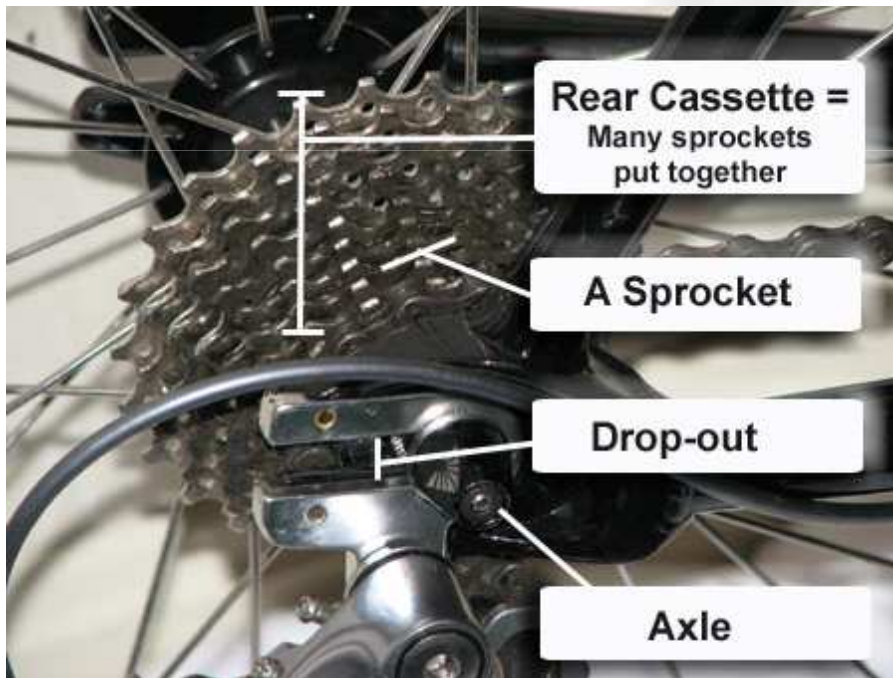
Cable

Front Derailleur

# Gear Basics

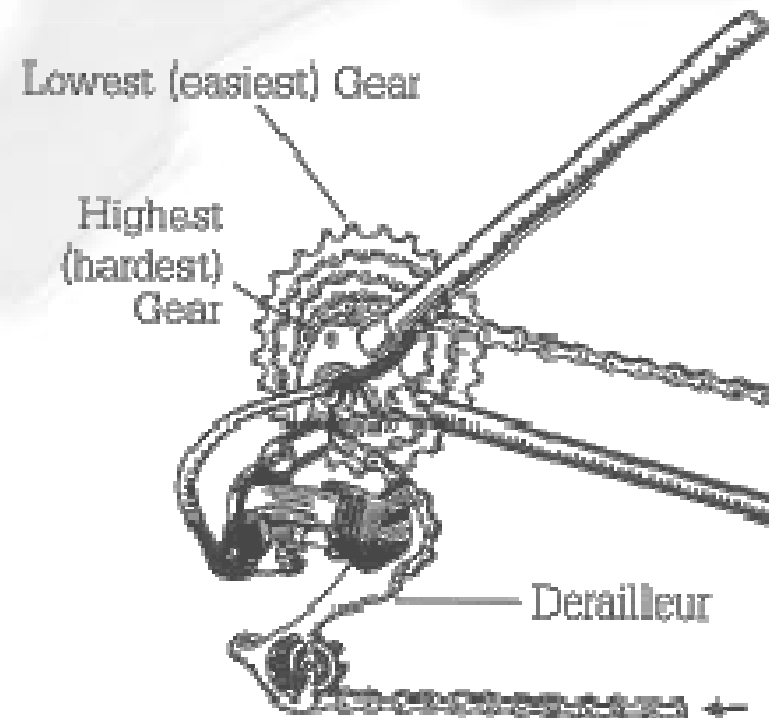
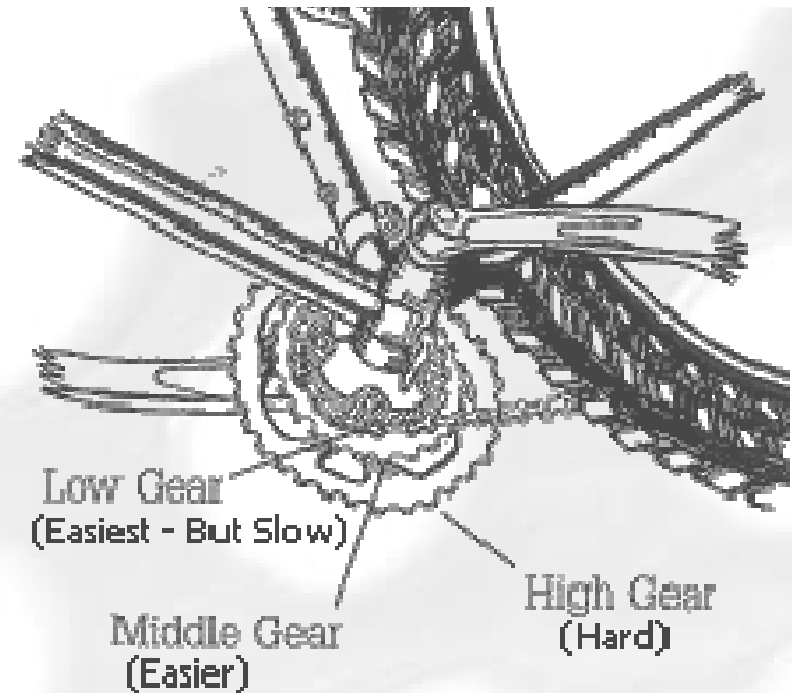
- Cassette

- Front Chain Rings



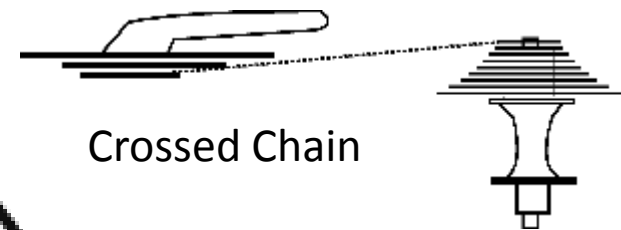
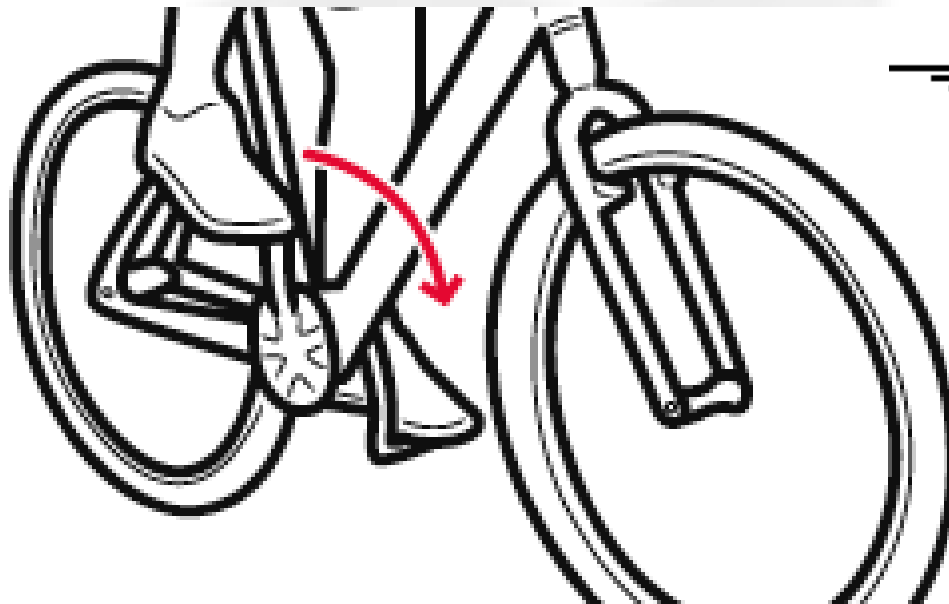
# Gear Ratios

- A gear ratio is measured by dividing the number of teeth on the front chain ring by the number of teeth on the back sprocket.
- Lower ratios make it easier to pedal.



# Proper Shifting

- Shift only when pedaling forward.
- Avoid “crossing” the chain as much as possible.
- Do not shift when pedaling hard (up a hill).



# What are shifters?

Shifters are devices on your handlebars, stem or downtube that allow you to change gears



Downtube shifters



STI shifters



# Types of Shifters



Stem-mounted shifters



Index shifter with integrated brake lever

# Types of Shifters



Bar-end shifter



Twist-style shifters



# How shifters work

- 2 functional types of shifters
  - Indexed (Preset positions, “click” shifting)
  - Friction (Undefined positions, analog)



# Friction Shifters



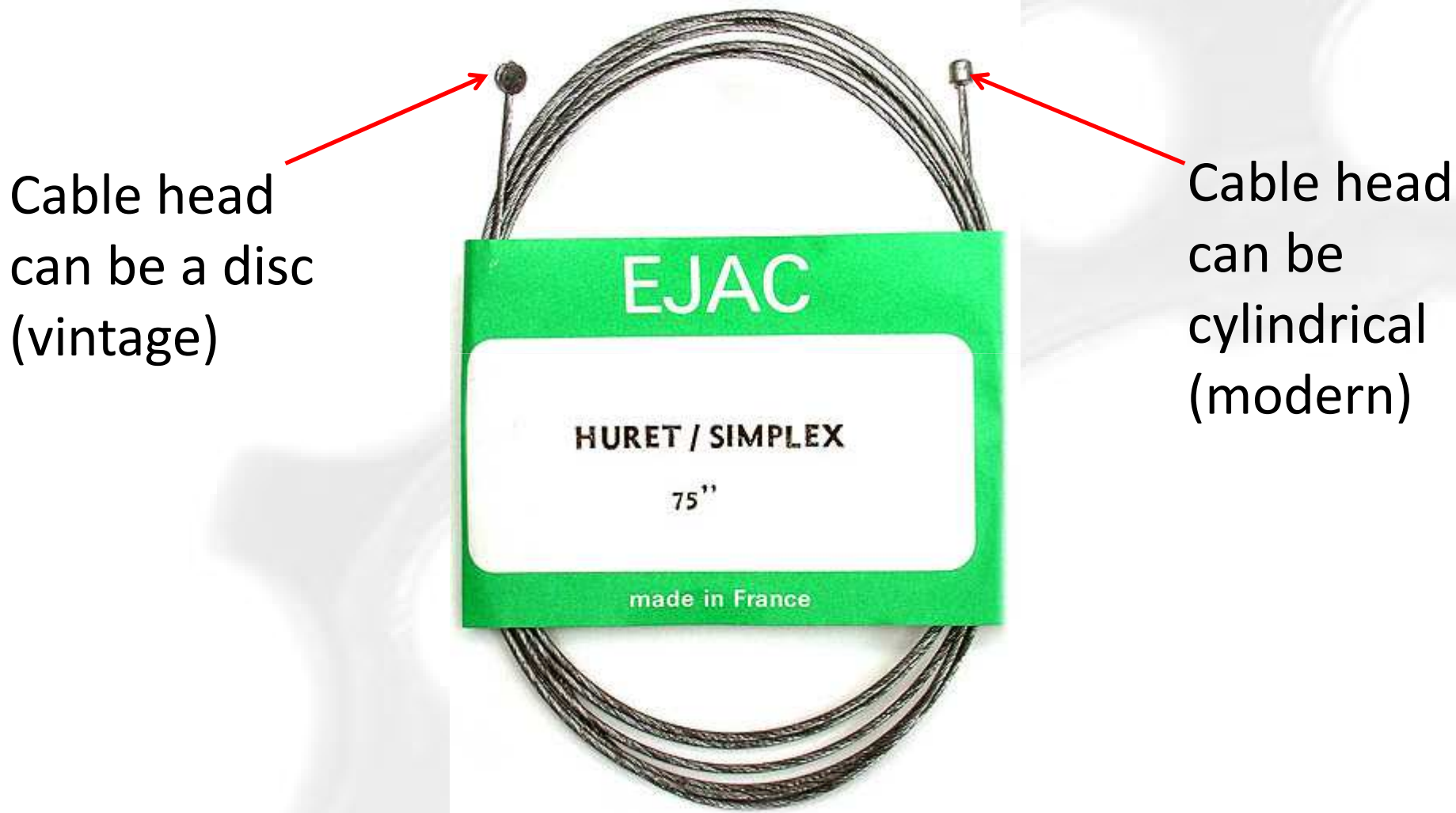
**Catch for  
cable nipple**

**Cable groove**

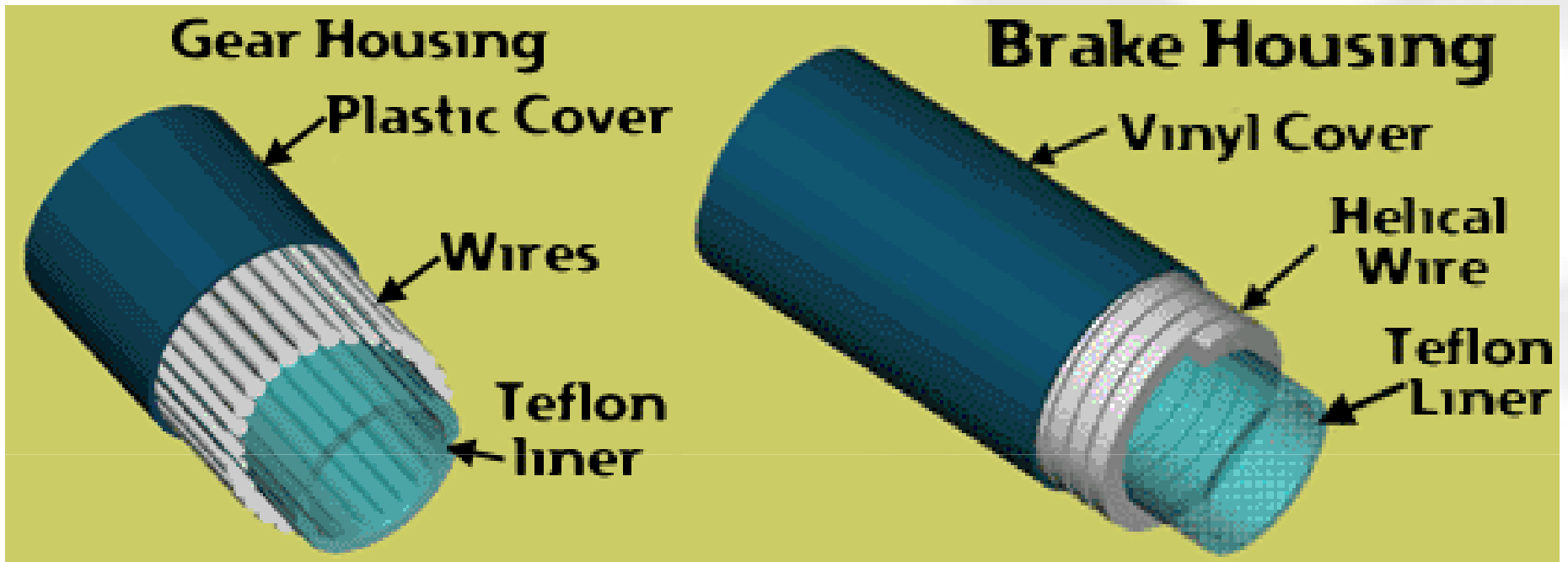
# Index Shifters



# Shifter Cables



# Shifter Housing



- Necessary for indexed shifting

- Can be used for tension shifting



# Types Of Front Derailleurs



Double

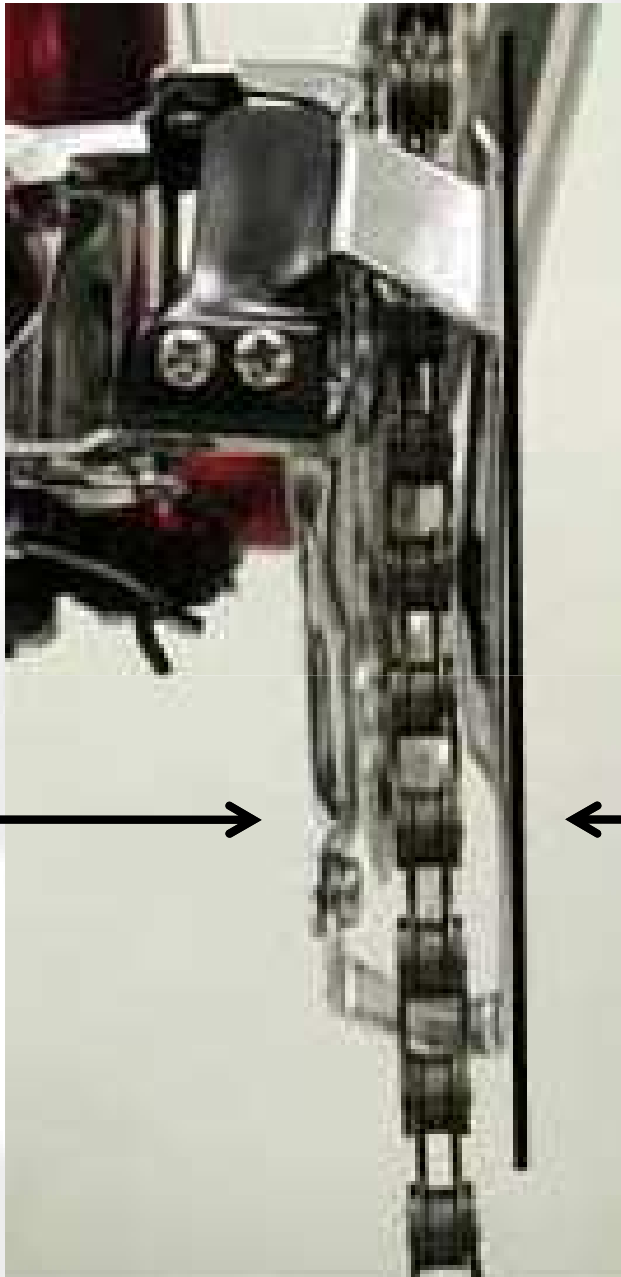


Triple

# How does it work?!

Pushes the chain to a different chainring





Chain jumps to a larger chainring

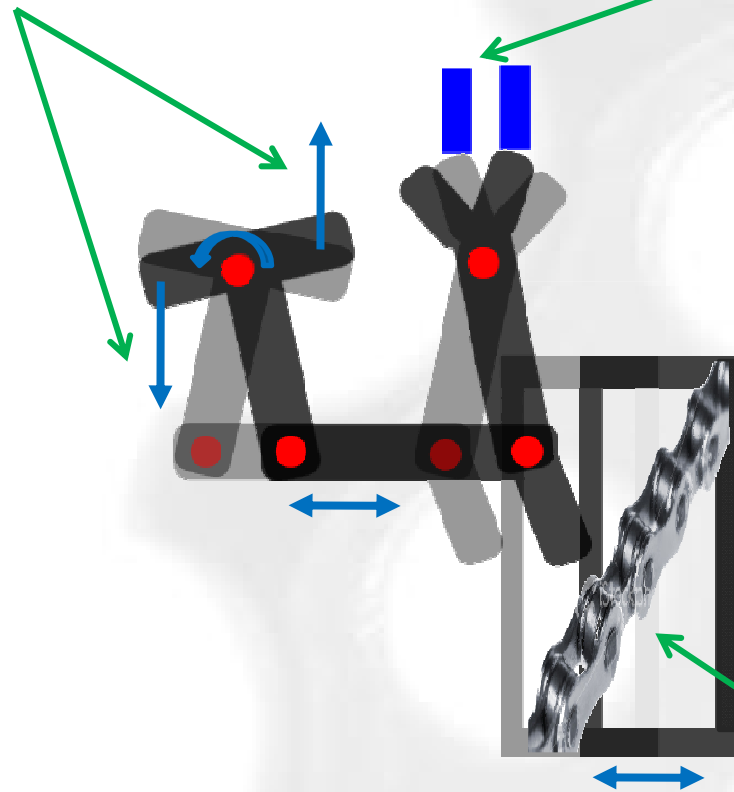


Chain falls to a smaller chainring

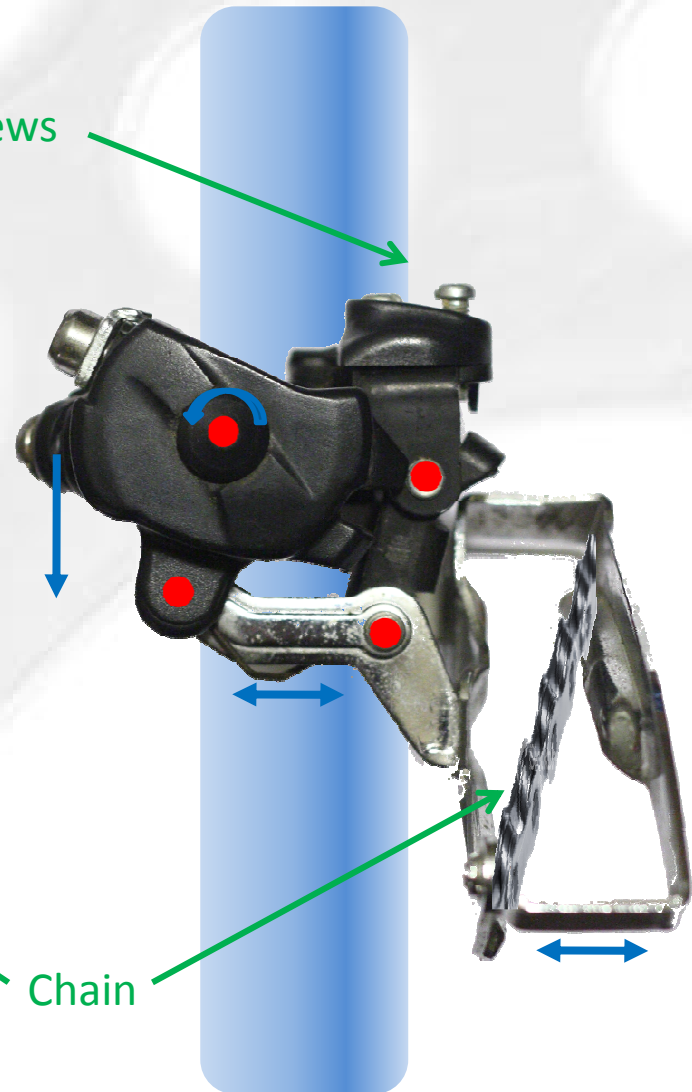
# Shifting Mechanism

Possible cable directions

Limit screws



=

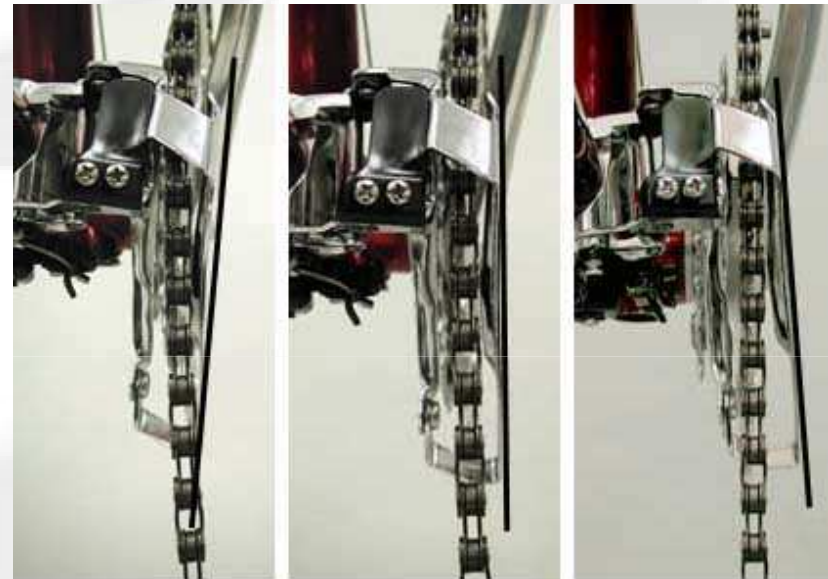


Chain

# Installation



Align the bottom of derailleur cage to be lightly above the largest chainring



**Tail too far inward**

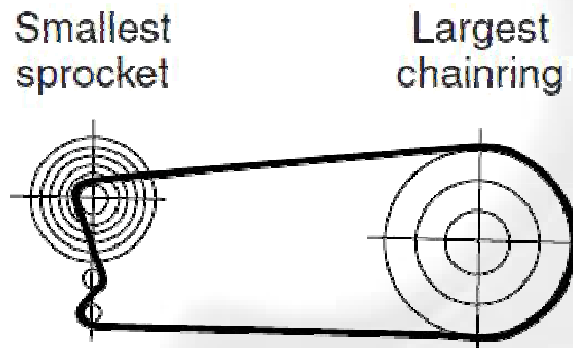
**Adequately aligned**

**Tail too far outward**

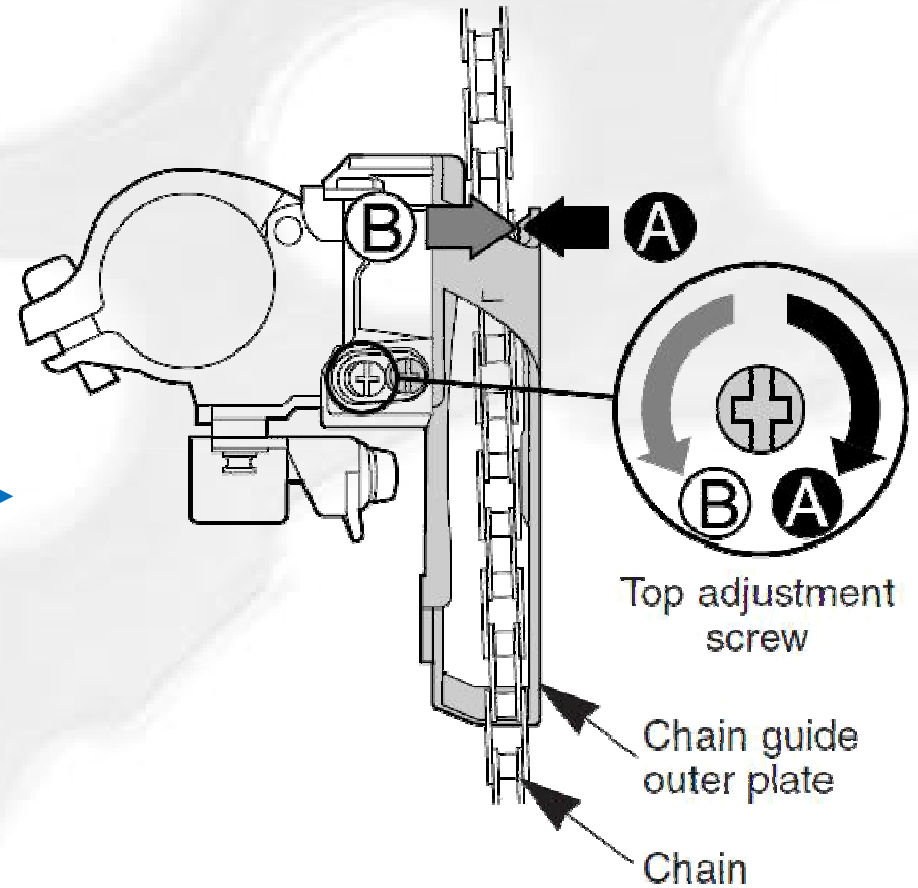
Angle cage by a couple degrees toward the rear of the bike



# Initial Set Up-Upper Limit Screw



Step 1: set gears as shown above

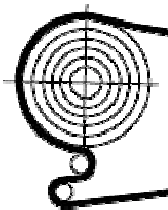


Step 2: turn HIGH adjustment screw until a small gap on the right side is achieved

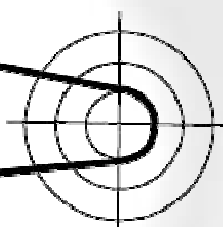
Source: techdocs.shimano.com

# Initial Set Up-Lower Limit Screw

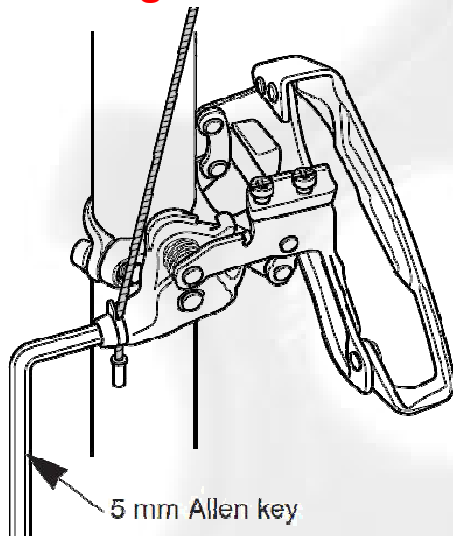
Largest sprocket



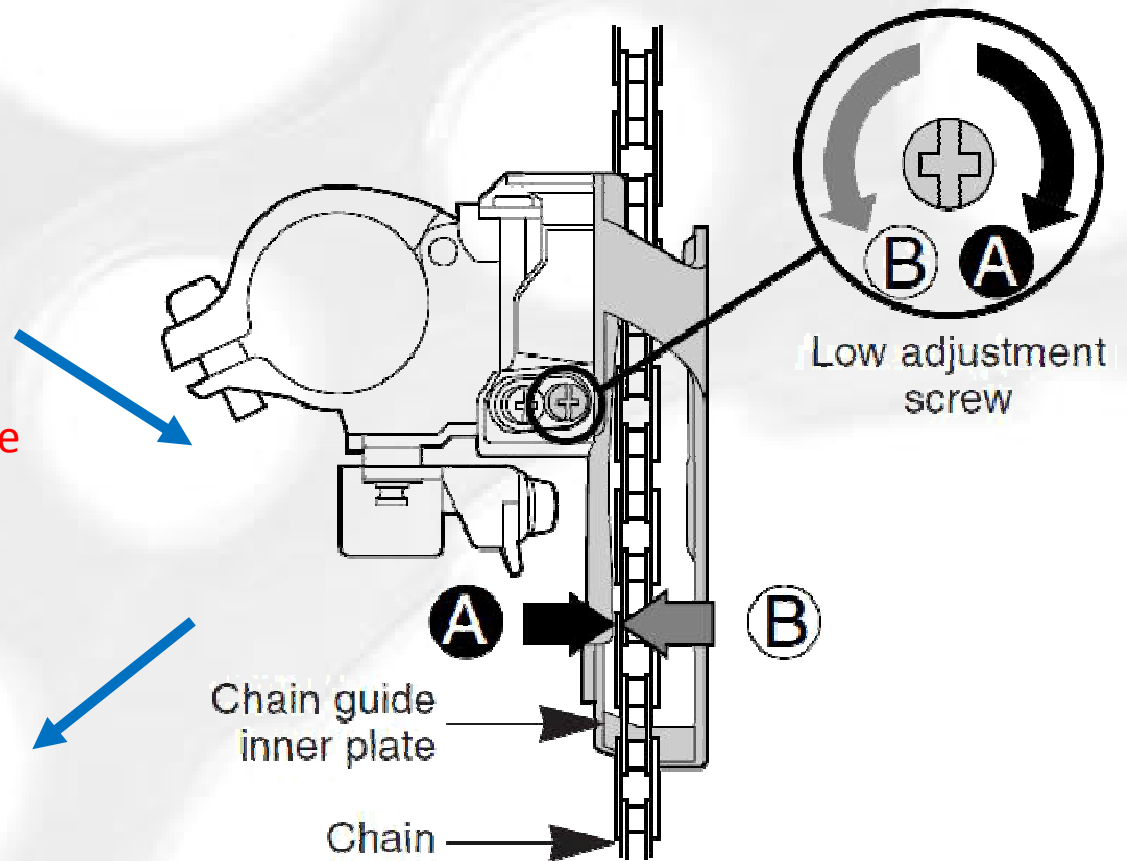
Smallest chainring



Step 1: set gears as shown above



Step 3: tension and secure cable to derailleur



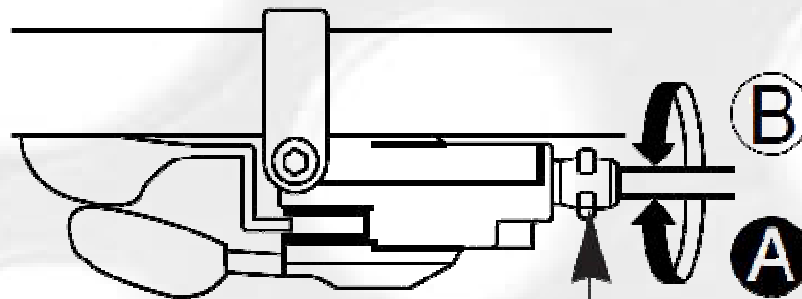
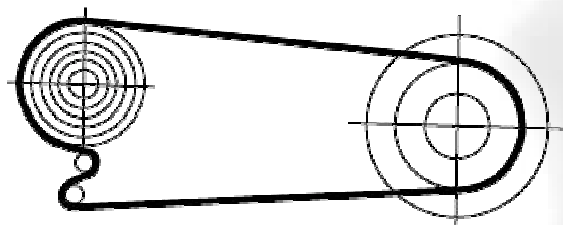
Step 2: turn LOW adjustment screw until small gap is achieved as shown

Source: techdocs.shimano.com

# Initial Set Up – Adjusting Shifting

Largest sprocket

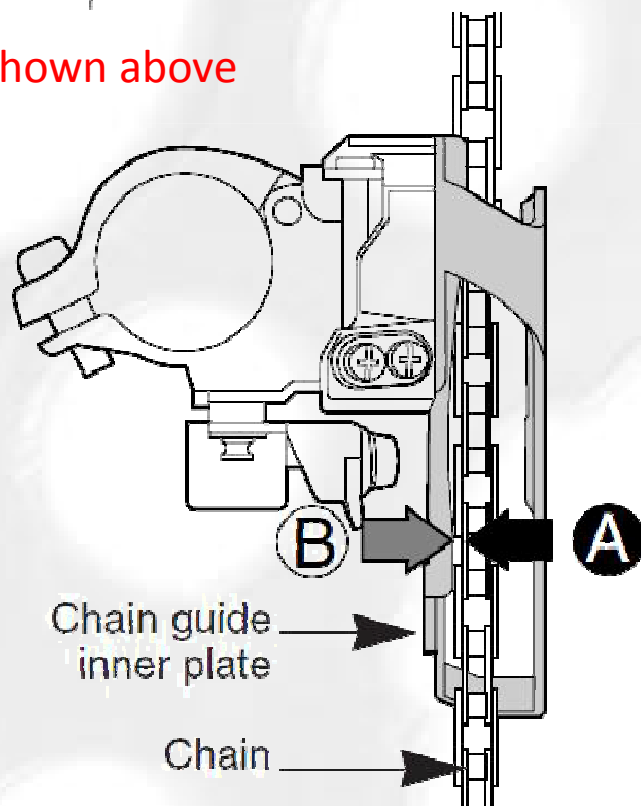
Intermediate chainring



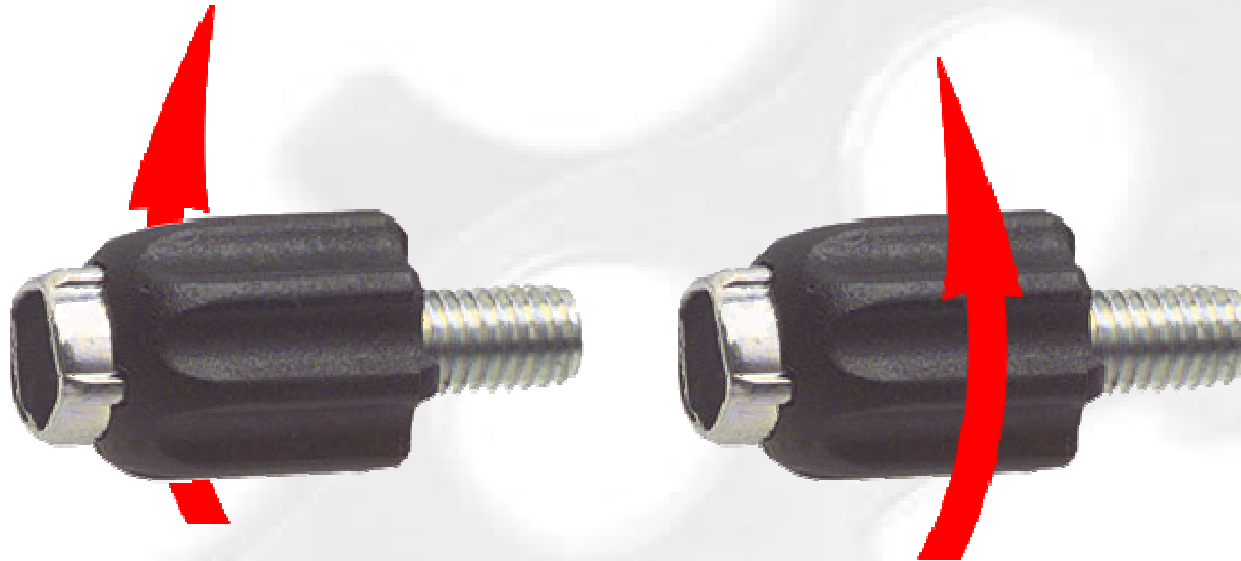
Step 1: set gears as shown above

Outer casing adjustment barrel

Step 2: turn the barrel adjuster counter-clockwise until a small gap on the left side is set. Go through all gears and fine-tune.



# Fine Adjustment



**Clockwise** = screws adjuster in  
= loosens cable tension =  
**Moves derailleur inward**

**Counterclockwise** = screws  
adjuster out = increases cable  
tension = **Moves derailleur  
outward**

- A properly tuned derailleur will shift between all front gears and not throw the chain off the chainrings.
- Even a well-adjusted derailleur may rub in some gear combinations