Operating Guide

For the Browning SmartShift 400 Four-Speed Transmission

BROWNING SMARTSHIFT TECHNOLOGY

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INTRODUCTION TO SAFE AUTOMATIC SHIFTING

Riding a bicycle equipped with a Browning SmartShift Transmission is a simple, friendly, enjoyable experience.

Until you get used to the way SmartShift works and feels, we recommend that you ride in areas where there is little or no traffic or other distracting obstacles. The Browning SmartShift 400 has the widest range of any four-speed rear transmission; therefore, at first, the difference between one gear and the next may be a surprise. But it doesn't take long to become accustomed to this range, and you'll soon pleasantly anticipate the next computer-commanded gear change.

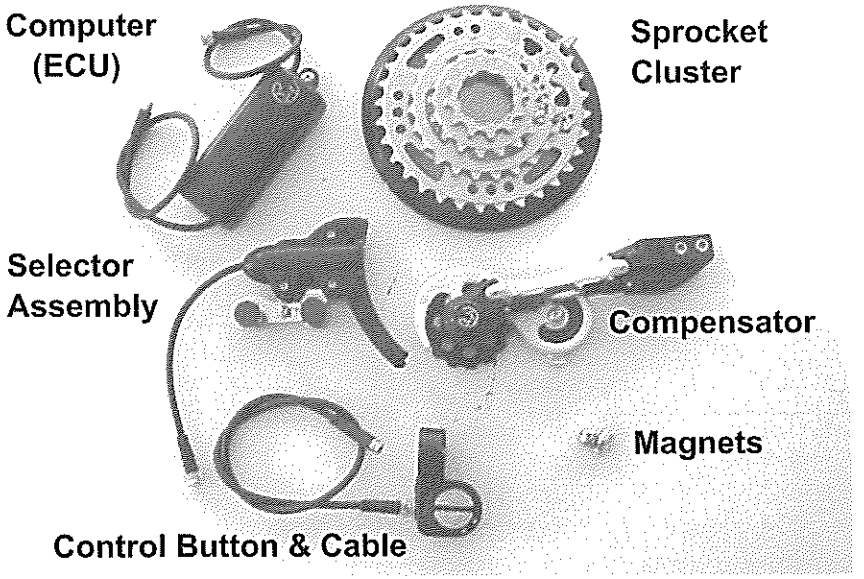
With SmartShift, it is *not* necessary to ease up on the pedaling pressure to shift gears. For example, SmartShift will downshift while you are pushing up a hill as hard as you can. However, before you get off the saddle and stand up to pump the pedals, we highly recommend shifting to Manual mode (see ***Buttons and Auto/Manual Operation***, page 6). because an unexpected automatic shift may cause you to loose your footing on the pedals.

WARNING: Riding out of the saddle with your weight on the pedals while in Auto mode could cause you to loose control and fall.

The Browning SmartShift Transmission was designed "to get on and ride". It is not complicated. In manual mode, *you* control the shifting. In automatic mode, you can forget about shifting because the computer does it for you.

This Guide provides comments and tips concerning operation and maintenance of your Browning SmartShift. It is important that you read and understand it. If you have any questions about the operation or maintenance of the SmartShift, please see your dealer. It is also important that you read and follow the instructions in the Owner's Manual and any other information which came with your bicycle.

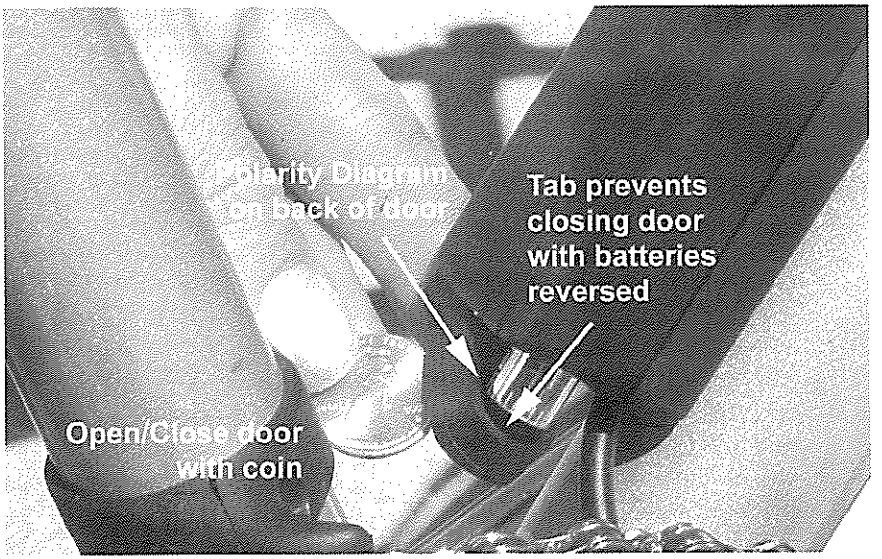
Component Modules



The Browning SmartShift 400 Transmission has individually replaceable components for ease of repair.

INSTALLING THE BATTERIES

The Browning Transmission operates on four (4) AAA alkaline batteries.

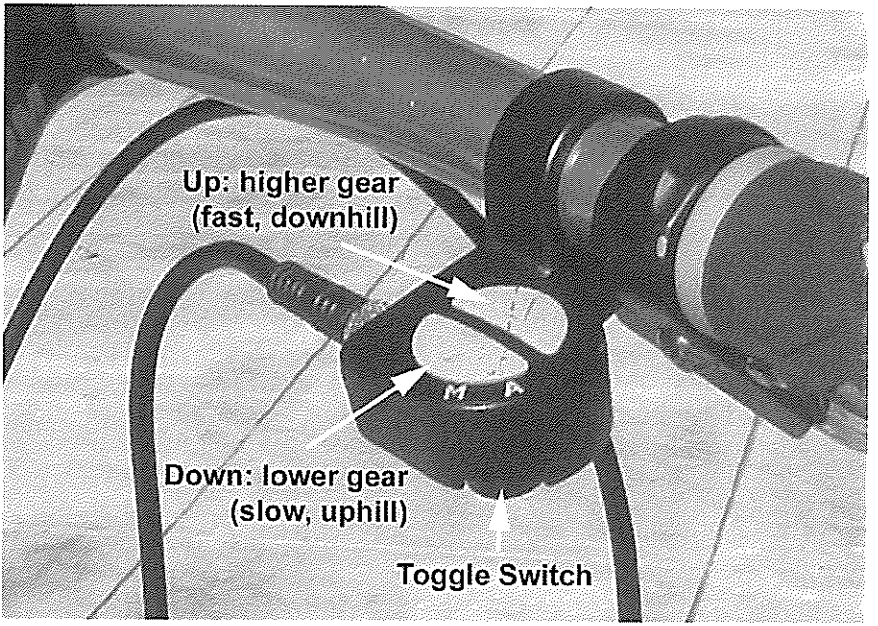


Changing the batteries every 500 miles or at least once per season is recommended.

Align new batteries (polarity) according to diagram on battery compartment door.

After new batteries are installed, push Up or Down Control Button and listen for "click" of Selector. If no "click" is heard, re-install batteries with greater attention to the polarity diagram.

BUTTONS AND AUTO/MANUAL OPERATION



Manual Mode

- Rotate Auto/Manual toggle switch (located on bottom of button housing) so knurled portion of toggle switch is turned to "M", toward the rider.
- Push up button once for next higher gear.
- Push down button once for next lower gear.
- More than one button push in either or both directions does no harm, however the mechanism responds only to the first button push after the last shift is completed. All excess button pushes are forgotten.

Automatic Mode

- Rotate Auto/Manual toggle switch (located on bottom of button housing) so knurled portion of toggle switch is under "A", away from the rider.

- In Automatic mode, the transmission shifts up or down one gear automatically, depending on pedaling cadence (the number of revolutions of the pedals per minute). The default cadence is 70 revolutions per minute.

Button functions in automatic

- The pedaling cadence at which the transmission shifts can be adjusted in either direction at any time. The cadence is adjusted while pedaling forward. Repeat the button push adjustment until your pedal cadence feels comfortable. The Computer will remember the reset cadence.

- Pushing "up" button once will shift to next higher gear AND change the automatic operation to maintain a slower cadence.

- Pushing "down" button once will shift to next lower gear AND change the automatic operation to maintain a faster cadence.

- Occasionally, you may notice that the computer does not know what gear it is in. This can occur after a tire is changed or when the batteries are low. To correct the computer:
  -If batteries are low: ride in Manual mode
  -If gear is too low: slow down and let the bike correct itself.
-If gear is too high: switch to Manual; shift 1 past the High limit; then switch back to Automatic

- If the system is shifting erratically and you can not get the shift points you want, you need to reset the ECU. Locate the small black button at the front of the ECU, press it firmly and hold for 2 seconds. The shift points will return to the default settings, and can then be adjusted to your liking with the button push

Adjustment described above. You can also reset to the default cadence by stopping the bike and moving the Auto/Manual toggle switch back and forth.

MAINTENANCE AND A FEW SIMPLE TESTS

In normal operation, the Browning SmartShift should not require adjustments during its lifetime. However, the transmission does require some care and maintenance. In addition, you can perform a few simple test to determine the health of your transmission.

Maintenance

- A new SmartShift should have a routine maintenance check by an authorized Browning service shop at the end of the first season or after the first 1,000 miles, whichever comes first.

- Load the battery compartment with new AAA Alkaline batteries of one brand, following the instructions in "Installing the Batteries". Keep the battery terminals clean. Corrosion on the battery terminals will stop the operation of the transmission.

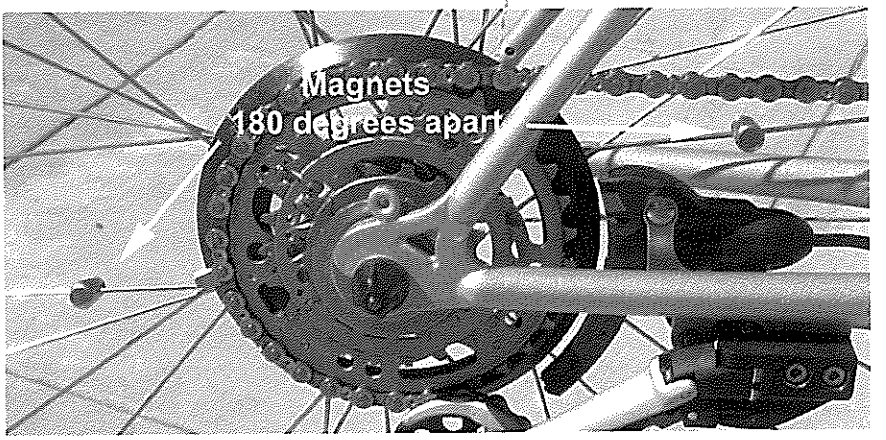
- The Browning SmartShift transmission will operate in rain and muddy conditions and does not have to be pampered. It is good practice to periodically wash the whole bicycle with a garden hose. **Do not use high pressure, which might force water into the bottom bracket and wheel bearings**. Use a mild detergent if an environmentally safe drain is available for the wastewater. Rinse well.

- Lubricate the chain with a bicycle-specific dry lubricant such as *White Lightning*.

- Every time the "up" button or the "down" button is pushed, the Selector responds with a "clicking" sound. This is normal, and

is an indication the mechanism is working as it should. You can check the Control Button/Selector/ECU function by pressing the "up" or "down" button and listening for the click . If no clicking is heard, check for loose connections in the cables; then check the batteries.

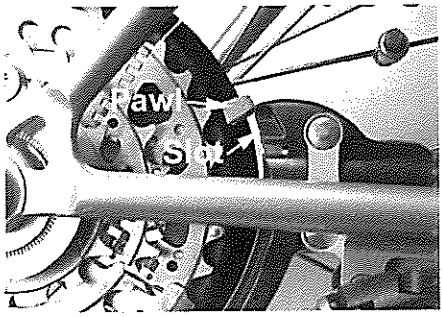
- Periodically check the position and condition of the magnets on the rear wheel. Loose, missing or out of position magnets will cause the transmission to malfunction. The magnets should sweep within 1/8" of the Witness Mark on the Selector. Make sure the magnets are tight enough on the spokes to prevent them from moving or turning and hitting the Selector.



The "Witness Mark" is an embossed line on the inner side of he front of the Selector and is visible through the spokes from the left side of the bicycle.

\ Few Simple Tests

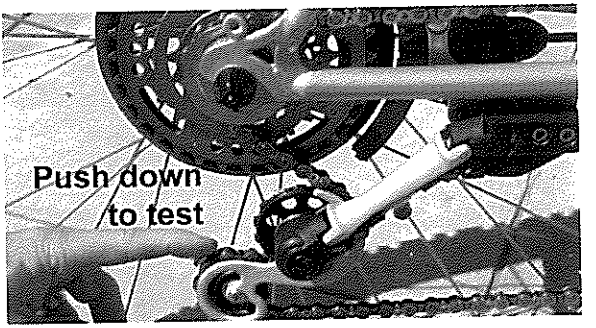
'he pawl on the Sprocket Cluster should track through the slot on ıe selector without touching.



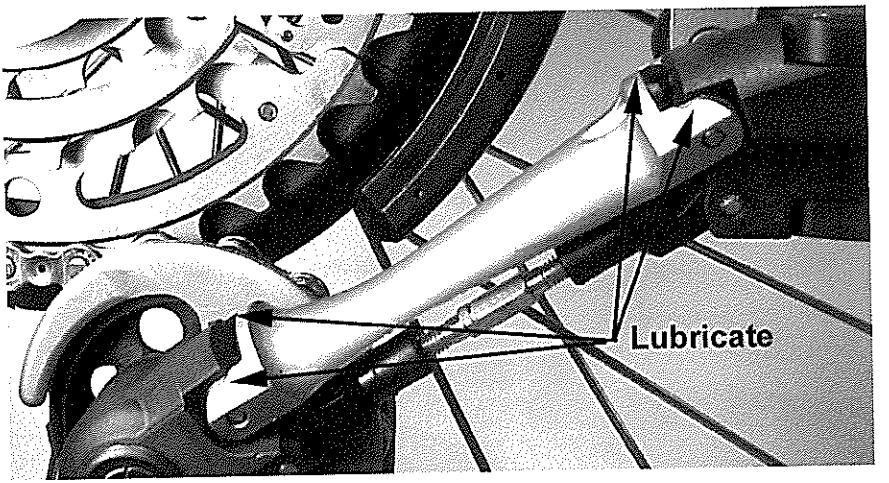
' a regular "ticking" noise is eard while pedaling the ıicycle, examine the bicycle ınmediately. The most likely auses are:

1. The rear wheel may be loose or not properly installed. If this is the case, this dangerous condition must be corrected before continuing the ride. (See the section "Changing a Tire," page 12, in this manual.)
2. The Sprocket Cluster Lock Nut may be loose. This requires a special tool. **Do not ride the bicycle until you have had the Lock Nut correctly tightened by an authorized Browning service center.**
3. The Selector may be loose. Tighten the two thumbscrews on the Selector mount.
4. The hinge of the Sprocket Cluster is sticking. Lubricate with a dry moly lubricant such as *Bike Aid*™.
5. If the "ticking" is mild, the bike is rideable but should be taken to an authorized Browning service center.

The Compensator must move freely for proper operation. Push the Compensator down and release quickly.



The Compensator must snap back up, holding the chain just under the Sprocket Cluster. If the Compensator does not snap all the way back, the parallelogram pivots need lubrication. The recommended lubricant is *Bike Aid*™ molly dry film lubricant, available in better bike shops.

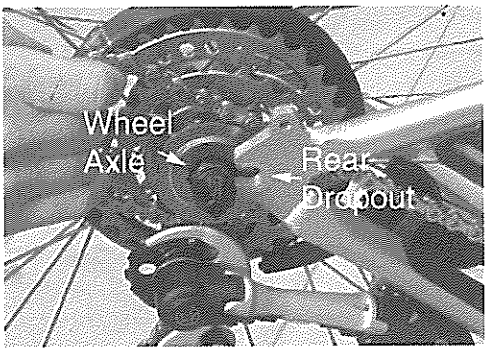


If lubricating the parallelogram arm pivots does not improve the freedom of the Compensator, the mechanism should be taken to an authorized Browning service center.

CHANGING A TIRE

Removing the Rear Wheel

1) Release the rear brakes (see bicycle's Owner's Manual for help).
2) Shift the chain on to the smallest rear sprocket.
3) Release the quick release lever on the hub (see bicycle's Owner's Manual for help).
4) Pull the chain to the rear, forming a loop. Free the chain from engagement with the cluster.
5) Remove the wheel.



Installing the Rear Wheel

1) Make a loop of the chain above the upper pulley to receive the Sprocket Cluster.
2) Place the wheel axle into the rear facing dropouts until the axle is all the way in the dropout. Replace the chain on to the smallest sprocket.

IMPORTANT: The dropout slot must be clean and the axle must rest firmly against its bottom on both sides before the quick release is tightened. This preserves the alignment of the pawl to the cam as well as the alignment of the wheel to the brakes.

3) Tighten the quick release according to the bicycle manufacturer's instructions.
4) Reset and test the rear brakes.

TROUBLESHOOTING

Transmission not shifting at all, in manual or automatic mode	
Verify	**Corrective Procedure**
Batteries are good.	If there is doubt concerning condition of the batteries, replace batteries.
Batteries are making proper contact and that polarity is correct.	Remove batteries from battery compartment. Check for corrosion or non-conducting interference on battery terminals. Reinstall batteries, making sure polarity of batteries is correct according to instructions "Installing Batteries" on page 5.
Selector mechanism is free of visible obstructions.	Brush away visible obstructions from Selector. Rinse with garden hose at very low pressure. Do not poke anything into the Selector, as it could cause damage.
Selector makes a "clicking sound" when button is pushed (Up or Down, Manual or Automatic Mode) and Cam is in turned position after pushing.	If Selector makes "clicking sound" and Cam is in turned position (either Up or Down is OK) after pushing: • Check proper assembly of Hub and Wheel to frame (page 12). • Check that Pawl on the Sprocket Cluster engages Cam in Selector. • If Selector does not make "clicking sound": • Check connectors and condition of electric cable between Selector, Computer and Button. • Replace the Selector. • Replace the Computer. • Replace the Button.
Selector makes a "clicking sound" (Up or Down, Manual or Automatic Mode) and Cam is NOT in turned position after pushing.	Remove Selector from Chain Stay mount but leave connected to Computer. Push button Up or Down and determine if Cam is being obstructed from turning. If Cam is unobstructed, replace Selector. Do not open the Selector, as you will break the moisture seal and void the warranty.

Transmission not shifting in manual mode but shifts in automatic mode

Verify	Corrective Procedure
Position of Mode Switch	Turn Mode Switch to **M**anual mode for manual operation.
Selector does NOT make a "clicking sound" when button is pushed (Up or Down, Manual or Automatic Mode).	• Tighten Connector fitting between Button and Computer. • Replace batteries • Replace electrical cable between Button and Computer. • Replace Button assembly.

Transmission not shifting in automatic mode but shifts in manual mode

Verify	Corrective Procedure
Position of Mode Switch	Turn Mode Switch to **A**utomatic mode for automatic operation.
Spoke magnets (2), attached to spokes of rear wheel, are in proper position.	Attach spoke magnets in correct position as shown in "Maintenance And a Few Simple Tests", page 9.

Transmission shifting is unreliable and must frequently be corrected with the buttons

Verify	Corrective Procedure
Compensator has free vertical movement.	• Lubricate Compensator Arm pivots. • Have adjustment checked by a Certified Browning Technician.
Spoke magnets (2), attached to spokes of rear wheel, are in proper position	Attach spoke magnets in correct position according to "Maintenance And a Few Simple Tests", page 9.
Batteries are good.	Install new batteries.

SPECIFICATIONS

BATTERY
Battery Type (4) AAA Alkaline
Typical Service Life 500 Miles / 200 days asleep.

COMPUTER
Clock Cycle Rate 11.059 MHz
Non-Volatile RAM 8 KB
Current Use 16mA / 30 nA on/sleep

PHYSICAL CHARACTERISTICS
Weight of complete system: 1 lb., 14 oz / 850g

CHAIN REQUIREMENTS
Yaban/WT70S2

GEARING (26 inch wheel - .6604 meters)

Gear	Teeth Front	Teeth Rear	Gear-inch Number	Metric Gear
1	42	32	34	2.72
2	42	23	47	3.79
3	42	17	64	5.13
4	42	12	91	7.26