2008

SRAM

(english) technical manual

part# 95-7915-006-000

SRAM ORIGINAL PARTS

CAUTION:

The SRAM Warranty policy does not cover damages caused by the use of non-SRAM parts.

Use only SRAM parts with SRAM components.

Installation of parts and accessories not originally intended could result in less than optimal performance and/or injury.

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Released 2007

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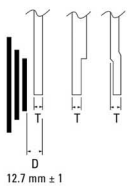
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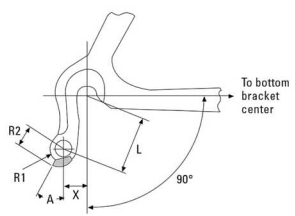
RED FORCE RIVAL

		Red	Force	Rival
	Speeds	10	10	10
Compatibility	Shifter Compatibility	SRAM Double Tap shifters (Red / Force / Rival)		
Compatibility	Cogsets	SRAM 10 speed and other 10 speed Shimano® cogsets (largest Cog maximum 28 teeth)		
Compatibility	Chains	SRAM 10 speed Power Chains PC 1090R / PC 1090 / PC 1070 / PC 1050 / PC 1030 and Shimano® 10 speed chains		
Compatibility	Cranks / Chainrings	10 speed compatible, 53-39 / 50-34 / 50-36 / 48-34 / 52-36		
Compatibility	Cable & Housing	High quality 1.1 mm shifting cable and 4 or 5 mm compressionless housing, high quality, with non-sealed end caps of maximum diameter 5.8 mm and maximum length 16 mm		
Chain Capacity	Total	33 T	33 T	33 T
Chain Capacity	Max Sprocket	28 T	28 T	28 T
Chain Capacity	Min Sprocket	11 T	11 T	11 T
Chain Capacity	Front Difference	16 T	16 T	16 T
Design	Parallelogram Spring	Titanium	Steel	Steel
Design	Pulleys	Ceramic cartridge bearing	Cartridge bearing	Cartridge bearing
Design	Direct Mount	Yes	Yes	Yes
Design	B-Knuckle	Forged Aluminum	Aluminum	Aluminum
Design	Outer Link	Forged Aluminum	Aluminum	Aluminum
Design	Inner Link	Carbon	Magnesium	Aluminum
Design	Outer Cage	Carbon	Carbon	Aluminum
Design	Inner Cage	Carbon	Aluminum	Aluminum
Design	Hanger Bolt	Aluminum	Aluminum	Aluminum

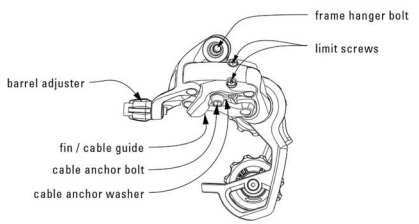
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DERAILLEUR ANATOMY



FRAME DIMENSIONS

(see figure 1 and 2)
For optimal rear derailleur performance, the recommended rear derailleur hanger length (L) should be 26 – 28 mm.

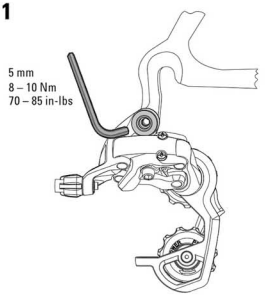
L	X	A	R1	R2	T
26	6 – 10	30° – 35°	8.5 max	11.5 – 12.5	7 – 8
28	8 – 10	30° – 35°	8.5 max	11.5 – 12.5	7 – 8

Chainstay length ≥ 405 mm

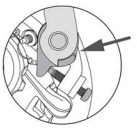
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RED / FORCE / RIVAL · REAR DERAILLEURS
ASSEMBLY

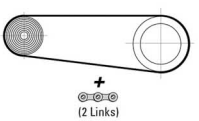
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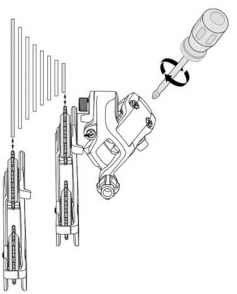
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ASSEMBLY

Advice:
Check the rear derailleur hanger alignment. A bent rear derailleur hanger will result in inaccurate index shifting.

- Attach the rear derailleur to the frame's rear derailleur hanger using a 5 mm hex head wrench (Fig. 1).
- Check that the b-adjust washer tab is clear of the rear derailleur dropout tab (Fig. 2).
- Tighten the 5 mm hex hanger bolt to 8 – 10 Nm (70–85 in-lbs) (Fig. 1).

CHAIN LENGTH

- Bypassing the rear derailleur, run the chain around the largest cog/large chainring combination (Fig. 3).
- Add 2 LINKS or 1 link + connection link to this length for proper chain length.

LIMIT SCREWS ADJUSTMENT

- View the rear derailleur and pulleys from behind the rear of the bicycle (Fig. 4).
- Turn the limit screw marked 'H' on the outer link of the derailleur to align the upper guide pulley center with the outboard edge of the smallest cog (Fig. 4).
- While turning the crank, push the rear derailleur towards the larger cogs by hand.
- Align the upper guide pulley under the largest cog, center to center, by turning the limit screw marked 'L' on the outer link (Fig. 4).

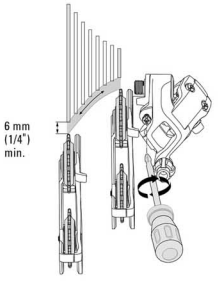
CHAIN GAP ADJUSTMENT

Chain gap is the distance between the upper guide pulley and the cog the chain is riding on. Optimal chain gap is small enough to allow quick, efficient shifts to and from any cog, but large enough to allow smooth shifts to and from the largest cog.

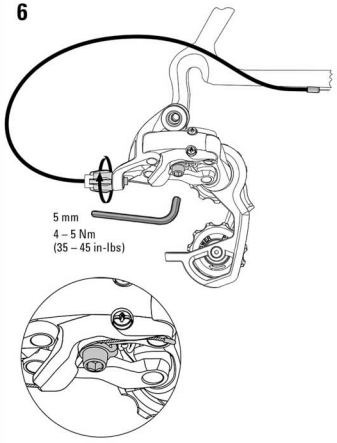
- Shift the chain to the small chain ring.
- Check the chain gap between the tip of the smallest cog and the tip of the upper guide pulley. While turning the crank, push the rear derailleur by hand to the largest cog and check the chain gap in this position. (Fig. 5).
- Using a screw driver, turn the b-adjust screw until the minimum chain gap in either position equals approximately 6 mm.

Advice:
- Setting the chain gap at this point of your installation may be considered a rough estimate. Precision index shifting may require small changes of the b-adjustment while setting the proper cable tension.
- Do not use the b-adjust screw to adjust the rear derailleur to act as a chain-tensioning device or to prevent chain suck. This increases the chain gap causing poor shifting performance.

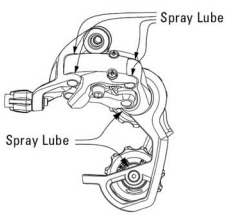
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INDEX SHIFTING ADJUSTMENT

- Check that the chain and the rear derailleur are in the smallest cog position.
- Cut the rear piece of cable housing. Make sure that it is not too short or long (Fig. 6).
- Make sure the shifter cable is fully released (hardest (highest) gear at rear shifter).
- Turn the rear derailleur barrel adjuster clockwise fully into the derailleur, then back it off 1 full turn.
- Feed the rear shifter cable through the rear derailleur cable housing, stops and cable guides.
- Thread the cable through the rear derailleur barrel adjuster and around the cable guide on the fin (Fig. 6).
- Pull the cable tight and position it under the cable anchor washer.
- Tighten the 5 mm hex cable anchor bolt to 4 – 5 Nm (35 – 45 in-lbs).
- Rapidly shift the chain and derailleur up and down the cassette several times. If the cable slips repeat the two former steps.
- Shift the chain to the smallest cog.
- While pedaling, move the shifter up one detent.
  - If the chain hesitates or does not shift to the second cog, increase the cable tension by turning the derailleur barrel adjuster counterclockwise.
  - If the chain shifts beyond the second cog, decrease the cable tension by turning the derailleur barrel adjuster clockwise.
- Repeat the two former steps until shifting and cable tension is accurate.
- While turning the crank, shift the chain up and down the cassette and chain rings several times to ensure that your derailleur is indexing smoothly.

MAINTENANCE

Wipe out debris from the interior of cage plates and parallelogram linkage. Brush the derailleur with clean or soapy water. Rinse the derailleur with clean water and let air dry. Do NOT use a pressure washer.

ATTENTION

Red: The ceramic pulley bearings require regular maintenance. Re-grease bearings using SKF LGHP2 grease after 100hrs of use in dry conditions or immediately following any significant exposure to water (riding in heavy rain, water crossings).

TROUBLESHOOTING

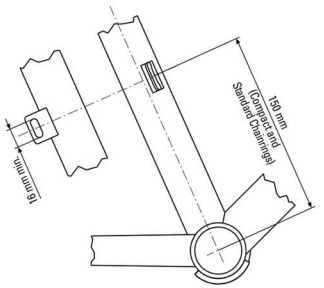
Problem	Cause	Remedy
Chain jumps from smallest sprocket to frame dropout.	High gear limit screw is not adjusted properly.	Turn in screw H until the guide pulley is aligned with the smallest sprocket.
Difficult or impossible to shift chain onto smallest sprocket.	High gear limit screw is not adjusted properly.	Unscrew screw H until the guide pulley is aligned with the smallest sprocket.
Chain jumps over largest sprocket and falls between the spokes and largest sprocket or inner cage plate scrapes on spokes.	Low gear limit screw is not adjusted properly.	Turn in screw L until the guide pulley is aligned with the largest sprocket.
	Rear derailleur or derailleur hanger is bent.	Straighten or replace.
Delayed shifting.	Clearance between guide pulley / sprocket is too large.	Adjust b-adjust screw by rotating counterclockwise.
Rough shifting behavior.	Clearance between guide pulley / sprocket is too small.	Adjust b-adjust screw by rotating clockwise.
Shifts more gears onto smaller sprockets as intended	Shift cable insufficiently tensioned.	Turn barrel adjuster on the shifter counterclockwise.
Delayed shifting onto larger sprocket	Shift cable insufficiently tensioned.	Turn barrel adjuster on the shifter counterclockwise.
Delayed shifting onto smaller sprocket	Shift cable is too tight.	Turn barrel adjuster on the shifter clockwise.
	Excessive cable friction, pinched or poorly routed cable.	Lubricate or replace cable and housing. Check for excessive bending of cable housing.

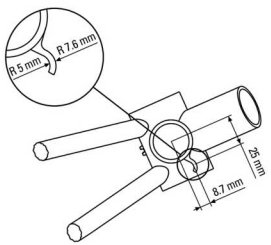
RED / FORCE / RIVAL · FRONT DERAILLEURS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

RED FORCE RIVAL

		Red	Force	Rival
Clamp	Braze-on	Yes	Yes	Yes
	31.8 mm	with band adaptor	Yes	Yes
	34.9 mm	with band adaptor	Yes	Yes
Compatibility	Rear Compatibility	10 speed	10 speed	10 speed
	Shifter Compatible	SRAM Double Tap Shifter (Red / Force / Rival)	←	
	Cogsets	SRAM 10 speed and other 10 speed Shimano® cogsets (largest Cog maximum 28 teeth)		
	Chains	SRAM 10 speed Power Chains PC 1090R / PC 1090 / PC 1070 / PC 1050 / PC 1030 and Shimano® 10 speed chains		
	Cranks / Chainrings	10 speed compatible, 53-39 / 50-34 / 50-36 / 48-34 / 52-36		
	Cable & Housing	High quality 1.1 mm shifting cable and 4 or 5 mm compressionless housing, high quality, with non-sealed end caps of maximum diameter 5.8 mm and maximum length 16 mm		
Maxim. Tooth Difference		16T	16T	16T
	Cable Routing	Bottom Pull	Bottom Pull	Bottom Pull
	Chainstay Angle	61 – 66°	61 – 66°	61 – 66°
	Mount Type	Down Swing	Down Swing	Down Swing
	Chain Line	44,5 mm	44,5 mm	44,5 mm
Design	Band Material	Forged Aluminum	Forged Aluminum	Forged Aluminum
	Outer Link	Aluminum	Aluminum	Aluminum
	Inner Link	Aluminum	Aluminum	Aluminum
	Chain Cage	Hardened Titanium	Steel Chrome Plated	Steel Chrome Plated

1



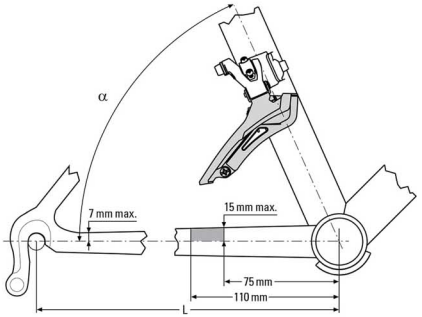


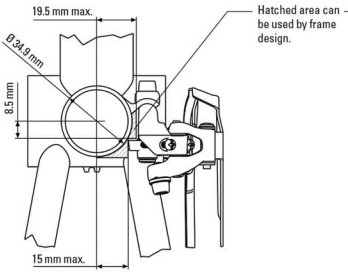
BRAZED-ON FRAME DEFINITIONS

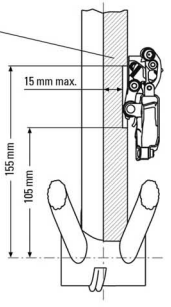
(see Fig. 1)

The contact surface of the braze-on boss should be aligned parallel with the center-line of the seat tube.

2







FRAME DIMENSIONS

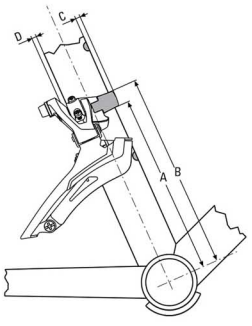
(see Fig. 2)
The seat tube should be positioned in the center of the bottom bracket shell.

Length of chainsty:
- Road L > 405 mm.
- Rear frame alignment must be symmetrical.

Chainstay angle:
α = 61° – 66°.

Chainline:
44.5 mm.
(Measurement from the center of the bracket to the center of the two chainrings.)

3



NECESSARY CLEARANCE FOR CLAMP VERSION

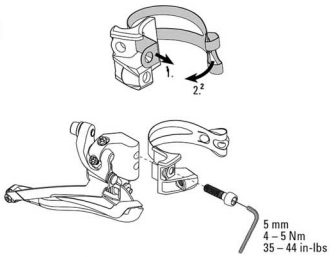
(see Fig. 3)
Be sure to leave enough clearance between bottle cage holes and clamp location.

Necessary clearance see Fig. 2					
Large Chainring		**48 T**	**50 T**	**52 T**	**53 T**
Clamp band position	**A**	135 mm	139 mm	143 mm	145 mm
	B	152 mm	156 mm	160 mm	162 mm

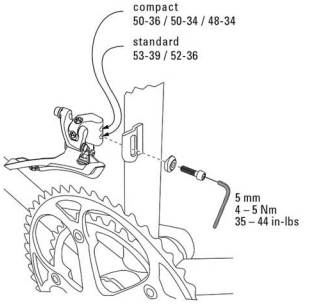
Clamp version		**Red**	**Force / Rival**
Necessary clearance	**C**	9 mm	4 mm
	D	1 mm	4 mm

RED / FORCE / RIVAL · FRONT DERAILLEURS
ASSEMBLY

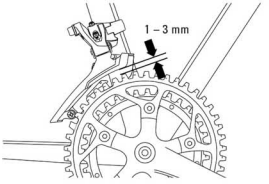
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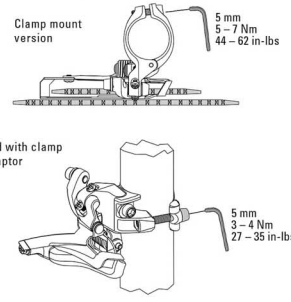
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3



4



ASSEMBLY

- **Red Front Derailleur with clamp adaptor**: Mount the front derailleur to the clamp adaptor using the upper mounting position. Tighten the 5 mm hex clamp bolt to 4 – 5 Nm (35 – 44 in-lbs) **(Fig. 1)**. Lightly clamp the front derailleur to the seat tube.
- **Red / Force / Rival braze-on mount version (see Figure 2):** Use upper thread for compact chainrings (50-36 / 50-34 / 48-34) or lower thread for standard chainrings (53-39 / 52-36).
- **Force / Rival clamp mount version (see Figure 2):** Lightly clamp the front derailleur to the seat tube.
- Adjust the position along the seat tube so that clearance between the front derailleur cage and the large chainring is 1 – 3 mm **(Fig. 3)**.

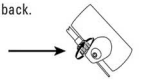
  At the same time, align the front derailleur cage outerplate to be parallel with the chainrings **(Fig. 4)**.
- **Red Front Derailleur with clamp adaptor**: Tighten 5 mm hex clamp bolt to 5 – 7 Nm (44 – 62 in-lbs)
- **Red braze-on mount version:** Tighten 5 mm hex clamp bolt to 5 – 7 Nm (44 – 62 in-lbs)
- **Force / Rival braze-on mount version:** Tighten 5 mm hex clamp bolt to 4 – 5 Nm (35 – 44 in-lbs)
- **Force / Rival clamp mount version:** Tighten 5 mm hex clamp bolt to 3 – 4 Nm (27 – 35 in-lbs)

LOW LIMIT ADJUSTMENT
(see Fig. 5)

- Place the chain on the largest rear cog and the small front chainring.
- Adjust the low limit screw **(Fig. 5)** so that the chain is positioned close to the inner cage plate without actually touching it (clearance between the front derailleur cage inner plate and the chain is 0.5 – 1 mm).

CONNECTING CABLE

- Check that the chain and the front derailleur are in the small chainring position.
- Make sure the shifter cable is fully released (easiest (lowest) gear for front shifter).
- Turn the barrel adjuster on the frame fully into the housing, then turn 1 full turn back.

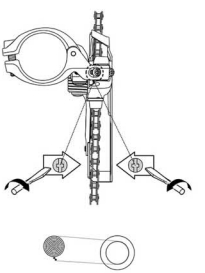


- Feed the front shifter cable through the cable housing and stops. Route cable through a cable guide beneath the bottom bracket.
- Run the cable under the cable anchor washer and hold taut **(Fig. 6)**.
- Tighten the 5 mm hex cable anchor bolt to 5 Nm (44 in-lbs).
- Shift the chain up and down the chainrings several times to take out initial slack in the cable.
- If necessary re-tension the cable and tighten cable anchor bolt.

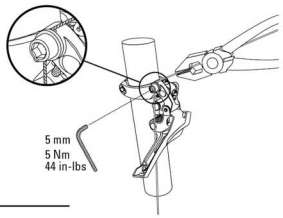
HIGH LIMIT ADJUSTMENT
(see Fig. 7)

- Set the chain to the smallest rear cog and the large front chainring.
- Adjust the high limit screw so that clearance between the front derailleur cage outer plate and the chain is 0.5 – 1 mm.

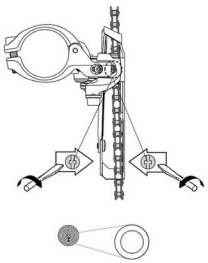
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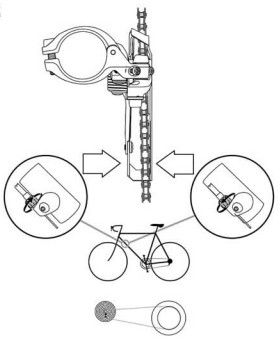
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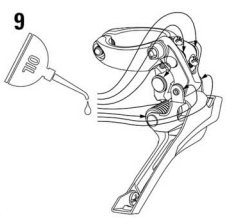
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8



9



INDEX SHIFTING ADJUSTMENT

(see Fig. 8)

Version Red:

Adjust the front shifter cable barrel adjuster to ensure the front derailleur contacts the high limit screw when the shifter is indexed to the large chainring position. Shift to and from the large chainring with the chain on several different rear cogs. If shifting performance is not acceptable, re-check the cage alignment (**Fig. 5**) and limit screw adjustments (**Fig. 6 and 7**), then repeat index shifting adjustment.

Versions Force / Rival:

Shift the chain onto the smallest rear sprocket and small chainring. Make sure the left shifter is set in the middle position – if the chain scrapes against the inner cage plate, turn the adjusting barrel on the frame until the chain shifts smoothly and free of obstruction.

ADVICE

Avoid using extreme gear combinations as these combinations cause noise and excessive wear!



TROUBLESHOOTING

Problem	Cause	Remedy
Shifter actuated, chain fails to change chainring.	Shift cable incorrectly clamped.	Check shift cable and correct as necessary (cable clamp; cable housing stops; cable recess in shifter; cable tension).
	High / low limit screw poorly adjusted.	Correct limit screws.
	Clearance between cage and large chainring is too big / small.	Correct position (1 – 3 mm).
Chain falls over large / small chainring.	High / low limit screw poorly adjusted.	Correct limit screws.
Force required to actuate gears is too high.	Excessive cable friction, pinched or poorly routed cable.	Lubricate or replace cable and housing. Check for excessive bending of cable housing.
Crank collides with front derailleur.	High gear limit screw incorrectly adjusted.	Correct high limit screw.
	Cage not parallel with chain-ring.	Correct the front derailleur position.

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RED / FORCE / RIVAL · DOUBLE TAP SHIFTERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

RED FORCE RIVAL

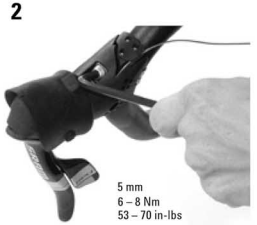
		Red		Force		Rival	
	Version	Double Tap Shifter	Double Tap Shifter	Double Tap Shifter	Double Tap Shifter	Double Tap Shifter	Double Tap Shifter
	Shifter Type	Front	Rear	Front	Rear	Front	Rear
	Speeds	2	10	2	10	2	10
Compatibility	Derailleur	SRAM Red / Force / Rival	←	←	←	←	←
Compatibility	Crankset	SRAM Red / Force / Rival	←	←	←	←	←
Compatibility	Brakes	SRAM Red / Force / Rival Dual Pivot Road calipers, Avid Shorty 4/6 cantilevers, Avid BB7 Road and most common Road caliper brakes					
Compatibility	Shifter Cable	High quality 1.1 m m shifting cable and 4 or 5 mm compressionless housing, high quality, with non-sealed end caps of maximum diameter 5.8 mm and maximum length 16 mm					
Compatibility	Brake Cable	1.6 mm high quality brake cable with road-style cable end and brake cable housing with end caps					
	Cable Pull Release	Double Tap	Double Tap	Double Tap	Double Tap	Double Tap	Double Tap
	Cable	Proprietary Stainl. Steel	Proprietary Stainl. Steel	PTFE Coat. Stainl. Steel	PTFE Coat. Stainl. Steel	Stainless Steel	Stainless Steel
	Reach Adjust	Brake and shift lever	Brake and shift lever	None	None	None	None
	Gear Indication	None	None	None	None	None	None
	Barrel Adjuster	None	None	None	None	None	None
	Clamping Diameter	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm

RED / FORCE / RIVAL · DOUBLE TAP SHIFTERS
ASSEMBLY

1



2



A S S E M B L Y

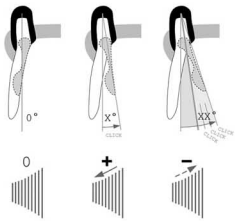
- Flip hood cover by hand. Slide shifter onto handlebar **(Fig. 1)**. Tighten the 5 mm hex clamp bolt to 6 – 8 Nm (53 – 70 in-lbs) **(Fig. 2)**.
- Feed the shifter cables and brake cables through the cable housings and stops. Make sure the shifter cable is fully released (easiest (lowest) gear for front shifter or the hardest (highest) gear for rear shifter).
  Red shifters: Choose the one shift cable exit which fits best for your handlebar cable routing **(Fig. 3)**. There is no need to disassemble the shifter. Seat the housing ferrules in the stops. Feed the shift cable into the cable housing end cap using a pick to guide the cable.
- Feed the brake cable through the brake cable holder so the cable head rests in the counterbore, which is just on one side of the cable anchor.
- Make sure the shifter cable is fully released (easiest (lowest) gear for front shifter or the hardest (highest) gear for rear shifter).
- Replace hood cover.
- Attach the front/rear shifter cable to the front/rear derailleur and adjust indexing per derailleur instructions.
  Attach the front/rear brake cable to the front/rear brake and adjust per brake instructions.

Caution:
Always check the front and rear brake levers for proper operation.

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USE

SHIFTER

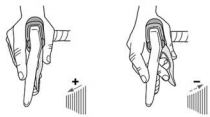
- Move the small shift lever inward slightly and an upshift to a harder (higher) gear is initiated **(Fig. 1)**. Push the same lever farther inward and you're shifting up to three shifts to easier (lower) gears **(Fig. 1)**.

The shifters also offer specific operations:

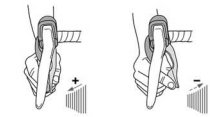
- Upshifting while sprinting:



- Shifting from the hoods:



- Shifting from the drops:



- The left hand shifter offers a trim function for the front derailleur to avoid chain rub in extreme positions. **Force and Rival shifters**: Shift position 1 and 2 is for the small chainring. Shift position 3 is for the large chainring. Red shifter: Shift position 1 is for the small chainring. Shift position 2 and 3 is for the large chainring. **Red shifters**:From the small chainring position, the first shift changes to the large chainring position. From the large chainring position, a slight release changes to the large chainring trim position. Alternately, a big release changes to the small chainring position.

BRAKE LEVER

Caution:
Always check the front and rear brake levers for proper operation!

REACH ADJUST

RED ONLY

Set the reach adjust on the shift lever first then adjust the brake lever until the brake lever bumper just touches the shift lever. This will ensure the brake lever does not interfere with the return action of the shift lever.

- Move the shift lever inboard to expose the reach adjust cam. **(Fig. 2)**
- Push the cam in and turn counterclockwise to move the shift lever closer to the handlebar. It may be helpful to use a pick. The shift lever has 6 different adjustment positions.
- Pull back hood cover by hand. **(Fig. 3)**
- Use the small 3mm hex bolt to set the reach adjust of the brake lever. Turn the bolt clockwise to move the brake lever closer to the handlebar until the brake lever bumper just touches the shift lever. **(Fig. 4)**

Caution:
Always check the front and rear brake levers for proper operation!

TT SHIFTERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

TT SHIFTER

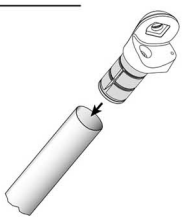
		TT Shifter	
	Version	Time Trial Shifter	Time Trial Shifter
	Shifter Type	Front (Friction)	Rear (Index)
	Speeds	2	10
Compatibility	Derailleur	SRAM Red / Force / Rival	SRAM Red / Force / Rival
Compatibility	Crankset	SRAM Red / Force / Rival	SRAM Red / Force / Rival
Compatibility	Shifter Cable	High quality 1.1 m m shifting cable and 4 or 5 mm compressionless housing, high quality, with non-sealed end caps of maximum diameter 5.8 mm and maximum length 16 mm	
Compatibility	Brake Cable	1.6 mm high quality brake cable with road-style cable end and brake cable housing with end caps	
Compatibility	Bar Inner Diameter	19.2 – 22.5 mm / Minimum depth 35 mm	
	Cable	Teflon Coat. Stainl. Steel	Teflon Coat. Stainl. Steel
	Gear Indication	None	None
	Barrel Adjuster	None	None

TT SHIFTERS
ASSEMBLY

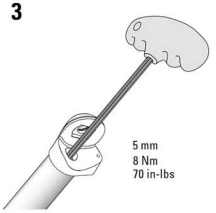
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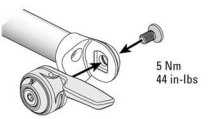
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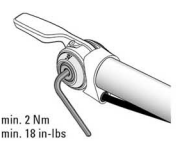
ASSEMBLY

- Remove screw to allow shift assembly to be removed from housing and to access the mounting screw **(Fig. 1)**.
  Advice:
  The shift assembly comes off as one piece and there is no opportunity to loose any parts unless the other screw is removed.
- Push the shifter housing onto the handlebar **(Fig. 2)**.
- Tighten the the clamp screw using a 5 mm Allen wrench, torque 8 Nm (70 in-lbs) **(Fig. 3)**.
- Re-assemble the shift assembly and re-install the screw, tightening torque 5 Nm (44 in-lbs) **(Fig. 4)**.
- Torque the friction adjust screw (center of red washer) to 2 Nm (18 in-lbs) minimum. Higher torque can be applied to increase torque to shift for rider preference **(Fig. 5)**.
- Feed the new cable through the cable entry (1) and out the shifter **(Fig. 6)**.
- Feed the new cable through the cable housing and cable stops.
- Pull the cable snug. Make sure that the cable nipple is firmly seated in the cable holder.
- Attach the cable to the derailleur and adjust indexing per derailleur instructions.

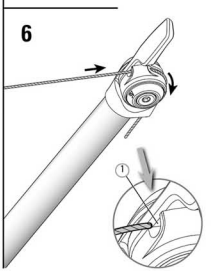
4



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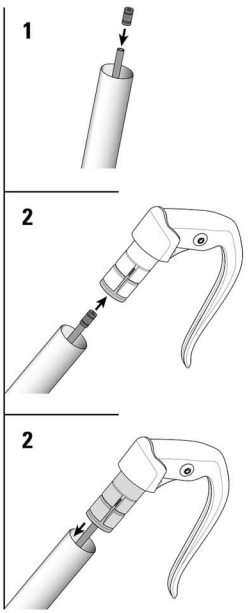


TT BRAKE LEVERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

TT BRAKE LEVER

		TT Brake Lever	
	Version	Time Trial Brake Lever	Time Trial Brake Lever
	Brake Lever	Left	Right
	Lever Size	5-finger	5-finger
Compatibil.	Brake compatibilty	SRAM Red / Force / Rival Dual Pivot Road calipers, Avid Shorty 4/6 cantilevers, Avid BB7 Road and most common Road caliper brakes	
Compatibil.	Bar Inner Diameter	19.2 – 22.5 mm / Minimum depth 39 mm	
Design	Reach Adjust	No	No
Design	Pivot Bushing	POM	POM
Design	Housing	Grilon Composite	Grilon Composite
Design	Lever	Carbon Comp.	Carbon Comp.

TT BRAKE LEVERS
ASSEMBLY

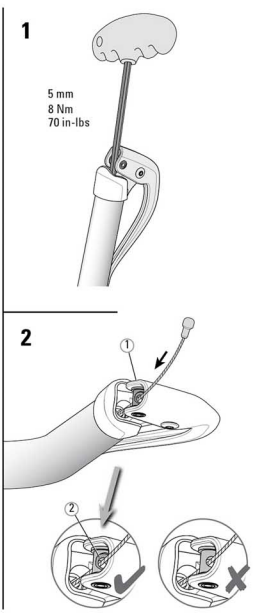


ASSEMBLY

- Push the cable housing end cap onto the brake cable housing **(Fig. 1)**.
- Insert the end of the brake cable housing into the brake lever bottom side **(Fig. 2)**.
- Push the brake lever onto the handlebar **(Fig. 3)**.
- Tighten the brake lever. 5 mm Allen wrench, torque 8 Nm (70 in-lbs) **(Fig. 4)**.
- Pull the brake handle toward the handlebar and make sure the countersunk side of the hole is visible (1). Feed the new cable through the cable holder (2), cable housing and cable stops **(Fig. 5)**.
- Pull the cable snug. Make sure that the cable nipple is firmly seated in the cable holder.
- Follow the brake manufacturer's instructions when mounting the brake cable and adjusting the brakes.

Caution:

- **Before riding, always check that all brake system components are functioning properly.**
- **Check and correct the brake cable tension after each handle change to ensure good brake performance.**



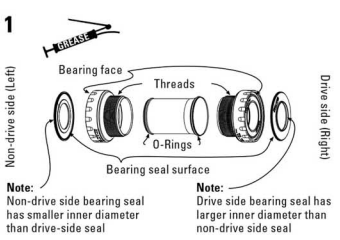
RED / FORCE / RIVAL · CRANKSETS W. GXP BOTTOM BRACKET
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

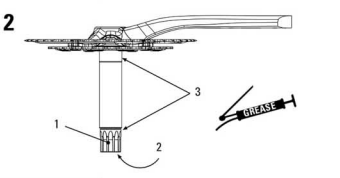
RED FORCE RIVAL

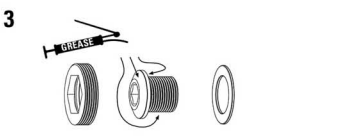
		Red	Red Compact	Force	Force Compact	Rival	Rival Compact
	BB Type	GXP External Bearing ←		GXP External Bearing ←		GXP External Bearing ←	
Compatibility	BB Thread	BSA or Italian	←	BSA or Italian	←	BSA or Italian	←
Compatibility	Bolt Circle Diam.	130 mm	110 mm	130 mm	110 mm	130 mm	110 mm
Compatibility	Chainring Ratio	53 / 39 T	50 / 34 – 50 /36 T	53 / 39 T	50 / 34 – 50 /36 T	53 / 39 T	50 / 34 – 50 /36 T
Compatibility	Chains	**Only compat. with** SRAM 10 speed chains		SRAM 10 speed chains PC1090R/PC1090/PC1070/PC1050/PC1030 and Shimano® 10 speed chains			
Compatibility	Chainline	44.5 mm	←	44.5 mm	←	44.5 mm	←
Compatibility	Minimum Chainstay	405 mm	←	405 mm	←	405 mm	←
	Crank Lengths	165 / 167.5 / 170 / 172.5 / 175 / 177.5		170 / 172.5 / 175		165 / 170 / 172.5 / 175 / 177.5 / 180 mm	
	Bearing	Ceramic Sealed Cartridge Bearing		Sealed Cartridge Bearing		Sealed Cartridge Bearing	
	BB Cup	Forged Alloy	←	Forged Alloy	←	Forged Alloy	←
Finish	Crank Arm	Carbon Fibre	←	Carbon Fibre	←	AL 6066 Aluminum	←
Finish	Chainring	7075-T6 Aluminum		7075-T6 Aluminum		7075-T6 Aluminum	
Finish	Chainring Bolts	7075-T6 Aluminum	←	7075-T6 Aluminum	←	7075-T6 Aluminum	←

Cranks are only compatible with GXP bottom brackets and Powerglide Chainrings by Truvativ.

RED / FORCE / RIVAL · CRANKSETS W. GXP BOTTOM BRACKET
ASSEMBLY







NECESSARY TOOLS

- Torque wrench
- 8 mm hex, 16 mm (5/8") hex
- Bottom Bracket installation tool (Truvativ GXP tool, Park™ BBT9 or equivalent)

Supplies:
- Grease

PARTS PREPARATION

- Assure the frame's bottom bracket shell threads are clean and undamaged, there should be no paint or dirt present. Have your bottom bracket shell chased and faced by your bike shop for best results. Check to make sure the threads of your GXP bottom bracket match the threads in the bottom bracket shell of your frame.

ASSEMBLY

- Grease frame threads **(Fig. 4)**. Thread the prepared bottom bracket into the drive side (right side) of the frame (counterclockwise to tighten English (BSA) thread or clockwise to tighten Italian thread) until the flange bottoms against the frame shell face.
  Torque to 34 – 41 Nm (301 – 363 in-lbs) using a torque wrench. Refer to **Figure 4.**

- Grease frame threads **(Fig. 5)**. Thread the prepared left adapter cup into the non-driveside (left side) of the frame (Clockwise to tighten) until the flange bottoms against the frame shell face. Torque the left adapter cup to 34 – 41 Nm (301 – 363 in-lbs) using a torque wrench.

- Prepare the bottom bracket as shown in **Figure 1**.
  It may be necessary to remove the drive side seal from the spindle.
  Both seals should be pressed into place so that the outer lip seats firmly in the bottom bracket cup groove. Apply grease to the surfaces shown in **Figure 1**.

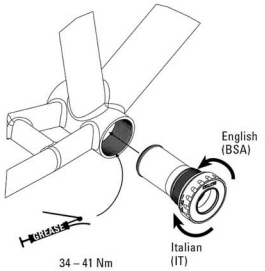
- Prepare the crank spindle:
  – Apply grease to splines (1, **Figure 2)**
  – Apply grease to crankbolt threads (2)
  – Apply grease to spindle bearing race surfaces (3)

- Prepare the self extracting crank bolt: Apply grease to the surfaces shown in **Figure 3.**

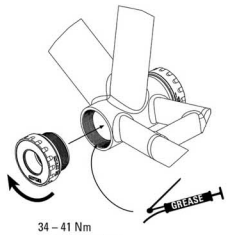
- Grease the inner bearing races as shown in **Figure 6.** Slide the right crankarm and spindle assembly through the bottom bracket until the left side splines come through the left side bottom bracket cup, and the spindle stops.

- If the crank bolt assembly has not been

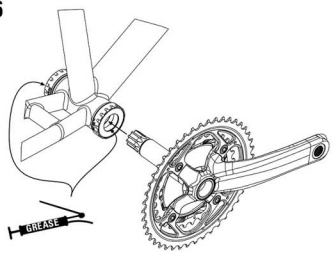
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assembled yet, assemble it and torque as shown in **Figure 7.** Use a 16 mm hex (5/8") and torque wrench to install self extractor and torque to 12 – 15 Nm (106 – 133 in-lbs).

- Assemble the left crankarm onto the bottom bracket spindle using an 8 mm hex and torque wrench and torque to 48 – 54 Nm (425 – 478 in-lbs) as shown in **Figure 8.**

- Check the assembly for play by pulling crankarm away from frame, alternating back and forth. If the crank moves, tighten crankarm bolt until no play is detected. If maximum torque of 48 – 54 Nm (425 – 478 in-lbs) has been achieved, remove the crankarm from the spindle, apply additional grease, and repeat installation. It may take several installations to eliminate all play.

- Grease the pedal threads, assemble and tighten the pedals to the crankarms with 31 – 34 Nm (274 – 301 in-lbs). Use the included pedal washers (1, **Figure 8)** if the pedal contact surface is not flat and smooth.
  Caution:
  Drivetrain side right hand pedal-thread. Non drive side left hand pedal-thread.

Advice:

- **If creaking of the assembly occurs, check that all parts were torqued to specification, grease is liberally applied on all surfaces noted. Also check chainring bolts (8 – 9 Nm / 80 – 90 in-lbs) and pedals are installed with proper lubrication and torque.**
- **GXP seals are designed to prevent contamination and therefore must rub against their sealing surfaces. New GXP seals will feel stiff upon initial installation. This is normal. With use the seals will wear-in and loosen up.**

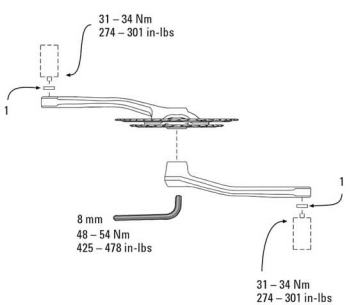
MAINTENANCE

Wipe out debris from the interior of cage plates and parallelogram linkage. Brush the derailleur with clean or soapy water. Rinse the derailleur with clean water and let air dry. Do NOT use a pressure washer.

ATTENTION

Red: The ceramic bottom bracket bearings require regular maintenance. Re-grease bearings using SKF LGHP2 grease after 100hrs of use in dry conditions or immediately following any significant exposure to water (riding in heavy rain, water crossings).

8



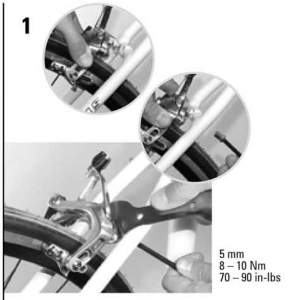
RED / FORCE / RIVAL · DUAL PIVOT ROAD CALIPERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

BRAKE CALIP.

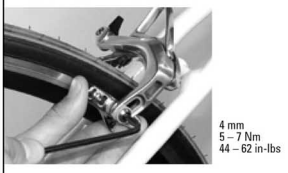
		Red		Force		Rival	
	Version	Front	Rear	Front	Rear	Front	Rear
Compat.	Brake Levers	SRAM Red / Force / Rival Double Tap shifters		←		←	←
Compat.	Brake Cable	1.6 mm high quality brake cable with road-style cable end and brake cable housing with end caps					
Design	Pad	Exchangeable	←	Exchangeable	←	Exchangeable	←
Design	Quick Release	Yes	←	Yes	←	Yes	←
Design	Barrel Adjuster	Yes	←	Yes	←	Yes	←
Design	Pivot Bolt	Titanium	←	Titanium	←	Stainless Steel	←
Design	Arms	Cold Forged Aluminum		Cold Forged Aluminum		Cold Forged Aluminum	

RED / FORCE / RIVAL · DUAL PIVOT ROAD CALIPERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

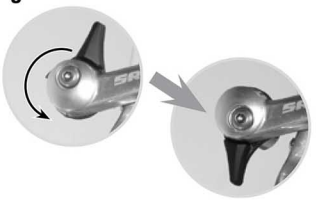
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ASSEMBLY

Install the brake caliper:
Hold the brake so it is approximately centered on the wheel, then tighten the brake mounting nut with a 5 mm Allen wrench, tighten to 8 – 10 Nm (70 – 90 in-lbs) **(Figure 1)**. For Red calipers, use a 13mm wrench to approximately center the brake on the rim.

Position the brake pads:
Adjusting the brake pad position as shown in **figure 2**. Toe-in, the angle of contact between the pad and the rim, can also be adjusted to optimize braking feel and performance.

- Tighten the brake pad bolt with a 4 mm allen key to 5 – 7 Nm (44 – 62 in-lbs).

Connect the brake cable:
- Make certain the quick release lever is in the closed position **(Figure 3)**.
- Place the cable in the groove in the cable clamp washer **(Figure 4)**.
- Squeeze the brake caliper until each brake pad is 1 – 1.5 mm from the rim.
- Tighten the cable bolt to 6 – 8 Nm (53 – 70 in-lbs).
- Turn the barrel adjuster to reset the shoe clearance (1 – 1.5 mm) **(Figure 5)**.

Center the brake pads:
- **Force / Rival**: Loosen the mounting nut of the caliper brake a bit **(Figure 6)**. Use a 12 mm wrench to precisely center the brake to the rim. Re-tighten the brake mounting nut to 8 – 10 Nm (70 – 90 in-lbs).
- **Red**: Turn the brake pad centering bolt with a 3 mm hex until the brake is precisely centered.

Spring Tension Adjustment (Red Only):
The spring tension on the brake caliper can be adjusted to your preference. Bicycles with complicated cable routing may experience increased cable friction and will require higher spring tension for proper function of the brake caliper. Turn the spring tension adjustment screw clockwise with a 2 mm hex to increase spring tension.

Inspection:
Squeeze brake lever hard several times to check that everything is operating correctly, then re-check the brake pad position and clearance to the rim.

RED / FORCE / RIVAL · DUAL PIVOT ROAD CALIPERS ASSEMBLY

4



6 – 8 Nm
53 – 70 in-lbs

5



6



Force / Rival
5 mm
8 – 10 Nm
70 – 90 in-lbs



Red

For Brake Lever information please read the integrated brake shifter User Manual.

Caution:

- **Brakes are a safety-critical item on a bicycle. Improper set-up or use of brakes can result in loss of control or an accident, which could lead to a severe injury. It is your responsibility to learn proper braking techniques. Consult the user manual for your bicycle and a professional bike dealer. Practice your riding and braking techniques on a flat and level surface prior to aggressive riding.**
- **The effectiveness of braking is dependent on many conditions over which SRAM has no control including the speed of the bicycle, type and condition of the riding surface, braking lever force, proper installation and maintenance of brakes, cables, levers, brake pads, the condition of the bike, weight of the rider, braking technique, weather, and a variety of other factors. Remember, it takes longer to stop in wet conditions.**
- **SRAM brakes and levers are not intended for use on any motorized bicycle or vehicle. Any such use could result in a serious personal injury.**
- **Inspect your brakes regularly for damage, and always inspect them thoroughly after any crash or severe impact. If you detect damage, please have your brakes inspected by a professional bike dealer.**
- **Follow these instructions carefully. If you do not understand the instructions, have the installation done by a professional bike mechanic.**

Advice;

- SRAM's standard road brake pads are optimized for aluminum rims. If used with ceramic-coated or carbon rims, use alternative brake pads specifically suited for these rim materials and inspect them often as they may wear quickly.
- If the brake pads are worn until the grooves disappear, replace them with new pads.

OG 1090

		OG 1090		
	Application	Road	Road	
	Technology	Open Glide	Open Glide	
	Largest Cog	26 T	23 T	
Compatibility	Speeds	10	10	
Compatibility	Chains	SRAM 10 speed Power Chains PC 1090R, PC 1090, PC 1070, PC 1050, PC 1030 and Shimano® 10 speed chains		
Compatibility	Hubs	Any hub with Shimano® compatible driver body (not compatible with Shimano® DURA-ACE deep-spline 10 speed cassettes bodies)		
Compatibility	Cogs	11/12/13/14/15/17/19/21/23/26	11/12/13/14/15/16/17/19/21/23	
	Lockring torque	40 Nm	40 Nm	
Design	Cogs	**Chromium Molybdenum steel, heat treated**	Chromium Molybdenum steel, heat treated	
Design	Spider	N/A	N/A	
Design	Lockring	Aluminum, anodized	Aluminum, anodized	
Design	Rivets	N/A	N/A	
Design	Finish	N/A	N/A	

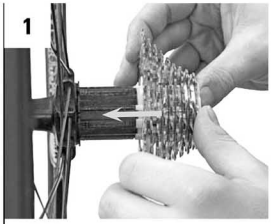
OG 1070

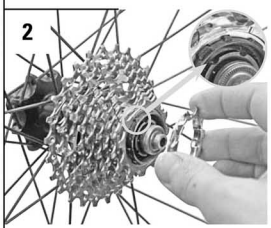
		OG 1070				
	Application	Road	Road	Road	Road	Road
	Technology	Open Glide	Open Glide	Open Glide	Open Glide	Open Glide
	Largest Cog	26 T	26 T	23 T	25 T	25 T
Compatibility	Speeds	10	10	10	10	10
Compatibility	Chains	SRAM 10 speed Power Chains PC 1090R, PC 1090, PC 1070, PC 1050, PC 1030 and Shimano® 10 speed chains				
Compatibility	Hubs	Any hub with Shimano® compatible driver body (not compatible with Shimano® DURA-ACE deep-spline 10 speed cassettes bodies)				
Compatibility	Cogs	12/13/14/15/16/17/19/21/23/26	11/12/13/14/15/17/19/21/23/26	11/12/13/14/15/16/17/19/21/23	12/13/14/15/16/17/19/21/23/25	11/12/13/14/15/17/19/21/23/25
	Lockring torque	40 Nm	40 Nm	40 Nm	40 Nm	40 Nm
Design	Cogs	Heat treated steel	Heat treated steel	Heat treated steel	Heat treated steel	Heat treated steel
Design	Spider	Aluminum 6061	Aluminum 6061	Aluminum 6061	Aluminum 6061	Aluminum 6061
Design	Lockring	Aluminum, anodized	Aluminum, anodized	Aluminum, anodized	Aluminum, anodized	Aluminum, anodized
Design	Rivets	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Design	Finish	Pearl Ni-Chrome Plated	Pearl Ni-Chrome Plated	Pearl Ni-Chrome Plated	Pearl Ni-Chrome Plated	Pearl Ni-Chrome Plated

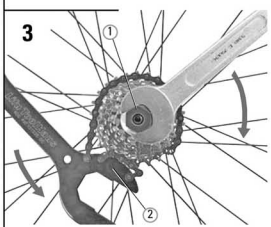
OG 1070

		OG 1070		
	Application	Road	Road	
	Technology	Open Glide	Open Glide	
	Largest Cog	27 T	28 T	
Compatibility	Speeds	10	10	
Compatibility	Chains	SRAM 10 speed Power Chains PC 1090R, PC 1090, PC 1070, PC 1050, PC 1030 and Shimano® 10 speed chains		
Compatibility	Hubs	Any hub with Shimano® compatible driver body (not compatible with Shimano® DURA-ACE deep-spline 10 speed cassettes bodies)		
Compatibility	Cogs	12/13/14/15/16/17/19/21/24/27	11/12/13/14/15/17/19/22/25/28	
	Lockring torque	40 Nm	40 Nm	
Design	Cogs	Heat treated steel	Heat treated steel	
Design	Spider	Aluminum 6061	Aluminum 6061	
Design	Lockring	Aluminum, anodized	Aluminum, anodized	
Design	Rivets	Stainless Steel	Stainless Steel	
Design	Finish	Pearl Ni-Chrome Plated	Pearl Ni-Chrome Plated	

9 / 8 speed cassettes see page 58 and 59.







ASSEMBLY

The sprockets are arranged on a plastic support (Speedloader).

- Remove the transportation lock.
- Versions with sprockets with 11 teeth: Remove the lockring from the front and the sprocket with 11 teeth from the back of the Speedloader.
- Versions with sprockets with 12 teeth: Remove the lockring from the Speed-loader.
- Align the spline patterns of the Speed-loader with the driver of the hub and press the Speedloader against the driver **(Figure 1).**
- Push the cassette from the Speedloader onto the driver of the hub.
  Advice:
  Cassettes with carbon spiders: Make sure to mount the steel washer (thick-ness 1 mm) between the driver and the cassette.
- Only versions with sprockets with 11 teeth:
  Position the sprocket with 11 teeth on the driver **(Figure 2).**
- Screw the lockring into the driver. Use a mounting tool (1, Fig. 3) (Park Tool® FR-5 or Shimano®) and a chain wrench (2, Fig. 3). Tightening torque 40 Nm (350 in-lbs) **(Figure 3).**

Advice:
Be careful not to damage the thread of the lockring by tilting.

- After installing the rear wheel adjust the rear derailleur per derailleur instruc-tions.

POWER CHAINS

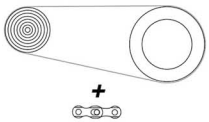
		PC 1090R	PC 1090	PC 1070	PC 1050	PC 1030
	Application	Road	Road	Road	Road	Road
	Max. No. of sprockets	10 only	10 only	10 only	10 only	10 only
	Compatibility Front	Truvativ / HG / EXA-Drive	Truvativ / HG / EXA-Drive	Truvativ / HG / EXA-Drive	Truvativ / HG / EXA-Drive	Truvativ / HG / EXA-Drive
	Compatibility Rear	SRAM OG / HG / EXA-Drive	SRAM OG / HG / EXA-Drive	SRAM OG / HG / EXA-Drive	SRAM OG / HG / EXA-Drive	SRAM OG / HG / EXA-Drive
	Dimension	$^1/_2$" x $^{11}/_{128}$"	$^1/_2$" x $^{11}/_{128}$"	$^1/_2$" x $^{11}/_{128}$"	$^1/_2$" x $^{11}/_{128}$"	$^1/_2$" x $^{11}/_{128}$"
Pin	Length	5.87 mm	5.87 mm	5.87 mm	5.95 mm	5.95 mm
Pin	Riveting	Cylindrical	Cylindrical	Cylindrical	Flat Cylindrical	Flat Cylindrical
Pin	Chrome Hardened	Yes	Yes	Yes	Yes	Yes
Pin	Push Power	2000 N / 450 lbs.	2000 N / 450 lbs.	2000 N / 450 lbs.	2000 N / 450 lbs.	2000 N / 450 lbs.
	Min. Tensile Strength	9000 N / 2023 lbs.	9000 N / 2023 lbs.	9000 N / 2023 lbs.	9000 N / 2023 lbs.	9000 N / 2023 lbs.
Design	External Pin Plate	Silver / Nickel Plated	Silver / Nickel Plated	Silver / Nickel Plated	Silver / Nickel Plated	Silver / Nickel Plated
Design	Internal Pin Plate	Silver / Nickel Plated	Silver / Nickel Plated	Grey	Silver / Nickel Plated	Grey
Design	Connecting Method [1]	Power Lock 10 Speeds	Power Lock 10 Speeds	Power Lock 10 Speeds	Power Lock 10 Speeds	Power Lock 10 Speeds

[1] **Caution:** Connecting method: with Power Lock only (no pin)!

9 / 8 speed chains see page 62.

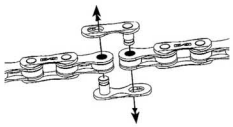
POWER CHAINS · ROAD
ASSEMBLY

1

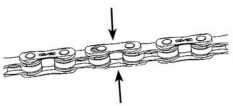


(1 Link + Power Lock)

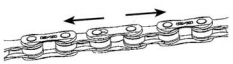
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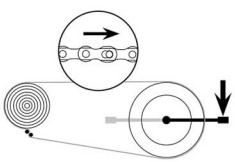
3



4



5



PC 1090R / PC 1090 / PC 1070 / PC 1050 / PC 1030 ($^{1}/_{2}$" x $^{11}/_{128}$")

Chain length:
(A chain tool will be required to shorten the chain.)

- Replacing a worn chain:
  Measure the worn chain and shorten the new to the same length.
- Initial assembly:
  Shorten the chain to the length specified by the derailleur manufacturer.
  SRAM derailleurs:
  place the chain over largest front chainwheel and largest rear sprocket and add 1 link + Power Lock **(Fig.1)**.

Closing chain with Power Lock:
Caution:

- **Use Power Lock only with SRAM chains!**
- **Use only Power Lock to close 10 speed chains (no Pin)!**
- **Use only Power Lock (black coloured) for PC 1090R, PC 1090, PC 1070, PC 1050, PC 1030 to avoid material damage or the rider to fall off his bicycle resulting in injury.**

- Fit chain, insert both halves of the Power Lock into the chain ends **(Fig. 2)** and bring the ends together **(Fig. 3)** on the bottom side of the drivetrain (no tension side).
- Pull chain apart until you feel some resistance **(Fig. 4).**
- Rotate the chain so the Power Lock is positioned on the top side of the drivetrain **(Fig. 5).**
- Pedal forward while holding bike firmly in place **(Fig. 5)** until you hear click sound. The Power Lock is now on its place and safely closed.

Opening:
Once the Power Lock is installed it can only be removed by means of a Chain tool.

Caution:

- **Power Lock is for one-time use only!**
- **Always use a new Power Lock when fitting a new chain.**
- **Failure to shorten the chain properly or to lock it exactly into place may cause damage to the chain and eventually total chain failure, material damage or the rider to fall off his bicycle resulting in injury.**
- **Worn sprockets should also be replaced when a new chain is fitted.**

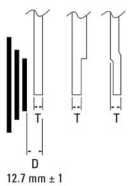
X.0 / X-9 / X-7 / X-5 / SX 4 / 3.0 · REAR DERAILLEURS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

MTB

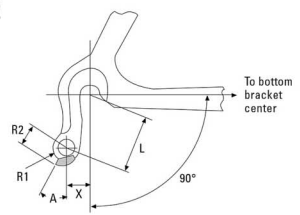
X·0 X-9 X-7 X-5 SX4 3·0

		X.0	X-9	X-7	X 5	SX 4	3.0
	Speeds	9/8	9/8	9/8	9/8	8/7	8/7
Compatib.	Shifter Compatibility	SRAM 1:1 Actuation Ratio 9 / 8 speed shifters	←	←		SRAM 1:1 8 / 7spd shifters	
Compatib.	Cogsets & Chains	SRAM / HG 9/8spd	SRAM / HG 9/8spd	SRAM / HG 9/8spd	SRAM / HG 9/8spd	SRAM / HG 8/7spd	
Compatib.	Chainrings	22-32-42/44, 24-34-46, 26-36-46/48	←	←	←	←	←
Chain Capacity	Total	45 T / 37 T / 30 T	45 T / 37 T	45 T / 37 T	45 T / 37 T	45 T / 37 T	45 T
Chain Capacity	Cage Length	Long / Medium / Short	Long / Medium	Long / Medium	Long / Medium	Long / Med.	Long
Chain Capacity	Max Sprocket	34 T	34 T	34 T	34 T	34 T	34 T
Chain Capacity	Min Sprocket	11 T	11 T	11 T	11 T	11 T	11 T
Chain Capacity	Front Difference	22 T	22 T	22 T	22 T	22 T	22 T
Design	Parallelogram Spring	Titanium	Steel	Steel	Steel	Steel	Steel
Design	Pulleys	Cartr. bearing, stainless	Cartr.bear./Bush., hard.	Bushing, hardened	Bushing	Bushing	Bushing
Design	Direct Mount	Yes	Yes	Yes	Yes	Yes	Yes
Design	Cable & Housing	1.1 or 1.2 mm high quality cables, 4 or 5 mm compressionless cable housing with end cap / maximum diameter of 5.8 mm					
Design	B-Knuckle	Forged Aluminum / Anod.	Aluminum	Aluminum	Aluminum	Aluminum	Compos.
Design	Outer Link	Forged Aluminum	Alu die-cast / Painted	Alu die-cast / Painted	Aluminum	Zinc Alloy	Compos.
Design	Inner Link	Forged Aluminum	Aluminum / Anodized	Steel / E-coat	Steel / E-coat	Composite	Steel
Design	Outer Cage	Carbon Composite	Stamped AL / Anodized	Stamped AL / Anodized	Steel / E-coat	Steel / E-coat	
Design	Inner Cage	Alloy	Stamped AL / Anodized	Steel	Steel	Steel	Compos.
Design	Hanger Bolt	Aluminum / Anodized	Aluminum / Anodized	Aluminum / Anodized	Steel	Steel	

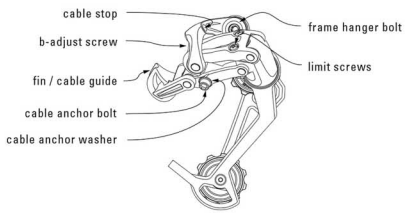
1



2



DERAILLEUR ANATOMY



FRAME DIMENSIONS

(see figure 1 and 2)

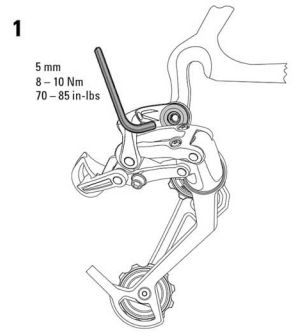
- For optimal 1:1 Actuation Ratio rear derailleur performance, the recommended rear derailleur hanger length (L) should be 28 – 30 mm.
- For a given L, use the chart below to determine other 1:1 Actuation Ratio rear derailleur hanger specifications.

L	X	A	R1	R2	T
28	6 – 10	25° – 30°	8.5 max	11.5 – 13.5	7 – 8
30	7.5 – 10	25° – 30°	8.5 max	11.5 – 13.5	7 – 8

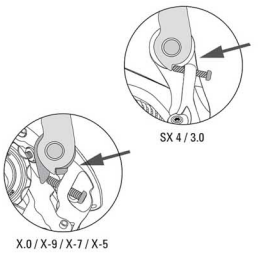
© SRAM CORPORATION • 2008 SRAM TECHNICAL MANUAL

X.0 / X-9 / X-7 / X-5 / SX 4 / 3.0 · REAR DERAILLEURS ASSEMBLY

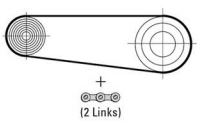
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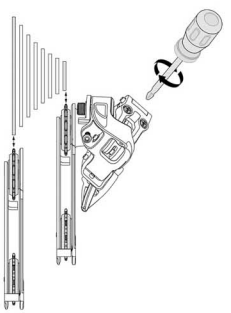
2



3



4



ASSEMBLY

Advice:
Check the rear derailleur hanger alignment. A bent rear derailleur hanger will result in inaccurate index shifting. Outboard side impacts are the most common causes of this type of damage.

- Attach the rear derailleur to the frame's rear derailleur hanger using a 5 mm hex head wrench **(Fig. 1)**.
- Check that the b-adjust washer tab (b-adjust screw) is clear of the rear derailleur dropout tab **(Fig. 2)**.
- Tighten the 5 mm hex hanger bolt to 8 – 10 Nm (70–85 in-lbs) **Fig. 1)**.

CHAIN LENGTH

A properly measured chain will prevent damage in case of accidentally shifting to the largest chain ring and cog combination. This type of accidental shifting may cause harmful binding or seizure of the chain and potentially cause severe damage.

- Bypassing the rear derailleur, run the chain around the largest cog/large chainring combination **(Fig. 3)**.
  – For rear suspension frames, position the rear suspension for the greatest chain length required.
- Add 2 LINKS or 1 link + Connecting Link to this length for proper chain length.

LIMIT SCREWS ADJUSTMENT

- View the rear derailleur and pulleys from behind the rear of the bicycle **(Fig. 4)**.
- Turn the limit screw marked 'H' on the outer link of the derailleur to align the upper guide pulley center with the outboard edge of the smallest cog – clockwise moves the guide pulley inboard towards the wheel.
- While turning the crank, push the rear derailleur towards the larger cogs by hand.
- Align the upper guide pulley under the largest cog, center to center, by turning the limit screw marked 'L' on the outer link – clockwise moves the guide pulley outboard away from the spokes.

CHAIN GAP ADJUSTMENT

Chain gap is the distance between the upper guide pulley and the cog the chain is riding on. Optimal chain gap is small enough to allow quick, efficient shifts to and from any cog, but large enough to allow smooth shifts to and from the largest cog.

- Shift chain to the small chain ring.
- While turning the crank, push the rear derailleur inboard by hand to the largest cog.
- Hold the derailleur in this position while making the following adjustment.
- Use a 2.5/3 mm hex wrench (screw driver for SX 4), turn the b-adjust screw until the chain gap equals approximately 6 mm ($^1/_4$") from tip of the cog to tip of upper guide pulley **(Fig. 5)**.

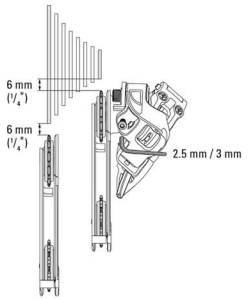
– Turn the b-adjust screw clockwise to increase the chain gap.
– Turn the b-adjust screw counterclockwise to decrease the chain gap.

Advice:
- **Bicycles equipped with an 11-28 cassette may require you to set the chain gap at the smallest cog. This is due to the shallow angle of the cassette in relation to the steeper movement of the 9spd rear derailleur.**
- **It is best to measure the rear piece of cable housing between the frame and derailleur after the chain gap is determined. See figure and chart for recommended lengths.**
- **Do not use the b-adjust screw to adjust the rear derailleur to act as a chain-tensioning device or to prevent chain suck. This increases the chain gap causing poor shifting performance.**

INDEX SHIFTING ADJUSTMENT

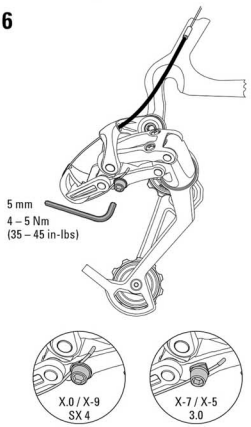
- Check that the chain and the rear derailleur are in the smallest cog position.
- Measure and cut the rear piece of cable housing. Make sure that it is not too short or long **(see figure and chart)**.
- Rotate the rear shifter until the largest number and gear indication tab/dash line up.
- Turn the rear shifter barrel adjust clockwise fully into the shifter, then turn counterclockwise 1 full turn.
- Feed the rear shifter cable through the rear derailleur cable housing, stops and cable guides.
- Feed the rear derailleur cable through the rear derailleur-housing stop and through the cable guide on the fin.
- Pull the cable tight and position it under the cable anchor washer **(Fig. 6)**.
- Tighten the 5 mm hex cable anchor bolt to 4 – 5 Nm (35 – 45 in-lbs).
- Rapidly shift the chain and derailleur up and down the cassette several times. If the cable slips repeat the two former steps.
- Shift the chain to the smallest cog.
- While pedaling, move the shifter up one detent.
  – If the chain hesitates or does not shift to the second cog, increase the cable tension by turning the shifter barrel adjuster counterclockwise.
  – If the chain shifts beyond the second cog, decrease the cable tension by turning the shifter barrel adjuster clockwise.

5



- Repeat the two former steps until shifting and cable tension is accurate.
- While turning the crank, shift the chain up and down the cassette and chain rings several times to ensure that your derailleur is indexing smoothly.

6



7

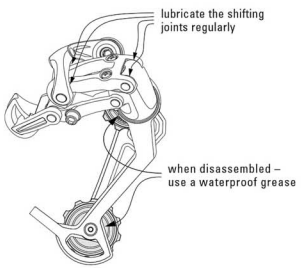
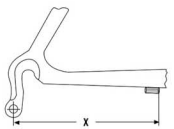
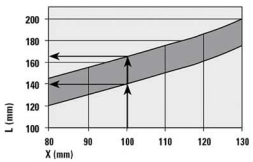
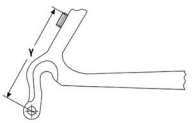
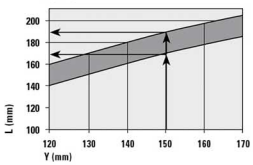


CHART / LENGTH OF CABLE HOUSINGS









Example:
Distance Y = 150 mm → cable housing length L = 165 – 190 mm.

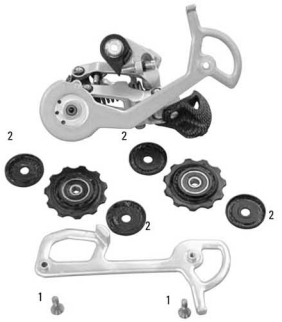
Caution:
It is imperative to respect the values for the correct length of cable housing.

TROUBLESHOOTING

Problem	Cause	Remedy
Chain jumps from smallest sprocket to frame dropout.	High gear limit screw is not adjusted properly.	Turn in screw H until the guide pulley is aligned with the smallest sprocket.
Difficult or impossible to shift chain onto smallest sprocket.	High gear limit screw is not adjusted properly.	Unscrew screw H until the guide pulley is aligned with the smallest sprocket.
Chain jumps over largest sprocket and falls between the spokes and largest sprocket or inner cage plate scrapes on spokes.	Low gear limit screw is not adjusted properly.	Turn in screw L until the guide pulley is aligned with the largest sprocket.
	Rear derailleur or derailleur hanger is bent.	Straighten or replace.
Delayed shifting.	Clearance between guide pulley / sprocket is too large.	Adjust b-adjust screw by rotating counterclockwise.
Rough shifting behavior.	Clearance between guide pulley / sprocket is too small.	Adjust b-adjust screw by rotating clockwise.
Shifts more gears onto smaller sprockets as intented	Shift cable insufficiently tensioned.	Turn barrel adjuster on the shifter counterclockwise.
Delayed shifting onto larger sprocket	Shift cable insufficiently tensioned.	Turn barrel adjuster on the shifter counterclockwise.
Delayed shifting onto smaller sprocket	Shift cable is too tight.	Turn barrel adjuster on the shifter clockwise.
	Excessive cable friction, pinched or poorly routed cable.	Lubricate or replace cable and housing. Check for excessive bending of cable housing.

X.0 · REAR DERAILLEURS MAINTENANCE

1



2



3



PULLEY MAINTENANCE

Advice:
X.0 pulleys use stainless steel balls and races for exceptional durability and corrosion resistance. When riding in wet, muddy, sandy or dusty conditions, periodic maintenance will insure a very long service life.

- Remove the pulleywheel screws (1, Fig. 1) using a 2,5 mm allen key.
  Make sure to fully engage the key in the 2,5 mm hex hole.
- Remove the aluminum covers (2) from both sides of the pulleywheels.
- Clean all parts carefully and give the bearings a spin to make sure they run smoothly.
- If not, remove the black rubber seal from one side of the bearing (Fig. 2), clean the bearing thoroughly and repack with a quality waterproof grease, then replace the rubber seal by pressing it into place.
- When assembling the covers to the pulleywheel, fill the gap between bearing and covers with a quality waterproof grease.
- Tightening torque of the pulleywheel screws is 2,5 Nm.
- If pulleys or bearings are damaged, replace with new SRAM X.0 pulleys, which come complete with new bearings and aluminum covers.

CAGE PIVOT MAINTENANCE / CAGE SPRING TENSION ADJUSTMENT

- Hold the cage in an extended position so you can reach the cage stop screw on the outside of the cage (Fig. 3).

Advice:
Disassembly and assembly of the cage stop screw are easier if there is a second helping hand!

- Make sure to firmly hold the whole assembly when unthreading the 2,5 mm cage stop screw (Fig. 3).
- Now slowly unwind the cage (clockwise) one turn to relieve spring tension.
- Remove the cage and spring. The cage must be rotated to the position shown in Figure 4 to remove it from the derailleur body.
- Clean thoroughly the shaft, cage plate, derailleur body and spring.
- Re-grease the shaft, spring tab and spring supports with a quality waterproof grease.
- Reinstall the spring and cage (Fig. 5). There are several cavities in the derailleur body, but only one is designed for installing the spring tab. Be certain to use the correct cavity.

Advice:
X.0 cage plates have 3 mounting holes (Fig. 6). The lowest spring tension position offers ideal tension for all around XC riding.
Higher spring tension holes are only recommended after extensive use has reduced the spring's stiffness.

- Wind the cage counterclockwise to tension the spring. The cage can not be fully installed into the derailleur body until the cage is at the same position as when it was originally removed (Fig. 4).
- After the cage is fully installed in the derailleur body, continue to rotate the cage counterclockwise until you can access the cage stop screw hole.
- A helping hand holding the cage makes the installation of the 2,5 mm stop screw easier (Fig. 3).
  Tightening torque of the cage stop is 1,5 Nm (13 in.lbs.).

4



5



6



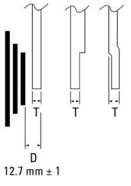
TROUBLESHOOTING

Problem	Cause	Remedy
Chain jumps from smallest sprocket to frame dropout.	High gear limit screw is not adjusted properly.	Turn in screw H until the guide pulley is aligned with the smallest sprocket.
Difficult or impossible to shift chain onto smallest sprocket.	High gear limit screw is not adjusted properly.	Unscrew screw H until the guide pulley is aligned with the smallest sprocket.
Chain jumps over largest sprocket and falls between the spokes and largest sprocket or inner cage plate scrapes on spokes.	Low gear limit screw is not adjusted properly.	Turn in screw L until the guide pulley is aligned with the largest sprocket.
	Rear derailleur or derailleur hanger is bent.	Straighten or replace.
Delayed shifting.	Clearance between guide pulley / sprocket is too large.	Adjust b-adjust screw by rotating counterclockwise.
Rough shifting behavior.	Clearance between guide pulley / sprocket is too small.	Adjust b-adjust screw by rotating clockwise.
Shifts more gears onto smaller sprockets as intented	Shift cable insufficiently tensioned.	Turn barrel adjuster on the shifter counterclockwise.
Delayed shifting onto larger sprocket	Shift cable insufficiently tensioned.	Turn barrel adjuster on the shifter counterclockwise.
Delayed shifting onto smaller sprocket	Shift cable is too tight.	Turn barrel adjuster on the shifter clockwise.
	Excessive cable friction, pinched or poorly routed cable.	Lubricate or replace cable and housing. Check for excessive bending of cable housing.

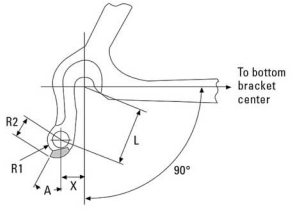
SRAM ESP

		SRAM ESP
	Speeds	8 / 7
Compatib.	Shifter Compatibility	SRAM 1:1 Actuation Ratio 8 / 7 speed shifters
	Cogsets & Chains	SRAM / Shimano HG 8/7spd
	Chainrings	22-32-42/44, 24-34-46, 26-36-46/48
Chain Capacity	Total	45T
	Cage Length	Long
	Max Sprocket	34T
	Min Sprocket	11T
	Front Difference	22T
Design	Spring Enhancement	Yes
	Pulleys	Bushing
	Direct Mount	Yes
	Cable & Housing	1.1 or 1.2 mm high quality cables, 4 or 5 mm compressionless cable housing with end cap / maximum diameter of 5.8 mm
	Knuckles	Grilon Composite
	Outer Link	Grilon Composite
	Inner Link	Steel / Zinc Coat
	Outer Cage	Grilon Composite
	Inner Cage	Grilon Composite
	Hanger Bolt	Steel

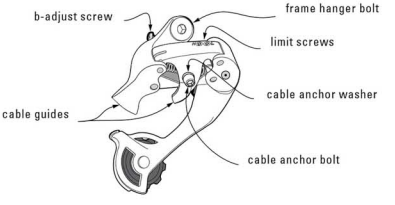
1



2



DERAILLEUR ANATOMY



FRAME DIMENSIONS

(see figure 1 and 2)

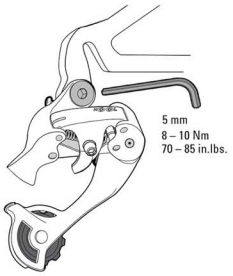
- For optimal 1:1 Actuation Ratio rear derailleur performance, the recommended rear derailleur hanger length (L) should be 28 – 30 mm.
- For a given L, use the chart below to determine other 1:1 Actuation Ratio rear derailleur hanger specifications.

L	X	A	R1	R2	T
28	6 – 10	25° – 30°	8.5 max	11.5 – 13.5	7 – 8
30	7.5 – 10	25° – 30°	8.5 max	11.5 – 13.5	7 – 8

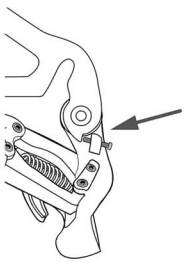
SRAM ESP · REAR DERAILLEURS ASSEMBLY

MTB

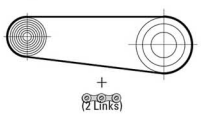
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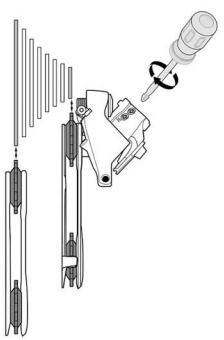
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3



4



ASSEMBLY

Advice:
Check the rear derailleur hanger alignment. A bent rear derailleur hanger will result in inaccurate index shifting. Outboard side impacts are the most common causes of this type of damage.

- Attach the rear derailleur to the frame's rear derailleur hanger using a 5 mm hex head wrench **(Fig. 1)**.
- Check that the b-adjust screw is clear of the rear derailleur dropout tab **(Fig. 2)**.
- Tighten the 5 mm hex hanger bolt to 8 – 10 Nm (70–85 in.lbs.) **(Fig. 1)**.

CHAIN LENGTH

A properly measured chain will prevent damage in case of accidentally shifting to the largest chain ring and cog combination. This type of accidental shifting may cause harmful binding or seizure of the chain and potentially cause severe damage.

- Bypassing the rear derailleur, run the chain around the largest cog/large chainring combination **(Fig. 3)**.
  – For rear suspension frames, position the rear suspension for the greatest chain length required.
- Add 2 LINKS or 1 link + Connecting Link to this length for proper chain length.

LIMIT SCREWS ADJUSTMENT

- View the rear derailleur and pulleys from behind the rear of the bicycle **(Fig. 4)**.
- Using a small screwdriver, turn the limit screw marked 'H' on the outer link of the derailleur to align the upper guide pulley center with the outboard edge of the smallest cog – clockwise moves the guide pulley inboard towards the wheel.
- While turning the crank, push the rear derailleur towards the larger cogs by hand.
- Align the upper guide pulley under the largest cog, center to center, by turning the limit screw marked 'L' on the outer link – clockwise moves the guide pulley outboard away from the spokes.

CHAIN GAP ADJUSTMENT

Chain gap is the distance between the upper guide pulley and the cog the chain is riding on. Optimal chain gap is small enough to allow quick, efficient shifts to and from any cog, but large enough to allow smooth shifts to and from the largest cog.

- Shift chain to the small chain ring.
- While turning the crank, push the rear derailleur inboard by hand to the largest cog.
- Hold the derailleur in this position while making the following adjustment:
- Use a 3 mm hex wrench, turn the b-adjust screw until t he chain gap equals approximately 6 mm ($^1/_4$") from tip of the cog to tip of upper guide pulley **(Fig. 5)**.

– Turn the b-adjust screw clockwise to increase the chain gap.
– Turn the b-adjust screw counterclockwise to decrease the chain gap.

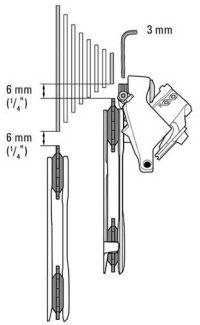
Advice:
- **Bicycles equipped with an 11–28 or 14–28 cassette may require you to set the chain gap at the smallest cog. This is due to the shallow angle of the cassette in relation to the steeper movement of the rear derailleur.**
- **Precision index shifting may require small changes of the b-adjustment while setting the proper cable tension.**
- **Do not use the b-adjust screw to adjust the rear derailleur to act as a chain-tensioning device or to prevent chain suck. This increases the chain gap causing poor shifting performance.**

INDEX SHIFTING ADJUSTMENT

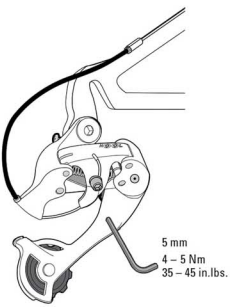
- Check that the chain and the rear derailleur are in the smallest cog position.
- Measure and cut the rear piece of cable housing. Make sure that it is not too short or long.
- Rotate the rear shifter until the largest number and gear indication tab/dash line up.
- Turn the rear shifter barrel adjust clockwise fully into the shifter, then turn counterclockwise 1 full turn.
- Feed the rear shifter cable through the rear derailleur cable housing, stops and cable guides.
- Thread the rear derailleur cable through the rear derailleur-housing stop and through the cable guide on the fin **(Fig. 6)**.
- Pull the cable tight and position it under the cable anchor washer **(Fig. 6)**.
- Tighten the 5 mm hex cable anchor bolt to 4 – 5 Nm (35 – 45 in.lbs.)
  – Be careful not to crush or deform the cable.
- Rapidly shift the chain and derailleur up and down the cassette several times. If the cable slips repeat the two former steps.
- Shift the chain to the smallest cog.
- While pedaling, move the shifter up one detent.
  – If the chain hesitates or does not shift to the second cog, increase the cable tension by turning the shifter barrel adjuster counterclockwise.
  – If the chain shifts beyond the second cog, decrease the cable tension by turning the shifter barrel adjuster clockwise.

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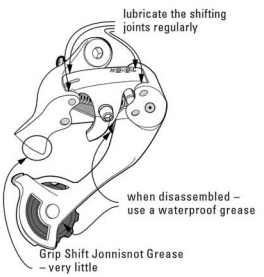
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6



7



- Repeat the two former steps until shifting and cable tension is accurate.
- While turning the crank, shift the chain up and down the cassette and chain rings several times to ensure that your derailleur is indexing smoothly.

MAINTENANCE

- Do not use solvents or corrosive materials to clean the components.
- Lubricate the shifting joints regularly **(Fig. 7)**.
- Grease any cable guides (e.g. beneath the bottom bracket).

TROUBLESHOOTING

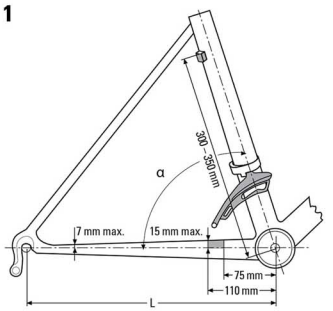
Problem	Cause	Remedy
Chain jumps from smallest sprocket to frame dropout.	High gear limit screw is not adjusted properly.	Turn in screw H until the guide pulley is aligned with the smallest sprocket.
Difficult or impossible to shift chain onto smallest sprocket.	High gear limit screw is not adjusted properly.	Unscrew screw H until the guide pulley is aligned with the smallest sprocket.
Chain jumps over largest sprocket and falls between the spokes and largest sprocket or inner cage plate scrapes on spokes.	Low gear limit screw is not adjusted properly.	Turn in screw L until the guide pulley is aligned with the largest sprocket.
	Rear derailleur or derailleur hanger is bent.	Straighten or replace.
Delayed shifting.	Clearance between guide pulley / sprocket is too large.	Adjust b-adjust screw by rotating counterclockwise.
Rough shifting behavior.	Clearance between guide pulley / sprocket is too small.	Adjust b-adjust screw by rotating clockwise.
Shifts more gears onto smaller sprockets as intented	Shift cable insufficiently tensioned.	Turn barrel adjuster on the shifter counterclockwise.
Delayed shifting onto larger sprocket	Shift cable insufficiently tensioned.	Turn barrel adjuster on the shifter counterclockwise.
Delayed shifting onto smaller sprocket	Shift cable is too tight.	Turn barrel adjuster on the shifter clockwise.
	Excessive cable friction, pinched or poorly routed cable	Lubricate or replace cable and housing. Check for excessive bending of cable housing.

X-9 / X-7 / 3.0 · HIGH CLAMP FRONT DERAILLEURS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

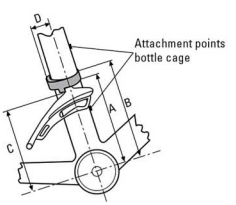
X-9 X-7 3.0

		X-9 High Clamp		X-7 High Clamp	3.0
Clamp Size	28.6 mm	—	←	with band adaptor	with band adaptor
	31.8 mm	original	←	with band adaptor	with band adaptor
	34.9 mm	original	←	original	original
	Rear Compatibility	9spd	←	9spd	8spd / 7spd
	Index Compatible	Yes	←	Yes	Yes
	Total Capacity	22T	←	22T	20T
	Top-Middle Min. Capacity	min. 12T	←	min. 12T	min. 10T
	Top Gear Teeth	44T or 48T	←	44T or 48T	42T or 48T
	Cable Routing	Top Pull Type	Bottom Pull Type	Twin Pull Type (Top and Bottom Pull)	
	Chainstay Angle	66 – 69°	←	66 – 69°	66 – 69°
	Mount Type	High Clamp	←	High Clamp	High Clamp
	Chain Line	47.5 – 51 mm	←	47.5 – 51 mm	47.5 – 51 mm
Design	Band Material	Aluminum, forged	←	Aluminum	Steel
	Outer Link	Aluminum	←	Aluminum	Steel
	Inner Link	Aluminum	←	Aluminum	Steel
	Link Bushing	Outer Sealed	←	Outer Sealed	Bushing
	Chain Cage	Steel Chrome Plated	←	Steel Chrome Plated	Steel Chrome Plated
	Color	Silver, polished		Silver or black painted	Black

1



2



FRAME DIMENSIONS
(see Fig. 1)

- For Top Pull version: upper cable stop should be positioned 300 – 350 mm above bottom bracket center.
- The seat tube should be positioned in the center of the bottom bracket shell.

Length of chainsty:

- MTB/Trekking L > 420 mm.
- Rear frame alignment must be symmetrical.

Chainstay angle:
α = 66° – 69°.

Chainline:
47.5 – 51 mm.
(Measurement from the center of the bracket to the center of middle chainring.)

NECESSARY CLEARANCE
(see Fig. 2)

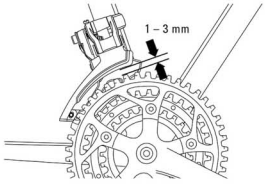
Be sure to leave enough clearance between bottle cage holes and clamp location.

Necessary clearance see Fig. 2		X-9 High Clamp 44T	X-9 High Clamp 48T	X-7 High Clamp 44T
Clamp band position	A	130 mm	135 mm	130 mm
	B	152 mm	157 mm	152 mm
	C	100 mm	105 mm	100 mm
Tire clearance	D	22 mm (Top Pull) / 36 mm Bottom Pull		38 mm

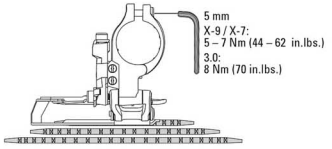
		X-7 High Clamp 48T	3.0 42T	3.0 48T
Clamp band position	A	135 mm	114 mm	119 mm
	B	157 mm	128 mm	133 mm
	C	105 mm	107 mm	112 mm
Tire clearance	D	38 mm	43 mm	43 mm

X-9 / X-7 / 3.0 · HIGH CLAMP FRONT DERAILLEURS ASSEMBLY

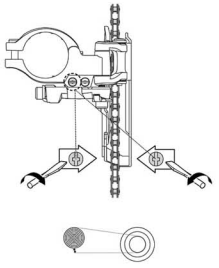
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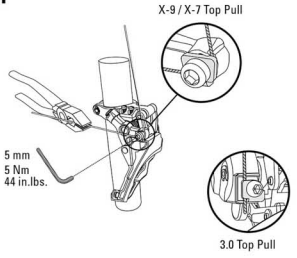
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3



4



ASSEMBLY

- Attach the front derailleur to the seat tube.
- Adjust the position along the seat tube so that clearance between the front derailleur cage and the large chainring is 1 – 3 mm **(Fig. 1)**.
  At the same time, align the front derailleur cage outerplate to be para llel with the chainrings **(Fig. 2)**.
- Tighten the 5 mm hex clamp bolt to 5 – 7 Nm (44 – 62 in.lbs.) for X-9 / X-7 or 8 Nm (70 in.lbs.) for 3.0.

LOW LIMIT ADJUSTMENT

(see Fig. 3)

- Place the chain on the largest rear cog and the smallest front chainring.
- Adjust the low limit screw **(Fig. 3)** so that the chain is positioned close to the inner cage plate without actually touching it.

CONNECTING CABLE

- Check that the chain and the front derailleur are in the smallest chainring position.
- Place the front shifter in gear position '1'.
- Turn the front shifter barrel adjuster clockwise fully into the shifter, then turn counterclockwise 1 full turn.
- Feed the front shifter cable through the cable housing and stops.
- Run the cable under the cable anchor washer and hold taut.
  – Top pull **(Fig. 4)**.
  – Bottom pull **(Fig. 5)**.
- Tighten the 5 mm hex cable anchor bolt to 5 Nm (44 in.lbs.).
- Shift the chain up and down the chainrings several times to take out initial slack in the cable.
- If necessary re-tension the cable and tighten cable anchor bolt.

HIGH LIMIT ADJUSTMENT

(see Fig. 6)

- Set the chain to the smallest rear cog and the largest front chainring.
- Adjust the high limit screw so that clearance between the front derailleur cage outer plate and the chain is 0 – 0.5 mm.

INDEX SHIFTING ADJUSTMENT

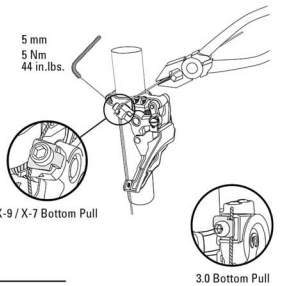
(see Fig. 7)

Shift the chain onto the largest rear sprocket and middle chainring – if the chain scrapes against the inner cage plate, turn the adjusting barrel on the shifter clockwise until the chain shifts smoothly and free of obstruction.

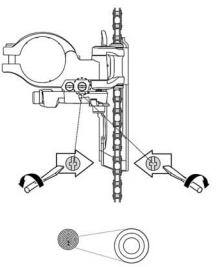
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X-9 / X-7 / 3.0 · HIGH CLAMP FRONT DERAILLEURS
ASSEMBLY / MAINTENANCE

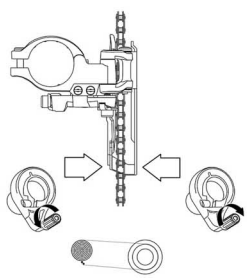
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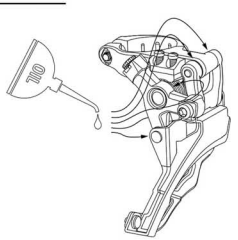
6



7



8



ADVICE

Avoid using extreme gear combinations as these combinations cause noise and excessive wear!



MAINTENANCE

- Do not use solvents or corrosive materials to clean the components.
- Lubricate the shifting joints regularly **(Fig. 8)**.
- Grease any cable guides (e.g. beneath the bottom bracket).

TROUBLESHOOTING

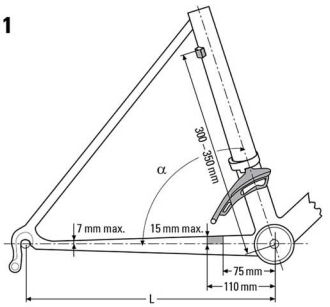
Problem	Cause	Remedy
Shifter actuated, chain fails to change chainring.	Shift cable incorrectly clamped.	Check shift cable and correct as necessary (cable clamp; cable housing stops; cable recess in shifter; cable tension).
	High / low limit screw poorly adjusted.	Correct limit screws
	Clearance between cage and large chainring is too big / small.	Correct position (1 - 3mm).
Chain falls over large / small chainring.	High / low limit screw poorly adjusted.	Lubricate or replace cable and housing. Check for excessive bending of cable housing.
Force required to actuate gears is too high.	Excessive cable friction, pinched or poorly routed cable.	Correct high limit screw.
Crank collides with front derailleur.		Correct the front derailleur position.

X-9 / X-7 / X-5 · LOW CLAMP FRONT DERAILLEURS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

X-9 X-7 X-5

		X-9 Low Clamp	X-7 Low Clamp	X-5 Low Clamp
Clamp Size	28.6 mm	—	—	—
	31.8 mm	original	with band adaptor	with band adaptor
	34.9 mm	original	original	original
Design	Rear Compatibility	9spd	9spd	9spd
	Index Compatible	Yes	Yes	Yes
	Total Capacity	22T	22T	22T
	Top-Middle Min. Capacity	min. 12T	min. 12T	min. 12T
	Top Gear Teeth	44T or 48T	44T or 48T	44T or 48T
	Cable Routing	Top Pull Type / Bottom Pull Type	Twin Pull Type (Top and Bottom Pull)	Twin Pull Type (Top and Bottom Pull)
	Chainstay Angle	66 – 69°	66 – 69°	66 – 69°
	Mount Type	Low Clamp	Low Clamp	Low Clamp
	Chain Line	51 mm	47.5 – 51 mm	47.5 – 51 mm
	Band Material	Aluminum, forged	Aluminum	Aluminum
	Outer Link	Steel	Steel	Steel
	Inner Link	Aluminum, forged	Aluminum	Aluminum
	Link Bushing	Outer Sealed	Outer Sealed	Outer Sealed
	Chain Cage	Steel Chrome Plated	Steel Chrome Plated	Steel Chrome Plated
	Color	Polished and clear coated	Silver or black painted	Silver or black painted

1



FRAME DIMENSIONS
(see Fig. 1)

- For Top Pull version: upper cable stop should be positioned 300 – 350 mm above bottom bracket center.
- The seat tube should be positioned in the center of the bottom bracket shell.

Length of chainsty:

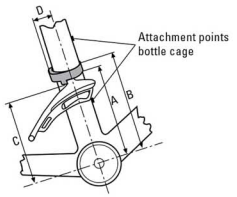
- MTB/Trekking L > 420 mm.
- Rear frame alignment must be symmetrical.

Chainstay angle:
α = 66° – 69°.

Chainline:
X-9: 51 mm / X-7 and X-5: 47.5 – 51 mm
(Measurement from the center of the bracket to the center of middle chainring.)

NECESSARY CLEARANCE
(see Fig. 2)
Be sure to leave enough clearance between bottle cage holes and clamp location.

2

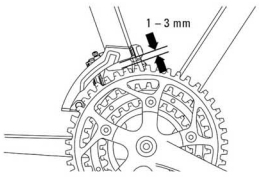


Necessary clearance see Fig. 2		X-9 Low Clamp 44T	X-9 Low Clamp 48T	X-7 Low Clamp 44T
Clamp position	A	69 mm	74 mm	69 mm
	B	86 mm	91 mm	86 mm
	C	71 mm	76 mm	69 mm
Tire clearance	D	42 mm	42 mm	43 mm

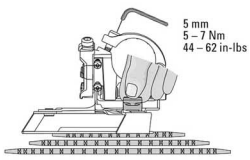
		X-7 Low Clamp 48T	X-5 Low Clamp 44T	X-5 Low Clamp 48T
Clamp position	A	74 mm	69 mm	74 mm
	B	91 mm	86 mm	91 mm
	C	74 mm	69 mm	74 mm
Tire clearance	D	43 mm	43 mm	43 mm

X-9 / X-7 / X-5 · LOW CLAMP FRONT DERAILLEURS ASSEMBLY

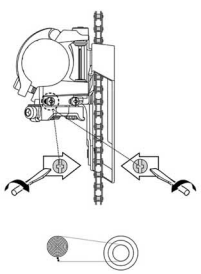
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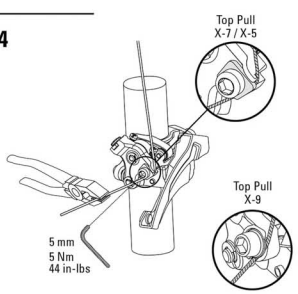
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3



4



ASSEMBLY

- Attach the front derailleur to the seat tube.
- Adjust the position along the seat tube so that clearance between the front derailleur cage and the large chainring is 1 – 3 mm **(Fig. 1)**.
  At the same time, align the front derailleur cage outerplate to be parallel with the chainrings **(Fig. 2)**.
- Tighten the 5 mm hex clamp bolt to 5 – 7 Nm (44 – 62 in-lbs).
- Remove the mounting aid (piece of plastic – **Fig. 2).**

LOW LIMIT ADJUSTMENT

(see Fig. 3)

- Place the chain on the largest rear cog and the smallest front chainring.
- Adjust the low limit screw **(Fig. 3)** so that the chain is positioned close to the inner cage plate without actually touching it.

CONNECTING CABLE

- Check that the chain and the front derailleur are in the smallest chainring position.
- Place the front shifter in gear position '1'.
- Turn the front shifter barrel adjuster clockwise fully into the shifter, then turn counterclockwise 1 full turn.
- Feed the front shifter cable through the cable housing and stops.
- Run the cable under the cable anchor washer and hold taut.
  – Top pull **(Fig. 4)**.
  – Bottom pull **(Fig. 5)**.
- Tighten the 5 mm hex cable anchor bolt to 5 Nm (44 in-lbs).
- Shift the chain up and down the chainrings several times to take out initial slack in the cable.
- If necessary re-tension the cable and tighten cable anchor bolt.

HIGH LIMIT ADJUSTMENT

(see Fig. 6)

- Set the chain to the smallest rear cog and the largest front chainring.
- Adjust the high limit screw so that clearance between the front derailleur cage outer plate and the chain is 0 – 0.5 mm.

INDEX SHIFTING ADJUSTMENT

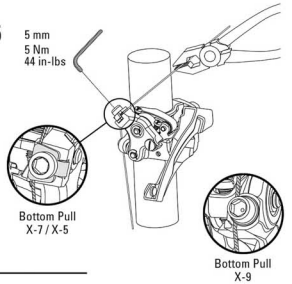
(see Fig. 7)

Shift the chain onto the largest rear sprocket and middle chainring – if the chain scrapes against the inner cage plate, turn the adjusting barrel on the shifter clockwise until the chain shifts smoothly and free of obstruction.

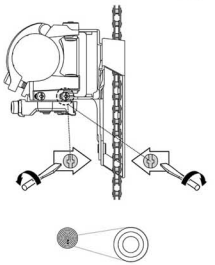
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X-9 / X-7 / X-5 · LOW CLAMP FRONT DERAILLEURS
ASSEMBLY

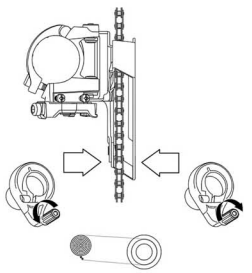
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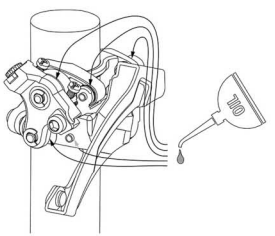
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7



8



ADVICE

Avoid using extreme gear combinations as these combinations cause noise and excessive wear!



TROUBLESHOOTING

Problem	Cause	Remedy
Shifter actuated, chain fails to change chainring.	Shift cable incorrectly clamped.	Check shift cable and correct as necessary (cable clamp; cable housing stops; cable recess in shifter; cable tension).
	High / low limit screw poorly adjusted.	Correct limit screws.
	Clearance between cage and large chainring is too big / small.	Correct position (1 – 3 mm).
Chain falls over large / small chainring.	High / low limit screw poorly adjusted.	Correct limit screws.
Force required to actuate gears is too high.	Excessive cable friction, pinched or poorly routed cable.	Lubricate or replace cable and housing. Check for excessive bending of cable housing.
Crank collides with front derailleur.	High gear limit screw incorrectly adjusted.	Correct high limit screw.
	Cage not parallel with chain-ring.	Correct the front derailleur position.

X.0 / X-9 · TRIGGER SHIFTERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

X·0 X-9

		X.0		X-9	
	Shifter Type	Front / Index	Rear 1:1 Actuation Ratio	Front / Index	Rear 1:1 Actuation Ratio
	Speeds	3	9	3	9
Compatibility	Derailleur	SRAM & Shimano	SRAM 1:1 Actuation Ratio	SRAM & Shimano	SRAM 1:1 Actuation Ratio
Compatibility	Crankset	Triple Indexed		Triple Indexed	
	Cable Pull Release	Zero loss Technology	←	Zero loss Technology	←
	Cable	Teflon Coat. Stainl. Steel	Teflon Coat. Stainl. Steel	Teflon Coat. Stainl. Steel	Teflon Coat. Stainl. Steel
	Gear Indication	None	None	None	None
	Barrel Adjuster	Indexing, Composite	Indexing, Composite	Indexing, Composite	Indexing, Composite
	Clamping Diameter	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm

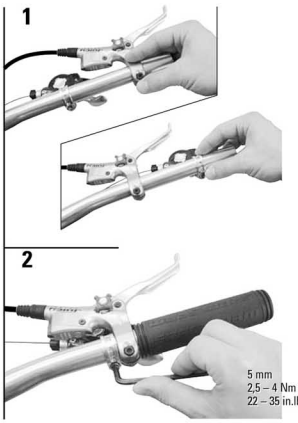
CABLE HOUSING

- Use only new high quality cable and compressionless cable housing with end caps.
- When choosing cable housing lengths, be sure to allow enough housing for an extreme turn of the handlebars in both directions.
- Note also, that different stem lengths and cable stop positions effects cable housing length.

SHIFTER ANATOMY



X.0 / X-9 · TRIGGER SHIFTERS
ASSEMBLY



ASSEMBLY

- Slide shifter and brake lever onto handlebar. Either component can be mounted first, depending on personal preference **(Fig. 1)**.
- Slide the handlebar grip onto the handlebar.
  Caution:
  Never use lubricants or solvents to install handlebar grips. Handlebar grips provide safety function.
  For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar!
- Choose the best position for your ergonomic needs. Tighten the 5 mm hex clamp bolt to 2,5 – 4 Nm (22 – 35 in.lbs.) **(Fig. 2)**.
- Feed the cable through the cable housing and stops. Make sure the shifter is in fully released position (lowest gear position (front shifter) or the highest gear number (rear shifter)).
- Attach the front/rear shifter cable to the front/rear derailleur.
- Adjust indexing per derailleur instructions.

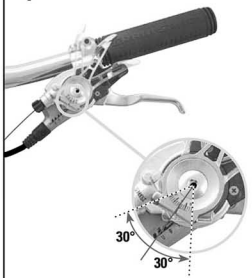
Caution:

- **Always check the front and rear brake levers for proper operation.**
- **If there is interference between a shifter and a brake lever, rotate one out of the way.**
- **Check for proper brake lever operation again!**

3



4



5



6



USE

Caution:

- **Always check the front and rear brake levers for proper operation.**
- **If there is interference between a shifter and a brake lever, rotate one out of the way.**
- **Check for proper brake lever operation again!**

The shifter offers the following adjustments:

– Shifter can be installed on handlebar inside and outside of brake **(Fig. 1)**.

– Clamp can be installed in two positions on shifter housing **(Fig. 3)**. Tighten the 5 mm hex clamp bolt to 2.5 – 4 Nm (22 – 35 in.lbs.).

– Aluminum lever orientation is infinitely adjustable **(Fig. 4)**.

CABLE CHANGE

Advice:

Use only new high quality cable and compressionless cable housing with endcaps.

- Make sure the shifter is in fully released position (lowest gear position (front shifter) or the highest gear number (rear shifter)).
- Detach the cable from the derailleur.
- Cut the cable off 6" (15 cm) from the shifter barrel adjuster. Discard the old cable and cable housing.
- Remove cover **(Fig. 5)**.
- Remove cable. It may be helpful to use a pick **(Fig. 6)**.
- Feed the new cable through the cable entry and out of the barrel adjuster.
- Replace cover.
- Feed the cable through the new cable housing and cable stops.
- Attach the cable to the derailleur and adjust indexing per derailleur instructions.

MAINTENANCE

Clean the shifter using only water and mild soap.

X-7 / X-5 / ATTACK · TRIGGER SHIFTERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

X-7 X-5

		X-7		X-5		
	Shifter Type	Front / Index	Rear 1:1 Actuation Ratio	Front / Index	Rear 1:1 Actuation Ratio	
	Speeds	3	9	3	9	8
Compatibility	Derailleur	SRAM & Shimano	SRAM 1:1 Actuation Ratio	SRAM & Shimano	SRAM 1:1 Actuation Ratio	
Compatibility	Crankset	Triple Indexed		Triple Indexed		
	Cable Pull Release	Impulse Technology	←	Impulse Technology	←	
	Cable	Stainless Steel	Teflon Coat. Stainl. Steel	Stainless Steel	←	
	Gear Indication	Window	Window	Window	Window	
	Barrel Adjuster	Indexing, Aluminum	Indexing, Aluminum	Indexing	Indexing	
	Clamping Diameter	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	
	Shifter Length	26 mm	←	26 mm	←	

ATTACK

		Attack		
	Shifter Type	Front / Index	Rear 2:1	
	Speeds	3	9	8
Compatibility	Derailleur	SRAM & Shimano	Shimano	
Compatibility	Crankset	Triple Indexed		
	Cable Pull Release	Impulse Technology	←	
	Cable	Stainless Steel	←	
	Gear Indication	Window	Window	
	Barrel Adjuster	Indexing	Indexing	
	Clamping Diameter	22.1 – 22.3 mm	22.1 – 22.3 mm	
	Shifter Length	26 mm	←	

CABLE HOUSING

- Use only new high quality cable and compressionless cable housing with end caps.
- When choosing cable housing lengths, be sure to allow enough housing for an extreme turn of the handlebars in both directions.
- Note also, that different stem lengths and cable stop positions effects cable housing length.

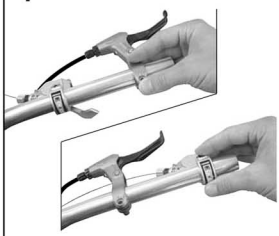
SHIFTER ANATOMY



X-7 / X-5 / ATTACK · TRIGGER SHIFTERS ASSEMBLY

MTB

1



2



ASSEMBLY

- Slide shifter and brake lever onto handlebar. Either component can be mounted first **(Fig. 1)**.
- Slide the handlebar grip onto the handlebar.
  Caution:
  Never use lubricants or solvents to install handlebar grips. Handlebar grips provide safety function.
  For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar!
- Position the shifter as you wish. We recommend that the surface of the smaller shift lever is vertical. Tighten the 5 mm hex clamp bolt to 44 in-lbs (5 Nm) **(Fig. 2)**.
- Feed the cable through the cable housing and stops. Make sure the shifter is in gear position "1" (front shifter) or the HIGHEST gear number (rear shifter).
- Attach the shifter cable to the derailleur.
- Adjust indexing per derailleur instructions.

Caution:

- **Always check the front and rear brake levers for proper operation.**
- **If there is interference between shifters and brake levers, re-adjust lever and shifter placement.**
- **Check for proper brake lever operation again!**

SX 4 / TRX · TRIGGER SHIFTERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

SX 4

		SX 4		
	Shifter Type	Front / Index	Rear 1:1 Actuation Ratio	Rear 1:1 Actuation Ratio
	Speeds	3	8	7
Compatibility	Derailleur	SRAM & Shimano	SRAM 1:1 Actuation Ratio	
Compatibility	Crankset	Triple Indexed		
	Cable Pull Release	Uni-Lever Technology	←	←
	Cable	Standard		
	Gear Indication	Window	Window	Window
	Barrel Adjuster	Indexing	Indexing	Indexing
	Clamping Diameter	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm
	Shifter Length	N/A	←	←

TRX

		TRX		
	Shifter Type	Front / Index	Rear 2:1	Rear 2:1
	Speeds	3	8	7
Compatibility	Derailleur	SRAM & Shimano	Shimano	Shimano
Compatibility	Crankset	Triple Indexed		
	Cable Pull Release	Uni-Lever Technology	←	←
	Cable	Standard	←	←
	Gear Indication	Window	Window	Window
	Barrel Adjuster	Indexing	Indexing	Indexing
	Clamping Diameter	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm
	Shifter Length	N/A	←	←

CABLE HOUSING

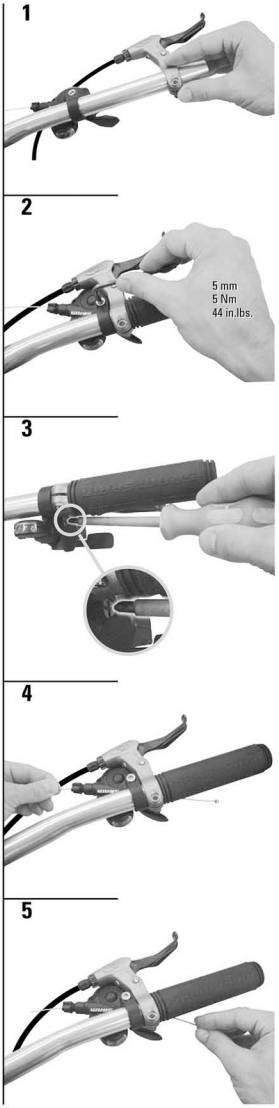
- Use only new high quality cable and compressionless cable housing with end caps.
- When choosing cable housing lengths, be sure to allow enough housing for an extreme turn of the handlebars in both directions.
- Note also, that different stem lengths and cable stop positions effects cable housing length.

SHIFTER ANATOMY



SX 4 / TRX · TRIGGER SHIFTERS
ASSEMBLY / MAINTENANCE

MTB



ASSEMBLY

- Slide first shifter then brake lever onto handlebar **(Fig. 1)**.
- Slide the handlebar grip onto the handlebar.
  Caution:
  Never use lubricants or solvents to install handlebar grips. Handlebar grips provide safety function.
  For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar!
- Position the shifter as you wish. Locate the perfect position of shifter levers for your ergonomic needs. Tighten the 5 mm hex clamp bolt to 44 in.lbs. (5 Nm) **(Fig. 2)**.
- Feed the cable through the cable housing and stops. Make sure the shifter is in gear position "1" (front shifter) or the HIGHEST gear number (rear shifter).
- Attach the shifter cable to the derailleur.
- Adjust indexing per derailleur instructions.

Caution:

- **Always check the front and rear brake levers for proper operation.**
- **If there is interference between shifters and brake levers, re-adjust lever and shifter placement.**
- **Check for proper brake lever operation again!**

CABLE CHANGE

Advice:

- **Leave the shifter on the handlebar.**
- **The shifter does not need to be opened.**
- **Use only new high quality cable and compressionless cable housing with endcaps.**

- Line-up the shifter in gear position "1" (front shifter) or the HIGHEST gear number (rear shifter).
- Detach the cable from the derailleur.
- Cut the cable off 6" (15 cm) from the shifter barrel adjuster. Discard the old cable and cable housing.
- Carefully unscrew cable change cap from cable entry with a screwdriver **(Fig. 3)**.
- Push cable out of the cable entry with rotating movement **(Fig. 4)**.
- Feed the new cable through the cable entry and out the barrel adjuster **(Fig. 5)**. It may be helpful to remove the barrel adjuster for better visibility.
- Replace cable change cap.
- Feed the cable through the new cable housing and cable stops.
- Attach the cable to the derailleur and adjust indexing per derailleur instructions.

MAINTENANCE

Clean the shifter using only water and mild soap.

X.0 / X-9 / X-7 / ROCKET / ATTACK · TWIST SHIFTERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

X·0 X-9

		X.0			X-9	
	Version	Shorty	Shorty	Shorty	Shorty	Shorty
	Shifter Type	Front / Micro adjust	Front / Index	Rear 1:1 Actuation Ratio	Front / Micro adjust	Front / Index
	Speeds		3	9 8		3
Compatibility	Derailleur	SRAM & Shimano	SRAM & Shimano	SRAM 1:1 Actuation Ratio	SRAM & Shimano	SRAM & Shimano
Compatibility	Crankset	Triple Indexed	Triple Indexed		Triple Indexed	Triple Indexed
	Cable Pull Release	SRS	SRS	SRS	SRS	SRS
	Cable	Stainless Steel	←	Teflon Coat. Stainl. Steel	Stainless Steel	←
	Gear Indication	Window	Window	Window	Window	Window
	Barrel Adjuster	Indexing	Indexing	Indexing	Indexing	Indexing
	Clamping Diameter	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm
	Shifter Length	70 mm	←	←	70 mm	←

X-9 X-7 ROCKET

		X-9	X-7			Rocket
	Version	Shorty	Shorty	Shorty	Shorty	Shorty
	Shifter Type	Rear 1:1 Actuation Ratio	Front / Micro adjust	Front / Index	Rear 1:1 Actuation Ratio	Front / Micro adjust
	Speeds	9 8		3	9 8	
Compatibility	Derailleur	SRAM 1:1 Actuation Ratio	SRAM & Shimano	SRAM & Shimano	SRAM 1:1 Actuation Ratio	SRAM & Shimano
Compatibility	Crankset		Triple Indexed	Triple Indexed		Triple Indexed
	Cable Pull Release	SRS	SRS	SRS	SRS	SRS
	Cable	Stainless Steel	Stainless Steel	←	←	Stainless Steel
	Gear Indication	Window	Window	Window	Window	Window
	Barrel Adjuster	Indexing	Indexing	Indexing	Indexing	Indexing
	Clamping Diameter	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm
	Shifter Length	70 mm	70 mm	←	←	70 mm

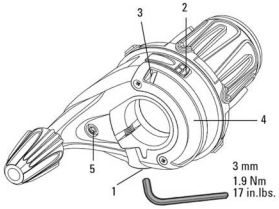
ROCKET ATTACK

		Rocket		Attack		
	Version	Shorty	Shorty	Shorty	Shorty	Shorty
	Shifter Type	Front / Index	Rear 2:1	Front / Micro adjust	Front / Index	Rear 2:1
	Speeds	3	9 8		3	9 8
Compatibility	Derailleur	SRAM & Shimano	Shimano	SRAM & Shimano	SRAM & Shimano	Shimano
Compatibility	Crankset	Triple Indexed		Triple Indexed	Triple Indexed	
	Cable Pull Release	SRS	SRS	SRS	SRS	SRS
	Cable	Stainless Steel	←	Stainless Steel	←	←
	Gear Indication	Window	Window	Window	Window	Window
	Barrel Adjuster	Indexing	Indexing	Indexing	Indexing	Indexing
	Clamping Diameter	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm
	Shifter Length	70 mm	←	70 mm	←	←

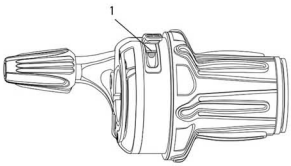
CABLE HOUSING

- Use only new high quality cable and compressionless cable housing with end caps.
- When choosing cable housing lengths, be sure to allow enough housing for an extreme turn of the handlebars in both directions.
- Note also, that different stem lengths and cable stop positions effects cable housing length.

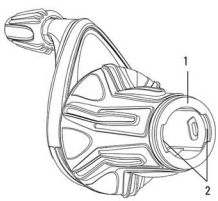
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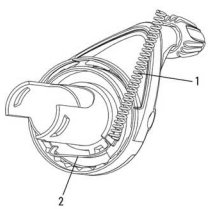
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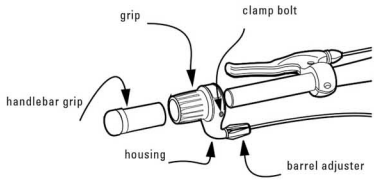
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4



SHIFTER ANATOMY



ASSEMBLY

Front and Rear:

- Slide the shifter onto the handlebar.
  - If necessary, move the brake lever to allow for shifter and handlebar grip.
  - Bar end users – don't forget to leave room for the bar end.
- Rotate the shifter until the barrel adjuster is beneath (but out of the way of) the brake lever.
- Tighten the 3 mm hex clamp bolt (1, **Fig. 1**) to 1.9 Nm (17 in.lbs.).
- Slide the handlebar grip onto the handlebar.
  Caution:
  Never use lubricants or solvents to install handlebar grips. Handlebar grips provide safety function.
  For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar!
- Feed the cable through the cable housing and stops.
- Attach cable to the derailleur.
- Adjust indexing per derailleur instruction.

Caution:

- **Always check the front and rear brake levers for proper operation.**
- **If there is interference between shifters and brake levers, re-adjust lever and shifter placement.**
- **Check again for proper operation!**

CABLE CHANGE

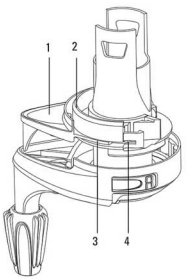
Advice:

- **Leave the shifter on the handlebar.**
- **No need to move other components. The shifter does not need to be opened.**
- **Use only new high quality cable and compressionless cable housing with end caps.**

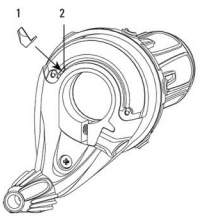
Front and Rear:

- Detach the cable from the derailleur.
- Cut cable off 15 cm (6") from shifter barrel adjuster. Discard old cable and cable housing.
- From the edge (2, **Fig. 1**), pull open the cable change hatch. The hinge of the hatch should remain attached to the shifter.
- Rotate the shifter fully in the cable release direction (3). (Gear "1" on the front shifter or HIGHEST gear number on the rear shifter.)
- Look for cable head entry **(Fig. 2)**.
- Using a small flat head screw driver, push back the tab (1, **Fig. 2)** covering the cable head.
- Push cable up/out of the shifter and discard.
- Feed the new cable through the cable entry and out the barrel adjuster.
- Pull cable snug to seat cable head under tab.
- Replace cable change hatch.
- Feed the cable through the new cable housing and frame stops.
- Attach cable to the derailleur.
- Adjust indexing per derailleur instruction.

5



6



GRIP REPLACEMENT

Advice:
Do not remove the triangular housing cover to make the change.

Removal:

- Rotate the shifter fully in the cable release direction (3, **Fig. 1**). (Gear "1" on the front shifter or HIGHEST gear number on the rear shifter.)
- Using a 3 mm hex wrench (1, **Fig. 1**), remove shifter from the handlebar.
- While holding shifter housing and grip together in one hand, remove axial fixture ring (1, **Fig. 3**) by squeezing together housing tabs (2).
- While pushing/rotating the grip lightly forward (release direction), slowly move the grip outward away from housing.
  – Pulling the grip quickly may cause the coil spring (1, **Fig. 4**) to move out of position.

Replacement:

- Replace front end of coil spring (1, **Fig. 4**) on to tab in groove if necessary.
- While sliding grip up towards the housing, align spring tab so that it catches the open end of the coil spring.
- Rotate grip forward slightly compressing the coil spring and engage grip and tab into the housing.
- Replace axial fixture ring (1, **Fig. 3**) over housing tabs (2).

INTERNAL CLEANING

Advice:
When shifting performance is compromised, try replacing the cable and housing before you disassemble the shifter for cleaning.

Disassembly:

- Follow "GRIP REPLACEMENT / Removal".
- Remove lens cover (4, **Fig. 1**).
- Remove gear indicator needle (3) by pulling straight out.
- Remove the spool's coil spring (1, **Fig. 4**).
- Using small pliers, pull leaf spring (2) straight out. Take note of the shape of the spring so that you can replace it in the correct direction.
- Remove housing cover screw (5, **Fig. 1**). Slide housing cover (1, **Fig. 5**) and spool (2) out at the same time being careful not to break the tab (3) on the cover.
- Clean all parts with soapy water only.
- Using only Grip Shift Jonnisnot, grease housing tube, detentes and cable track at housing bend.

Reassembly:

- Slip tab (3, **Fig. 5**) on housing cover into groove (4) on spool.
- Slide spool and cover into housing and install cover screw (5, **Fig. 1**).
- Place leaf spring (2, **Fig. 4**) into spool. Push down slightly on opposite end of spring, then seat spring completely into spool and housing.
- Follow "GRIP REPLACEMENT / Replacement".
- Rotate shifter to full release position.
- Install gear indication needle (1, **Fig. 6**) in slot (2).
- Replace gear indicator lens (4, **Fig. 1**) and screws.
- Install shifter on to bars and check for proper function.

X-5 / CENTERA · TWIST SHIFTERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

MTB

X-5

		X-5			
	Version	Shorty	Shorty	Shorty	Shorty
	Shifter Type	Front / Micro adjust	Front / Index	Rear 1:1 Actuation Ratio	Rear 1:1 Actuation Ratio
	Speeds		3	9	8
Compatibility	Derailleur	SRAM & Shimano	SRAM & Shimano	SRAM 1:1 Actuation Ratio	SRAM 1:1 Actuation Ratio
Compatibility	Crankset	Triple Indexed	Triple Indexed		
	Cable Pull Release	FFS	FFS	Standard	Standard
	Cable	Die Drawn Steel	←	←	←
	Gear Indication	Printed	Printed	Printed	Printed
	Barrel Adjuster	Indexing	Indexing	Indexing	Indexing
	Clamping Diameter	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm
	Shifter Length	65 mm	←	←	←

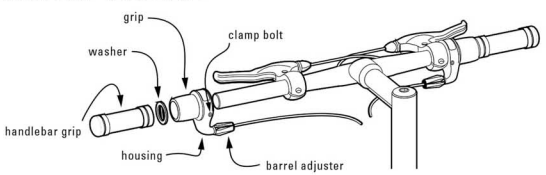
CENTERA

		Centera			
	Version	Shorty	Shorty	Shorty	Shorty
	Shifter Type	Front / Micro adjust	Front / Index	Rear 2:1	Rear 2:1
	Speeds		3	9	8
Compatibility	Derailleur	SRAM & Shimano	SRAM & Shimano	Shimano	Shimano
Compatibility	Crankset	Triple Indexed	Triple Indexed		
	Cable Pull Release	FFS	FFS	Standard	Standard
	Cable	Die Drawn Steel	←	←	←
	Gear Indication	Printed	Printed	Printed	Printed
	Barrel Adjuster	Indexing	Indexing	Indexing	Indexing
	Clamping Diameter	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm
	Shifter Length	65 mm	←	←	←

CABLE HOUSING

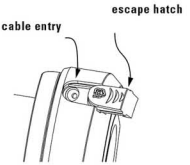
- Use only new high quality cable and compressionless cable housing with end caps.
- When choosing cable housing lengths, be sure to allow enough housing for an extreme turn of the handlebars in both directions.
- Note also, that different stem lengths and cable stop positions effects cable housing length.

SHIFTER ANATOMY

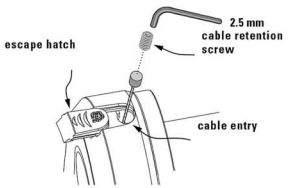


X-5 / CENTERA · TWIST SHIFTERS
ASSEMBLY

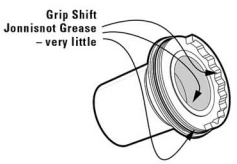
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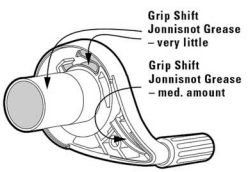


2



3





A S S E M B L Y

Front and Rear:

- Slide the shifter onto the handlebar.
  – If necessary, move the brake lever to allow for shifter and handlebar grip.
  – Bar end users – don't forget to leave room for the bar end.
- Rotate the shifter until the barrel adjuster is beneath (but out of the way of) the brake lever.
- Tighten the 3 mm hex clamp bolt to 1.9 Nm (17 in-lbs).
- Slide the plastic washer onto the handlebar.
- Slide the handlebar grip onto the handlebar.
  Caution:
  Never use lubricants or solvents to install handlebar grips. Handlebar grips provide safety function.
  For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar!
- Feed the cable through the cable housing and stops.
- Attach the shifter cable to the derailleur.
- Adjust indexing per derailleur instructions.

Caution:

- **Always check the front and rear brake levers for proper operation.**
- **If there is interference between shifters and brake levers, re-adjust lever and shifter placement.**
- **Check again for proper operation!**

SX 4 / MRX PRO · TWIST SHIFTERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

MTB

SX 4

		SX 4				
	Version	Half Pipe	Half Pipe	Half Pipe	Half Pipe	Half Pipe
	Shifter Type	Front / Micro adjust	Front / Index	Rear 1:1 Actuation Ratio	Rear 1:1 Actuation Ratio	Rear 1:1 Actuation Ratio
	Speeds		3	9	8	7
Compatibility	Derailleur	SRAM & Shimano	SRAM & Shimano	SRAM 1:1 Actuation Ratio		
Compatibility	Crankset	Triple Indexed	Triple Indexed			
	Cable Pull Release	SRS	SRS	SRS	SRS	SRS
	Cable	Die Drawn Steel	←	←	←	←
	Gear Indication	Window	Window	Window	Window	Window
	Barrel Adjuster	Indexing	Indexing	Indexing	Indexing	Indexing
	Clamping Diameter	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm
	Shifter Length	86 mm	←	←	←	←

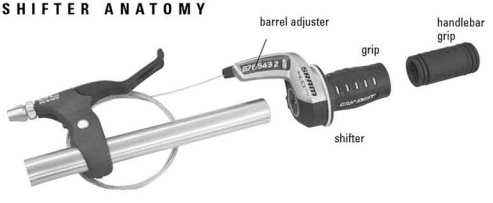
MRX PRO

		MRX Pro							
	Version	Half Pipe	Half Pipe	Half Pipe	Half Pipe	Half Pipe	Half Pipe	Half Pipe	Half Pipe
	Shifter Type	Front / Micro adjust	Front / Index	Rear 2:1			Rear Shimano Rapid Rise		
	Speeds		3	9	8	7	9	8	7
Compatibility	Derailleur	SRAM & Shimano	SRAM & Shimano	Shimano			Shimano Rapid Rise		
Compatibility	Crankset	Triple Indexed	Triple Indexed						
	Cable Pull Release	SRS	SRS	SRS			SRS		
	Cable	Die Drawn Steel	←	←			←		
	Gear Indication	Window	Window	Window			Window		
	Barrel Adjuster	Indexing	Indexing	Indexing			Indexing		
	Clamping Diameter	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm			22.1 – 22.3 mm		
	Shifter Length	86 mm	←	←			←		

CABLE HOUSING

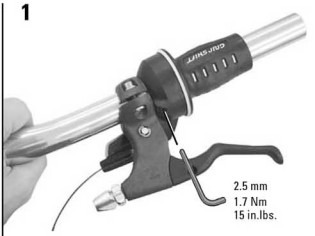
- Use only new high quality cable and compressionless cable housing with end caps.
- When choosing cable housing lengths, be sure to allow enough housing for an extreme turn of the handlebars in both directions.
- Note also, that different stem lengths and cable stop positions effects cable housing length.

SHIFTER ANATOMY



SX 4 / MRX PRO · TWIST SHIFTERS
ASSEMBLY / MAINTENANCE

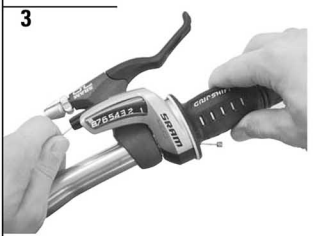
1



2



3



4



ASSEMBLY

Front and Rear:

- Slide the shifter onto the handlebar.
  - – If necessary, move the brake lever to allow for shifter and handlebar grip.
  - – Bar end users – don't forget to leave room for the bar end.
- Rotate the shifter until the barrel adjuster is above (but out of the way of) the brake lever and the gear indication is clearly visible from the riding position.
- Tighten the 2.5 mm hex clamp bolt **(Fig. 1)** to 1.7 Nm (15 in.lbs.).
- Slide the handlebar grip onto bar **(Fig. 2)**.
  Caution:
  Never use lubricants or solvents to install handlebar grips. Handlebar grips provide safety function.
  For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar!
- Feed the cable through the cable housing and frame stops.
- Attach cable to the derailleur.
- Adjust indexing per derailleur instructions.

Caution:
Not recommended for use on thin walled alluminum handlebars such as Hyperlite® type handlebars or Carbon handlebars.

Caution:
- **Always check the front and rear brake levers for proper operation.**
- **If there is interference between shifters and brake levers, re-adjust lever and shifter placement.**
- **Check again for proper operation!**

CABLE CHANGE

Advice:
- **Leave the shifter on the handlebar.**
- **No need to move other components. The shifter does not need to be opened.**
- **Use only new high quality cable and compressionless cable housing with endcaps.**

- Detach the cable from the derailleur.
- Cut the cable off 6" (15 cm) from the shifter barrel adjuster.
- Discard the old cable and cable housing.
- Line up the "1" (front) or HIGHEST gear number (rear) mark with the indicator mark (MRX Pro Shimano Rapid Rise® Gear number "1" for front and rear). Look for the cable entry.
- Push cable up/out of the shifter and discard **(Fig. 3)**.
- Feed the new cable through the cable entry and out the barrel adjuster **(Fig. 4)**.
- Pull the cable snug.
- Feed the cable through the new cable housing and stops.
- Attach the cable to the derailleur and adjust indexing per the derailleur instructions.

MAINTENANCE

Clean all shifter parts using only water and mild soap.

3.0 COMP / MRX COMP · TWIST SHIFTERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

MTB

3.0 COMP

		3.0 Comp				
Version		Shorty	Shorty	Shorty	Shorty	Shorty
Shifter Type		Front / Micro adjust	Front / Index	Rear 1:1 Actuation Ratio	Rear 1:1 Actuation Ratio	Rear 1:1 Actuation Ratio
Speeds			3	8	7	6
Compatibility	Derailleur	SRAM & Shimano	SRAM & Shimano	SRAM 1:1 Actuation Ratio	←	
Compatibility	Crankset	Triple Indexed	Triple Indexed			
Cable Pull Release		SRS	SRS	SRS	SRS	SRS
Cable		Standard Steel	←	←	←	←
Gear Indication		Printed	Printed	Printed	Printed	Printed
Barrel Adjuster		Friction	Friction	Friction	Friction	Friction
Clamping Diameter		22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm
Shifter Length		67 mm	←	←	←	←

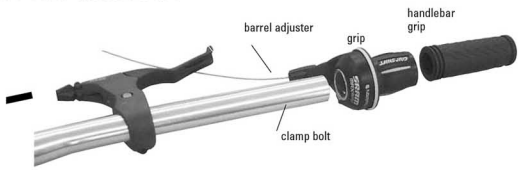
MRX COMP

		MRX Comp								
Version		Shorty	Shorty	Shorty	Shorty	Shorty	Shorty	Shorty	Shorty	
Shifter Type		Front / Micro adjust	Front / Index	Rear 2:1				Rear Shimano Rapid Rise		
Speeds			3	8	7	6	5	8	7	6
Compatibility	Derailleur	SRAM & Shimano	SRAM & Shimano	Shimano				Shimano Rapid Rise		
Compatibility	Crankset	Triple Indexed	Triple Indexed							
Cable Pull Release		SRS	SRS	SRS				SRS		
Cable		Standard Steel	←	←				←		
Gear Indication		Printed	Printed	Printed				Printed		
Barrel Adjuster		Friction	Friction	Friction				Friction		
Clamping Diameter		22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm				22.1 – 22.3 mm		
Shifter Length		67 mm	←	←				←		

CABLE HOUSING

- Use only new high quality cable and compressionless cable housing with end caps.
- When choosing cable housing lengths, be sure to allow enough housing for an extreme turn of the handlebars in both directions.
- Note also, that different stem lengths and cable stop positions effects cable housing length.

SHIFTER ANATOMY



3.0 COMP / MRX COMP · TWIST SHIFTERS
ASSEMBLY / MAINTENANCE

1



2



3



4



5



ASSEMBLY

- Slide the shifter onto the handlebar **(Fig. 1)**.
  – If necessary, move the brake lever to allow for shifter and stationary grip.
  – Bar end users – don't forget to leave room for the bar end.
- Rotate the shifter until the barrel adjuster is beneath (but out of the way of) the brake lever.
- Tighten the 2.5 mm hex clamp bolt **(Fig. 2)** to 1.7 Nm (15 in.lbs.).
- Slide the stationary grip onto the handlebar **(Fig. 3)**.
  Caution:
  Never use lubricants or solvents to install handlebar grips. Handlebar grips provide safety function.
  For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar!
- Feed the cable through the cable housing and stops.
- Attach the front/rear shifter cable to the front/rear derailleur.
- Adjust indexing per derailleur instructions.

Caution:
Not recommended for use on thin walled alluminum handlebars such as Hyperlite® type handlebars or Carbon handlebars.

Caution:
- **Always check the front and rear brake levers for proper operation.**
- **If there is interference between shifters and brake levers, re-adjust lever and shifter placement.**
- **Check again for proper operation!**

CABLE CHANGE

Advice:
- **Leave the shifter on the handlebar.**
- **No need to move other components. The shifter does not need to be opened.**
- **Use only new high quality cable and compressionless cable housing with endcaps.**

- Detach the cable from the derailleur.
- Cut the cable off 6" (15 cm) from the shifter barrel adjuster.
- Discard the old cable and cable housing.
- Line up the "1" (front) or HIGHEST gear number (rear) mark with the indicator mark (MRX Pro Shimano Rapid Rise® Gear number "1" for front and rear). Look for the cable entry.
- Push cable up/out of the shifter and discard **(Fig. 4)**.
- Feed the new cable through the cable entry and out the barrel adjuster **(Fig. 5)**.
- Pull the cable snug.
- Feed the cable through the new cable housing and stops.
- Attach the cable to the derailleur and adjust indexing per the derailleur instructions.

MAINTENANCE

Clean the shifter using only water and mild soap.

3.0 PLUS / 3.0 / MRX PLUS / MRX · TWIST SHIFTERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

MTB

3.0 PLUS & 3.0

		3.0 Plus Half Pipe / 3.0 Shorty			
	Version	3.0 Plus 3.0	3.0 Plus 3.0	3.0 Plus 3.0	3.0 Plus 3.0
	Shifter Type	Front / Micro adjust	Front / Index	Rear 1:1 Actuation Ratio	Rear 1:1 Actuation Ratio
	Speeds		3	8	7
Compatibility	Derailleur	SRAM & Shimano	SRAM & Shimano	SRAM 1:1 Actuation Ratio	SRAM 1:1 Actuation Ratio
Compatibility	Crankset	Triple Indexed	Triple Indexed		
	Cable Pull Release	FFS	FFS	Standard	Standard
	Cable	Die Drawn Steel	←	←	←
	Gear Indication	Printed	Printed	Printed	Printed
	Barrel Adjuster	Indexing	Indexing	Indexing	Indexing
	Clamping Diameter	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm
	Shifter Length	96 mm 64 mm	96 mm 64 mm	96 mm 64 mm	96 mm 64 mm

MRX PLUS

		MRX Plus Half Pipe			
	Version	Half Pipe	Half Pipe	Half Pipe	Half Pipe
	Shifter Type	Front / Micro adjust	Front / Index	Rear 2:1	Rear Shimano Rapid Rise
	Speeds		3	8 7	8 7
Compatibility	Derailleur	SRAM & Shimano	SRAM & Shimano	Shimano	Shimano Rapid Rise
Compatibility	Crankset	Triple Indexed	Triple Indexed		
	Cable Pull Release	FFS direct	FFS direct	Standard	Standard
	Cable	Die Drawn Steel	←	←	←
	Gear Indication	Printed	Printed	Printed	Printed
	Barrel Adjuster	Indexing	Indexing	Indexing	Indexing
	Clamping Diameter	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm
	Shifter Length	96 mm	←	←	←

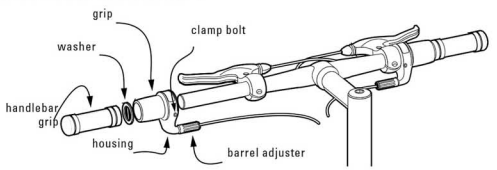
MRX

		MRX			
	Version	Shorty	Shorty	Shorty	Shorty
	Shifter Type	Front / Micro adjust	Front / Index	Rear 2:1	Rear Shimano Rapid Rise
	Speeds		3	8 7 6 5	8 7 6
Compatibility	Derailleur	SRAM & Shimano	SRAM & Shimano	Shimano	Shimano Rapid Rise
Compatibility	Crankset	Triple Indexed	Triple Indexed		
	Cable Pull Release	FFS	FFS	Standard	Standard
	Cable	Standard Steel			
	Gear Indication	Printed	Printed	Printed	Printed
	Barrel Adjuster	Indexing	Indexing	Indexing	Indexing
	Clamping Diameter	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm	22.1 – 22.3 mm
	Shifter Length	64 mm			

CABLE HOUSING

- Use only new high quality cable and compressionless cable housing with end caps.
- When choosing cable housing lengths, be sure to allow enough housing for an extreme turn of the handlebars in both directions.
- Note also, that different stem lengths and cable stop positions effects cable housing length.

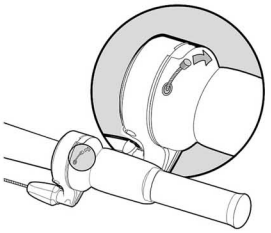
SHIFTER ANATOMY



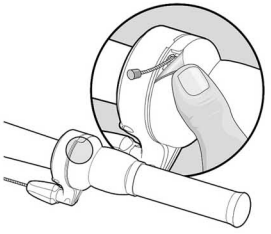
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3.0 PLUS / 3.0 / MRX PLUS / MRX · TWIST SHIFTERS
ASSEMBLY / MAINTENANCE

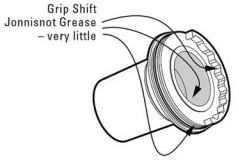
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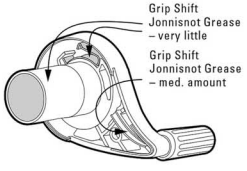


2



3





ASSEMBLY

Front and Rear:

- Slide the shifter onto the handlebar.
  - If necessary, move the brake lever to allow for shifter and handlebar grip.
  - Bar end users – don't forget to leave room for the bar end.
- Rotate the shifter until the barrel adjuster is beneath (but out of the way of) the brake lever.
- Tighten the 2.5 mm hex clamp bolt to 1.7 Nm (15 in.lbs.).
- Slide the plastic washer onto the handlebar.
- Slide the handlebar grip onto bar.
  Caution:
  Never use lubricants or solvents to install handlebar grips. Handlebar grips provide safety function.
  For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar!
- Feed the cable through the cable housing and frame stops.
- Attach cable to the derailleur.
- Adjust indexing per derailleur instructions.

Caution:
Not recommended for use on thin walled alluminum handlebars such as Hyperlite® type handlebars or Carbon handlebars.

Advice:
- **Always check the front and rear brake levers for proper operation.**
- **If there is interference between shifters and brake levers, re-adjust lever and shifter placement.**
- **Check again for proper operation!**

CABLE CHANGE

Advice:
- **Leave the shifter on the handlebar.**
- **No need to move other components. The shifter does not need to be opened.**
- **Use only new high quality cable and compressionless cable housing with endcaps.**

See Figure 1 (3.0 Plus / MRX Plus) or Figure 2 (3.0 / MRX)
- Detach the cable from the derailleur.
- Cut the cable off 15 cm (6") from shifter barrel adjuster. Discard old cable and cable housing.
- Rotate the shifter until the cable entry is visible.
- 3.0 / MRX only: Carefully peel back the corner of the grip cover shown in **Fig. 2**. Use your fingernail or a small screw-driver.
- Remove and discard the rest of the old cable.
- Feed the new cable through the cable entry in the grip and out through the barrel adjuster.
- Feed the cable through the new cable housing and stops.
- Attach the cable to the derailleur and adjust indexing per derailleur instruction.

MAINTENANCE

- **Clean all shifter parts using only water and mild soap.**
- **Use only Grip Shift Jonnisnot Grease for any shifter lubrication.**
- **After proper cleaning relubricate the areas shown in Fig. 3.**

CASSETTES · MTB / ROAD
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

PG 990 PG 980

		PG 990		PG 980	
	Application	MTB	MTB	MTB	MTB
	Technology	Power Glide II	Power Glide II	Power Glide II	Power Glide II
	Largest Cog	34 T	32 T	34 T	32 T
Compatibility	Speeds	9	9	9	9
Compatibility	Chains	SRAM / 9 speed index	SRAM / 9 speed index	SRAM / 9 speed index	SRAM / 9 speed index
Compatibility	Hubs	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG
Compatibility	Cogs	11/13/15/17/21/23/26/30/34	11/12/14/16/18/21/24/28/32	11/13/15/17/21/23/26/30/34	11/12/14/16/18/21/24/28/32
	Lockring torque	40 Nm	40 Nm	40 Nm	40 Nm
Design	Cogs	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel
Design	Spider	Aluminum, forged	Aluminum, forged	Aluminum	Aluminum
Design	Lockring	Aluminum, anodized	Aluminum, anodized	Chrome Plated, Satin	Chrome Plated, Satin
Design	Rivets	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Design	Finish	Pearl Ni-Chrome Plated	Pearl Ni-Chrome Plated	Pearl Ni-Chrome Plated	Pearl Ni-Chrome Plated

PG 970

		PG 970				
	Application	MTB	MTB	Road	Road	Road
	Technology	Power Glide II	Power Glide II	Power Glide II	Power Glide II	Power Glide II
	Largest Cog	34 T	32 T	26 T	23 T	23 T
Compatibility	Speeds	9	9	9	9	9
Compatibility	Chains	SRAM / 9 speed index	SRAM / 9 speed index	SRAM / 9 speed index	SRAM / 9 speed index	SRAM / 9 speed index
Compatibility	Hubs	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG
Compatibility	Cogs	11/13/15/17/20/23/26/30/34	11/12/14/16/18/21/24/28/32	12/13/14/15/17/19/21/23/26	12/13/14/15/16/17/19/21/23	11/12/13/14/15/17/19/21/23
	Lockring torque	40 Nm	40 Nm	40 Nm	40 Nm	40 Nm
	Weight	410 g	330 g	230 g	210 g	210 g
Design	Cogs	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel
Design	Lockring	Chrome Plated, Satin	Chrome Plated, Satin	Aluminum, anodized	Aluminum, anodized	Aluminum, anodized
Design	Screws	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat
Design	Finish	Chrome Plated, Satin	Chrome Plated, Satin	Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated

PG 970 PG 950

		PG 970	PG 950			
	Application	Road	MTB	MTB	Road	Road
	Technology	Power Glide II	Power Glide II	Power Glide II	Power Glide II	Power Glide II
	Largest Cog	21 T	34 T	32 T	26 T	26 T
Compatibility	Speeds	9	9	9	9	9
Compatibility	Chains	SRAM / 9 speed index	SRAM / 9 speed index	SRAM / 9 speed index	SRAM / 9 speed index	SRAM / 9 speed index
Compatibility	Hubs	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG
Compatibility	Cogs	11/12/13/14/15/16/17/19/21	11/13/15/17/20/23/26/30/34	11/12/14/16/18/21/24/28/32	12/13/14/15/17/19/21/23/26	11/12/13/15/17/19/21/23/26
	Lockring torque	40 Nm	40 Nm	40 Nm	40 Nm	40 Nm
Design	Cogs	SAPH 440 steel	Steel	Steel	SAPH 440 steel	SAPH 440 steel
Design	Lockring	Aluminum, anodized	Forged Steel	Forged Steel	Forged Steel	Forged Steel
Design	Screw	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat
Design	Finish	Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated

PG 950

		PG 950	
	Application	Road	Road
	Technology	Power Glide II	Power Glide II
	Largest Cog	28 T	23 T
Compatibility	Speeds	9	9
Compatibility	Chains	SRAM / 9 speed index	SRAM / 9 speed index
Compatibility	Hubs	9 / 8 speed HG	9 / 8 speed HG
Compatibility	Cogs	11/12/13/14/16/18/21/24/28	12/13/14/15/16/17/19/21/23
Compatibility	Lockring torque	40 Nm	40 Nm
	Weight	249 g	220 g
Design	Cogs	SAPH 440 steel	SAPH 440 steel
Design	Lockring	Forged Steel	Forged Steel
Design	Screw	Steel / Zinc Coat	Steel / Zinc Coat
Design	Finish	Ni-Chrome Plated	Ni-Chrome Plated

PG 850

		PG 850				
	Application	MTB	MTB	MTB	Road	Road
	Technology	Power Glide II	Power Glide II	Power Glide II	Power Glide II	Power Glide II
	Largest Cog	32 T	30 T	28 T	26 T	23 T
Compatibility	Speeds	8	8	8	8	8
Compatibility	Chains	SRAM / 8 speed index	SRAM / 8 speed index	SRAM / 8 speed index	SRAM / 8 speed index	SRAM / 8 speed index
Compatibility	Hubs	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG
Compatibility	Cogs	11/12/14/16/18/21/26/32	11/13/15/17/20/23/26/30	11/12/14/16/18/21/24/28	12/13/15/17/19/21/23/26	12/13/14/15/17/19/21/23
Compatibility	Lockring torque	40 Nm	40 Nm	40 Nm	40 Nm	40 Nm
Design	Cogs	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel
Design	Lockring	Forged Steel	Forged Steel	Forged Steel	Forged Steel	Forged Steel
Design	Screw	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat
Design	Finish	Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated

PG 830 / PG 730

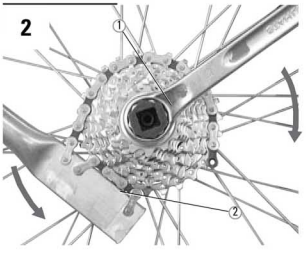
		PG 830			PG 730
	Application	MTB	MTB	MTB	MTB
	Technology	Power Glide II	Power Glide II	Power Glide II	Power Glide II
	Largest Cog	32 T	30 T	28T	32T
Compatibility	Speeds	8	8	8	7
Compatibility	Chains	SRAM / 8 speed index	SRAM / 8 speed index	SRAM / 8 speed index	SRAM / 7 speed index
Compatibility	Hubs	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG	7 speed HG
Compatibility	Cogs	11/12/14/16/18/21/26/32	11/13/15/17/20/23/26/30	11/12/14/16/18/21/24/28	12/14/16/18/21/26/32
Compatibility	Lockring torque	40 Nm	40 Nm	40 Nm	40 Nm
Design	Cogs	Steel	Steel	Steel	Steel
Design	Lockring	Forged Steel	Forged Steel	Forged Steel	Forged Steel
Design	Screw	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / black Zinc Coat
Design	Finish	Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated

CASSETTES · MTB / ROAD
ASSEMBLY

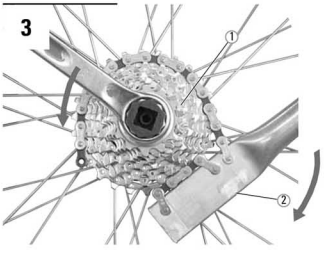
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2



3



ASSEMBLY

- Position the cassette cluster and individuel sprockets on the cassette body by aligning the spline pattern **(Fig. 1)**.
- Screw the lockring in to the cassette body and tighten it to 40 Nm (350 in.lbs.) by using a cassette tool (1, **Fig. 2)** like the Park Tool® FR-5 or Shimano® and a chain wrench (2).
- Adjust the rear derailleur according to the installation advice from the derailleur manufacturer.

Advice:
Due to the optimized stability of the rear wheel, there is less space between the right spoke flange and the sprocket cassette. This means that not all spoke protector discs available on the market will fit. Please carry out a trial assembly run before specifying spoke protector discs (spoke protector discs must not rub against the sprocket cassette).

MAINTENANCE

Advice:

- **The only maintenance necessary on the cassette is to replace worn sprockets.**
- **If the chain jumps repeatedly on a sprocket with correct derailleur setting it might be sufficient to replace only the chain.**
  If the new chain also jumps on the sprocket the sprocket is worn out and should be replaced.
- **Always put on a new chain when you replace worn sprockets.**

To replace the sprocket do as follows:

- Remove the lockring by using cassette tool (1, **Fig. 3)** and a chain wrench (2) to hold the cassette.
- Disassemble the sprocket cluster by unscrewing the small bolt on the backside of the cassette.
- Replace worn or damaged sprocket and re-assemble sprockets and spacers in the correct order and re-install the bolt.
- Make sure that all the splines on the cogs are aligned to each other and the cassette body pattern.
- Tighten the cassette with 40 Nm (350 in.lbs.) (see **ASSEMBLY**).

POWER CHAINS · MTB / ROAD
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

MTB

POWER CHAINS

		PC 991	PC 991 Hollow Pin	PC 991 Cross Step	PC 971	PC 951
	Application	MTB / Road	MTB / Road	MTB / Road	MTB / Road	MTB / Road
	Max. No. of sprockets	9 only	9 only	9 only	9 only	9 only
	Compatibility Front	Truvativ / HG / EXA-Drive	Truvativ / HG / EXA-Drive	Truvativ / HG / EXA-Drive	Truvativ / HG / EXA-Drive	Truvativ / HG / EXA-Drive
	Compatibility Rear	HG / PG / EXA-Drive	HG / PG / EXA-Drive	HG / PG / EXA-Drive	HG / PG / EXA-Drive	HG / PG / EXA-Drive
	Dimension	$^1/_2$" x $^{11}/_{128}$"	$^1/_2$" x $^{11}/_{128}$"	$^1/_2$" x $^{11}/_{128}$"	$^1/_2$" x $^{11}/_{128}$"	$^1/_2$" x $^{11}/_{128}$"
Pin	Length	6.65 mm	6.35 mm	6.65 mm	6.65 mm	6.65 mm
Pin	Riveting	Step	Cylindrical	Cross Step	Step	Step
Pin	Chrome Hardened	Yes	Yes	Yes	Yes	Yes
Pin	Push Power	2000 N / 450 lbs.	2000 N / 450 lbs.	2500 N / 562 lbs.	2000 N / 450 lbs.	2000 N / 450 lbs.
	Min. Tensile Strength	9000 N / 2023 lbs.	9000 N / 2023 lbs.	9000 N / 2023 lbs.	9000 N / 2023 lbs.	9000 N / 2023 lbs.
Design	External Pin Plate	Nickel Plated	Nickel Plated	Nickel Plated	Nickel Plated	Grey
Design	Internal Pin Plate	Nickel Plated	Nickel Plated	Nickel Plated	Grey	Grey
Design	Connecting Method [1]	Power Link Gold or Pin	Power Link Gold	Power Link Gold	Power Link Gold or Pin	Power Link Gold or Pin

[1] Caution: Hollow Pin and Cross Step chains connecting method: with Power Link only (no pin)!

POWER CHAINS

		PC 890	PC 870	PC 850	PC 830 Saltshaker	PC 830
	Application	MTB / Road	MTB / Road	MTB / Road	MTB / Road	MTB / Road
	Max. No. of sprockets	max. 8	max. 8	max. 8	max. 8	max. 8
	Compatibility Front	HG / IG / PG / EXA-Drive	HG / IG / PG / EXA-Drive	HG / IG / PG / EXA-Drive	HG / IG / EXA-Drive	HG / IG / EXA-Drive
	Compatibility Rear	HG/HG-I/IG/PG/EXA-Drive	HG/HG-I/IG/PG/EXA-Drive	HG/HG-I/IG/PG/EXA-Drive	HG/HG-I/IG/PG/EXA-Drive	HG/HG-I/IG/PG/EXA-Drive
	Dimension	$^1/_2$" x $^3/_{32}$"	$^1/_2$" x $^3/_{32}$"	$^1/_2$" x $^3/_{32}$"	$^1/_2$" x $^3/_{32}$"	$^1/_2$" x $^3/_{32}$"
Pin	Length	7.0 mm	7.0 mm	7.0 mm	7.0 mm	7.0 mm
Pin	Riveting	Step	Step	Step	Step	Step
Pin	Chrome Hardened	Yes	Yes	Yes	No	No
Pin	Push Power	2000 N / 450 lbs.	2000 N / 450 lbs.	2000 N / 450 lbs.	1300 N / 292 lbs.	1500 N / 340 lbs.
	Min. Tensile Strength	9000 N / 2023 lbs.	9000 N / 2023 lbs.	9000 N / 2023 lbs.	9000 N / 2023 lbs.	9000 N / 2023 lbs.
Design	External Pin Plate	Silver / Nickel Plated	Silver / Nickel Plated	Grey / Polished	Light Grey	Grey / Polished
Design	Internal Pin Plate	Silver / Nickel Plated	Grey / Polished	Grey / Polished	Light Grey	Grey / Polished
Design	Connecting Method	Power Link Silver	Power Link Silver or Pin	Power Link Silver or Pin	Power Link SS2 oder Pin	Power Link Silver or Pin

POWER CHAINS · MTB / ROAD
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

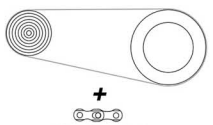
POWER CHAINS

		PC 10 Saltshaker	PC 10	PC 10C
	Application	MTB	MTB	MTB
	Max. No. of sprockets	max. 7	max. 7	max. 7
	Compatibility Front	Single / HG	Single / HG	Single / HG
	Compatibility Rear	Single / HG	Single / HG	Single / HG
	Dimension	1/2" x 3/32"	1/2" x 3/32"	1/2" x 3/32"
Pin	Length	6.9 mm	6.9 mm	7.1 mm
Pin	Riveting	Step	Step	Step
Pin	Chrome Hardened	No	No	No
Pin	Push Power	1000 N / 225 lbs.	1000 N / 225 lbs.	1000 N / 225 lbs.
	Min. Tensile Strength	9000 N / 2023 lbs.	9000 N / 2023 lbs.	9000 N / 2023 lbs.
Design	External Pin Plate	Light Grey	Brown	Light Grey
Design	Internal Pin Plate	Light Grey	Brown	Light Grey
Design	Connecting Method	Power Link SS1 or Pin	Power Link Grey or Pin	Pin only

POWER CHAINS

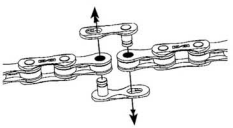
		PC 1 Saltshaker	PC 1 Ni	PC 1
	Application	Gear Hubs	Gear Hubs	Gear Hubs
	Max. No. of sprockets	1	1	1
	Compatibility Front	Single	Single	Single
	Compatibility Rear	Single	Single	Single
	Dimension	1/2" x 1/8"	1/2" x 1/8"	1/2" x 1/8"
Pin	Length	7.8 mm	7.8 mm	8.9 mm
Pin	Riveting	Step	Step	V shape
Pin	Chrome Hardened	No	No	No
Pin	Push Power	800 N / 180 lbs.	800 N / 180 lbs.	800 N / 180 lbs.
	Min. Tensile Strength	9000 N / 2023 lbs.	9000 N / 2023 lbs.	9000 N / 2023 lbs.
Design	External Pin Plate	Light Grey	Silver / Nickel Plated	Brown
Design	Internal Pin Plate	Light Grey	Silver / Nickel Plated	Brown
Design	Connecting Method	Snap Lock or Pin	Snap Lock, 3pcs Connection Link or Pin	

1

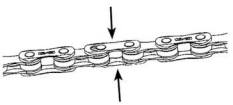


(1 Link + Power Lock)

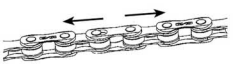
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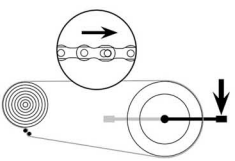
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4



5



6



(2 links)

PC 1090R / PC 1090 / PC 1070 / PC 1050 / PC 1030 ($^{1}/_{2}$" x $^{11}/_{128}$")

Chain length:
(A chain tool will be required to shorten the chain.)
- Replacing a worn chain:
  Measure the worn chain and shorten the new to the same length.
- Initial assembly:
  Shorten the chain to the length specified by the derailleur manufacturer.
  SRAM derailleurs:
  place the chain over largest front chainwheel and largest rear sprocket and add 1 link + Power Lock **(Fig.1)**.

Closing chain with Power Lock:
Caution:
- **Use Power Lock only with SRAM chains!**
- **Use only Power Lock to close 10 speed chains (no Pin)!**
- **Use only Power Lock (black coloured) for PC 1090R, PC 1090, PC 1070, PC 1050, PC 1030 to avoid material damage or the rider to fall off his bicycle resulting in injury.**

- Fit chain, insert both halves of the Power Lock into the chain ends **(Fig. 2)** and bring the ends together **(Fig. 3)** on the bottom side of the drivetrain (no tension side).
- Pull chain apart until you feel some resistance **(Fig. 4)**.
- Rotate the chain so the Power Lock is positioned on the top side of the drivetrain **(Fig. 5)**.
- Pedal forward while holding bike firmly in place **(Fig. 5)** until you hear click sound. The Power Lock is now on its place and safely closed.

Opening:
Once the Power Lock is installed it can only be removed by means of a Chain tool.

Caution:
- **Power Lock is for one-time use only!**
- **Always use a new Power Lock when fitting a new chain.**
- **Failure to shorten the chain properly or to lock it exactly into place may cause damage to the chain and eventually total chain failure, material damage or the rider to fall off his bicycle resulting in injury.**
- **Worn sprockets should also be replaced when a new chain is fitted.**

PC 991 / PC 971 / PC 951 / PC 890 / PC 870 / PC 850 / PC 830 / PC 10 ($^{1}/_{2}$" x $^{3}/_{32}$" AND $^{1}/_{2}$" x $^{11}/_{128}$")

Chain length:
(A chain tool will be required to shorten the chain.)
- Replacing a worn chain:
  Measure the worn chain and shorten the new to the same length.
- Initial assembly:
  Shorten the chain to the length specified by the derailleur manufacturer.
  SRAM derailleurs:
  - Place the chain over largest front chainwheel and largest rear sprocket (Fig. 6). For rear suspension frame, position the rear suspension for the greatest chain length required.
  - Add 2 links or 1 link + Power Link **(Fig. 6)**.

Closing chain with Power Link:
Caution:
- **Use Power Link only with SRAM chains!**
- **Use only Power Link to close Hollow Pin chains and Cross Step chains (no Pin)!**
- **Use only as specified, to avoid material damage or the rider to fall off his bicycle resulting in injury:**

Power Link Gold (gold coloured):
for PC 991 Hollow Pin, PC 991 Cross Step, PC 991, PC 971, PC951
Power Link Silver (silver coloured):
for PC 890, PC 870, PC 850, PC 830
Power Link SS2 (light grey coloured):
für PC 830 Saltshaker
Power Link SS1 (light grey coloured):
für PC 10 Saltshaker
Power Link Grey (grey coloured):
for PC 10

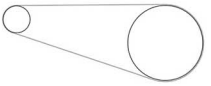
Closing:
- Fit chain, bring the ends together and insert both halves of the Power Link into the chain ends. **(Fig. 2)**
- Press both halves of the Power Link together (Fig. 3) and lock in place by pulling the chain apart. **(Fig. 4)**

Opening:
Press both plates of the Power Link together **(Fig. 3)** while sliding the chain ends together (unlock). Remove the two halves of the link from the chain ends.

Caution:
- **Always use a new Power Link when fitting a new chain.**
- **Failure to shorten the chain properly or to lock it exactly into place may cause damage to the chain and eventually total chain failure, material damage or the rider to fall off his bicycle resulting in injury.**
- **Worn sprockets should also be replaced when a new chain is fitted.**

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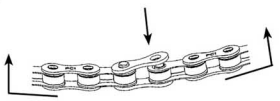
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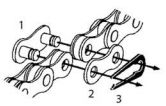
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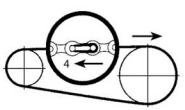
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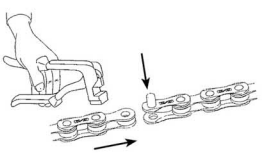
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11



12



Closing standard version with clamping pin:
Fit chain, bring the two ends together and press pin through with assembly tool **(Fig. 12). The pin must extend by the same amount at both outer plates. It must be possible to move the connecting link slightly.**

PC 1
($^1/_2$" x $^1/_8$")

Chain length:
(A chain tool will be required to shorten the chain.)

- Replacing a worn chain:
  Measure the worn chain and shorten the new to the same length.
- Initial assembly:
  Shorten the chain to the length specified by the drivetrain manufacturer.
  SRAM components:
  Place the chain over front chainwheel and rear sprocket **(Fig. 7)**. For rear suspension frame, position the rear suspension for the greatest chain length required.

Closing chain with Snap Lock:
Caution:
Use Snap Lock only with SRAM chains!

- Fit the shortened chain, bring the ends together and connect with the Snap Lock. Place the outer plate on one pin **(Fig. 8)**.
- Gently flex the chain until the outside connector plate snaps into position over the second pin **(Fig. 9)**.

Caution:

- **Make sure plate is fully seated in the pin channel and plates are parallel to each other.**
- **If movement of the connector plate is noticed a new Snap Lock must be used.**
- **Snap Lock is for one-time use only!**
- **Always use a new Snap Lock when fitting a new chain.**
- **Failure to shorten the chain properly or to lock it exactly into place may cause damage to the chain and eventually total chain failure, material damage or the rider to fall off his bicycle resulting in injury.**
- **Worn sprockets should also be replaced when a new chain is fitted.**

Closing chain with 3pcs Connection Link:

- Fit the shortened chain, bring the two ends together and connect with the chain lock. The chain lock consists of an outer plate with pins (1, **Fig. 10**), an outer plate (2) and a retaining spring (3).
- Insert outer plate with pins (1) into the chain ends, attach outer plate (2) and press chain lock together (1+2).
- Attach retaining spring (3) with the closed end of the retaining ring pointing in the direction of chain travel **(Fig. 10)**.
- Slide retaining spring in the direction of arrow (4, **Fig. 11**) to engage it in the grooves in the pins.

Closing standard version with clamping pin:
Fit chain, bring the two ends together and press pin **(Fig. 12)** through with assembly tool. **The pin must extend by the same amount at both outer plates. It must be possible to move the connecting link slightly.**

MAINTENANCE / CARE

- Clean dirty chains before oiling. Do not use any acidic agents. Cleaning agent must be rinsed off after a few minutes with water. Apply oil after chain is completely dried.
- Regular lubrication will extend the chain's service life. Apply oil to the chain links rollers and allow to work in.

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