

2008

**NEW TECH. SPECIFICATIONS
ROAD / MTB COMPONENTS**

ENGLISH



SRAM®



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MTB COMPONENTS

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RED / FORCE / RIVAL · REAR DERAILLEURS

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

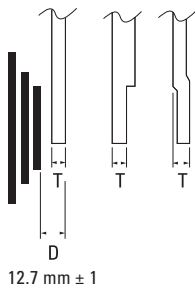


NEW

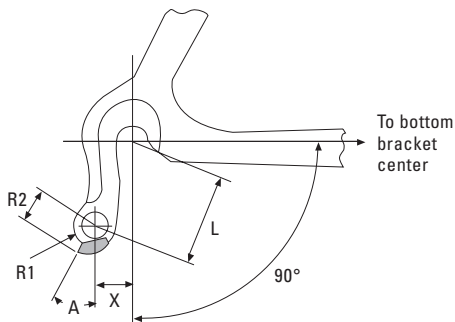
RED
FORCE
RIVAL

	Red	Force	Rival
Speeds	10	10	10
Shifter Compatibility	SRAM Double Tap shifters (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		
Chain Capacity			
Total	31 T	31 T	31 T
Max Sprocket	28 T	28 T	28 T
Min Sprocket	11 T	11 T	11 T
Front Difference	16 T	16 T	16 T
Parallelogram Spring	Titanium	Steel	Steel
Pulleys	Ceramic cartridge bearing	Cartridge bearing	Cartridge bearing
Direct Mount	Yes	Yes	Yes
Weight	158 g	176 g	186 g
Design			
B-Knuckle	Forged Aluminum	Aluminum	Aluminum
Outer Link	Forged Aluminum	Aluminum	Aluminum
Inner Link	Carbon	Magnesium	Aluminum
Outer Cage	Carbon	Carbon	Aluminum
Inner Cage	Carbon	Aluminum	Aluminum
Hanger Bolt	Aluminum	Aluminum	Aluminum

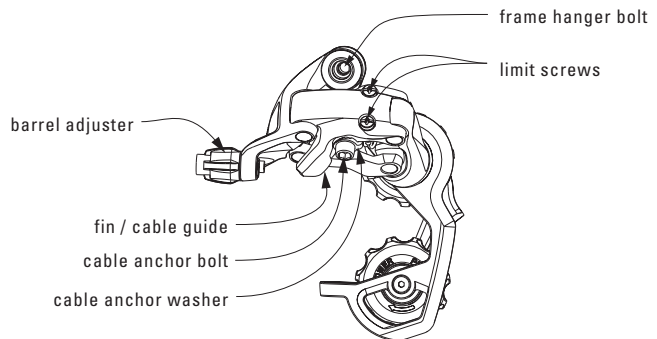
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2



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.

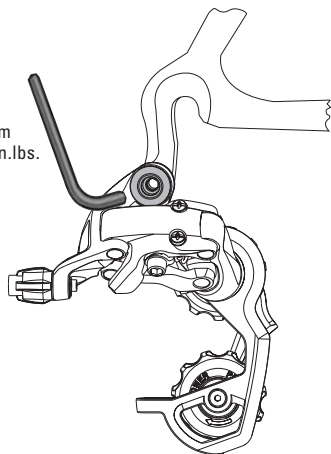
L	X	A	R1	R2	T
26	6 – 10	30° – 35°	8.5 max	11.5 – 12.5	7 – 8
28	8 – 10	30° – 35°	8.5 max	11.5 – 12.5	7 – 8

Chainstay length ≥ 405 mm

RED / FORCE / RIVAL • REAR DERAILLEURS ASSEMBLY

1

5 mm
8 – 10 Nm
70 – 85 in.lbs.



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

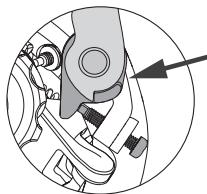
Chain gap is the distance between the upper guide pulley and the cog the chain is riding on. Optimal chain gap is small enough to allow quick, efficient shifts to and from any cog, but large enough to allow smooth shifts to and from the largest cog.

- 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.

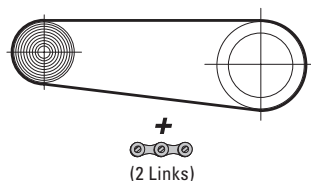
Advice:

- **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.**

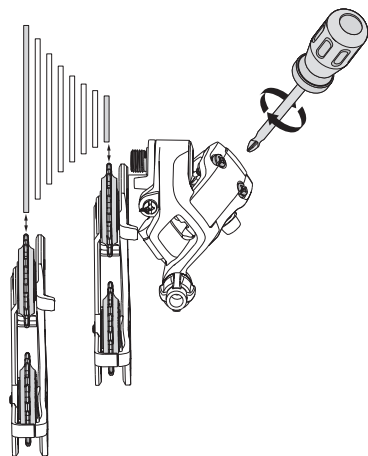
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3



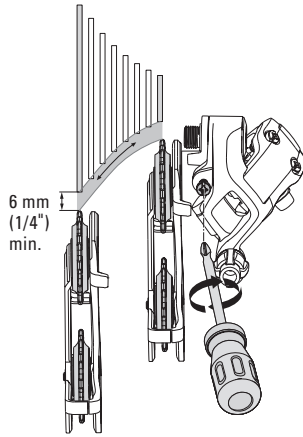
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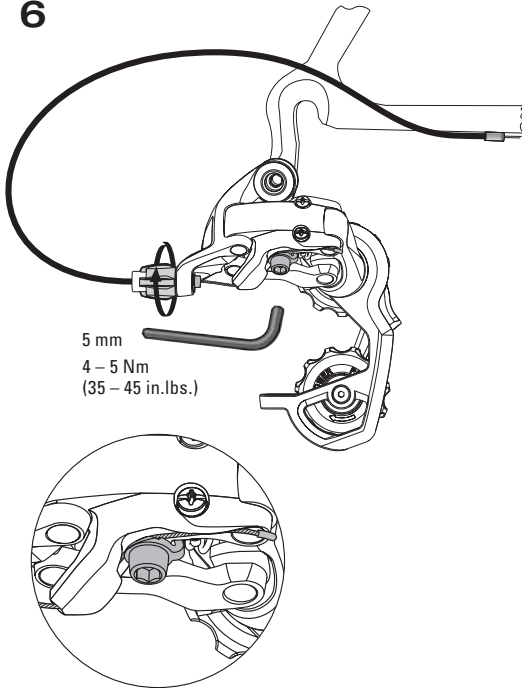
RED / FORCE / RIVAL • REAR DERAILLEURS ASSEMBLY



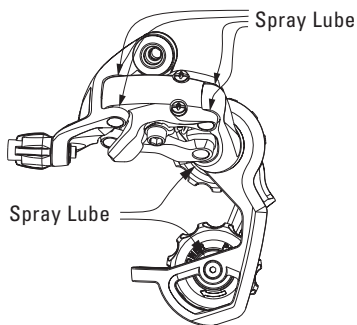
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6



7



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.

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

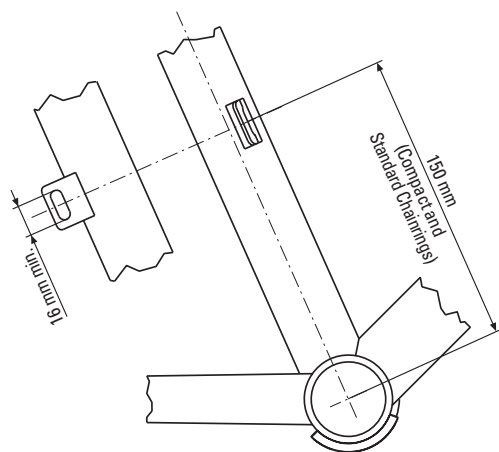
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

NEW

**RED
FORCE
RIVAL**

	Red	Force	Rival	
Clamp	Braze-on	Yes	Yes	
	31.8 mm	with band adaptor	Yes	
	34.9 mm	with band adaptor	Yes	
Compatibility	Rear Compatibility	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			
Design	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
	Weight	Braze-on: 58 g / 31.8 mm: N/A / 34.9 mm: NA	Braze-on: 88 g / 31.8 mm: 102 g / 34.9 mm: 103 g	Braze-on: 88 g / 31.8 mm: 102 g / 34.9 mm: 103 g
	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

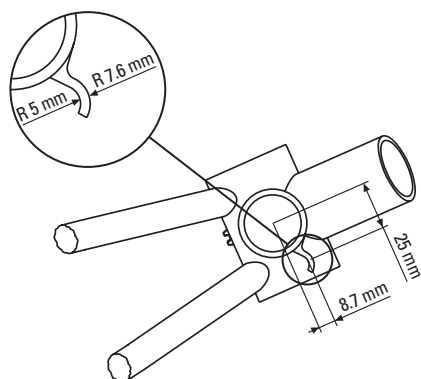
1



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.

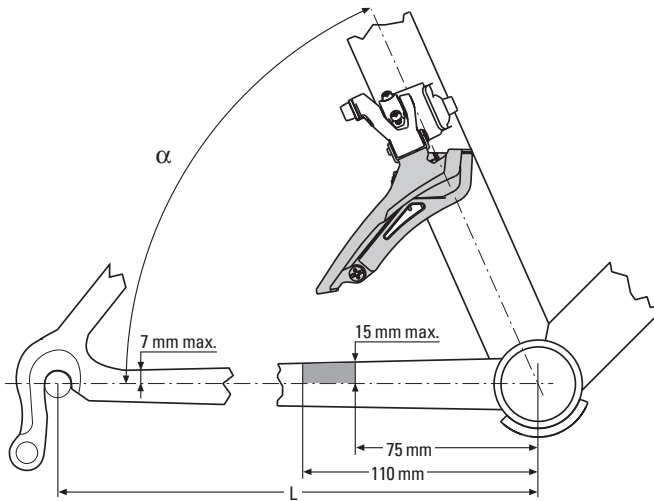


RED / FORCE / RIVAL · FRONT DERAILLEURS

TECHNICAL DATA / ASSEMBLY REQUIREMENTS



2



FRAME DIMENSIONS

(see Fig. 2)

The seat tube should be positioned in the center of the bottom bracket shell.

Length of chainstay:

- Road L > 405 mm.
- Rear frame alignment must be symmetrical.

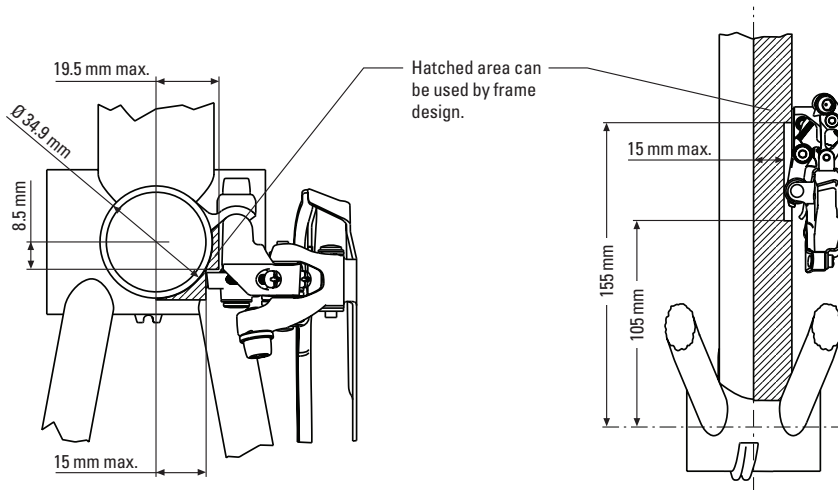
Chainstay angle:

$\alpha = 61^\circ - 66^\circ$.

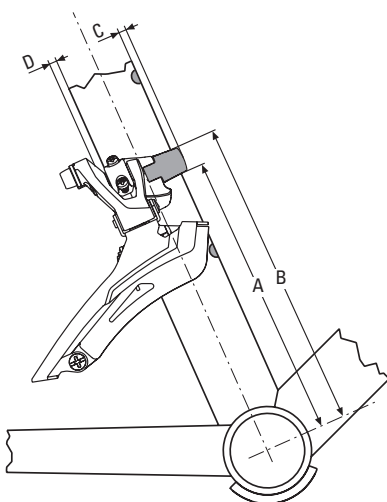
Chainline:

44.5 mm.

(Measurement from the center of the bracket to the center of the two chainrings.)



3



NECESSARY CLEARANCE FOR CLAMP VERSION

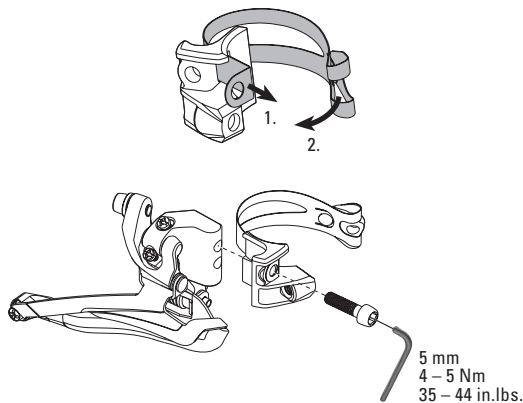
(see Fig. 3)

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

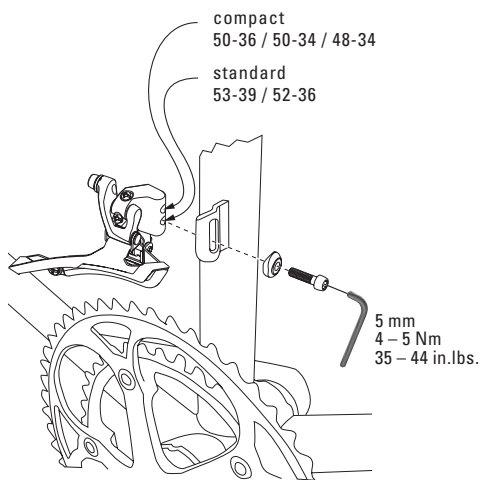
Necessary clearance see Fig. 2					
Large Chainring		48 T	50 T	52 T	53 T
Clamp band position	A	135 mm	139 mm	143 mm	145 mm
	B	152 mm	156 mm	160 mm	162 mm
Clamp version		Red	Force / Rival		
Necessary clearance	C	9 mm	4 mm		
	D	1 mm	4 mm		

RED / FORCE / RIVAL • FRONT DERAILLEURS ASSEMBLY

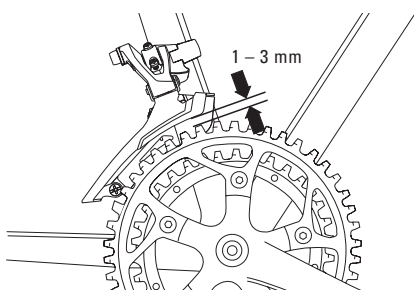
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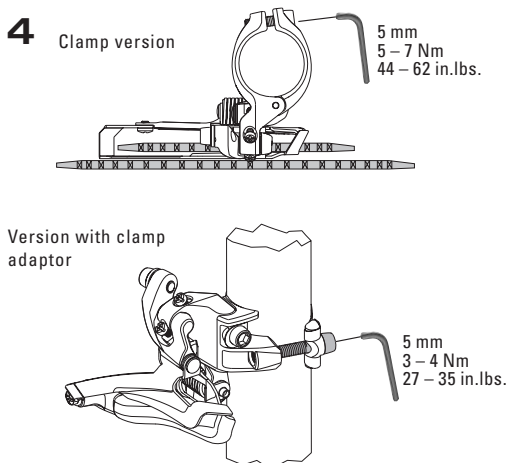
2



3



4



ASSEMBLY

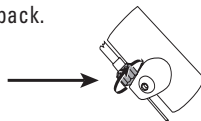
- Only version Red: Mount the front derailleur to the clamp adaptor. Tighten the 5 mm hex clamp bolt to 4 – 5 Nm (35 – 44 in.lbs.) (**Fig. 1**).
- Attach the front derailleur to the seat tube. Direct mount version (see **Figure 2**): use upper thread for compact chainrings (50-36 / 50-34 / 48-34) or lower thread for standard chainrings (53-39 / 52-36).
- 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**).
- Tighten the 5 mm hex clamp bolt to 4 – 5 Nm (35 – 44 in.lbs.) for direct mount version or 3 – 4 Nm (27 – 35 in.lbs.) for version with band adaptor or 5 – 7 Nm (44 – 62 in.lbs.) for clamp version.

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.

INDEX SHIFTING ADJUSTMENT

(see Fig. 8)

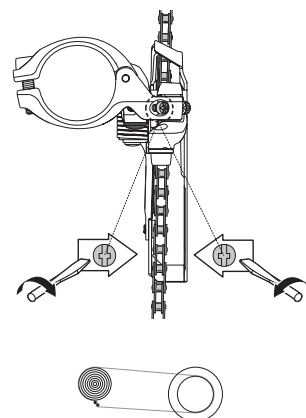
Version Red:

Shift the chain onto the biggest rear sprocket and big 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.

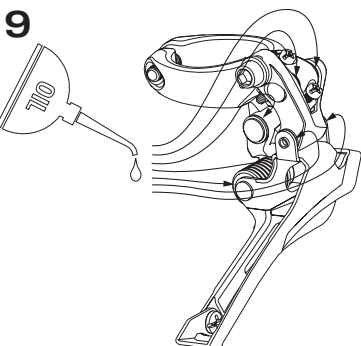
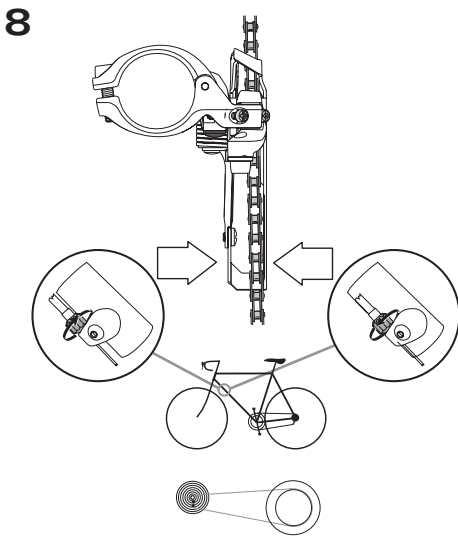
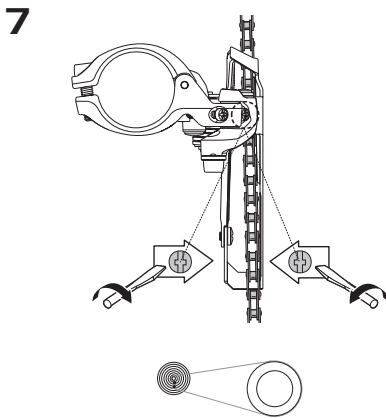
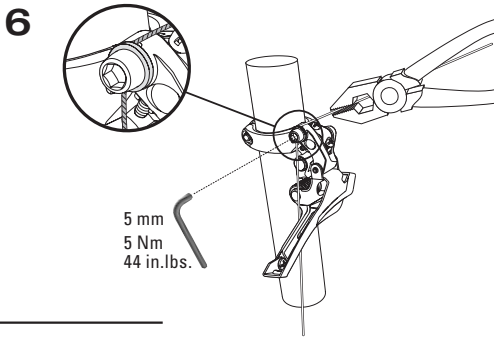
Versions Force / Rival:

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.

5



RED / FORCE / RIVAL · FRONT DERAILLEURS ASSEMBLY



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.
	High gear limit screw incorrectly adjusted.	Correct high limit screw.
Crank collides with front derailleur.	Cage not parallel with chainring.	Correct the front derailleur position.

RED / FORCE / RIVAL · DOUBLE TAP SHIFTERS

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

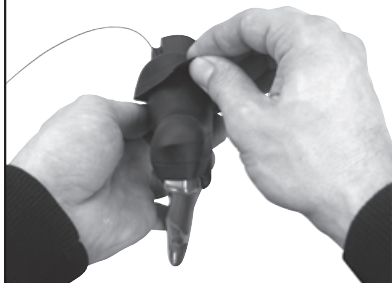
RED
FORCE
RIVAL

	Red		Force		Rival	
	Double Tap Shifter	Double Tap Shifter	Double Tap Shifter	Double Tap Shifter	Double Tap Shifter	Double Tap Shifter
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
Deraileur	SRAM Red / Force / Rival		←	←	←	←
Crankset	SRAM Red / Force / Rival		←	←	←	←
Brakes	SRAM Red / Force / Rival Dual Pivot Road calipers, Avid Shorty 4/6 cantilevers, Avid BB7 Road and most common Road caliper brakes					
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					
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	Teflon Coat. Stainl. Steel	Teflon Coat. Stainl. Steel	Teflon Coat. Stainl. Steel	Teflon 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
Weight	280 g	280 g	303 g	303 g	340 g	340 g

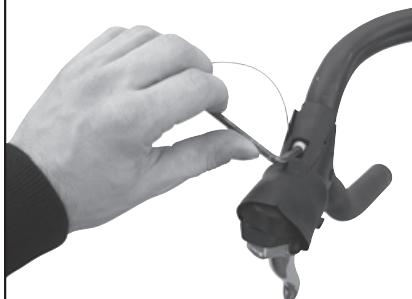
RED / FORCE / RIVAL · DOUBLE TAP SHIFTERS

ASSEMBLY

1



2



5 mm
6 – 8 Nm
53 – 70 in.lbs.

ASSEMBLY

- 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 (*Fig. 3*). It may be helpful to use a pick. There is no need to disassemble the shifter.
- Replace hood cover.
- Attach the front/rear shifter cable to the front/rear deraileur and adjust indexing per deraileur 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.

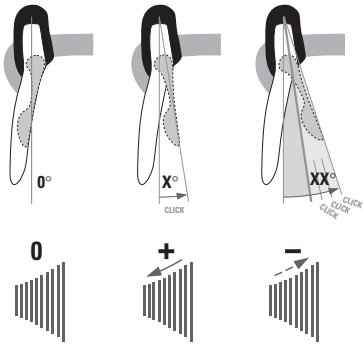
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RED / FORCE / RIVAL · DOUBLE TAP SHIFTERS USE



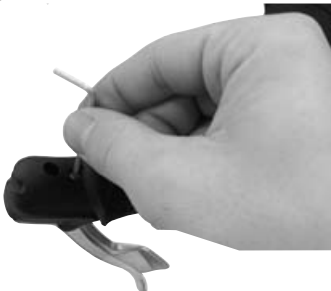
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2



3



4



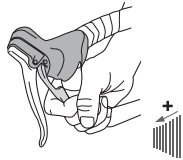
USE

SHIFTER

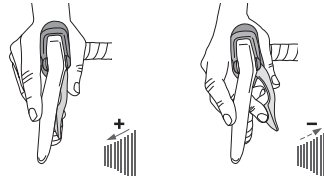
- Move the small shift lever inward slightly and an upshift to a harder (higher) gear is initiated (**Fig. 1**). Push the same lever farther inward and you're shifting up to three shifts to easier (lower) gears (**Fig. 1**).

The shifters also offer specific operations:

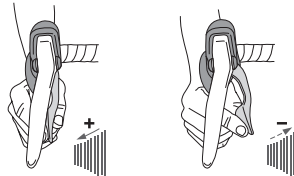
- Upsifting while sprinting:



- Shifting from the hoods:



- Shifting from the drops:



- The left hand shifter offers a trim function for the front derailleur to allow the chain running smoothly 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.

BRAKE LEVER

Caution:

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

REACH ADJUST

Brake lever (**Fig. 3**):

- Flip hood cover by hand.

- Use the small hex clamp bolt (2 mm) to set the reach adjust of the brake lever.

Caution:

After any change on the reach adjust of the brake lever always re-adjust the shift lever to avoid interference between the two levers.

Shift lever (**Fig. 4**):

Pull the shift lever toward the handlebar. While pushing turn the cam plate to set the reach adjust. It may be helpful to use a pick.

Caution:

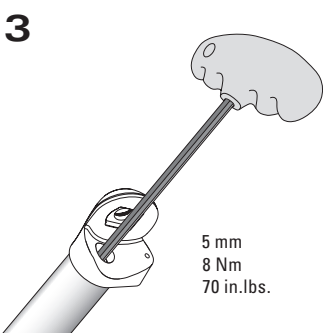
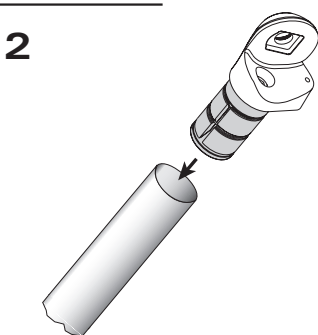
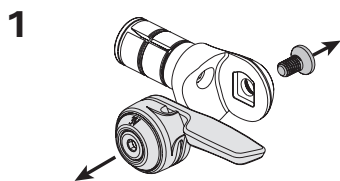
Always check the front and rear brake levers for proper operation!

TT SHIFTERS

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

TT SHIFTER	Compatibility	TT Shifter		
		Version	Time Trial Shifter	Time Trial Shifter
		Shifter Type	Front (Friction)	Rear (Index)
		Speeds	2	10
		Derailleur	SRAM Red / Force / Rival	SRAM Red / Force / Rival
		Crankset	SRAM Red / Force / Rival	SRAM Red / Force / Rival
		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	
		Brake Cable	1.6 mm high quality brake cable with road-style cable end and brake cable housing with end caps	
		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
		Weight	138 g	138 g

TT SHIFTERS ASSEMBLY



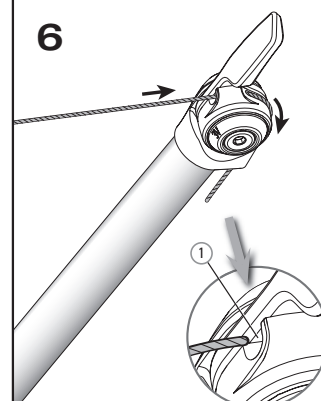
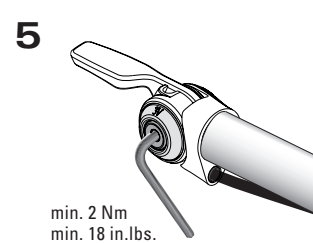
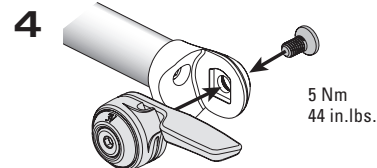
ASSEMBLY

- 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.



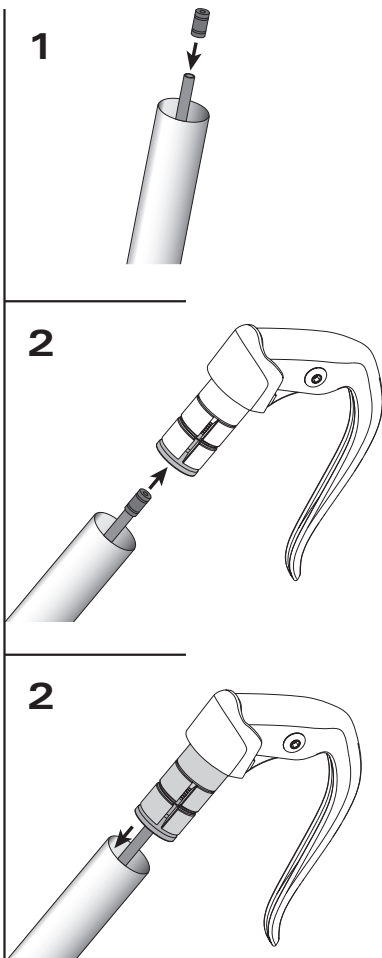
TT BRAKE LEVERS

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

**TT
BRAKE
LEVER**

		TT Brake Lever	
Compatibili.	Version	Time Trial Brake Lever	Time Trial Brake Lever
	Brake Lever	Left	Right
	Lever Size	5-finger	5-finger
	Brake compatibility	SRAM Red / Force / Rival Dual Pivot Road calipers, Avid Shorty 4/6 cantilevers, Avid BB7 Road and most common Road caliper brakes	
	Bar Inner Diameter	19.2 – 22.5 mm / Minimum depth 39 mm	
Design	Reach Adjust	No	No
	Pivot Bushing	POM	POM
	Weight	99 g	99 g
	Housing	Grilon Composite	Grilon Composite
	Lever	Carbon Comp.	Carbon Comp.

TT BRAKE LEVERS ASSEMBLY

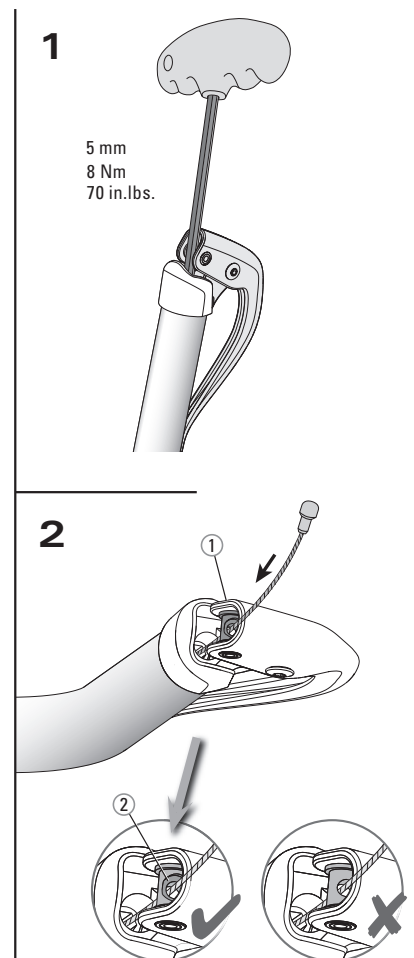


ASSEMBLY

- 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.**

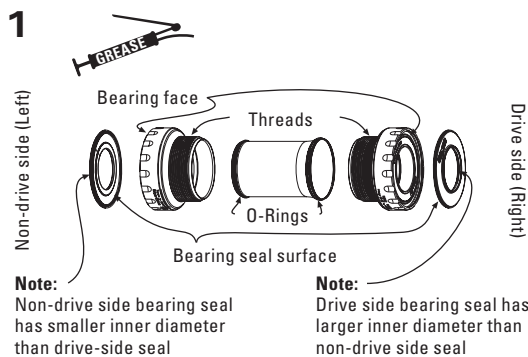


RED / FORCE / RIVAL · CRANKSETS W. GXP BOTTOM BRACKET TECHNICAL DATA / ASSEMBLY REQUIREMENTS

RED FORCE RIVAL	Compatibility	Red	Red Compact	Force	Force Compact	Rival	Rival Compact	
		BB Type	GXP External Bearing ←		GXP External Bearing ←		GXP External Bearing ←	
		BB Thread	BSA or Italian ←		BSA or Italian ←		BSA or Italian ←	
		Bolt Circle Diam.	130 mm	110 mm	130 mm	110 mm	130 mm	110 mm
		Chaining 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
		Chains	Only compat. with SRAM 10 speed chains					
		Chainline	44.5 mm ←		44.5 mm ←		44.5 mm ←	
		Minimum Chainstay	405 mm ←		405 mm ←		405 mm ←	
		Crank Lengths	165 / 170 / 172.5 / 175 / 177.5 / 180 mm		165 / 170 / 172.5 / 175 / 177.5 / 180 mm		165 / 170 / 172.5 / 175 / 177.5 / 180 mm	
		Bearing	Ceramic Sealed Cartridge Bearing		Sealed Cartridge Bearing		Sealed Cartridge Bearing	
Finish	Weight	765 g	765 g	790 g	780 g	850 g	840 g	
	BB Cup	Forged Alloy ←		Forged Alloy ←		Forged Alloy ←		
	Crank Arm	Carbon Fibre ←		Carbon Fibre ←		AL 6066 Aluminum ←		
	Chaining	AL 7075-T6 Aluminum with TNT Finish		AL 7075-T6 Aluminum with TNT Finish		AL 7075-T6 Aluminum with Hard Anodizing		
	Chaining Bolts	AL 7075-T6 Aluminum ←		AL 7075-T6 Aluminum ←		AL 7075-T6 Aluminum ←		
	Chaining Bolts	AL 7075-T6 Aluminum ←		AL 7075-T6 Aluminum ←		AL 7075-T6 Aluminum ←		

Cranksets 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

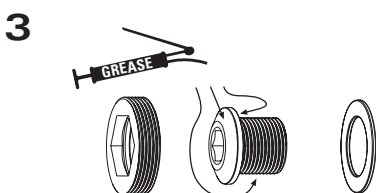
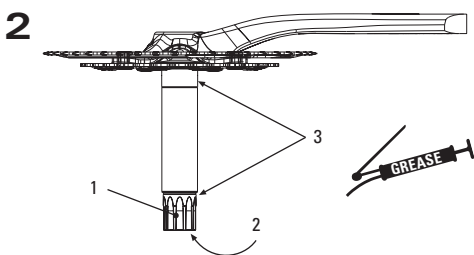
PARTS PREPARATION

- Prepare the frame's bottom bracket shell threads as 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.

- 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)

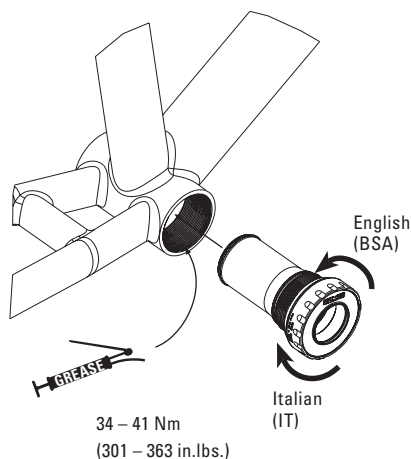
- Prepare the self extracting crank bolt: Apply grease to the surfaces shown in **Figure 3**.



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



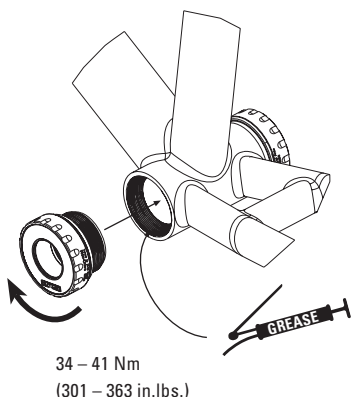
4



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 the pedal threads, add pedal washers (1, **Figure 8**), assemble and tighten the pedals to the crankarms with 31 – 34 Nm (274 – 301 in.lbs.).
Caution:
Drivetrain side right hand pedal-thread. Non drive side left hand pedal-thread.

5

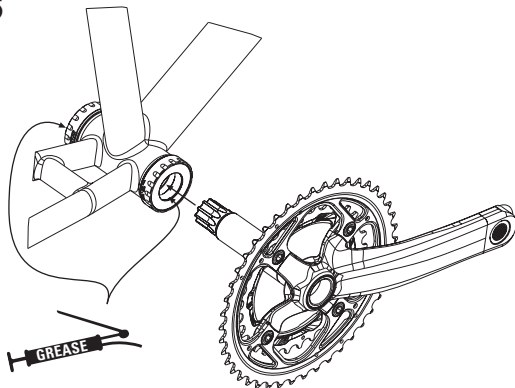


- Grease the inner bearing races as shown in **Figure 6**. Slide the right crankarm and spindle assembly through the bottom bracket until the left side splines come through the left side bottom bracket cup, and the spindle stops.
- If the crank bolt assembly has not been assembled yet, assemble it and 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**.

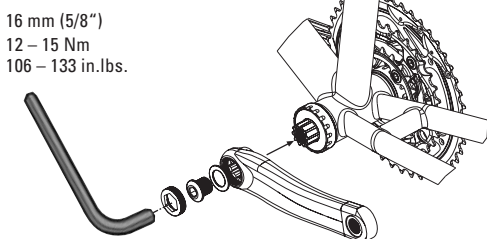
Advice:

- *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.*

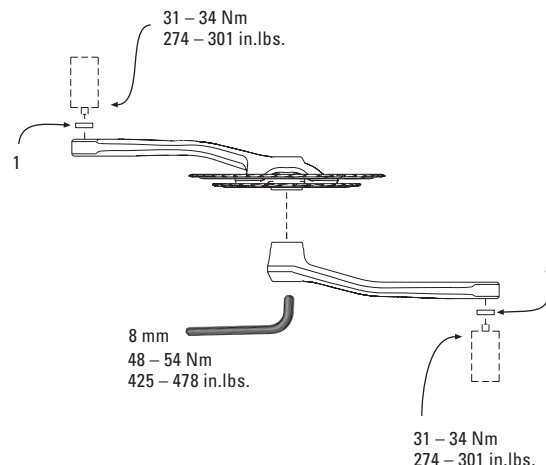
6



7



8



RED / FORCE / RIVAL · DUAL PIVOT ROAD CALIPERS

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

BR AKE CALI P.	Compat.	Version	Red		Force		Rival			
			Front	Rear	Front	Rear	Front	Rear		
		Brake Levers	SRAM Red / Force / Rival Double Tap shifters						←	←
		Brake Cable	1.6 mm high quality brake cable with road-style cable end and brake cable housing with end caps							
		Pad	Exchangeable	←	Exchangeable	←	Exchangeable	←		
		Quick Release	Yes	←	Yes	←	Yes	←		
		Barrel Adjuster	Yes	←	Yes	←	Yes	←		
	Design	Weight per Set	265 g (front and rear)	265 g (front and rear)	279 g (front and rear)	279 g (front and rear)	289 g (front and rear)	287 g (front and rear)		
		Pivot Bolt	Titanium		Titanium		Stainless Steel			
		Arms	Cold Forged Aluminum		Cold Forged Aluminum		Cold Forged Aluminum			

RED / FORCE / RIVAL · DUAL PIVOT ROAD CALIPERS

TECHNICAL DATA / ASSEMBLY REQUIREMENTS



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*).

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:

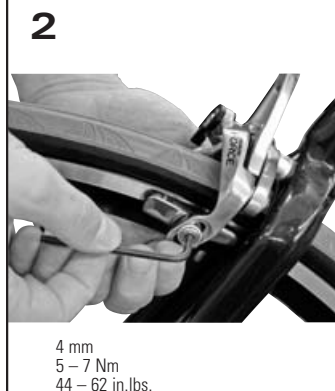
- Make certain the quick release lever is in the closed position (*Figure 3*).
- Place the cable in the groove in the cable clamp washer (*Figure 4*).
- Squeeze the brake caliper until each brake pad is 1 – 1.5 mm from the rim.
- Tighten the cable bolt to 6 – 8 Nm (53 – 70 in.lbs.).
- Turn the barrel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

Center the brake pads:

- 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.).

Inspection:

Squeeze brake lever hard 10 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



3

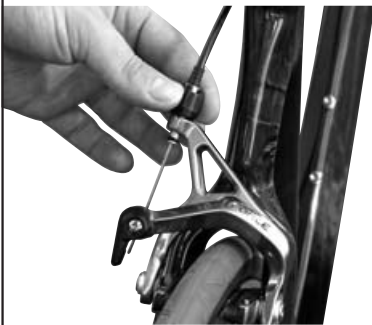


4



6 – 8 Nm
53 – 70 in.lbs.

5



6



5 mm
8 – 10 Nm
70 – 90 in.lbs.

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 road brake pads are optimized for aluminum rims. If used with ceramic-coated or carbon rims, the brake pads will wear more rapidly. Be certain to inspect them often.
- If the brake pads are worn until the grooves disappear, replace them with new pads.

CASSETTES · ROAD

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

OG 1090

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

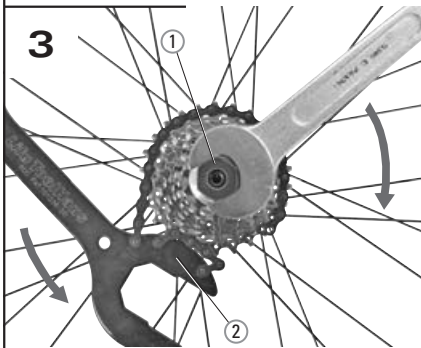
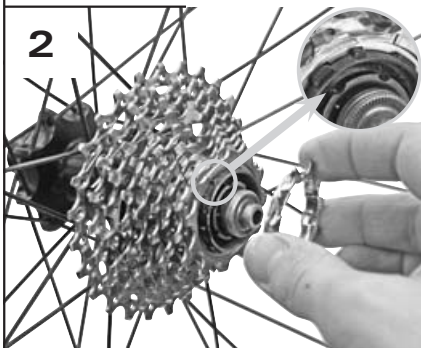
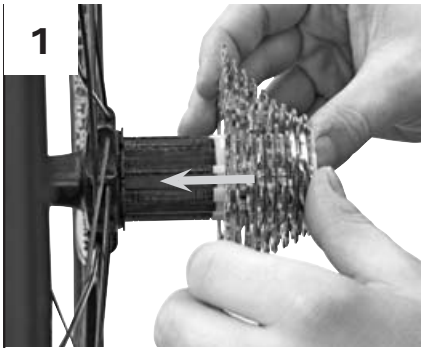
OG 1070

		OG 1070				
Compati- bility	Application	Road	Road	Road	Road <i>NEW</i>	Road <i>NEW</i>
	Technology	Open Glide	Open Glide	Open Glide	Open Glide	Open Glide
	Largest Cog	26 T	26 T	23 T	25 T	25 T
	Speeds	10	10	10	10	10
	Chains	SRAM 10 speed Power Chains PC 1090R, PC 1090, PC 1070, PC 1050, PC 1030 and Shimano® 10 speed chains				
	Hubs	Any hub with Shimano® compatible driver body (not compatible with Shimano® DURA-ACE 10 speed cassettes bodies)				
	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
Design	Lockring torque	40 Nm	40 Nm	40 Nm	40 Nm	40 Nm
	Weight	243 g	232 g	210 g	238 g	223 g
	Cogs	Heat treated steel	Heat treated steel	Heat treated steel	Heat treated steel	Heat treated steel
	Spider	Aluminum 6061	Aluminum 6061	Aluminum 6061	Aluminum 6061	Aluminum 6061
	Lockring	Aluminum, anodized	Aluminum, anodized	Aluminum, anodized	Aluminum, anodized	Aluminum, anodized
	Rivets	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
	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	
Compati- bility	Application	Road <i>NEW</i>	Road <i>NEW</i>
	Technology	Open Glide	Open Glide
	Largest Cog	27 T	28 T
	Speeds	10	10
	Chains	SRAM 10 speed Power Chains PC 1090R, PC 1090, PC 1070, PC 1050, PC 1030 and Shimano® 10 speed chains	
	Hubs	Any hub with Shimano® compatible driver body (not compatible with Shimano® DURA-ACE 10 speed cassettes bodies)	
	Cogs	12/13/14/15/16/17/19/21/24/27	11/12/13/14/15/17/19/22/25/28
Design	Lockring torque	40 Nm	40 Nm
	Weight	243 g	242 g
	Cogs	Heat treated steel	Heat treated steel
	Spider	Aluminum 6061	Aluminum 6061
	Lockring	Aluminum, anodized	Aluminum, anodized
	Rivets	Stainless Steel	Stainless Steel
	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 locking from the front and the sprocket with 11 teeth from the back of the Speedloader.
- Versions with sprockets with 12 teeth: Remove the locking from the Speedloader.
- Align the spline patterns of the Speedloader 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 (thickness 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 instructions.

POWER CHAINS · ROAD

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

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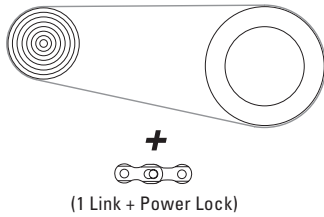
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	PC 1090R	PC 1090	PC 1070	PC 1050 <i>NEW</i>	PC 1030 <i>NEW</i>
Application	Road	Road	Road	Road	Road
Max. No. of sprockets	10 only	10 only	10 only	10 only	10 only
Compatibility Front	Truvativ / HG / EXA-Drive	Truvativ / HG / EXA-Drive	Truvativ / HG / 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	$\frac{1}{2} \times \frac{11}{128}$ "	$\frac{1}{2} \times \frac{11}{128}$ "	$\frac{1}{2} \times \frac{11}{128}$ "	$\frac{1}{2} \times \frac{11}{128}$ "	$\frac{1}{2} \times \frac{11}{128}$ "
Length	5.87 mm	5.87 mm	5.87 mm	5.95 mm	5.95 mm
Riveting	Cylindrical	Cylindrical	Cylindrical	Flat Cylindrical	Flat Cylindrical
Chrome Hardened	Yes	Yes	Yes	Yes	Yes
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.
Weight (114 links)	257 g	265 g	265 g	277 g	277 g
External Pin Plate	Silver / Nickel Plated	Silver / Nickel Plated	Silver / Nickel Plated	Silver / Nickel Plated	Silver / Nickel Plated
Internal Pin Plate	Silver / Nickel Plated	Silver / Nickel Plated	Grey	Silver / Nickel Plated	Grey
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.

1



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

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 chain-wheel and largest rear sprocket and add 1 link + Power Lock (*Fig.1*).

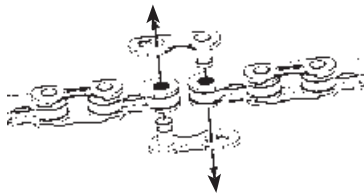
Opening:

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.**

2

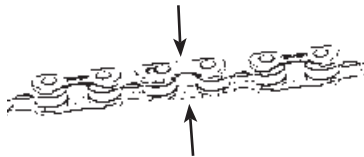


Closing chain with Power Lock:

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.**

3



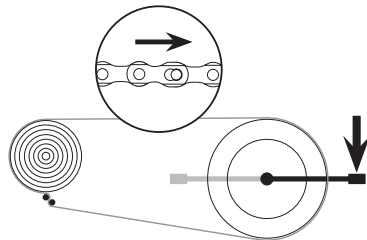
- Fit chain, insert both halves of the Power Lock into the chain ends (*Fig. 2*) and bring the ends together (*Fig. 3*) on the bottom side of the drivetrain (no tension side).

4



- 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.

5



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

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

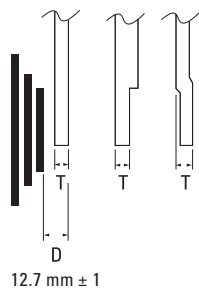


NEW

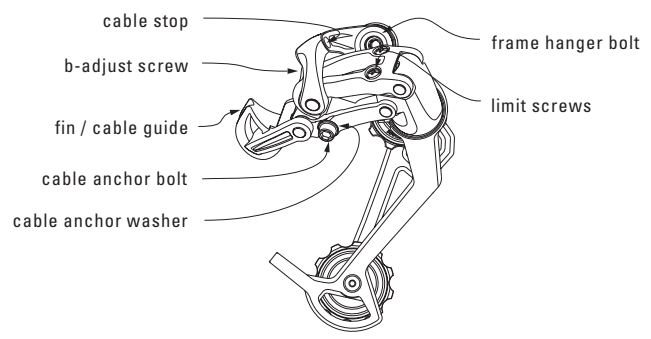
X
·
0
X
-
9
X
-
7
X
-
5
S
X
4
3
·
0

	X.0			X-9		X-7		X5		SX 4		3.0
Speeds	9/8			9/8		9/8		9/8		8/7		8/7
Shifter Compatibility	SRAM 1:1 Actuation Ratio			9 / 8 speed shifters		←		←		SRAM 1:1 8 / 7spd shifters		
Cogsets & Chains	SRAM / IG & HG 9/8spd			SRAM / IG & HG 9/8spd		SRAM / IG & HG 9/8spd		SRAM / IG & HG 9/8spd		SRAM / IG & HG 8/7spd		
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
Cage Length	Long	Medium	Short	Long	Medium	Long	Medium	Long	Medium	Long	Med.	Long
Max Sprocket	34 T			34 T		34 T		34 T		34 T		34 T
Min Sprocket	11 T			11 T		11 T		11 T		11 T		11 T
Front Difference	22 T			22 T		22 T		22 T		22 T		22 T
Parallelogram Spring	Titanium			Steel		Steel		Steel		Steel		Steel
Pulleys	Cartr. bearing, stainless			Cartr.bear./Bush., hard.		Bushing, hardened		Bushing		Bushing		Bushing
Direct Mount	Yes			Yes		Yes		Yes		Yes		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											
Weight	210 g	197 g	192 g	230 g	225 g	275 g	N/A	309 g	N/A	309 g	N/A	275 g
B-Knuckle	Forged Aluminum / Anod.			Aluminum		Aluminum		Aluminum		Aluminum		Compos.
Outer Link	Forged Aluminum			Alu die-cast / Painted		Alu die-cast / Painted		Aluminum		Zinc Alloy		Compos.
Inner Link	Forged Aluminum			Aluminum / Anodized		Steel / E-coat		Steel / E-coat		Composite		Steel
Outer Cage	Alumin.	Carbon Composite		Stamped AL / Anodized		Stamped AL / Anodized		Steel / E-coat		Steel / E-coat		
Inner Cage	Alumin.	Carbon Composite		Stamped AL / Anodized		Steel		Steel		Steel		Compos.
Hanger Bolt	Aluminum / Anodized			Aluminum / Anodized		Aluminum / Anodized		Steel		Steel		

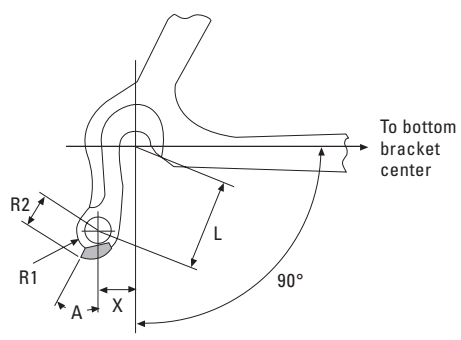
1



DERAILLEUR ANATOMY



2



FRAME DIMENSIONS

(see figure 1 and 2)

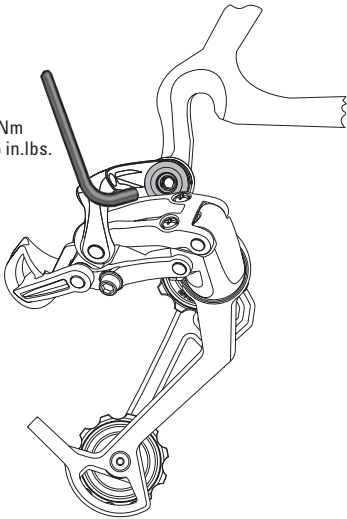
- For optimal 1:1 Actuation Ratio rear derailleur performance, the recommended rear derailleur hanger length (L) should be 28 – 30 mm.
- For a given L, use the chart below to determine other 1:1 Actuation Ratio rear derailleur hanger specifications.

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

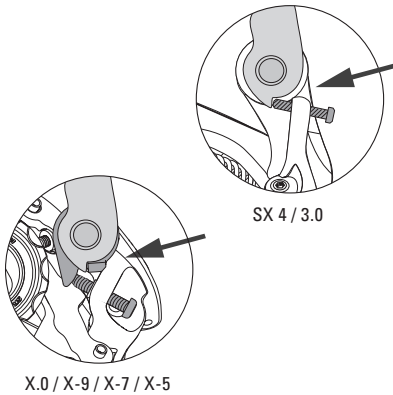
X.0 / X-9 / X-7 / X-5 / SX 4 / 3.0 • REAR DERAILLEURS ASSEMBLY

1

5 mm
8 – 10 Nm
70 – 85 in.lbs.

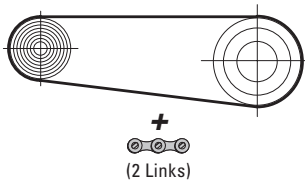


2



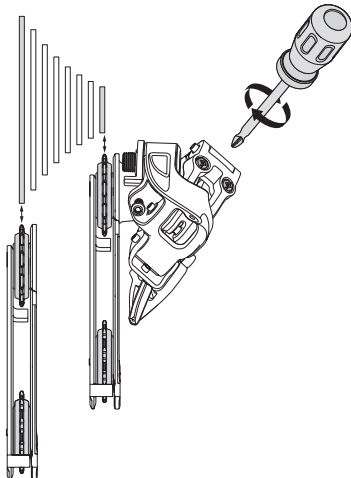
X.0 / X-9 / X-7 / X-5

3



(2 Links)

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 chainering 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.

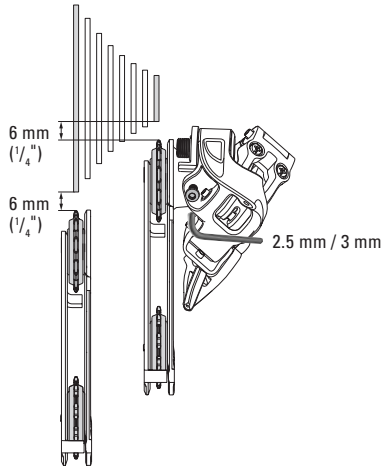
Advice:

- **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

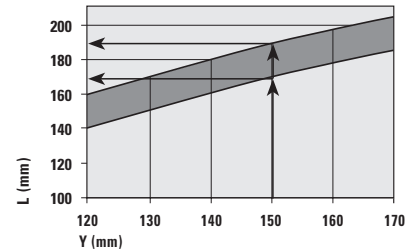
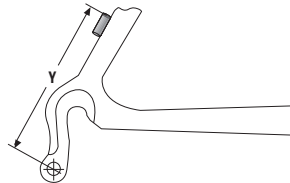
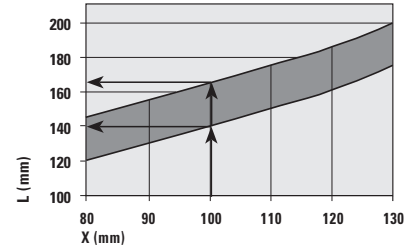
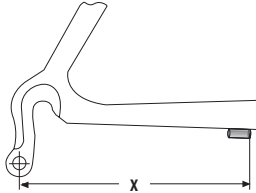
- Check that the chain and the rear derailleur are in the smallest cog position.
- Measure and cut the rear piece of cable housing. Make sure that it is not too short or long (**see figure and chart**).
- Rotate the rear shifter until the largest number and gear indication tab/dash line up.
- Turn the 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.

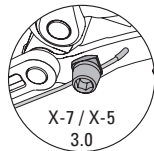
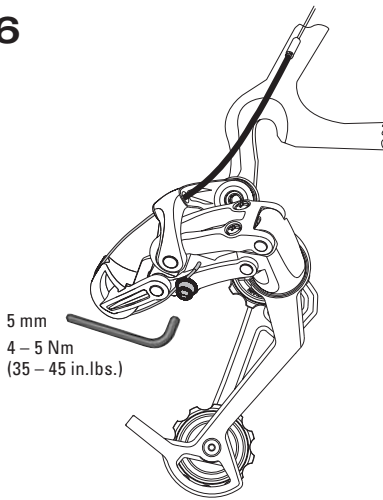
CHART / LENGTH OF CABLE HOUSINGS



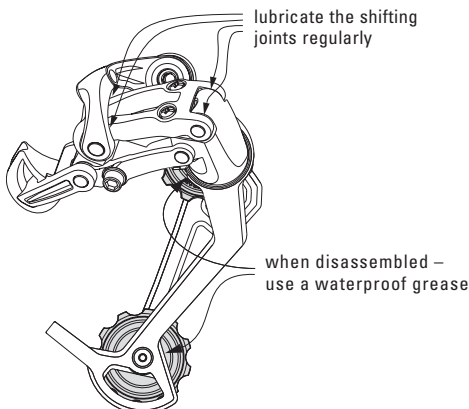
Example:
Distance Y = 150 mm → cable housing length L = 165 – 190 mm.

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

6



7



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.

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

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

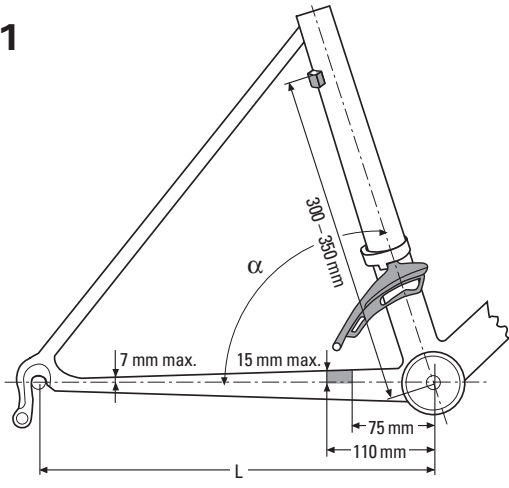


NEW

X-9
X-7
X-5

Clamp Size	X-9 Low Clamp		X-7 Low Clamp	X-5 Low Clamp
	28.6 mm	—		—
31.8 mm	original		with band adaptor	with band adaptor
34.9 mm	original		original	original
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
Weight	155 g		175 g (w/o adaptor) / 180 g (w. adaptor)	175 g (w/o adaptor) / 180 g (w. adaptor)
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)

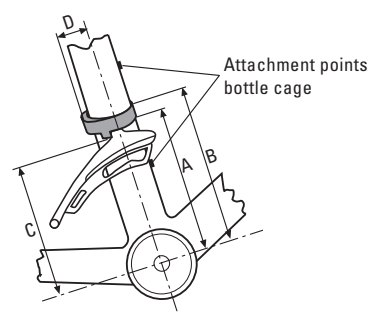
- For Top Pull version: upper cable stop should be positioned 300 – 350 mm above bottom bracket center.
- The seat tube should be positioned in the center of the bottom bracket shell.

Chainstay angle:
 $\alpha = 66^\circ - 69^\circ$.

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.)

- Length of chainstay:**
- MTB/Trekking L > 420 mm.
 - Rear frame alignment must be symmetrical.

2



NECESSARY CLEARANCE (see Fig. 2)

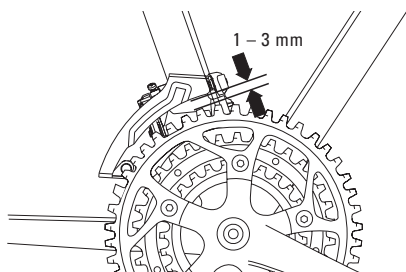
Be sure to leave enough clearance between bottle cage holes and clamp location.

Necessary clearance see Fig. 2		X-9 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

1



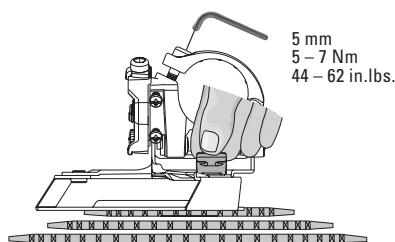
ASSEMBLY

- 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*).

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.

2



LOW LIMIT ADJUSTMENT

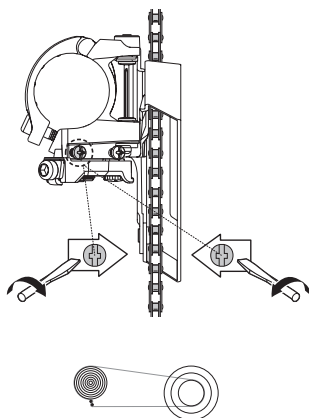
(*see Fig. 3*)

- 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.

3

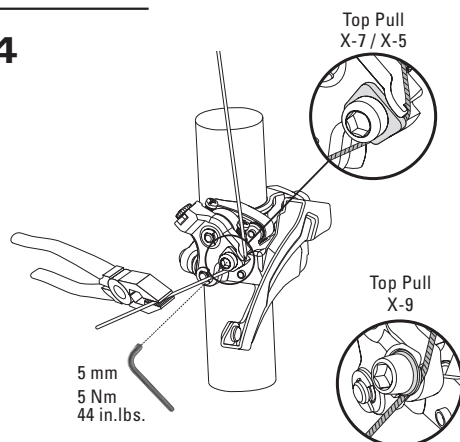


HIGH LIMIT ADJUSTMENT

(*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.

4

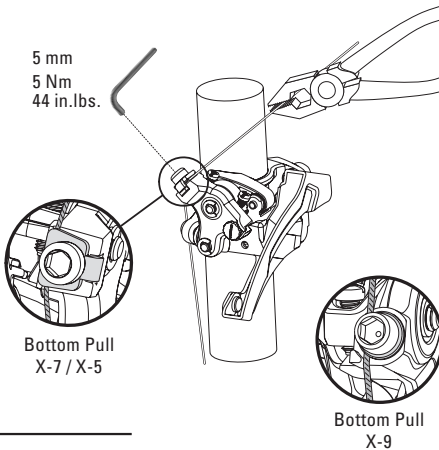


X-9 / X-7 / X-5 · LOW CLAMP FRONT DERAILLEURS ASSEMBLY

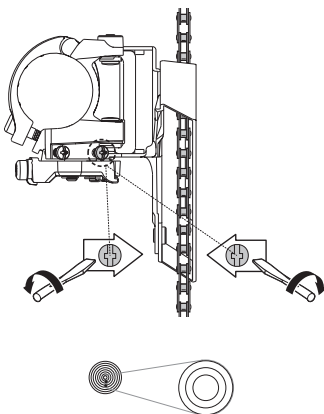


5

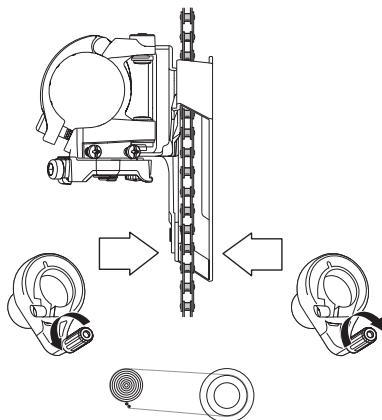
5 mm
5 Nm
44 in.lbs.



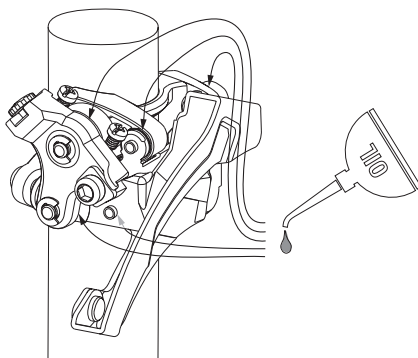
6



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 chainring.	Correct the front derailleur position.

X-5 / CENTERA · TWIST SHIFTERS

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

X-5

		X-5 <i>NEW</i>			
Com- pati- bility	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
	Deraillieur	SRAM & Shimano	SRAM & Shimano	SRAM 1:1 Actuation Ratio	SRAM 1:1 Actuation Ratio
	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	←	←	←
	Weight	N/A	N/A	N/A	N/A

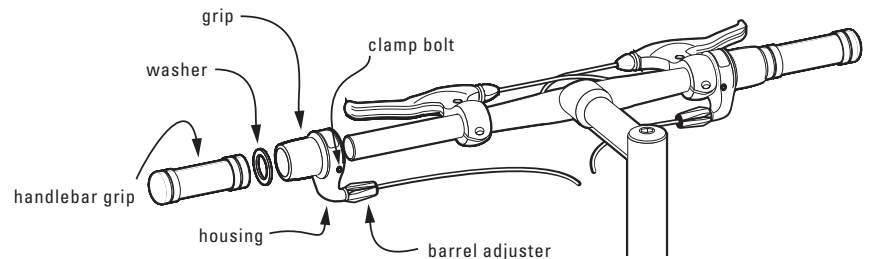
CENTERA

		Centera			
Com- pati- bility	Version	Shorty	Shorty	Shorty	Shorty
	Shifter Type	Front / Micro adjust	Front / Index	Rear 2:1	Rear 2:1
	Speeds		3	9	8
	Deraillieur	SRAM & Shimano	SRAM & Shimano	Shimano	Shimano
	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	←	←	←
	Weight	N/A	N/A	N/A	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



X-5 / CENTERA • TWIST SHIFTERS ASSEMBLY



MTB

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 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!**

X-7 / X-5 / ATTACK · TRIGGER SHIFTERS

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

X-7
X-5

		X-7		X-5 <i>NEW</i>	
Com- pati- bility	Shifter Type	Front / Index	Rear 1:1 Actuation Ratio	Front / Index	Rear 1:1 Actuation Ratio
	Speeds	3	9	3	9 8
	Deraillieur	SRAM & Shimano	SRAM 1:1 Actuation Ratio	SRAM & Shimano	SRAM 1:1 Actuation Ratio
	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	←
	Weight	262 g	262 g	260 g	260 g

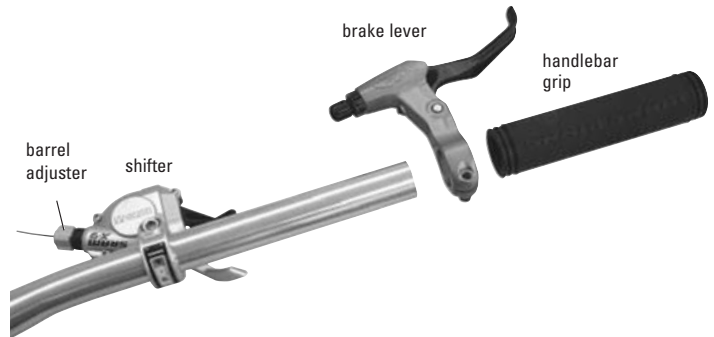
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		Attack	
Com- pati- bility	Shifter Type	Front / Index	Rear 2:1
	Speeds	3	9 8
	Deraillieur	SRAM & Shimano	Shimano
	Crankset	Triple Indexed	
	Cable Pull Release	Impulse Technology	←
	Cable	Stainless Steel	←
	Gear Indication	Window	Window
	Barrel Adjuster	Indexing	Indexing
	Clamping Diameter	22.1 – 22.3 mm	22.1 – 22.3 mm
	Shifter Length	26 mm	←
	Weight	260 g	260 g

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.

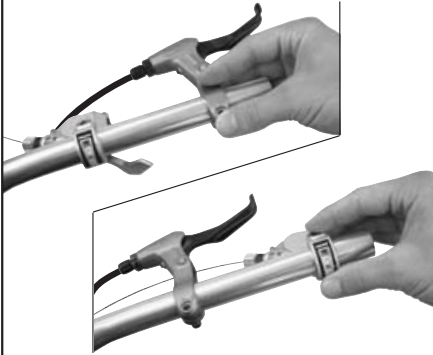
SHIFTER ANATOMY



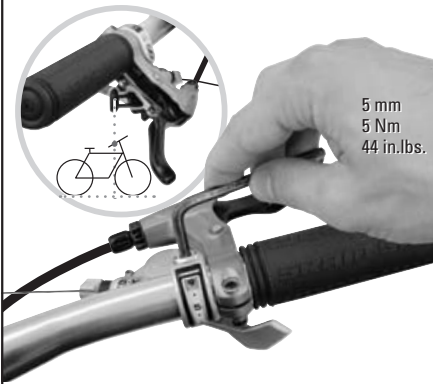
X-7 / X-5 / ATTACK · TRIGGER SHIFTERS ASSEMBLY



1



2



5 mm
5 Nm
44 in.lbs.

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!**

CASSETTES · MTB

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

PG9900PG0890	Compatibility	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
		Speeds	9	9	9	9
		Chains	SRAM / 9 speed index	SRAM / 9 speed index	SRAM / 9 speed index	SRAM / 9 speed index
		Hubs	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG
		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
	Design	Lockring torque	40 Nm	40 Nm	40 Nm	40 Nm
		Weight	310 g	280 g	310 g	280 g
		Cogs	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel
		Spider	Aluminum, forged	Aluminum, forged	Aluminum	Aluminum
		Lockring	Aluminum, anodized	Aluminum, anodized	Chrome Plated, Satin	Chrome Plated, Satin
		Rivets	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
		Finish	Pearl Ni-Chrome Plated	Pearl Ni-Chrome Plated	Pearl Ni-Chrome Plated	Pearl Ni-Chrome Plated

PG9700	Compatibility	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
		Speeds	9	9	9	9	9
		Chains	SRAM / 9 speed index	SRAM / 9 speed index	SRAM / 9 speed index	SRAM / 9 speed index	SRAM / 9 speed index
		Hubs	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG
		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
	Design	Lockring torque	40 Nm	40 Nm	40 Nm	40 Nm	40 Nm
		Weight	410 g	330 g	230 g	210 g	210 g
		Cogs	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel
		Lockring	Chrome Plated, Satin	Chrome Plated, Satin	Aluminum, anodized	Aluminum, anodized	Aluminum, anodized
		Screws	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat
		Finish	Chrome Plated, Satin	Chrome Plated, Satin	Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated

PG9700PG050	Compatibility	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
		Speeds	9	9	9	9	9
		Chains	SRAM / 9 speed index	SRAM / 9 speed index	SRAM / 9 speed index	SRAM / 9 speed index	SRAM / 9 speed index
		Hubs	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG
		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
	Design	Lockring torque	40 Nm	40 Nm	40 Nm	40 Nm	40 Nm
		Weight	200 g	460 g	380 g	240 g	235 g
		Cogs	SAPH 440 steel	Steel	Steel	SAPH 440 steel	SAPH 440 steel
		Lockring	Aluminum, anodized	Forged Steel	Forged Steel	Forged Steel	Forged Steel
		Screw	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat
		Finish	Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated

CASSETTES · MTB

TECHNICAL DATA / ASSEMBLY REQUIREMENTS



PG9050

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

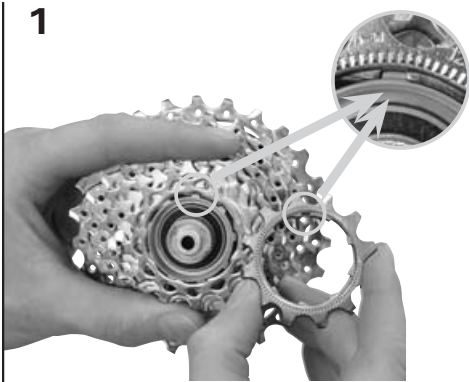
PG850

		PG 850				
Compatibility	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
	Speeds	8	8	8	8	8
	Chains	SRAM / 8 speed index	SRAM / 8 speed index	SRAM / 8 speed index	SRAM / 8 speed index	SRAM / 8 speed index
	Hubs	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG
	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
	Lockring torque	40 Nm	40 Nm	40 Nm	40 Nm	40 Nm
	Weight	280 g	310 g	250 g	230 g	220 g
	Design	Cogs	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel
Lockring		Forged Steel	Forged Steel	Forged Steel	Forged Steel	Forged Steel
Screw		Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat
Finish		Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated

PG830 PG730

		PG 830			PG 730
Compatibility	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
	Speeds	8	8	8	7
	Chains	SRAM / 8 speed index	SRAM / 8 speed index	SRAM / 8 speed index	SRAM / 7 speed index
	Hubs	9 / 8 speed HG	9 / 8 speed HG	9 / 8 speed HG	7 speed HG
	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
	Lockring torque	40 Nm	40 Nm	40 Nm	40 Nm
	Weight	320 g	340 g	280 g	310 g
	Design	Cogs	Steel	Steel	Steel
Lockring		Forged Steel	Forged Steel	Forged Steel	Forged Steel
Screw		Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / black Zinc Coat
Finish		Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated

CASSETTES • MTB ASSEMBLY

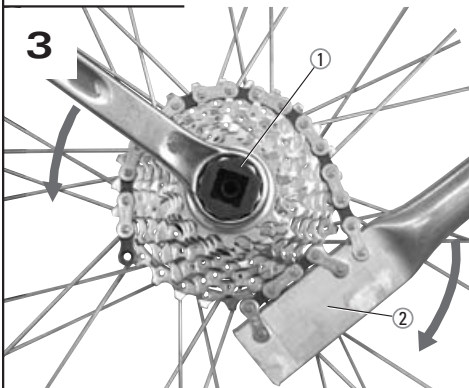
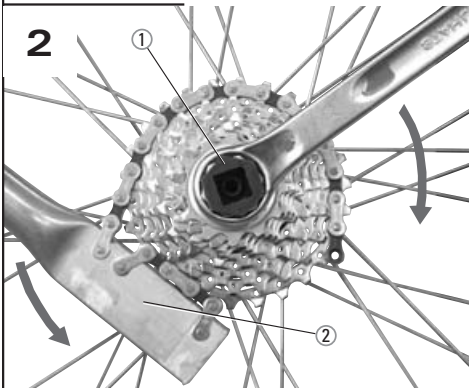


ASSEMBLY

- Position the cassette cluster and individual 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).



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