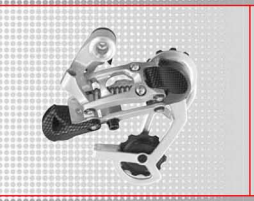
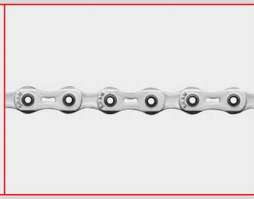
2005

TECHNICAL MANUAL
MTB COMPONENTS

ENGLISH



SRAM

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Publ. No. 8044 E

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Released July 2004

SRAM Technical Documentation, Schweinfurt/Germany

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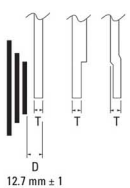
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1:1

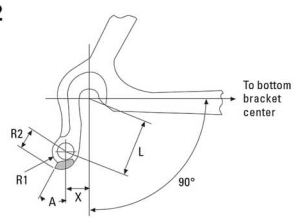
X.0 X-9 X-7 5.0 4.0 3.0

		X.0		X-9		X-7	5.0	4.0	3.0
	Speeds	9/8		9/8		9/8	9/8/7	9/8/7	
Compatib.	Shifter Compatibility	SRAM 1:1 Actuation Ratio 9/8/7 speed shifters		←		←	←	←	
Compatib.	Cogsets & Chains	SRAM / IG & HG 9/8spd		SRAM / IG & HG 9/8spd		SRAM / IG & HG 9/8	SRAM / IG & HG 9/8/7spd	SRAM / IG & HG 9/8/7spd	
Compatib.	Chainrings	22-32-42/44, 24-34-46, 26-36-46/48		←		←	←	←	
Chain Capacity	Total	37 T	45 T	37 T	45 T	45 T	45 T	45 T	
Chain Capacity	Cage Length	Medium	Long	Medium	Long	Long	Long	Long	
Chain Capacity	Max Sprocket	34 T		34 T		34 T	34 T	34 T	
Chain Capacity	Min Sprocket	11 T		11 T		11 T	11 T	11 T	
Chain Capacity	Front Difference	22 T		22 T		22 T	22 T	22 T	
Design	Parallelogram Spring	Titanium		Steel		Steel	Steel	Steel	
Design	Pulleys	Cartr. bearing, stainless		Cartr.bear./Bush., hard.		Bushing, hardened	Bushing, hardened	Bushing	
Design	Direct Mount	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	Weight	205 g	210 g	225 g	230 g	275 g	282 g	290 g	275 g
Design	B-Knuckle	Forged Aluminum / Anod.		Aluminum		Aluminum	Aluminum	Aluminum	Composite
Design	Outer Link	Forged Aluminum		Alu die-cast / Painted		Alu die-cast / Painted	Grilon Composite	Grilon Composite	
Design	Inner Link	Aluminum / Anodized		Aluminum / Anodized		Steel / E-coat	Steel / E-coat	Steel / E-coat	
Design	Outer Cage	Forged AL / Anodized		Stamped AL / Anodized		Stamped AL / Anodized	Steel / E-coat	Steel / E-coat	
Design	Inner Cage	Forged AL / Anodized		Stamped AL / Anodized		Steel	Grilon Composite	Grilon Composite	
Design	Hanger Bolt	Aluminum / Anodized		Aluminum / Anodized		Aluminum / Anodized	Steel	Steel	

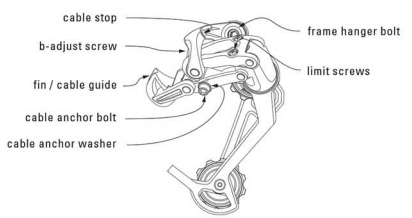
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2



DERAILLEUR ANATOMY



FRAME DIMENSIONS

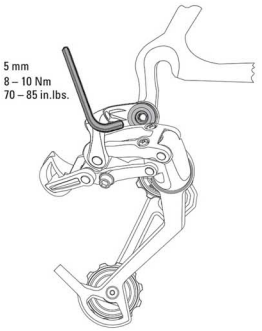
(see figure 1 and 2)

- 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.

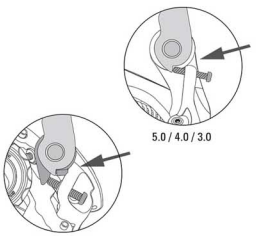
L	X	A	R1	R2	T
28	6 – 10	25° – 30°	8.5 max	11.5 – 13.5	7 – 8
30	7.5 – 10	25° – 30°	8.5 max	11.5 – 13.5	7 – 8

X.0 / X-9 / X-7 / 5.0 / 4.0 / 3.0 · REAR DERAILLEURS ASSEMBLY

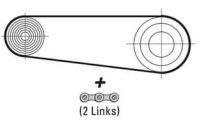
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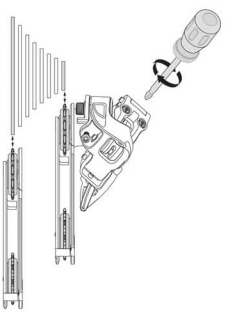
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3



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 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 + Power 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, 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.

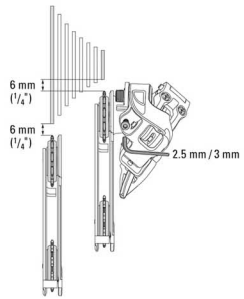
Advice:

- ***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.***

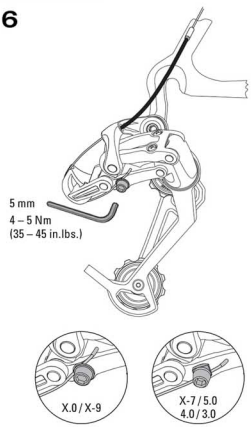
INDEX SHIFTING ADJUSTMENT

- 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.).
  – 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.

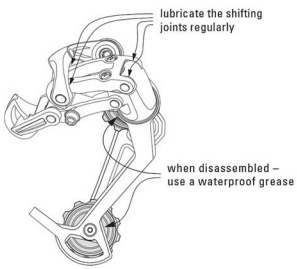
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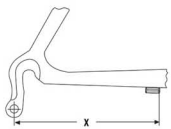


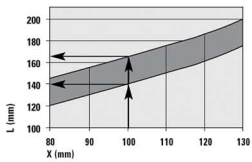
- Repeat the two former steps until shifting and cable tension is accurate.
- While turning the crank, shift the chain up and down the cassette and chain rings several times to ensure that your derailleur is indexing smoothly.

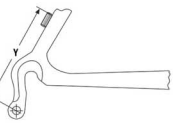
MAINTENANCE

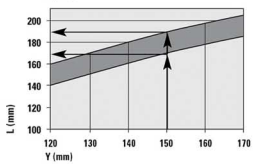
- Do not use solvants or corrosive materials to clean the components.
- Lubricate the shifting joints regularly ***(Fig. 7)***.
- Grease any cable guides (e.g. beneath the bottom bracket).

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.
Chain jumps two gears on small sprocket	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



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.

2



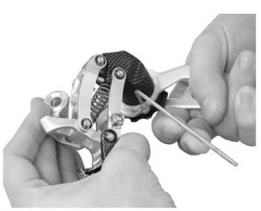
CAGE PIVOT MAINTENANCE / CAGE SPRING TENSION ADJUSTMENT

- 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.

3



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.).

1:1

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.
Chain jumps two gears on small sprocket	Shift cable insufficiently tensioned.	Turn barrel adjuster on the shifter counterclockwise.
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	Excessive cable friction, pinched or poorly routed cable.	Lubricate or replace cable and housing. Check for excessive bending of cable housing.

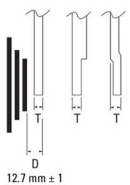
SRAM ESP · REAR DERAILLEURS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

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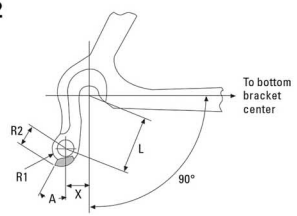
SRAM ESP

		SRAM ESP
	Speeds	8 / 7
Compatib.	Shifter Compatibility	SRAM 1:1 Actuation Ratio 8 / 7 speed shifters
Compatib.	Cogsets & Chains	SRAM / IG & HG 8/7spd
Compatib.	Chainrings	22-32-42/44, 24-34-46, 26-36-46/48
Chain Capacity	Total	45T
Chain Capacity	Cage Length	Long
Chain Capacity	Max Sprocket	34T
Chain Capacity	Min Sprocket	11T
Chain Capacity	Front Difference	22T
	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
	Weight	239 g
Design	Knuckles	Grilon Composite
Design	Outer Link	Grilon Composite
Design	Inner Link	Steel / Zinc Coat
Design	Outer Cage	Grilon Composite
Design	Inner Cage	Grilon Composite
Design	Hanger Bolt	Steel

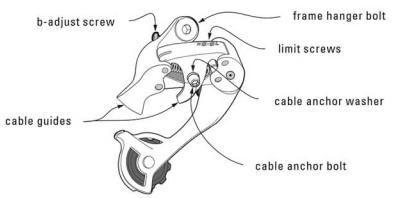
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2



DERAILLEUR ANATOMY



FRAME DIMENSIONS

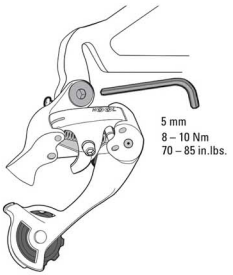
(see figure 1 and 2)

- 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.

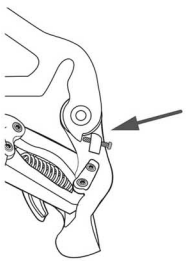
L	X	A	R1	R2	T
28	6 – 10	25° – 30°	8.5 max	11.5 – 13.5	7 – 8
30	7.5 – 10	25° – 30°	8.5 max	11.5 – 13.5	7 – 8

SRAM ESP · REAR DERAILLEURS ASSEMBLY

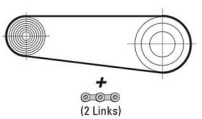
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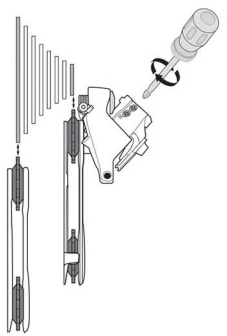
2



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 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 + Power 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 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.

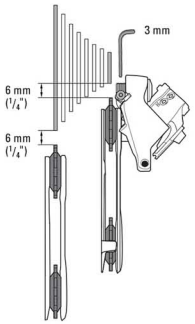
Advice:

- ***Bicycles equipped with an 11–28 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

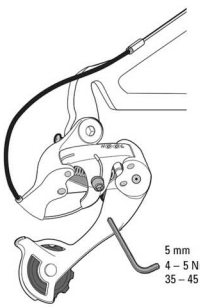
- Check that the chain and the rear derailleur are in the smallest cog position.
- Measure and cut the rear piece of cable housing. Make sure that it is not too short or long.
- Rotate the rear shifter until the largest number and gear indication tab/dash line up.
- Turn the rear shifter barrel adjust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

5

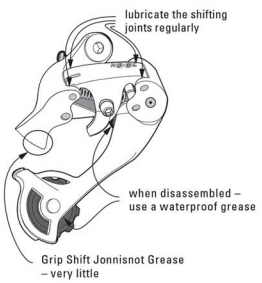


- Repeat the two former steps until shifting and cable tension is accurate.
- While turning the crank, shift the chain up and down the cassette and chain rings several times to ensure that your derailleur is indexing smoothly.

6



7



MAINTENANCE

- Do not use solvants 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

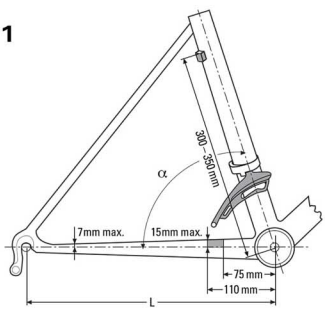
Problem	Cause	Remedy
Chain jumps from smallest sprocket to frame dropout.	High gear limit screw is not adjusted properly.	Turn in screw H until the guide pulley is aligned with the smallest sprocket.
Difficult or impossible to shift chain onto smallest sprocket.	High gear limit screw is not adjusted 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.
Chain jumps two gears on small sprocket	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-GEN / 3.0 · FRONT DERAILLEURS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

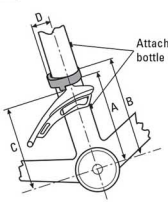
X-GEN 3.0

		X-Gen NEW		3.0 NEW	
Clamp Size	28.6 mm	with band adaptor	←	Not available	←
	31.8 mm	with band adaptor	←	with band adaptor	←
	34.9 mm	original	←	original	←
	Rear Compatibility	9spd	←	8spd / 7spd	←
	Index Compatible	Yes	←	Yes	←
	Total Capacity	22T	←	20T	←
	Top-Middle Min. Capacity	min. 12T	←	min. 10T	←
	Top Gear Teeth	44T	←	42T	48T
	Cable Routing	Twin Pull Type (Top and Bottom Pull)		Twin Pull Type (Top and Bottom Pull)	
	Chainstay Angle	66 – 69°	←	66 – 69°	←
	Mount Type	Down Swing	←	Down Swing	←
	Chain Line	47,5 – 51 mm	←	47,5 – 51 mm	←
	Weight	185 g	←	210 g	←
Design	Band Material	Aluminum	←	Steel	←
	Outer Link	Aluminum	←	Steel	←
	Inner Link	Aluminum	←	Steel	←
	Link Bushing	Outer Sealed	←	Bushing	←
	Chain Cage	Steel Chrome Plated	←	Steel Chrome Plated	←
	Color	Silver	Black	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.)

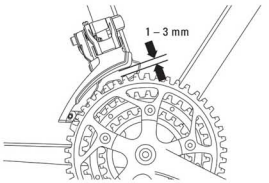
NECESSARY CLEARANCE
(see Fig. 2)

- Be sure to leave enough clearance between bottle cage holes and clamp location.
- Lower bottle cage hole is usually placed between 90 – 110 mm over bottom bracket center.

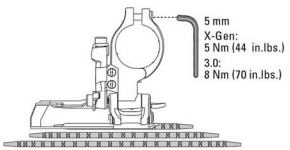
Necessary clearance see Fig. 2		X-Gen	3.0 42T	3.0 48T
Clamp band position	A	130 mm	114 mm	119 mm
	B	152 mm	128 mm	133 mm
	C	100 mm	107 mm	112 mm
Tire clearance	D	38 mm	43 mm	43 mm

X-GEN / 3.0 · FRONT DERAILLEURS ASSEMBLY / MAINTENANCE

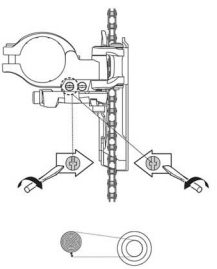
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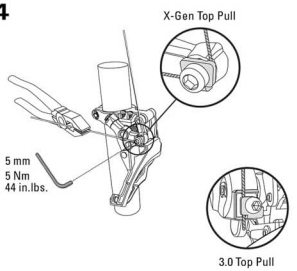
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3



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 Nm (44 in.lbs.) for X-Gen 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

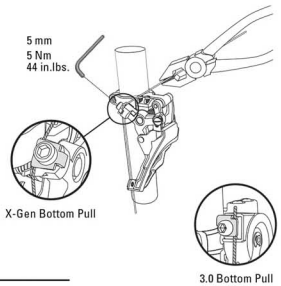
(see Fig. 7)

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.

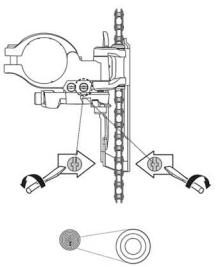
MAINTENANCE

- Do not use solvants or corrosive materials to clean the components.
- Lubricate the shifting joints regularly ***(Fig. 9)***.
- Grease any cable guides (e.g. beneath the bottom bracket).

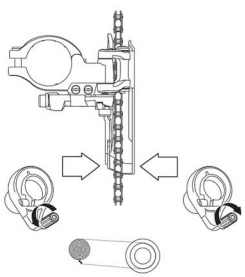
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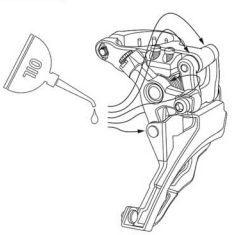
6



7



9



ADVICE

Avoid using extreme gear combinations as these combinations cause striping 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.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	22.3 mm	22.3 mm	22.3 mm	22.3 mm	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	22.3 mm	22.3 mm	22.3 mm	22.3 mm	22.3 mm
	Shifter Length	70 mm	70 mm	←	←	70 mm

ROCKET ATTACK

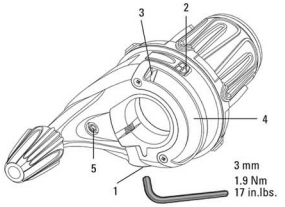
		Rocket		Attack		
	Version	Shorty	Shorty	Shorty	Shorty	Shorty
	Shifter Type	Front / Index	Rear 2:1	Front / Micro adjust	Front / Index	Rear 2:1
	Speeds	3	9 8		3	9 8
Compatibility	Derailleur	SRAM & Shimano	Shimano	SRAM & Shimano	SRAM & Shimano	Shimano
Compatibility	Crankset	Triple Indexed		Triple Indexed	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	22.3 mm	22.3 mm	22.3 mm	22.3 mm	22.3 mm
	Shifter Length	70 mm	←	70 mm	←	←

CABLE HOUSING

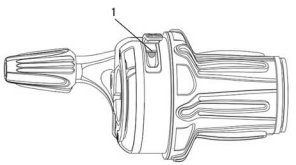
- Use only new high quality cable and compressionless cable housing with end caps.
- When choosing cable housing lengths, be sure to allow enough housing for an extreme turn of the handlebars in both directions.
- Note also, that different stem lengths and cable stop positions effects cable housing length.

X.0 / X-9 / X-7 / ROCKET / ATTACK · TWIST SHIFTERS ASSEMBLY / MAINTENANCE

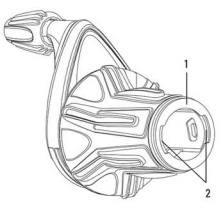
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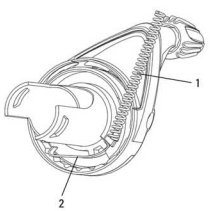
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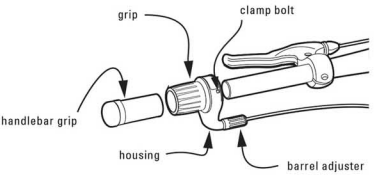
3



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

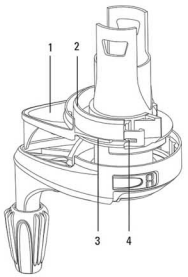
Advice:

- ***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.***

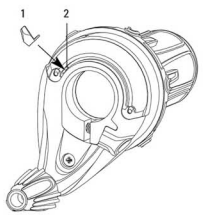
Front and Rear:

- 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.

5.0 / CENTERA · TWIST SHIFTERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

5.0

		5.0			
	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	Stainless Steel	←	←	←
	Gear Indication	Printed	Printed	Printed	Printed
	Barrel Adjuster	Indexing	Indexing	Indexing	Indexing
	Clamping Diameter	22.3mm	22.3mm	22.3mm	22.3mm
	Shifter Length	65 mm	←	←	←
	Weight	N/A	N/A	N/A	N/A

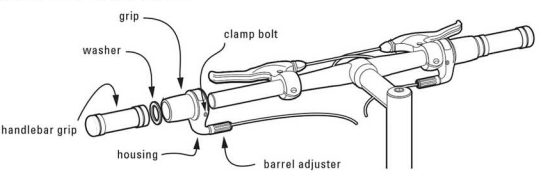
CENTERA

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

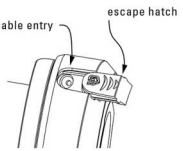
SHIFTER ANATOMY



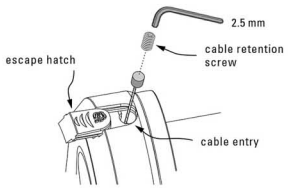
5.0 / CENTERA · TWIST SHIFTERS ASSEMBLY / MAINTENANCE

1:1
2:1

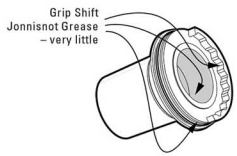
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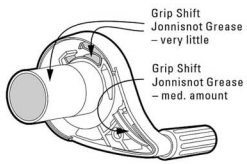


2



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 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!***

CABLE CHANGE

Front and Rear:

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.***

- Detach the cable from the derailleur.
- Cut the cable off 15 cm (6") from shifter barrel adjuster. Discard old cable and cable housing.
- Remove the escape hatch ***(Fig. 1)***.
- Rotate the shifter so the indicator mark is aligned with the highlighted number. Look for the cable entry.
- **Only Rear shifter:** remove the 2.5 mm hex cable retention screw ***(Fig. 2)***.
- Remove and discard the rest of the old cable.
- Feed the new cable through the cable entry and out the barrel adjuster. Pull the cable snug.
- **Only Rear shifter:** replace the cable retention screw – be sure to turn until the screw contacts the cable head.
- Replace the escape hatch.
- 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.***

4.0 PRO / MRX PRO · TWIST SHIFTERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

4.0 PRO

		4.0 Pro				
	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	Standard Steel	←	←	←	←
	Gear Indication	Window	Window	Window	Window	Window
	Barrel Adjuster	Friction	Friction	Friction	Friction	Friction
	Clamping Diameter	22.3 mm	22.3 mm	22.3 mm	22.3 mm	22.3 mm
	Shifter Length	86 mm	←	←	←	←
	Weight	87 g	87 g	87 g	87 g	87 g

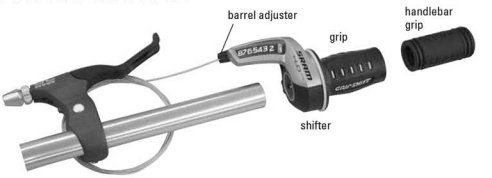
MRX PRO

		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	Standard Steel	←	←			←		
	Gear Indication	Window	Window	Window			Window		
	Barrel Adjuster	Friction	Friction	Friction			Friction		
	Clamping Diameter	22.3 mm	22.3 mm	22.3 mm			22.3 mm		
	Shifter Length	86 mm	←	←			←		
	Weight	87 g	87 g	87 g			87 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.

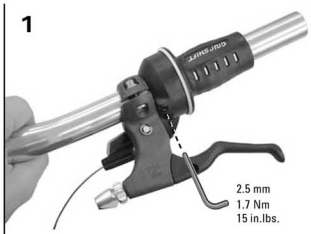
SHIFTER ANATOMY



4.0 PRO / MRX PRO · TWIST SHIFTERS ASSEMBLY / MAINTENANCE

1:1
2:1

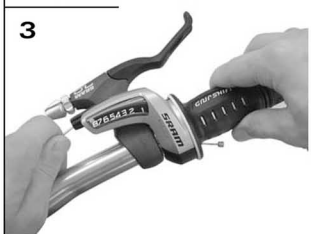
1



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.

Not recommended for use on thin walled alluminum handlebars such as Hyperlite® type 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

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	22.3 mm	22.3 mm	22.3 mm	22.3 mm	22.3 mm
	Shifter Length	67 mm	←	←	←	←
	Weight	67 g	67 g	67 g	67 g	67 g

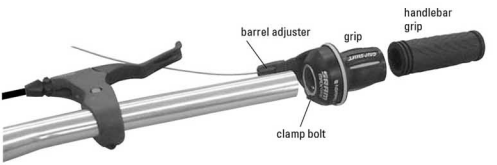
MRX COMP

		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	22.3 mm	22.3 mm	22.3 mm				22.3 mm		
	Shifter Length	67 mm	←	←				←		
	Weight	67 g	67 g	67 g				67 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



3.0 COMP / MRX COMP · TWIST SHIFTERS ASSEMBLY / MAINTENANCE

1:1
2:1











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.

Not recommended for use on thin walled alluminum handlebars such as Hyperlite® type 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

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	22.3 mm		22.3 mm		22.3 mm		22.3 mm	
	Shifter Length	96 mm	64 mm	96 mm	64 mm	96 mm	64 mm	96 mm	64 mm
	Weight	N/A	58 g	N/A	58 g	N/A	58 g	N/A	58 g

MRX PLUS

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

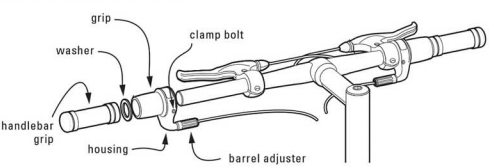
MRX

		MRX								
	Version	Shorty		Shorty				Shorty		
	Shifter Type	Front / Micro adjust		Front / Index				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	22.3 mm		22.3 mm		22.3 mm				22.3 mm		
	Shifter Length	64 mm		←		←				←		
	Weight	58 g		58 g		58 g				58 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.

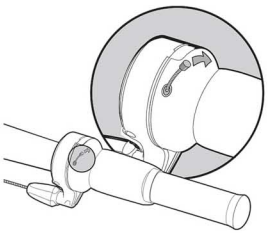
SHIFTER ANATOMY



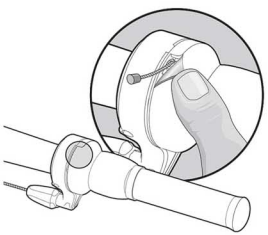
3.0 PLUS / 3.0 / MRX PLUS / MRX · TWIST SHIFTERS ASSEMBLY / MAINTENANCE

1:1
2:1

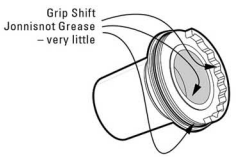
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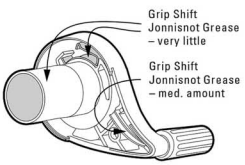


2



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.

Not recommended for use on thin walled alluminum handlebars such as Hyperlite® type 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.***

X-9 / X-7 / ROCKET / ATTACK · TRIGGER SHIFTERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

X-9 X-7

		X-9		X-7		
	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	22.3 mm	22.3 mm	22.3 mm	22.3 mm	
	Shifter Length	26 mm	←	26 mm	←	
	Weight	262 g	262 g	260 g	260 g	

ROCKET ATTACK

		Rocket		Attack		
	Shifter Type	Front / Index	Rear 2:1	Front / Index	Rear 2:1	
	Speeds	3	9	3	9	8
Compatibility	Derailleur	SRAM & Shimano	Shimano	SRAM & Shimano	Shimano	
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	22.3 mm	22.3 mm	22.3 mm	22.3 mm	
	Shifter Length	26 mm	←	26 mm	←	
	Weight	262 g	262 g	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.

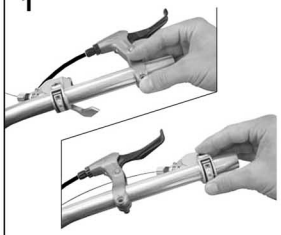
SHIFTER ANATOMY



X-9 / X-7 / ROCKET / ATTACK · TRIGGER SHIFTERS ASSEMBLY / MAINTENANCE

1:1
2:1

1



2



3



4



5



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!***

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.

4.0 / TRX · TRIGGER SHIFTERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

4.0

		4.0 NEW		
	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	22.3 mm	22.3 mm	22.3 mm
	Shifter Length	N/A	←	←
	Weight	N/A	N/A	N/A

TRX

		TRX NEW		
	Shifter Type	Front / Index	Rear 2:1	Rear 2:1
	Speeds	3	9	8
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	22.3 mm	22.3 mm	22.3 mm
	Shifter Length	N/A	←	←
	Weight	N/A	N/A	N/A

CABLE HOUSING

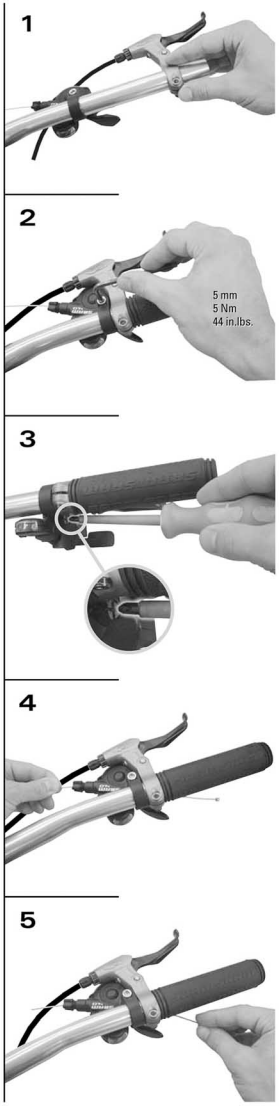
- Use only new high quality cable and compressionless cable housing with end caps.
- When choosing cable housing lengths, be sure to allow enough housing for an extreme turn of the handlebars in both directions.
- Note also, that different stem lengths and cable stop positions effects cable housing length.

SHIFTER ANATOMY



4.0 / TRX · TRIGGER SHIFTERS ASSEMBLY / MAINTENANCE

1:1
2:1



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.

CASSETTES
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

PG 990

		PG 990				
	Application	MTB	MTB			
	Technology	Power Glide II	Power Glide II			
	Largest Cog	34 T	32 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	11/12/14/16/18/21/24/28/34	11/12/14/16/18/21/24/28/32			
	Lockring torque	40 Nm	40 Nm			
	Weight	300 g	290 g			
Design	Cogs	SAPH 440 steel	SAPH 440 steel			
Design	Spider	Composite	Composite			
Design	Lockring	Forged Steel	Forged Steel			
Design	Rivets	Stainless Steel	Stainless Steel			
Design	Finish	Chrome Plated, Satin	Chrome Plated, Satin			

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	Forged Steel	Forged Steel	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	Chrome Plated	Chrome Plated	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	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	11/12/13/14/15/16/17/19/21	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	12/13/14/15/16/17/19/21/23
	Lockring torque	40 Nm	40 Nm	40 Nm	40 Nm	40 Nm
	Weight	200 g	470 g	380 g	240 g	220 g
Design	Cogs	SAPH 440 steel	Steel	Steel	SAPH 440	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	Chrome Plated	Chrome Plated	Chrome Plated	Chrome Plated	Chrome Plated

CASSETTES
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

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
	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	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	Chrome Plated	Chrome Plated	Chrome Plated	Chrome Plated	Chrome Plated

PG 830 PG 730

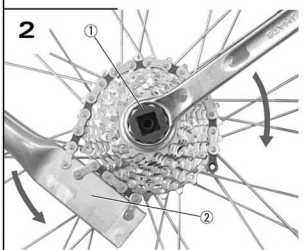
		PG 830			PG 730	
	Application	MTB	MTB	MTB	MTB	
	Technology	Power Glide II	Power Glide II	Power Glide II	Power Glide II	
	Largest Cog	32 T	30 T	28T	32T	
Compatibility	Speeds	8	8	8	7	
Compatibility	Chains	SRAM / 8 speed index	SRAM / 8 speed index	SRAM / 8 speed index	SRAM / 7 speed index	
Compatibility	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	
	Lockring torque	40 Nm	40 Nm	40 Nm	40 Nm	
	Weight	320 g	340 g	280 g	310 g	
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 / Zinc Coat	
Design	Finish	Chrome Plated	Chrome Plated	Chrome Plated	Chrome Plated	

CASSETTES
ASSEMBLY / MAINTENANCE

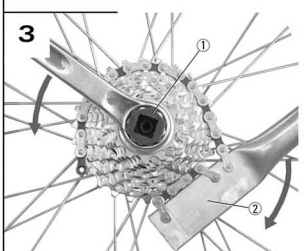
1



2



3



ASSEMBLY

- Position the cassette cluster and indi-viduel 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**).

CASSETTES
ASSEMBLY / MAINTENANCE

POWER CHAINS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

POWER CHAINS

		PC 99 Hollow Pin	PC 89R Hollow Pin	PC 990	PC 970	PC 950
	Application	MTB	Road	MTB / Road	MTB / Road	MTB / Road
	Max. No. of sprockets	9 only	9 only	9 only	9 only	9 only
	Compatibility Front	HG / EXA-Drive	HG / EXA-Drive	HG / EXA-Drive	HG / EXA-Drive	HG / EXA-Drive
	Compatibility Rear	HG / EXA-Drive	HG / EXA-Drive	HG / EXA-Drive	HG / EXA-Drive	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	6.35 mm	6.15 mm	6.65 mm	6.65 mm	6.65 mm
Pin	Riveting	Cylindrical	Cylindrical	Step	Step	Step
Pin	Chrome Hardened	Yes	Yes	Yes	Yes	Yes
Pin	Push Power	2000 N / 450 lbs.	1500 N / 340 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)	284 g	271 g	297 g	297 g	297 g
Design	External Pin Plate	Silver / Nickel Plated	Silver / Nickel Plated	Nickel Plated	Nickel Plated	Grey
Design	Internal Pin Plate	Silver / Nickel Plated	Silver / Nickel Plated	Nickel Plated	Grey	Grey
Design	Weight Reduced	Yes	Yes			
Design	Connecting Method	Power Link Gold	Power Link Gold	Power Link Gold or Pin	Power Link Gold or Pin	Power Link Gold or Pin

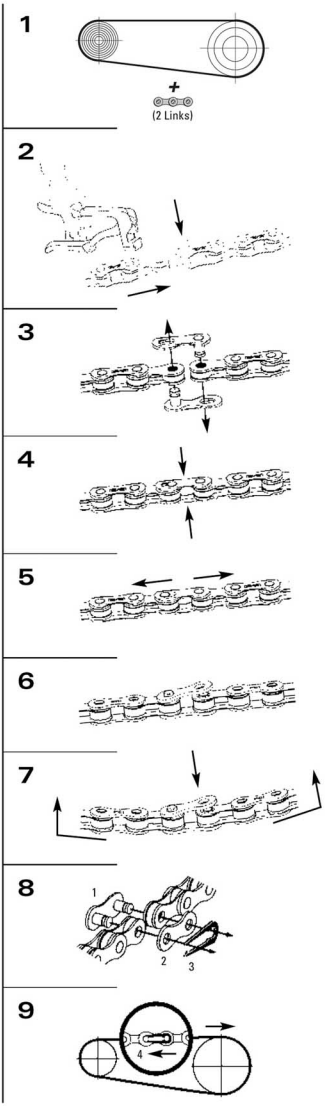
POWER CHAINS

		PC 68	PC 58	PC 48	PC 38 Saltshaker	PC 38
	Application	MTB	MTB	MTB	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	7.1 mm	7.1 mm	7.1 mm	7.1 mm	7.1 mm
Pin	Riveting	Cross Step	Step	Step	Step	Step
Pin	Chrome Hardened	Yes	Yes	Yes		
Pin	Push Power	2000 N / 450 lbs.	1500 N / 340 lbs.	1500 N / 340 lbs.	1100 N / 247 lbs.	1300 N / 292 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)	307 g	307 g	307 g	307 g	307 g
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 or Pin	Power Link Silver or Pin

POWER CHAINS

		PC 10 Saltshaker	PC 10	PC 1 Saltshaker	PC 1 Ni	PC 1
	Application	MTB	MTB	Gear Hubs	Gear Hubs	Gear Hubs
	Max. No. of sprockets	max. 7	max. 7	1	1	1
	Compatibility Front	Single / HG	Single / HG	Single	Single	Single
	Compatibility Rear	Single / HG	Single / HG	Single	Single	Single
	Dimension	1/2" x 3/32"	1/2" x 3/32"	1/2" x 1/8"	1/2" x 1/8"	1/2" x 1/8"
Pin	Length	6.9 mm	6.9 mm	7.8 mm	7.8 mm	7.8 mm
Pin	Riveting	Step	Step	Step	Step	Step
Pin	Push Power	1000 N / 225 lbs.	1000 N / 225 lbs.	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.	9000 N / 2023 lbs.	9000 N / 2023 lbs.
	Weight (114 links)	300 g	300 g	330 g	330 g	330 g
Design	External Pin Plate	Light Grey	Brown	Light Grey	Silver / Nickel Plated	Brown
Design	Internal Pin Plate	Light Grey	Brown	Light Grey	Silver / Nickel Plated	Brown
Design	Connecting Method	Power Link SS1 or Pin	Power Link Grey or Pin	Snap Lock or Pin	Snap Lock, 3pcs Connection Link or Pin	

POWER CHAINS
ASSEMBLY / MAINTENANCE



PC 99 / PC 89R / PC 990 / PC 970 / PC 950 / PC 68 / PC 58 / PC 48 / PC 38 / PC 10 (1/2" x 3/32" AND 1/2" x 11/128")

Chain length:

- Shorten chain to the length specified by the derailleur manufacturer.

SRAM derailleurs:

- Place chain over largest front chainwheel and largest rear sprocket and add 2 links or 1 link + Power Link ***(Fig. 1)***.
- For rear suspension frame, position the rear suspension for the greatest chain length required.

Closing standard version with clamping pin:
Fit chain, bring the two ends together and press pin ***(Fig. 2)*** 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.**

Power Link connecting links:

Caution:

- ***Use only for SRAM chains, use as specified, to avoid material damage or the rider to fall off his bicycle resulting in injury.***
- ***Use only Power Link Gold for closing Hollow Pin chains (no pin).***

Power Link Grey	grey coloured
	for PC 10
Power Link SS1 (SaltShaker 1)	light gray coloured
	for PC 10 SaltShaker
Power Link Silver	silver coloured
	for PC38
Power Link SS2 (SaltShaker 2)	light grey coloured
	for PC38 SaltShaker
Power Link Gold	gold coloured
	for PC990, PC970, PC 950, PC99 & PC 89R Hollow Pin

Closing:

- Fit chain, bring the ends together and insert both halves of the Power Link into the chain ends. ***(Fig. 3)***
- Press both halves of the Power Link together ***(Fig. 4)*** and lock in place by pulling the chain apart. ***(Fig. 5)***

Opening:

- Press both plates of the Power Link together ***(Fig. 4)*** 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.

PC 1 (1/2" x 1/8")

Closing chain with Snap Lock:

- Fit the shortened chain, bring the ends together and connect with the Snap Lock. Place the outer plate on one pin ***(Fig. 6)***.
- Gently flex the chain until the outside connector plate snaps into position over the second pin ***(Fig. 7)***.

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.***
- ***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.***

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. 8)***, 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. 9)***.
- Slide retaining spring in the direction of arrow (4, ***Fig. 9)*** 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. 2)*** 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

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

NOTICES

NOTICES

SUPPORT
WHO TO CALL / SPARE PARTS

WHO TO CALL

In warranty cases or need of technical support help, please contact the appropriate locations.

NORTH AMERICA

Dealer Helpdesk Number:

(800)-346-2928

EUROPE

Please contact your local distributor.

SPARE PARTS

You can find an extensive spare parts program in SRAM's Spare Parts List Model Year 2005 · Publ. Number 8505.

SRAM ORIGINAL PARTS

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

www.sram.com

www.rockshox.com

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SRAM