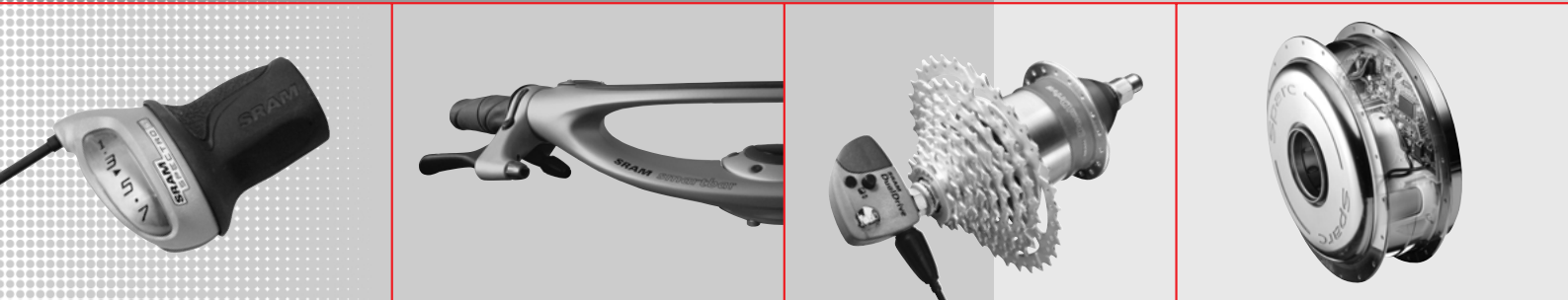


2003

**TECHNICAL MANUAL
GEAR HUB SYSTEMS**

ENGLISH



SRAM®



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intended for bicycle factories
and qualified bicycles dealers
only!

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Publ. No. 8034 E

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Released August 2002

SRAM Technical Documentation,
Schweinfurt/Germany

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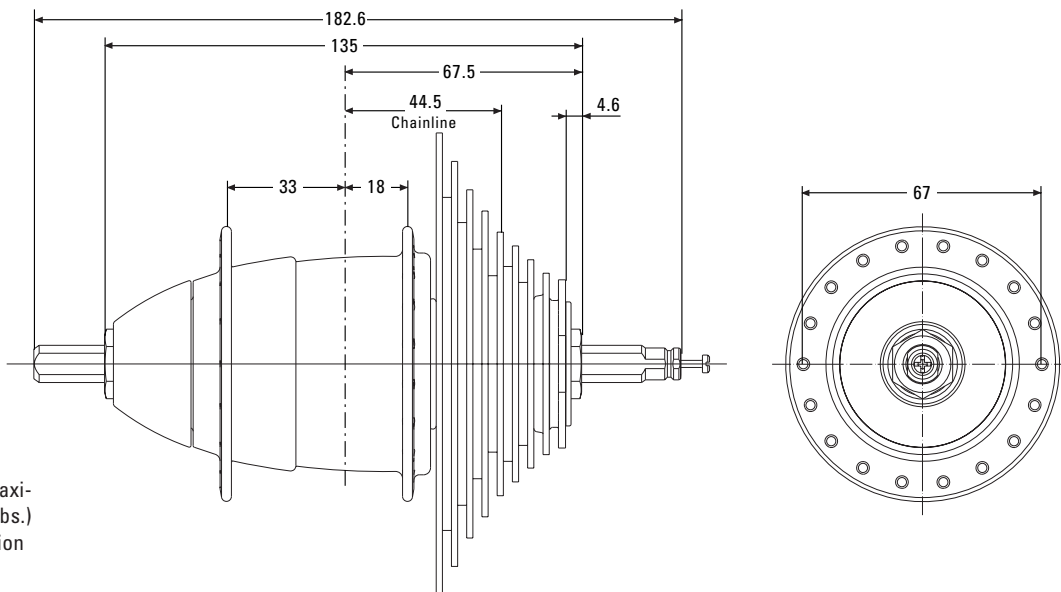
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DUALDRIVE

TECHNICAL DATA / ASSEMBLY REQUIREMENTS



- Expanded gear range
- Efficient design
- Stand-still shifting (mode selector)
- Single chainring design
- Sealed system
- Easy wheel removal
- ESP 1:1 actuation ratio technology
- Improved material use
- Outward facing limit screws
- Low system weight



Caution:
Not suitable for tandems, trademen's delivery bicycles and similar.

Cycle frame:

The strength must be such that with a maximum braking torque of 250 Nm (2200 in.lbs.) on the rear wheel no residual deformation can occur on the rear structure.

		DualDrive 27/24 · without brake		DualDrive 27/24 · disc brake compatible		
ICBS	Part No.	—	—	—	—	
		Brake	None	Interface for Disc brakes		
	Axle	Over Locknut Dim.	135 mm		135 mm	
		Length	182.6 mm		182,6 mm	
	Spoke	Ends Diameter	FG 10.5		FG 10.5	
		Holes	36	32	36	32
		Hole Diameter	2.6 mm		2.6 mm	
		Hole Ref. ø	67 mm		67 mm	
	Ratio	Flange Dist. to 1/2 OLD	33 mm / 18 mm		33 mm / 18 mm	
		Totally	576 % (27spd) / 542 % (24spd)		←	
Totally hub		186 %		←		
Speed 1		73 %		←		
Speed 2		100 %		←		
Speed 3		136 %		←		
Chainline		45 mm		45 mm		
Crankset		33 / 38 Teeth		←		
Cogset		9 / 8 Speed, 11-34/32 Teeth		←		
Cogset Compatib.		DualDrive 27 / DualDrive 24		←		
Shifter Compatib.	DualDrive 27 / DualDrive 24		←			
Sealing	Extra sealed		←			
Tandem compatib.	—		—			
Disc compatib.	—		SRAM / Magura / Hayes / Shimano			
Finish	Weight	970 g		970 g		
	Hub Shell	Aluminum		Aluminum		
	Shifting device	Composite		Composite		

DUALDRIVE TECHNICAL DATA / ASSEMBLY REQUIREMENTS

DERAILLEURS

	DualDrive 27	DualDrive 24 <i>NEW</i>
Speeds	9	8
Shifter Compatibility	DualDrive 27	DualDrive 24
Cage Length	Short, 75 mm	Short, 75 mm
Sprocket, max.	34 Teeth	32 Teeth
Sprocket, min.	11 Teeth	11 Teeth
Pulleys	Exchangeable / Bushing	Exchangeable / Bushing
Direct Mount	●	●
Weight	260 g	220 g
Upper Knuckle	Aluminum	Grilon Composite silver
Lower Knuckle	Grilon Composite silver	Grilon Composite silver
Outer Link	Aluminum	Grilon Composite silver
Inner Link	Steel / Zinc coat	Steel / Zinc coat
Outer Cage	Forged Aluminum	Grilon Composite black
Inner Cage	Grilon Composite black	Grilon Composite black
Hanger Bolt	Aluminum	Steel

Design

CASS.

	DualDrive 27	DualDrive 24
Part No.	—	—
Largest Cog	34 Teeth	32 Teeth
Speeds	9	8
Cogs	11/12/14/16/18/21/24/28/34	11/12/14/16/18/21/26/32
Spacers	Blue	Black
Chain compatib.	9spd, HG/IG/PG II comp.	8spd, HG/IG/PG II comp.
Weight	320 g	270 g
Cogs	SAPH 440 steel	←
Screws	Steel / Zinc Coat	←
Finish	Matte Nickel Plated	Chrome

Design

SHIFTERS

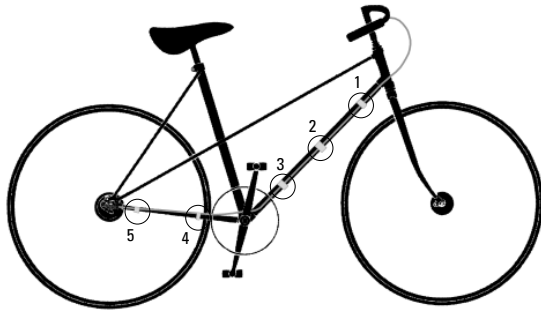
	DualDrive 27					DualDrive 24				
Part No.	—	—	—	—	—	—	—	—	—	—
Clickbox Cable	1400 mm	1500 mm	1600 mm	1700 mm	2100 mm	1400 mm	1500 mm	1600 mm	1700 mm	2100 mm
Shifter Type	SRS Twisting-Thumbshifter-Combo (2in1)					SRS Twisting-Thumbshifter-Combo (2in1)				
Arrangement	Handlebar, right					Handlebar, right				
Com- pat.	DualDrive					DualDrive				
Derailleur	DualDrive 9spd					DualDrive 8spd				
Gear Indication Der.	Window					Printed				
Riding Mode Indic.	Printed					Printed				
Barrel Adj. Gear Hub	None					None				
Barrel Adj. Derailleur	Indexing					Indexing				
Clamping Diameter	22.3 mm					22.3 mm				
Handlebar, Straight Area	Minimum length for shifter = 150 mm					Minimum length for shifter = 150 mm				
Cable Routing, Gear Hub	Continuous housing (preassembled)					Continuous housing (preassembled)				
Cable Routing, Der.	Open or continuous					Open or continuous				
Weight	N/A					N/A				
Cables	Stainless steel					Stainless steel				
Housing	Glass filled PA – Silver painted					Glass filled PA – Silver painted				
Grip Cover	Thermoplastic elastomer, Overmolded					Thermoplastic elastomer, Overmolded				
Clamping Collar	Aluminum					Aluminum				
Clickbox	Composite					Composite				

Design

DUALDRIVE TECHNICAL DATA / ASSEMBLY REQUIREMENTS



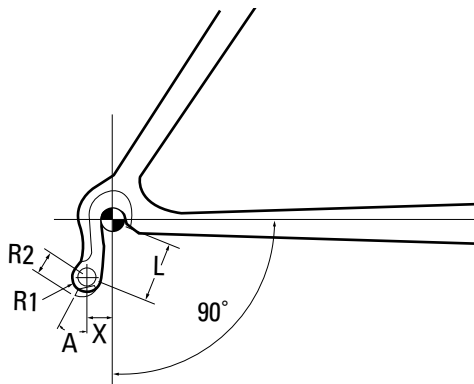
1



Cable routing	DualDrive 27	DualDrive 24
Hub cable	Along chainstay only	Along chainstay only
Deraillieur cable	Along chainstay only	Along chainstay only

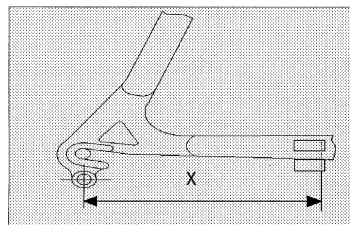
Cable attachment see Fig. 1	Cable housing	Attachment points	Cable stops
Hub	Continuous	1/2/3/4 (see Fig. 1)	—
Deraillieur	Continuous	1/2/3/4/5 (see Fig. 1)	—
	Open	—	1/5 (Fig. 1)

2



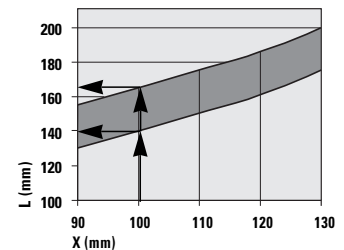
CABLE HOUSING FOR DERAILLEUR

Rear cable stop position



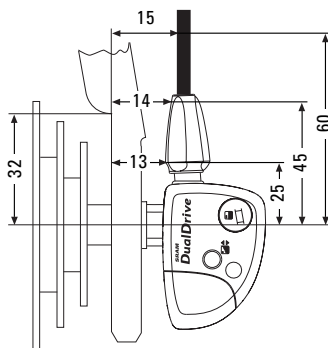
Length X min. 90 mm.
Cable stop below or beside chainstay.

Rear housing length (only DualDrive 27)



Example: Distance X = 100 mm → cable housing length L = 140 – 165 mm.

3



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.

DROPOUT

Only flat and no off-set versions.
Dropout thickness: 7 – 8 mm.
Vertical or horizontal dropout slot.
Dropouts must be parallel.

Dropout dimensions: see Fig. 2 and 3.

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

CRANKSET

Bicycle without chain case:
Use a chain guard disc (at the outer surface of chainring, material no resin)
Use only standard chainring version (non-shifting teeth).

Chainline = 45 mm.

Recommended cranks:

Cyclone:

- DualDrive crank for chainguard, 33 T, Part No. CPI-104 (chain guide fork necessary).
- DualDrive crank for Trekking, 33 T, Part No. CY-100W.
- DualDrive crank for MTB, 33 T, Part No. CF-100W.

Truvativ:

- CR-02-XF-SS or CR-02-XF-SSA

DualDrive crank supplier:

Cyclone Precision Inc.
P.O. Box 3-41 · Nantou 540 · Taiwan
Tel.: +886-49-257-829 · Fax: +886-49-257-832
eMail: justin@cpi-cw.com.tw
<http://www.cpi-cw.com>
or Truvativ · <http://www.truvativ.com>

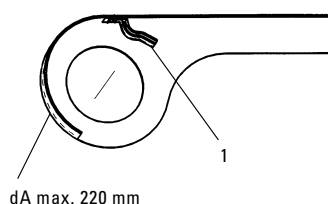
CHAIN GUIDE FORK

It prevents chain from jumping off front chainring, is bolted inside the chain case (1, Fig. 4).

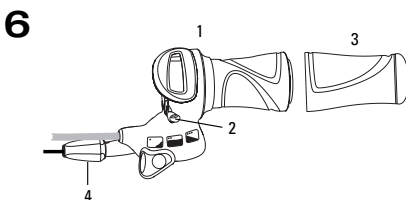
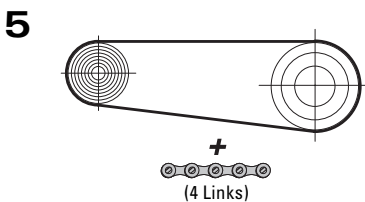
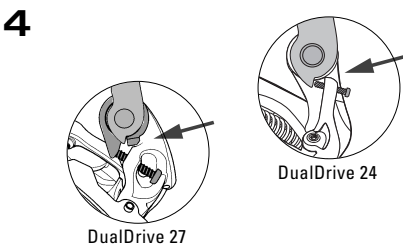
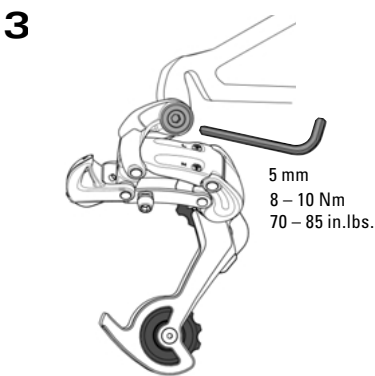
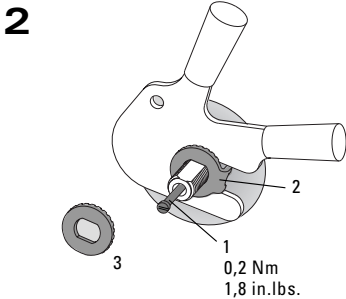
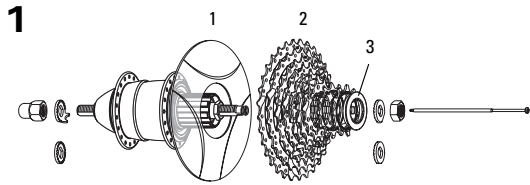
HANDLEBAR

Diameter: 22.3 mm.
Minimum length of straight area for shifter: 150 mm.
Check the compatibility of intended handlebars and brake levers.

4



DUALDRIVE ASSEMBLY



ASSEMBLY HUB

- Lace the wheel as normal.
- Place spoke protector disc (1, **Fig. 1**) on shoulder of hub, fit cassette (2) onto driver profile. Screw lock nut (3) with cassette tool (Park Tool FR-5 or SRAM Part No. 4624 411 010), tightening torque: 40 Nm (350 in.lbs.).
- Screw shifting rod (1, **Fig. 2**) into the hub axle and tighten it with 0.2 Nm (1.8 in.lbs.).
- Fit wheel in dropouts.
- Place retaining washers (**Fig. 2**) on both sides of the axle – the serrations must bear against the dropout.
 - Version for horizontal dropouts (2): the lug must engage in the dropout slot.
 - Version for vertical dropouts (3): without lug.
- Tighten up axle nuts. Tightening torque 30 – 40 Nm (266 – 350 in.lbs.).

ASSEMBLY DERAILLEUR

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. 3**).
- Check that the b-adjust washer tab (b-adjust screw at DualDrive 24) is clear of the rear derailleur dropout tab (**Fig. 4**).
- Tighten the 5 mm hex hanger bolt to 8 – 10 Nm (70–85 in.lbs.).

CHAIN LENGTH

- Bypassing the rear derailleur, run the chain around the largest cog/chainring combination (**Fig. 5**).
 - For rear suspension frames, position the rear suspension for the greatest chain length required.
- Add 4 LINKS or 3 links + Power Link to this length for proper chain length.

ASSEMBLY SHIFTER

- Slide the shifter (1, **Fig. 6**) onto the handlebar.
- Rotate the shifter until the barrel adjuster (4) is beneath (but out of the way of) the brake lever.
- Tighten the 3 mm hex clamp bolt (2) to 1.9 Nm (17 in.lbs.).
- Slide the handlebar grip (3) onto the handlebar.

Caution:

- **Never use lubricants or solvents to install handlebar grips. Handlebar grips provide an axial safety function. For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar.**
- **Check that the shifter and brake lever function properly and are unobstructed (realign if necessary).**
- **Never ride without the handlebar grips this can result in severe injury or death.**

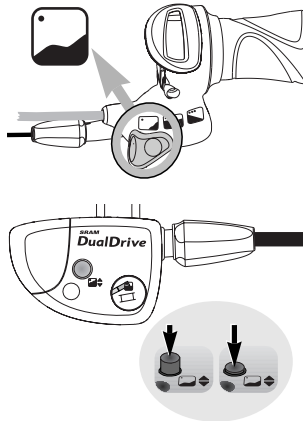
INSTALLING CLICKBOX

- Fit the cable and avoid small radius.
- Cable attachment points **see Page 5 / Fig. 1**. **Cable housing must be movable inside attachment.**
- Place shift lever in uphill riding mode / gear position "1" (**Fig. 7**).
- Push Clickbox button down (**Fig. 7**).
- Push on Clickbox to the stop on the hub axle.
- Press button up.
- Place thumb shift lever in standard riding mode / gear position "2" (**Fig. 8**).
- Match up the marks in the Clickbox viewing window by twisting the barrel adjuster (**Fig. 8**).

DUALDRIVE ASSEMBLY



7

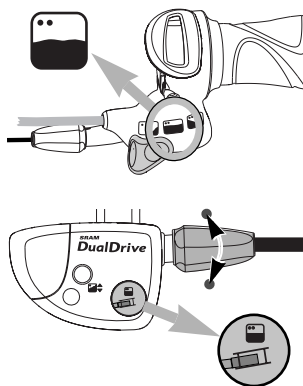


DERAILLEUR ADJUSTMENT

Limit screw adjustment:

- View the rear derailleur and pulleys from behind the rear of the bicycle (**Fig. 9**).
- 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.

8

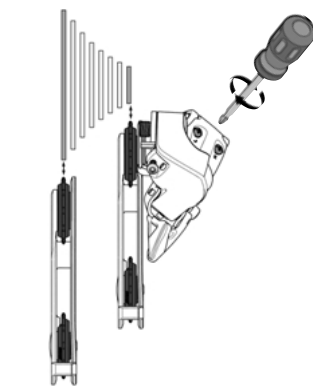


Chain gap adjustment:

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 ($\frac{1}{4}$ ") from tip of the cog to tip of upper guide pulley (**Fig. 10**).
 - Turn the b-adjust screw clockwise to increase the chain gap.
 - Turn the b-adjust screw counterclockwise to decrease the chain gap.

9



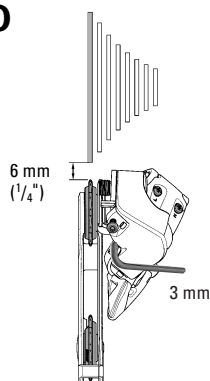
Advice:

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.

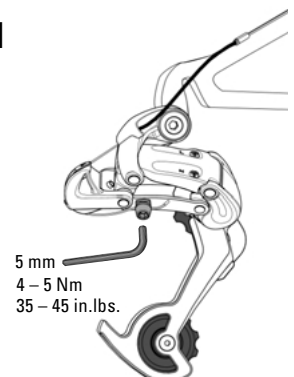
Index shifting adjustment:

- 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 (**DualDrive 27: see page 5 for figure and chart**).
- Rotate the twist shifter until the largest number and gear indication tab/dash line up.
- Turn the twist shifter barrel adjuster (4, **Fig. 6**) clockwise fully into the shifter, then turn counterclockwise 1 full turn.
- Feed the 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. 11**).
- 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.
- 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.

10

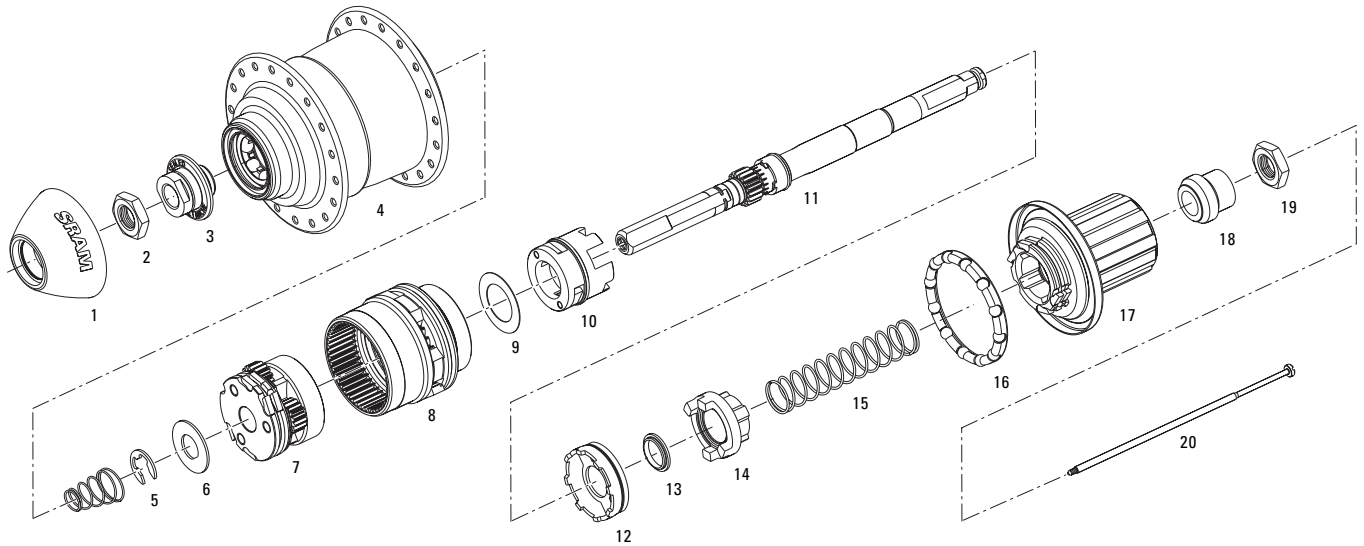


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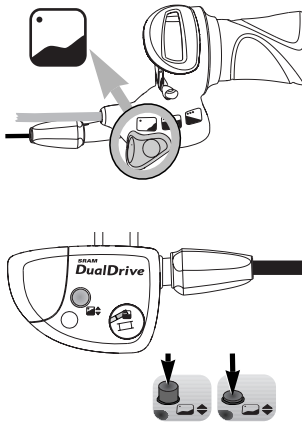


DUALDRIVE MAINTENANCE

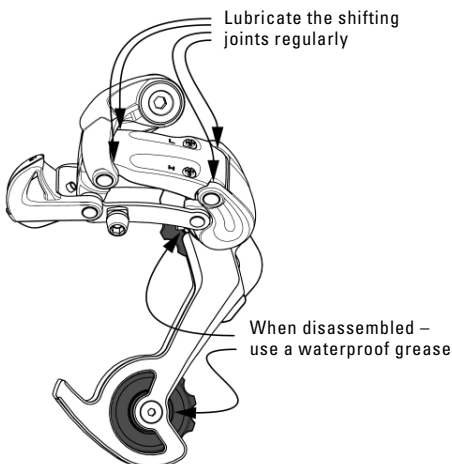
1



2



3



REMOVE WHEEL

- Rotate the twist shifter to the highest gear position (speed "8/9").
- Place shift lever in uphill riding mode / gear position "1" (**Fig. 2**).
- Push Clickbox button down (**Fig. 2**).
- Pull Clickbox off the axle.
- Screw out shifting rod (20, **Fig. 1**).
- Dismantle wheel.

DISMANTLING HUB *see Figure 1*

- Dismantle cassette lock nut with cassette tool (Park Tool FR-5 or SRAM Part No. 4624 411 010).
- Remove cassette and spoke protector disc.
- Clamp hub with the two axle flats (driverside facing downwards).
- Remove cap (1), unscrew lock nut (2), screwed adjusting cone (3) and hub shell (4).
- Dismantle retaining washer (5), remove washer (6), planetary gear carrier (7) and gear ring (8).
- Squeeze down pawls and remove pawl carrier (10) with washer (9) and ball retainer (16).
- Clamp other axle end (longer axle thread).
- Dismantle lock nut (19) and cone (18).
- Remove driver (17), compression spring (15), coupling gear clutch (14) and shift sleeve (12) with bushing (13).

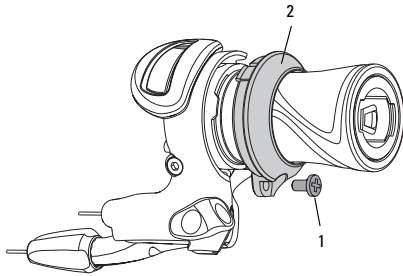
REASSEMBLY HUB *see Fig. 1*

Lubrication see "LUBRICATION GEAR HUB".

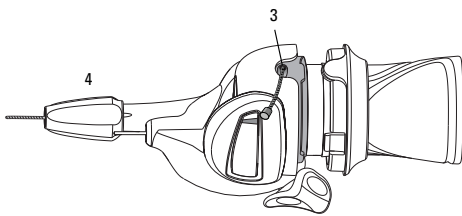
- Clamp axle with the two axle flats (longer axle thread).
- Fit shift sleeve (12), bushing (13) with small diameter first, compression spring (15), coupling gear clutch (14), and driver (17).
- Mount cone (18) and lock nut (19). Tightening torque 15 – 20 Nm (133 – 177 in.lbs.).
- Clamp other axle end (driver side facing downwards).
- Mount ball retainer (16), pawl carrier (10) and washer (9).
- Press pawls against spring force and mount gear ring (8) with smaller diameter first. Rotate gear ring counterclockwise until pawls engage inside the gear ring.
- Fit planetary gear carrier (7) and washer (6).
- Press and rotate planetary gear carrier until axle groove is visible.
- Mount retaining washer (5).
- Mount hub shell (4), obligatory with a slight counterclockwise turn.
- Mount adjusting cone (3).
- Screw on counternut (2), adjust bearings to be free of play and tighten with a torque of 15 – 20 Nm (133 – 177 in.lbs.).
- Mount cap (1).
- Unclamp hub and mount shifting rod (20) with a torque of 0,2 Nm (1.8 in.lbs.). Mount spoke protector disc and cassette.



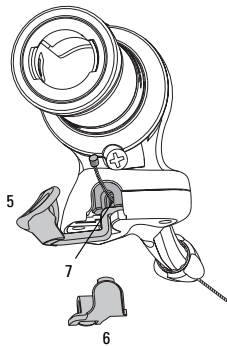
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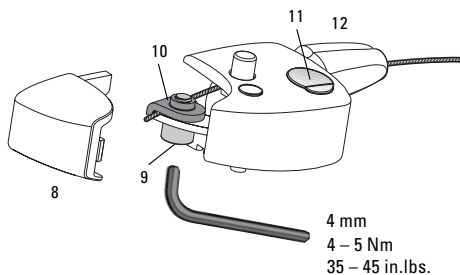
5



6



7



LUBRICATION GEAR HUB

Hubs are provided with permanent lubrication and maintenance-free under normal conditions.

Cleaning of parts:

- All parts – except the planetary gear carrier and the driver – can be degreased in a cleaning bath.
- Planetary gear carrier and driver only need to be cleaned on the outside with a brush so as not to degrease the bearings.

Lubrication of parts:

Use only SRAM grease (Part No. 0369 135 201) and standard bicycle oil.

- To lubricate the bearing points on the planetary gear sets, position the planetary gear carrier pawls upside and apply 2 – 3 drops of oil to the bearing bolts – at the same time turning the planetary gears so that the bearing points are completely wet. Oil axle slot, apply a thin coating of grease to the outside.
- Grease the teeth of the axle (fill the gaps).
- Apply grease to gear ring teeth but just oil the pawls and pawl teeth.
- Oil pawl carrier pawls and pawl bearings.
- Oil cartridge bearing.
- Regrease ball retainers, line ball bearing running tracks with grease.

Caution:

Do not use high-pressure water when cleaning the gear hub (e.g. strong water jets, high-pressure cleaners etc.) – if water penetrates it could lead to functional problems.

LUBRICATION REAR DERAILLEUR

- Do not use solvents or corrosive materials to clean the components.
- Lubricate the shifting joints regularly (Fig. 3).
- Grease any cable guides (e.g. beneath the bottom bracket).

CABLE CHANGE

Advice:

Use only new high quality cable and compressionless cable housing with end caps.

Twist shifter (rear derailleur):

- Detach the cable from the derailleur.
- Cut cable off 15 cm (6") from shifter barrel adjuster. Discard old cable and cable housing.
- Remove screw (1, Fig. 4) and pull open the cable change sleeve (2).
- Rotate the shifter fully in the cable release direction (gear position "8/9").
- Look for cable head entry (3, Fig. 5).
- Push cable up/out of the shifter and discard.
- Feed the new cable through the cable entry and out the barrel adjuster (4).
- Pull cable snug.
- Install cable change sleeve (2, Fig. 4).
- Feed the cable through the new cable housing and frame stops.
- Attach cable to the derailleur.
- Adjust indexing per derailleur instruction.

Thumb shift lever (gear hub):

- Place thumb shift lever (5, Fig. 6) in uphill riding mode / gear position "1".
- Snap open Clickbox-cover (8, Fig. 7) (no need to move Clickbox from the axle end).
- Unscrew clamping bolt (9).
- Remove the shifter escape hatch (6, Fig. 6).
- Remove and discard the old cable.
- Feed the new cable through the cable entry (7, Fig. 6), the new cable housing and pull the cable snug.
- Attach the escape hatch.
- Pull the cable tight and position it under the cable anchor washer (10, Fig. 7).
- Tighten the 4 mm hex cable anchor bolt to 4 – 5 Nm (35 – 45 in.lbs.).
- Cut off cable end to 1 – 3 mm.
- Snap in Clickbox-cover (8).
- Place thumb shift lever in standard riding mode / gear position "2".
- Match up the marks in the Clickbox viewing window (11, Fig. 7) by turning the barrel adjuster (12).

DUALDRIVE MAINTENANCE

TROUBLESHOOTING

Problem	Cause	Remedy
Hub: Shifting difficulties	Incorrect gear setting	Adjust shifting system, oil control cable, check that cable stop is fastened correctly.
Pedals are carried forward when freewheeling	Bearings set too tight	Re-adjust bearing
	Loose lock nuts	Tighten lock nuts (15 – 20 Nm, 133 – 177 in.lbs.)
	Rear frame dropouts non parallel	Bend / reorient dropouts
Derailleur: 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.

DUALDRIVE MAINTENANCE



SPECTRO S7

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

57

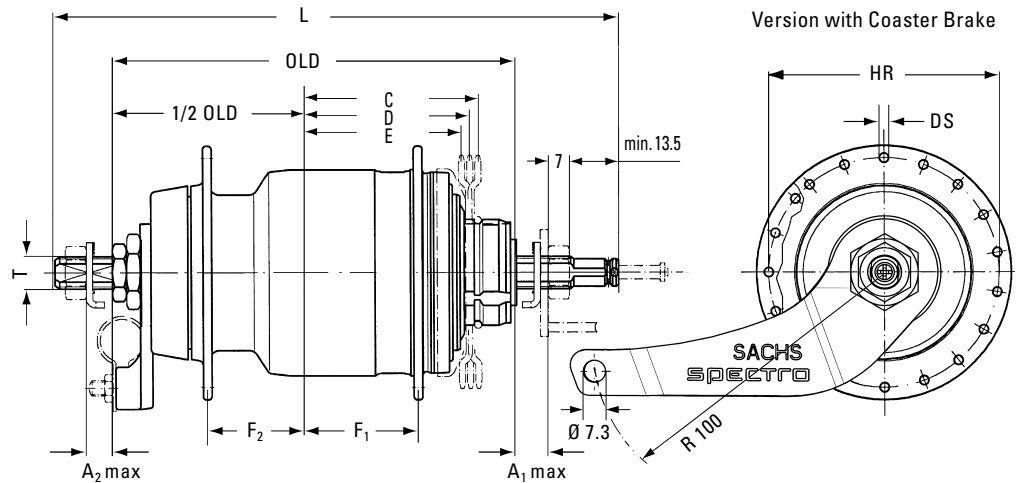
- Comfort Action Shifting
- Improved Ergonomics
- Optimal Gear Ratio
- Spectro Design
- Matte Chrome Finish
- Reliable Brake Performance
- Most Efficient Hub In Its Class

Caution:

- **Spectro S7 hubs are not suitable for tandems, trademen's delivery bicycles and similar.**
- **Use always 2 retaining washers. Alternatively assemble both retaining washers on the left axle end (Fig. 5).**

Cycle frame:

- Dropouts must be parallel.
- Slot width at rear dropout max. 10,5 mm.
- The strength must be such that with a maximum braking torque of 250 Nm (2200 in.lbs.) on the rear wheel no residual deformation can occur on the rear structure.



HUBS

	Spectro S7 with coaster brake	Spectro S7 with drum brake	Spectro S7 without brake
Type	MH 7215	MH 7225	MH 7205
Brake	Coaster	Drum „D“ „NL“	None
Over Locknut Dim., OLD	130 mm	135 mm	130 mm
Length, L	183.4 mm	188.5 mm	183.4 mm
Ends Diameter, T	FG 10.5	FG 10.5	FG 10.5
Dropout Width Dim.	A ₁ max. = 12.5 mm / A ₂ max. = 12 mm	A ₁ max. = 12.5 mm / A ₂ max. = 12.2 mm	A ₁ max. = 12.5 mm / A ₂ max. = 10 mm
Holes	36	36	36
Hole Diameter, DS	3.0 mm	2.9 mm	3.0 mm
Hole Ref. ø, HR	75 mm	89 mm	75 mm
Flange Dist. to 1/2 OLD	F ₁ = 33 mm / F ₂ = 34 mm	F ₁ = 34.8 mm / F ₂ = 35.7 mm	F ₁ = 33 mm / F ₂ = 34 mm
Totally	303 %	←	←
Speed 1	57 %	←	←
Speed 2	68 %	←	←
Speed 3	81 %	←	←
Speed 4	100 %	←	←
Speed 5	124 %	←	←
Speed 6	148 %	←	←
Speed 7	174 %	←	←
Usable Dimensions	1/2" x 1/8" or 1/2" x 3/32"	1/2" x 1/8" or 1/2" x 3/32"	1/2" x 1/8" or 1/2" x 3/32"
Line, C/D/E	54/51/48 mm	55.5/52.5/49.5 mm	54/51/48 mm
Ratio	24", 26", 28" = 1.83–1.90 / 20" = 1.83–2.00	←	←
Shifter Compatib.	Spectro Grip 7	←	←
Clickbox Compatib.	Clickbox S7	←	←
Tandem Compatib.	—	—	—
Weight	1714 g	1737 g	1556 g
Hub Shell Material	Steel	Aluminum	Steel
Finish	Matt Chrome Plated	Clear Coat	Matt Chrome Plated

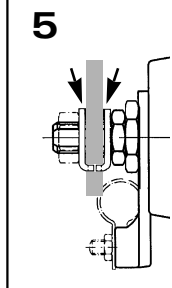
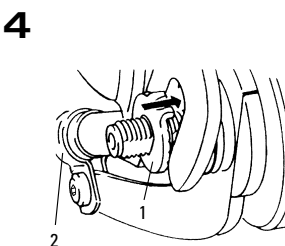
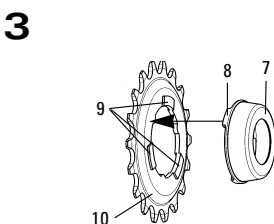
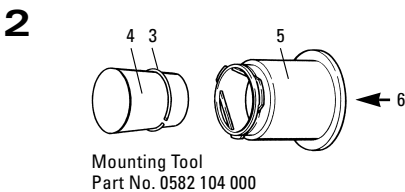
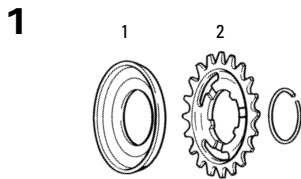
SPECTRO S7

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

SHIFTERS

		Spectro Grip 7							
Design	Part No.	—	—	—	—	—	—	—	
	Shifter Type	Twist Shifter							
	Cable	1450 mm	1550 mm	1650 mm	1750 mm	1850 mm	1950 mm	2050 mm	2150 mm
	Gear Indication	Window							
	Clamping Diameter	22.3 mm							
	Handlebar, Straight Area	Minimum length for shifter = 150 mm							
	Weight	89g							
	Housing	Glass filled PA							
	Grip	PP							
	Grip Cover	Thermoplastic elastomer, Overmolded							
	Clamping Collar	Aluminum							

SPECTRO S7 ASSEMBLY



ASSEMBLY HUB

- Lace the wheel as normal. See spoke length table.
- Place the dust cap (1, **Fig. 1**) and sprocket (2) on the driver.
- Push sprocket circlip (3, **Fig. 2**) onto the cone of tool sleeve (4). Place tool sleeve with large diameter on the driver.
- Push the spring end of sliding sleeve (5) of the tool over the tool sleeve. Thrust sliding sleeve in direction (6), this forces circlip into the recess of the driver.
- Remove tool and check that the circlip is seated correctly.
- Turn dust cap (7, **Fig. 3**) until the three lugs (8) are between the three beads (9) on the sprocket (10).
- Position dust cap and push towards sprocket until it is felt to lock into place.
- Placing the wheel in the rear frame.
- Mount the chain.

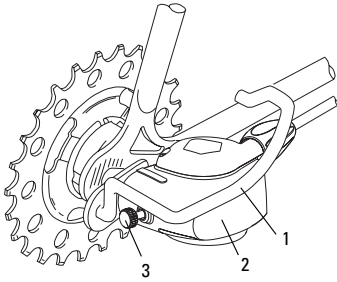
- Fit retaining washers (1, **Fig. 4**) on both axle ends. The serrations must bear against the dropout and the lug must engage in the dropout slot. In case of exceeding the dimension A₁ max. = 12.5 mm (**see Page 13**), e.g. by thick dropouts, both retaining washers should be assembled on the left axle end (**Fig. 5**).
- On the sprocket side fit the protective bracket (1, **Fig. 6**) directly below the fixing nut. Tightening torque on a con or hex nuts 30 – 40 Nm (266 – 350 in.lbs.).
- Mount the brake lever using a suitable frame clamp (2, **Fig. 4 resp. Fig. 10**).
Caution:
Mount the brake lever between the two straps of the frame clamp.
The clamp must be seated on the frame without play.
Use a self-locking nut! Tightening torque: 2 – 3 Nm (18 – 27 in.lbs.).

Spoke length table:

Tire Size	Cross	Length MH 7215/7205	Length MH 7225
47–406	20" x 1.75 x 2	3 x	181 mm
37–490	22" x 1 3/8	3 x	225 mm
47–507	24" x 1.75 x 2	3 x	232 mm
37–540	24" x 1 3/8	3 x	251 mm
47–559	26" x 1.75 x 2	3 x	259 mm
37–590	26" x 1 3/8	3 x	275 mm
47–622	28" x 1.75	3 x	289 mm
37–622	28" x 1 3/8 x 1 5/8	3 x	289 mm
28–622	28" x 1 1/8	3 x	289 mm
32–622	28" x 1 5/8 x 1 1/4	3 x	289 mm
28–630	27" x 1 1/4 fifty	3 x	294 mm
32–630	27" x 1 1/4	3 x	294 mm

Spoke lengths are approximate values. They must be checked through lacing attempts and adjusted accordingly.

6



Advice:

- If a different protective bracket (1, Fig. 6) is used the thickness of the attachment plate must be max. 3 mm.
- Do not use additional washers.
- At least the beginning of the axle thread must be visible in front of the axle nut.

- Turn locating sleeve on the axle until the guiding rib (4) is facing roughly upwards.
- Place shifter in gear position "1".
- Push on Clickbox (2, Fig. 6) to the stop on the hub axle. The guiding rib (4, Fig. 9) of the locating sleeve thereby engages in the slot on the housing. In the end position tighten up the knurled bolt (3, Fig. 6) by hand (0,3 Nm / 2,7 in.lbs.).

ASSEMBLY SHIFTERS

Advice:

- Contrary to the old shifter version the shifter cable of the new version runs above the brake lever. Maybe you need 50 mm more cable length.
- 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 handlebar positions effects cable housing length.
- Slide shifter (1, Fig. 7) onto handlebar.
- Mount fixed grip (2) onto end of handlebar.
- Slide shifter against fixed grip, adjust shifter on handlebar and tighten with bolt (3) with a torque of 1.5 Nm (13 in.lbs.).

ADJUSTMENT

- Be sure to reset rotational shifter from 5th. to 4th gear.
- Match up the marks in the Clickbox viewing window (4, Fig. 7) by turning the adjusting screw (5).

CONNECTING DRUM BRAKE

Caution:

Only use brake levers with a cable moving distance of at least 15 mm and a minimum leverage of 3.8.

- Fit cable stop (1, Fig. 10) with adjusting bolt (2) and nut (3) and insert into the slot on the brake anchor plate.
- Turn adjusting bolt down by approx. $\frac{2}{3}$ and route the brake cable from the brake handle.
- Push lower brake cable end through adjusting bolt (2) and insert lower cable housing end into adjusting bolt.
- Thread brake cable end (4) into fork unit (5).
- Tighten screw (6) slightly.
- Attach fork unit to brake lever (7).
- Pull brake cable end taut with pliers so that fork unit can still be attached and removed (important for changing wheel).
- Tighten screw (6).

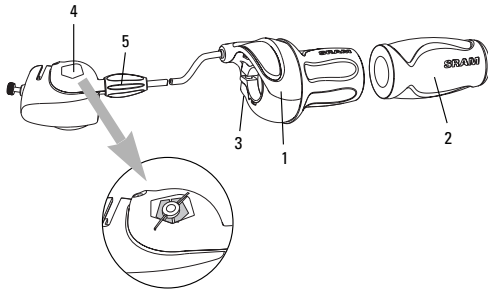
Caution:

For NL version drum brake hub with special lever (8), only use original NL brake cable (fork unit (5) is not suitable).

ADJUSTMENT DRUM BRAKE

- Unscrew adjusting screw (2, Fig. 10) until the brake pads drag lightly.
- Actuate the hand brake lever forcefully several times and then, if necessary, turn the adjusting screw further in just until the wheel starts spinning freely.
- Lock hex nut (3).

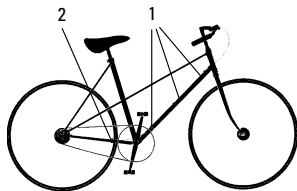
7



Caution:

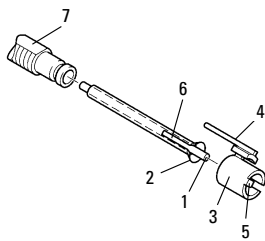
- Never use lubricants or solvents to install fixed grips. Fixed grips provide an axial safety function. For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar.
- Check that the shifter and brake lever function properly and are unobstructed (realign if necessary).
- Never ride without the fixed grips. The turning grip may loosen from housing and slip off handlebar – this can result in severe injury or death.

8



- When fitting the cable avoid small radius. Attach the cable 3 times to the down tube (1, Fig. 8).
- Last attachment point is on the lower rear wheel fork (2, Fig. 8) immediately behind the chain wheel. Cable housing must be movable inside attachment.

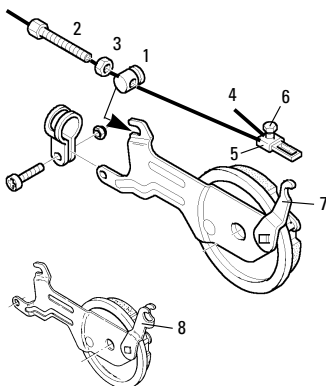
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INSTALLING CLICKBOX

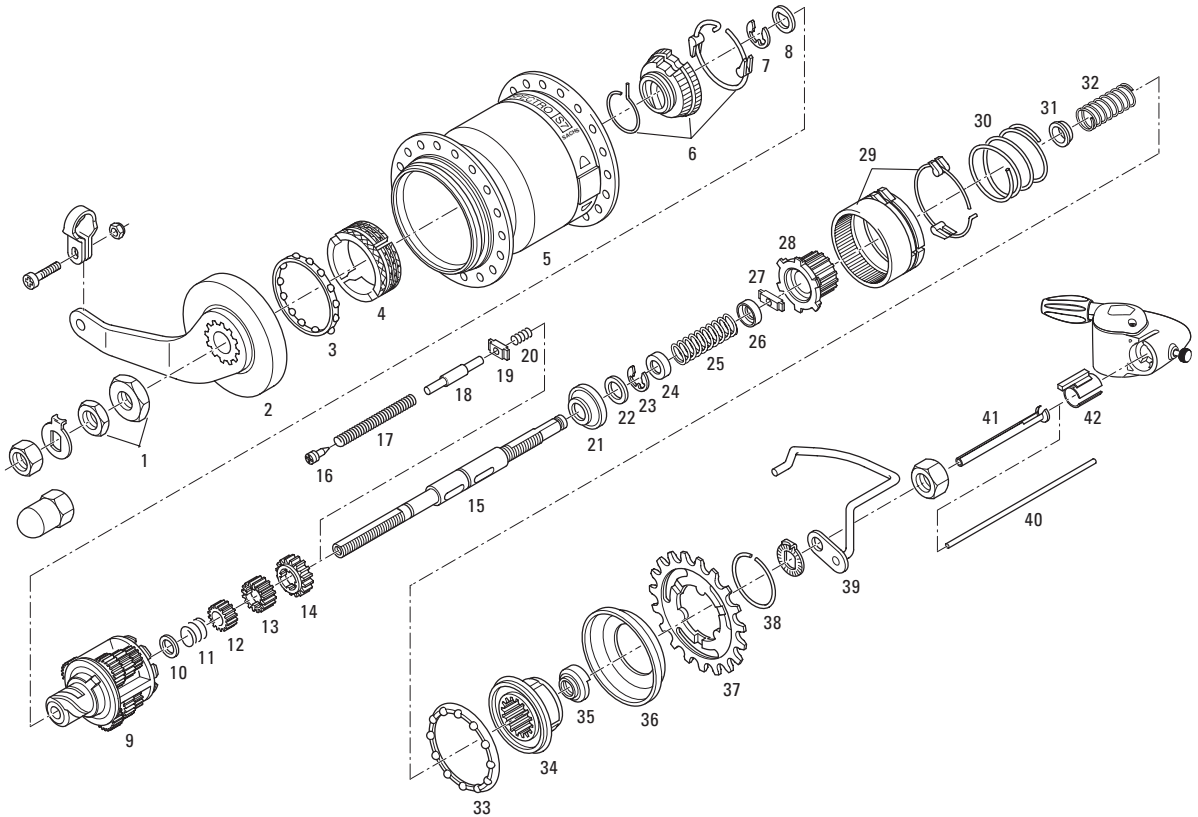
- Insert shift rod (1, Fig. 9) in shift tube (2) (oil parts lightly) and then push into axle bore as far as the stop. Turn slot (6) in shift tube to a position where it is easily visible.
- Push locating sleeve (3) with guiding rib (4) to the front onto the hub axle – making sure that the internal lug (5) is guided in the slot (6) of the shift tube until it can be felt – and heard – to engage.

10



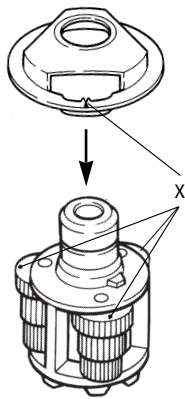
SPECTRO S7 MAINTENANCE

1

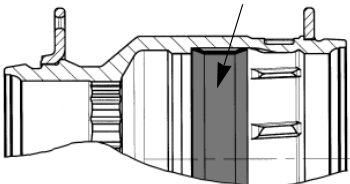


2

Spectro S7 mounting aid
Part No. 65 0324 103 000



3



REMOVE WHEEL

- Place shifter in gear position "1".
- Loosen the knurled screw and pull the Clickbox off the axle.
- Disengage the location sleeve and pull it off. Remove shift rod/tube out of the axle bore.
- Remove wheel.

DISMANTLING HUB

see Fig. 1

- Remove circlip (38), sprocket (37) and dust cap (36) as normal.
- Withdraw locating sleeve (42) (latched)
- Take out shift rod/tube (40/41).
- Clamp hub by the axle between aluminum jaws with sprocket side facing downwards.
- Unscrew both locknuts (1).
- Remove lever cone (2) ball retainer (3) and brake shell (4).
- Withdraw hub sleeve (5) upwards.
- Unscrew brake cone (6) from flat thread.
- Take out retaining washer (7) and thrust washer (8).
- Remove planetary gear carrier (9), washer (10) compression spring (11) and the three sun gears (12, 13, 14).
- Clamp other axle end.
- Unscrew fixed cone (35).
- Remove driver (34), compression spring (32) with cover (31), large compression spring (30), ball retainer (33), gear ring (29) and coupling gear (28).
- Compress spring (25) and remove thrust block (27).

- Remove cover (26), spring (25) and cover (24).
- Dismantle retaining washer (23).
- Remove thrust washer (22) and plastic profile washer (21).
- Unscrew grub screw (16) (Caution: It is subject to spring pressure) – and dismantle the long compression spring (17) guide pin (18), thrust block (19) and the short compression spring (20).

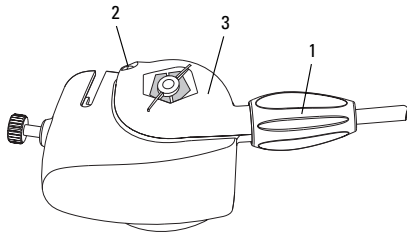
REASSEMBLY HUB

see Fig. 1

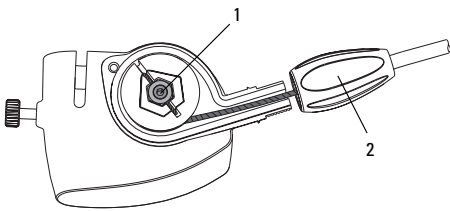
Lubrication see "MAINTENANCE/LUBRICATION".

- Insert into the axle (on the side with the internal thread):
- Short compression spring (20).
- Thrust block (19) – it is the same both sides.
- Guide rod (18) – it is the same both sides.
- Long compression spring (17).
- Compress spring and fit grub screw (16).
- Clamp axle, end for clickbox facing upwards.
- Fit plastic profile washer (21) with its large diameter upwards.
- Fit thrust washer (22) and retaining washer (23).
- Locate cover (24), compression spring (25) with 7 turns, cover (26, insides to the spring).
- Compress spring and position thrust block (27) – it is the same both sides – centrally in the axle.

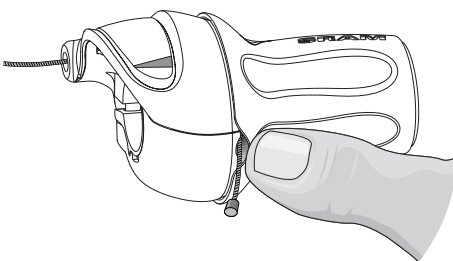
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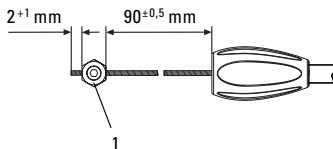
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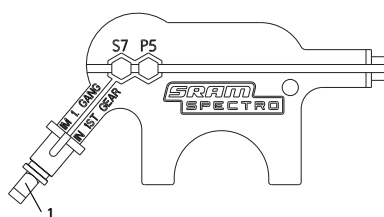
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7



8



- Clamp other axle end.
- Fit large sun gear (14), with deflector bevels upwards.
- Position medium sun gear (13), with deflector bevels upwards.
- Fit small sun gear (12) – with recesses in front, thrust block engages in the slots.
- Position smallest compression spring (11).
- Fit 1 mm thick washer (10).
- Fit planetary gear carrier (9).
- Place the mounting aid (Fig. 2) on the planetary gear carrier such that the markings (X) on the 3 small planet gears and the mounting aid match up.
- Turn planetary gear carrier and at the same time push it downwards over the sun gears.
- Fit thrust washer (8) and retaining washer (7) in the undercut.

Only now remove the mounting aid.

Advice:
If the gears are not accurately assembled the hub may feel tight in use. This may lead to gear wheel damage during travel.

- Reclamp axle (Clickbox end facing upwards)
 - Fit coupling gear (28) with carrier plate downwards
 - Push ring gear (29) over the coupling gear.
 - Locate large spring (30).
 - Fit largest ball retainer (33) with balls underneath.
 - Fit cover (31, inside to the spring).
 - Assemble the compression spring (32) with 12 turns.
 - Position driver (34) – push it down – and screw on fixed cone (35) to the stop, tightening torque 20 Nm (177 in.lbs.).
 - Clamp other axle end.
 - Screw brake cone (6) onto the flat thread.
 - Assemble hub shell – with a slight counter-clockwise movement.
- In case the hub shell jams, position the plastic ring (Fig. 3) correctly.
- Insert brake shell (4, Fig. 1) – retaining lugs upwards, thereby the friction spring on the brake cone must engage in the slot on the brake shell.
 - Locate ball retainer (3) (balls underneath), position lever cone (2), thereby turn it clockwise until the retaining lugs engage.
 - Screw on locknuts (1), adjust bearing so that there is no play and lock nuts together with 15 – 20 Nm (133 – 177 in.lbs.).

Advice:
Dismantling and reassembly of hub types MH 7205 / MH 7225 should be carried out in the same way. Differences: Instead of brake shell/cone a click-and-pawl carrier is installed on the planetary gear carrier here. Without flat thread – fixed with a retaining washer.

CABLE CHANGE

Dismantling shifter cable:

- Place shifter in gear position “1”.
- Do not remove the Clickbox from the axle end.
- Unscrew the adjusting screw (1, Fig. 4) completely. Unscrew the cover screw (2), brush aside the adjusting screw (1) and remove the cover (3).
- Withdraw shifter cable and clamping bolt (1, Fig. 5) upwards, loosen clamp and pull clamping piece from the cable.
- Slightly lift the grip cover (Fig. 6), push the cable out and discard.

Assembly shifter cable:

- Route new cable through shifter housing and pull cable to seat cable head completely into cable recess. Feed the cable through the new cable housing and adjusting screw.
- Position clamping bolt (1, Fig. 7) at a distance of 90 mm, tighten up with 1.5 Nm (13 in.lbs.) and cut off cable ends to 2 – 3 mm. For positioning the clamping bolt use adjust gauge (Fig. 8). (Part. No. 65 0324 107 000)
- Locate clamping bolt (1, Fig. 5) and place shifter cable around the carrier cylinder (counter-clockwise winding).
- Position the cover (3, Fig. 4) and tighten up with the cover screw (2). Torque 0.35 – 0.45 Nm (3.1 – 4.0 in.lbs.). Screw in the adjusting screw (1) completely.

Advice:

- *If you want to remove the Clickbox from the axle end for changing the cable, do as follows:*
 - Place shifter in gear position “1”.
 - Loosen the knurled screw and pull the Clickbox off the axle.
 - Now it's essential to push the end (1, Fig. 8) of the adjust gauge completely into the Clickbox and tighten up the knurled bolt (so that you maintain the initial tension of the spring inside the Clickbox).
 - Change cable as per description above.
- *If you remove the Clickbox from the axle and change the cable without using the end of the adjust gauge, then you will lose the initial tension of the spring inside the Clickbox. In this case you must assemble the cable by placing it around the carrier cylinder with an additional winding (Fig. 5).*

SPECTRO S7 MAINTENANCE

9

TILL 1998



Don't combine with newer versions!

EXCHANGEABILITY SHIFTER / CLICKBOX

Produced till 1998 (Fig. 9):

Don't combine with newer versions!

Produced till end 2002 and as of 2003 (Fig. 10):

Combine shifter and Clickbox only according to Fig. 10.

Distance of the clamping bolt:

Each Clickbox version needs its specific distance of the clamping bolt:

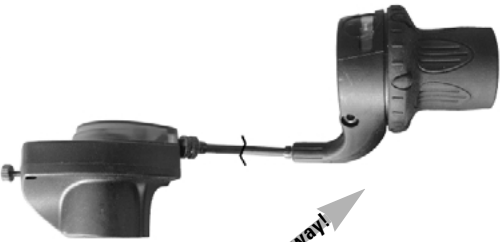
- Till 1998: Distance 68,5 mm
- Till end 2002: Distance 89 mm
- As of 2003: Distance 90 mm

ADJUSTMENT

- Be sure to reset rotational shifter from 5th. to 4th gear.
- Match up the marks in the Clickbox viewing window (Fig. 12) by turning the adjusting screw (1).

10

TILL END 2002



AS OF 2003



combine only that way!

REPLACEMENT BY A NEW CLICKBOX (AS OF 2003)

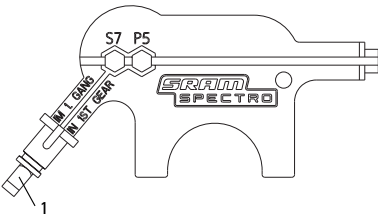
- Place shifter in gear position "1".
- Loosen the knurled screw and pull the Clickbox off the axle.
- Unscrew the adjusting screw (1, Fig. 12) completely. Unscrew the cover screw (2), brush aside the adjusting screw (1) and remove the cover (3).
- Push the end (1, Fig. 11) of the adjust gauge (Part. No. 65 0324 107 000) completely into the Clickbox and tighten up the knurled bolt (so you maintain the initial tension of the spring inside the Clickbox).
- Withdraw shifter cable and clamping bolt (1, Fig. 5) upwards.
- Locate clamping bolt (1, Fig. 5) in the new Clickbox and place shifter cable around the carrier cylinder (counter-clockwise winding).

Advice:

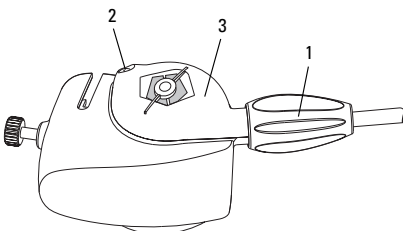
If you remove the Clickbox from the axle and change the cable without using the end of the adjust gauge, then you will lose the initial tension of the spring inside the Clickbox. In this case you must assemble the cable by placing it around the carrier cylinder with an additional winding (Fig. 5).

- Position the cover (3, Fig. 12) and tighten up with the cover screw (2). Torque 0.35 – 0.45 Nm (3.1 – 4.0 in.lbs.). Screw in the adjusting screw (1) completely.
- Loosen the knurled screw on the Clickbox and pull the adjust gauge off.
- Push on Clickbox on the hub axle. Tighten up the knurled bolt by hand.

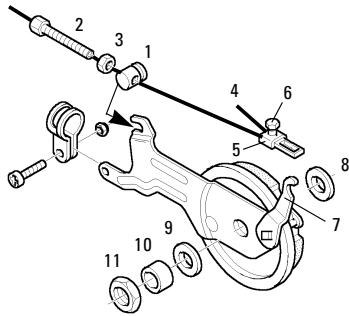
11



12



13



DRUM BRAKE

Install brake anchor plate (or exchange it):

- Place thrust washer (8, **Fig. 13**) over the axle on the adjusting cone and fit complete brake anchor plate. Position washer (9) distance sleeve (10) and screw on locknut (11).
- Push brake lever (7) to the stop and hold it there to center the brake jaws in the brake drum – tighten up locknut with a torque of 15 – 20 Nm (133 – 177 in.lbs.).

ADJUSTMENT DRUM BRAKE

- Unscrew adjusting screw (2, **Fig. 13**) until the brake pads drag lightly.
- Actuate the hand brake lever forcefully several times and then, if necessary, turn the adjusting screw further in just until the wheel starts spinning freely.
- Lock hex nut (3).

Caution:

Check that all the brake system components are functioning properly!

- Oil the inside of the sun gears, grease the outside teeth (fill the gaps in the teeth).
- Oil outside teeth and carrier plate on the coupling gear and lightly grease the borehole from right and left.
- Do not apply grease to ring gear but just oil the pawl pockets.
- Grease the brake cone in the borehole and the friction spring.
- Spread grease on the inside and outside of the brake shell.
- Fill lever cone with grease reserves for brakes
- Regrease ball retainer, line ball bearing running tracks with grease.

MAINTENANCE / LUBRICATION

Caution:

The Spectro hubs are provided with permanent lubrication and under normal conditions is maintenance-free. If the coaster brake is loaded excessively its effect can be too strong, the hub may lock. In such a case the brake shell should be lubricated with a special grease (Part No. 0369 135 201). Renew brake shell, when rhombic pattern is worn out.

Cleaning of parts:

- All parts – except for the planetary gear carrier – can be degreased in a cleaning bath.
- The planetary gear carrier only needs to be cleaned on the outside with a brush so as not to degrease the planetary gear bearing.

Caution:

Do not use high-pressure water when cleaning the gear hub (e.g. strong water jets, high-pressure cleaners etc.) – if water penetrates it could lead to functional problems.

Lubrication of parts:

- To lubricate the bearing points on the planetary gear sets, position the planetary gear carrier on its crown and apply 2 – 3 drops of oil to the bearing bolts – at the same time turning the planetary gears so that the bearing points are completely wet. Oil axle through the axle bore and axle slot, apply a thin coating of grease to the outside.

TROUBLESHOOTING

Problem	Cause	Remedy
Shifting difficulties	Damaged control cable	Replace control cable
	Incorrect gear setting	Adjust shift system
	To much additional axle attachments between hub and axle nut	Beginning of axle thread must be visible in front of the axle nut
Pedals are carried forward when free-wheeling	Bearings set too tight	Re-adjust bearings
	Loose lock nuts	Tighten lock nuts (15 – 20 Nm)
	Chain is over-tensioned	Reduce chain tension
Hub locks when braking (coaster brake)	Brake shell has run dry	Wash out hub sleeve, repolish and relubricate brake cylinder, renew brake shell

SPECTRO P5

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

P5

- Comfort Action Shifting
- Improved Ergonomics
- Optimal Gear Ratio
- Spectro Design
- Matte Chrome Finish
- Reliable Brake Performance
- Most Efficient Hub In Its Class

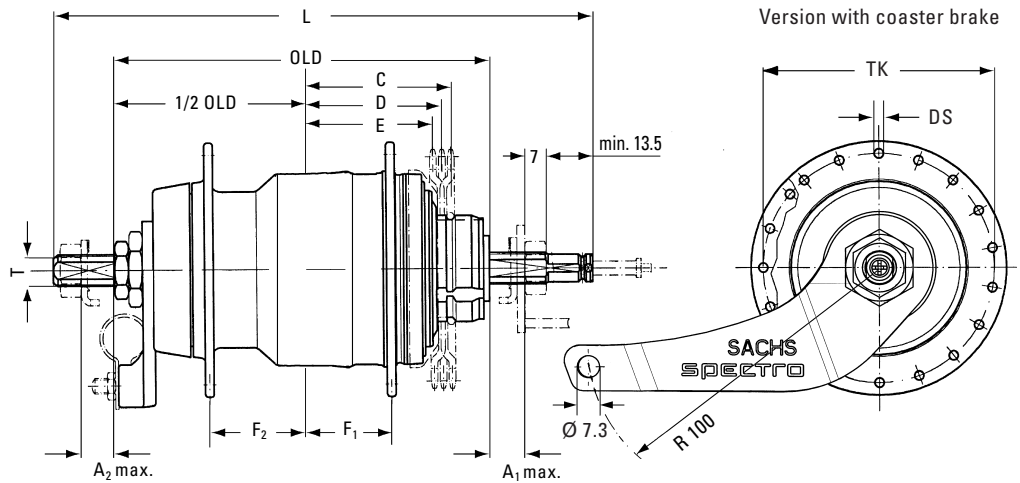
Version Spectro P5 Cargo:
see page 29.

Caution:

- **Spectro P5 hubs are not suitable for tandems, trademen's delivery bicycles and similar.**
- **Use always 2 retaining washers. Alternatively assemble both retaining washers on the left axle end (Fig. 5).**

Cycle frame:

- Dropouts must be parallel.
- Slot width at rear dropout max. 10,5 mm.
- The strength must be such that with a maximum braking torque of 250 Nm (2200 in.lbs.) on the rear wheel no residual deformation can occur on the rear structure.



HUBS

		Spectro P5 with coaster brake	Spectro P5 with drum brake	Spectro P5 without brake
	Type	MH 5215	MH 5225	MH 5205
	Brake	Coaster	Drum „D“ „NL“ „NL“	None
AXLE	Over Locknut Dim., OLD	122 mm	126 mm	122 mm
	Length, L	175 mm	179 mm	175 mm
	Ends Diameter, T	FG 10.5 / FG 10.5 toothed cone	FG 10.5	FG 10.5
AXLE	Dropout Width Dim.	A ₁ max. = 12.5 mm / A ₂ max. = 11.5 mm	A ₁ max. = 12.5 mm / A ₂ max. = 12.5 mm	A ₁ max. = 12.5 mm / A ₂ max. = 10.5 mm
	Holes	36	36	36
SPOKE	Hole Diameter, DS	3.0 mm	2.9 mm	3.0 mm
	Hole Ref. ø, HR	75 mm	89 mm	75 mm
	Flange Dist. to 1/2 OLD	F ₁ = 28.5 mm / F ₂ = 29.5 mm	F ₁ = 30.5 mm / F ₂ = 29.5 mm	F ₁ = 29 mm / F ₂ = 29 mm
GEAR HUB RATIO	Totally	251 %	←	←
	Speed 1	63 %	←	←
	Speed 2	78 %	←	←
	Speed 3	100 %	←	←
	Speed 4	128 %	←	←
	Speed 5	158 %	←	←
CHAIN	Usable Dimensions	1/2" x 1/8" or 1/2" x 3/32"	1/2" x 1/8" or 1/2" x 3/32"	1/2" x 1/8" or 1/2" x 3/32"
	Line, C/D/E	49/45.5/43 mm	51.5/48.5/45.5 mm	49/45.5/43 mm
	Ratio	24", 26", 28" = 1.8 - 1.9 / 20" = 1.8 - 2.0	←	←
	Shifter Compatib.	Spectro Grip 5	←	←
	Clickbox Compatib.	Clickbox P5	←	←
	Tandem Compatib.	—	—	—
	Weight	1495 g	1536 g	1330 g
FINISH	Hub Shell Material	Steel	Aluminum	Steel
	Finish	Matt Chrome Plated	Clear Coat / Clear Coat / Black Painted	Matt Chrome Plated

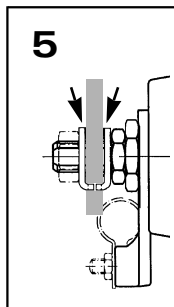
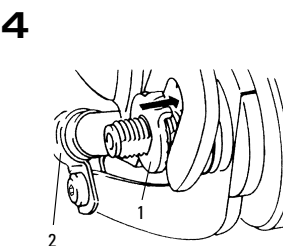
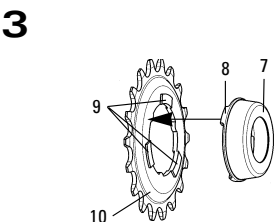
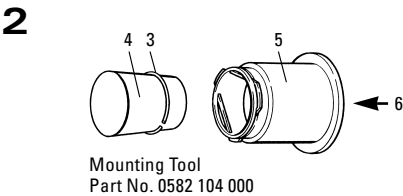
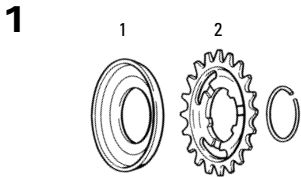
SPECTRO P5

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

SHIFTERS

		Spectro Grip 5							
Design	Part No.	—	—	—	—	—	—	—	
	Shifter Type	Twist Shifter							
	Cable	1450 mm	1550 mm	1650 mm	1750 mm	1850 mm	1950 mm	2150 mm	2350 mm
	Gear Indication	Window							
	Clamping Diameter	22.3 mm							
	Handlebar, Straight Area	Minimum length for shifter = 150 mm							
	Weight	89g							
	Housing	Glass filled PA							
	Grip	PP							
	Grip Cover	Thermoplastic elastomer, Overmolded							
	Clamping Collar	Aluminum							

SPECTRO P5 ASSEMBLY



ASSEMBLY HUB

- Lace the wheel as normal. See spoke length table.
- Place the dust cap (1, **Fig. 1**) and sprocket (2) on the driver.
- Push sprocket circlip (3, **Fig. 2**) onto the cone of tool sleeve (4). Place tool sleeve with large diameter on the driver.
- Push the spring end of sliding sleeve (5) of the tool over the tool sleeve. Thrust sliding sleeve in direction (6), this forces circlip into the recess of the driver.
- Remove tool and check that the circlip is seated correctly.
- Turn dust cap (7, **Fig. 3**) until the three lugs (8) are between the three beads (9) on the sprocket (10).
- Position dust cap and push towards sprocket until it is felt to lock into place.
- Placing the wheel in the rear frame.
- Mount the chain.

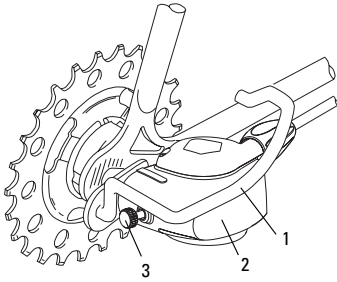
- Fit retaining washers (1, **Fig. 4**) on both axle ends. The serrations must bear against the dropout and the lug must engage in the dropout slot. In case of exceeding the dimension A₁ max. = 12.5 mm (**see Page 21**), e.g. by thick dropouts, both retaining washers should be assembled on the left axle end (**Fig. 5**).
- On the sprocket side fit the protective bracket (1, **Fig. 6**) directly below the fixing nut. Tightening torque on a con or hex nuts 30 – 40 Nm (266 – 350 in.lbs.).
- Mount the brake lever using a suitable frame clamp (2, **Fig. 4 resp. Fig. 10**).
Caution:
Mount the brake lever between the two straps of the frame clamp.
The clamp must be seated on the frame without play.
Use a self-locking nut! Tightening torque: 2 – 3 Nm (18 – 27 in.lbs.).

Spoke length table:

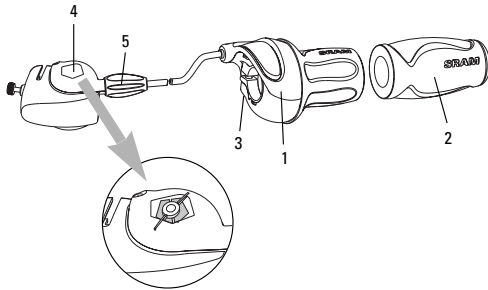
Tire Size	Cross	Length MH 5215/5205	Length MH 5225
47-406	20" x 1.75 x 2	3 x	181 mm
37-490	22" x 1 3/8	3 x	225 mm
47-507	24" x 1.75 x 2	3 x	232 mm
37-540	24" x 1 3/8	3 x	251 mm
47-559	26" x 1.75 x 2	3 x	259 mm
37-590	26" x 1 3/8	3 x	275 mm
47-622	28" x 1.75	3 x	289 mm
37-622	28" x 1 3/8 x 1 5/8	3 x	289 mm
28-622	28" x 1 1/8	3 x	289 mm
32-622	28" x 1 5/8 x 1 1/4	3 x	289 mm
28-630	27" x 1 1/4 fifty	3 x	294 mm
32-630	27" x 1 1/4	3 x	294 mm

Spoke lengths are approximate values. They must be checked through lacing attempts and adjusted accordingly.

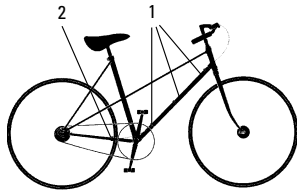
6



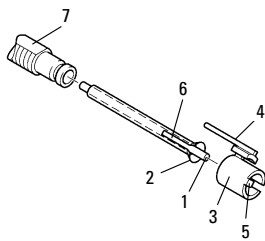
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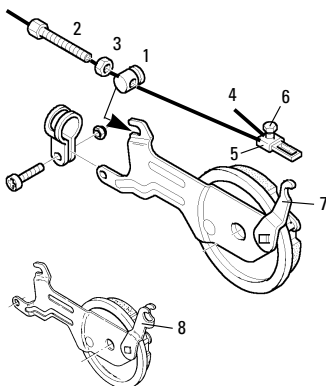
8



9



10



Advice:

- If a different protective bracket (1, Fig. 6) is used the thickness of the attachment plate must be max. 3 mm.
- Do not use additional washers.
- At least the beginning of the axle thread must be visible in front of the axle nut.

ASSEMBLY SHIFTERS

Advice:

- Contrary to the old shifter version the shifter cable of the new version runs above the brake lever. Maybe you need 50 mm more cable length.
- 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 handlebar positions effects cable housing length.
- Slide shifter (1, Fig. 7) onto handlebar.
- Mount fixed grip (2) onto end of handlebar.
- Slide shifter against fixed grip, adjust shifter on handlebar and tighten with bolt (3) with a torque of 1.5 Nm (13 in.lbs.).

Caution:

- Never use lubricants or solvents to install fixed grips. Fixed grips provide an axial safety function. For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar.
- Check that the shifter and brake lever function properly and are unobstructed (realign if necessary).
- Never ride without the fixed grips. The turning grip may loosen from housing and slip off handlebar – this can result in severe injury or death.

- When fitting the cable avoid small radius. Attach the cable 3 times to the down tube (1, Fig. 8).
- Last attachment point is on the lower rear wheel fork (2, Fig. 8) immediately behind the chain wheel. Cable housing must be movable inside attachment.

INSTALLING CLICKBOX

- Insert shift rod (1, Fig. 9) in shift tube (2) (oil parts lightly) and then push into axle bore as far as the stop. If the shifting rod is sticking up out of the axle end: apply slight pressure on the shift rod with its threaded section and screw inwards in a clockwise direction until it can again be moved axially (valid for older hub versions). Turn slot (6) in shift tube to a position where it is easily visible.

- Push locating sleeve (3) with guiding rib (4) to the front onto the hub axle – making sure that the internal lug (5) is guided in the slot (6) of the shift tube until it can be felt – and heard – to engage.
- Turn locating sleeve on the axle until the guiding rib (4) is facing roughly upwards.
- Place shifter in gear position “2”.
- Push on Clickbox (2, Fig. 6) to the stop on the hub axle. The guiding rib (4, Fig. 9) of the locating sleeve thereby engages in the slot on the housing. In the end position tighten up the knurled bolt (3, Fig. 6) by hand (0,3 Nm / 2,7 in.lbs.).

ADJUSTMENT

- Be sure to reset rotational shifter from 4th. to 3th gear.
- Match up the marks in the Clickbox viewing window (4, Fig. 7) by turning the adjusting screw (5).

CONNECTING DRUM BRAKE

Caution:

- Only use brake levers with a cable moving distance of at least 15 mm and a minimum leverage of 3.8.
- Fit cable stop (1, Fig. 10) with adjusting bolt (2) and nut (3) and insert into the slot on the brake anchor plate.
- Turn adjusting bolt down by approx. 2/3 and route the brake cable from the brake handle.
- Push lower brake cable end through adjusting bolt (2) and insert lower cable housing end into adjusting bolt.
- Thread brake cable end (4) into fork unit (5).
- Tighten screw (6) slightly.
- Attach fork unit to brake lever (7).
- Pull brake cable end taut with pliers so that fork unit can still be attached and removed (important for changing wheel).
- Tighten screw (6).

Caution:

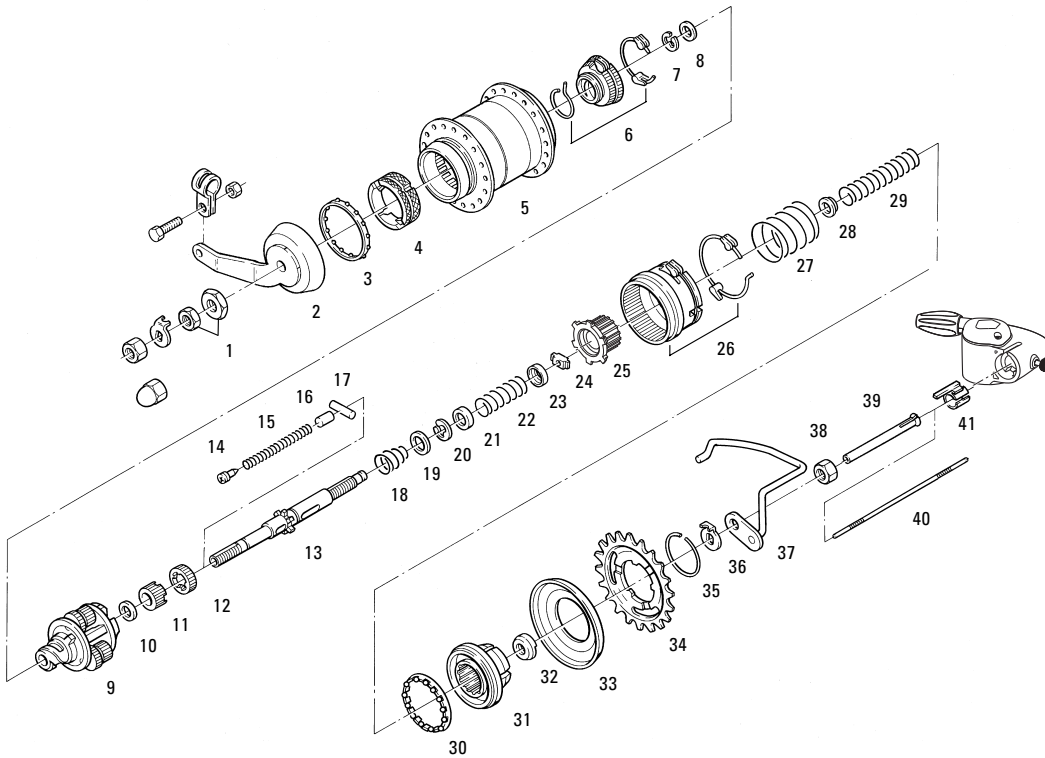
For NL version drum brake hub with special lever (8), only use original NL brake cable (fork unit (5) is not suitable).

ADJUSTMENT DRUM BRAKE

- Unscrew adjusting screw (2, Fig. 10) until the brake pads drag lightly.
- Actuate the hand brake lever forcefully several times and then, if necessary, turn the adjusting screw further in just until the wheel starts spinning freely.
- Lock hex nut (3).

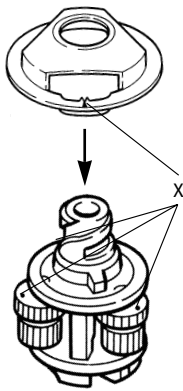
SPECTRO P5 MAINTENANCE

1

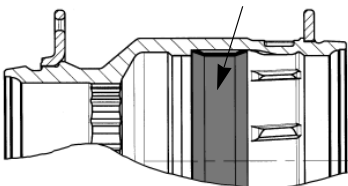


2

Spectro P5 mounting aid
Part No. 5024 300 000



3



REMOVE WHEEL

- Place shifter in gear position "2".
- Loosen the knurled screw and pull the Clickbox off the axle.
- Disengage the location sleeve and pull it off. Remove shift rod/tube, if necessary pull shift rod outwards and unscrew in a counter-clockwise direction.
- Remove wheel.

DISMANTLING HUB

see Fig. 1

- Remove circlip (35), sprocket (34) and dust cap (33).
- Clamp hub with sprocket side facing downwards with the two axle flats.
- Unscrew the two locknuts (1).
- Remove lever cone (2), ball retainer (3) and brake shell (4).
- Withdraw hub sleeve (5) upwards.
- Unscrew brake cone (6) from flat thread.
- Remove retaining washer (7), thrust washer (8).
- Remove planetary gear carrier (9) and thrust washer (10).
- Clamp other axle end.
- Unscrew fixed cone (32).
- Remove driver (31), compression spring (29), large compression spring (27) and ball retainer (30). – Withdraw gear ring (26) and coupling gear (25) and then remove cover (28) from the coupling gear.

- Take out thrust block (24), (to do this compress the spring). Remove spring (22) and the two covers (23/21).
- Dismantle retaining washer (20), washer (19), conical compression spring (18), and the large sun gear (12). Clamp other axle end (thrust block visible).
- Unscrew grub screw (14) – Dismantle spring (15), guide bolt (16) and thrust block (17).
- Remove small sun gear (11).

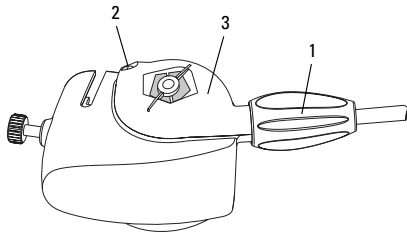
REASSEMBLY HUB

see Fig. 1

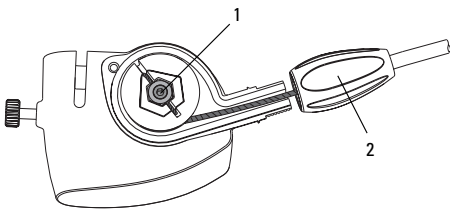
Lubrication see "MAINTENANCE/LUBRICATION".

- Clamp axle with internal thread upwards.
- Position small sun gear (11) with crown gears to the front.
- Position thrust block (17) in the slotted hole (is laterally guided when the sun gear is screwed in).
- Locate bolt (16), then spring (15) in the axle and screw in grub screw (14) until it is flush with the axle.
- Reclamp axle. Fit large sun gear (12) (it is the same both sides). Position conical compression spring (18), with the large diameter first. Press spring together and fit washer (19) and retaining washer (20).

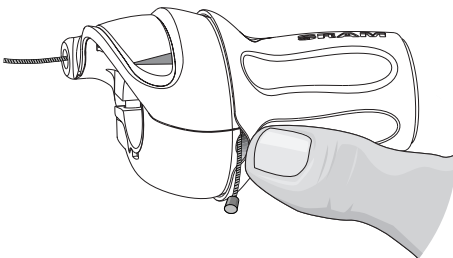
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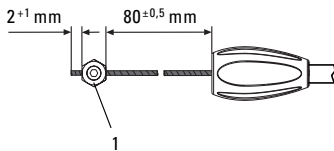
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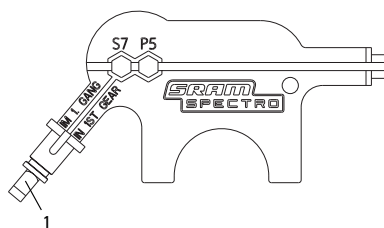
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7



8



- Assemble cover (21), compression spring with 7 turns (22) and the second cover (23, insides to the spring).
 - Compress spring and position thrust block (24) (it is the same both sides) in the center of the slotted hole.
 - Position coupling gear (25) with carrier plate facing downwards.
 - Fit cover (28, inside to the spring) for compression spring.
 - Position gear ring (26) over the teeth of the coupling gear.
 - Place ball retainer (30), with balls below on the gear ring.
 - Position large compression spring (27) on gear ring.
 - Mount compression spring with 13 turns (29) on the axle. (Is supported in the coupling wheel by the cover).
 - Locate driver (31), press it down and screw on fixed cone (32) as far as the stop. Tightening torque 20 Nm. (Then reclamp hub.)
 - Push on thrust washer (10) and fit planetary gear carrier (9). In doing this: Position mounting aid (Fig. 2) on the planetary gear carrier so that the (X) markings on the threeplanetary gears match with the mounting aid.
 - Insert planetary gear carrier, place thrust washer (8) on it and mount retaining washer (7) in recess.
- Only now remove the mounting aid.**

Advice:

If the gears are not accurately installed the hub may be tight to move. This could lead to damage to the gear-wheels in operation.

- Screw brake cone (6) onto flat threads.
- Mount hub sleeve (5), with a slight counter-clockwise turn. In case the hub shell jams, position the plastic ring (Fig. 3) correctly.
- Locate brake shell (4, Fig. 1) – with retaining lugs uppermost –, then the friction spring on the brake cone must engage with the slot on the brake shell.
- Insert ball retainer (3) – with balls below.
- Position lever cone (2) – in doing this turn it clockwise until the retaining lugs engage.
- Screw on counter nuts (1), adjust bearings to be free of play and tighten lock nuts. Tightening torque 15 – 20 Nm (133 – 177 in.lbs.).

Advice:

The dismantly and reassembly of the hub types MH 5205 / MH 5225 should be carried out in the same way. Differences: Instead of brake shell/cone a click-and-pawl carrier is installed on the planetary gear carrier here. Without flat thread – fixed with a retaining washer.

CABLE CHANGE

Dismantling shifter cable:

- Place shifter in gear position “2”.
- Do not remove the Clickbox from the axle end.
- Unscrew the adjusting screw (1, Fig. 4) completely. Unscrew the cover screw (2), brush aside the adjusting screw (1) and remove the cover (3).
- Withdraw shifter cable and clamping bolt (1, Fig. 5) upwards, loosen clamp and pull clamping piece from the cable.
- Slightly lift the grip cover (Fig. 6), push the cable out and discard.

Assembly shifter cable:

- Route new cable through shifter housing and pull cable to seat cable head completely into cable recess. Feed the cable through the new cable housing and adjusting screw.
- Position clamping bolt (1, Fig. 7) at a distance of 80 mm, tighten up with 1.5 Nm (13 in.lbs.) and cut off cable ends to 2 – 3 mm. For positioning the clamping bolt use adjust gauge (Fig. 8). (Part. No. 65 0324 107 000)
- Locate clamping bolt (1, Fig. 5) and place shifter cable around the carrier cylinder (counter-clockwise winding).
- Position the cover (3, Fig. 4) and tighten up with the cover screw (2). Torque 0.35 – 0.45 Nm (3.1 – 4.0 in.lbs.). Screw in the adjusting screw (1) completely.

Advice:

- *If you want to remove the Clickbox from the axle end for changing the cable, do as follows:*
 - Place shifter in gear position “2”.
 - Loosen the knurled screw and pull the Clickbox off the axle.
 - Now it’s essential to push the end (1, Fig. 8) of the adjust gauge completely into the Clickbox and tighten up the knurled bolt (so that you maintain the initial tension of the spring inside the Clickbox).
 - Change cable as per description above.
- *If you remove the Clickbox from the axle and change the cable without using the end of the adjust gauge, then you will lose the initial tension of the spring inside the Clickbox. In this case you must assemble the cable by placing it around the carrier cylinder with an additional winding (Fig. 5).*

SPECTRO P5 MAINTENANCE

9

TILL 1998



Don't combine with newer versions!

EXCHANGEABILITY SHIFTER / CLICKBOX

Produced till 1998 (Fig. 9):

Don't combine with newer versions!

Produced till end 2002 and as of 2003 (Fig. 10):

Combine shifter and Clickbox only according to Fig. 10.

Distance of the clamping bolt:

Each Clickbox version needs its specific distance of the clamping bolt:

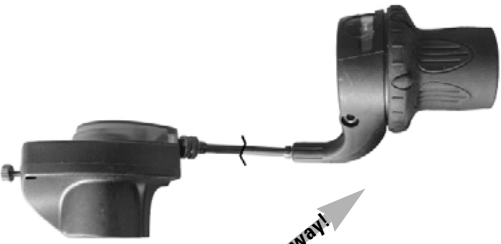
- Till 1998: Distance 68,5 mm
- Till end 2002: Distance 83 mm
- As of 2003: Distance 80 mm

ADJUSTMENT

- Be sure to reset rotational shifter from 4th. to 3th gear.
- Match up the marks in the Clickbox viewing window (Fig. 12) by turning the adjusting screw (1).

10

TILL END 2002



AS OF 2003



combine only that way!

REPLACEMENT BY A NEW CLICKBOX (AS OF 2003)

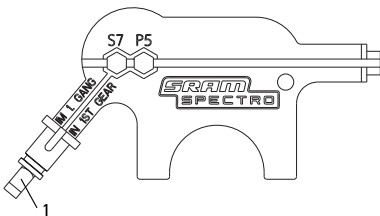
- Place shifter in gear position "2".
- Loosen the knurled screw and pull the Clickbox off the axle.
- Unscrew the adjusting screw (1, Fig. 12) completely. Unscrew the cover screw (2), brush aside the adjusting screw (1) and remove the cover (3).
- Push the end (1, Fig. 11) of the adjust gauge (Part. No. 65 0324 107 000) completely into the Clickbox and tighten up the knurled bolt (so you maintain the initial tension of the spring inside the Clickbox).
- Withdraw shifter cable and clamping bolt (1, Fig. 5) upwards.
- Locate clamping bolt (1, Fig. 5) in the new Clickbox and place shifter cable around the carrier cylinder (counter-clockwise winding).

Advice:

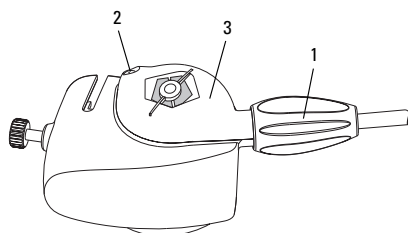
If you remove the Clickbox from the axle and change the cable without using the end of the adjust gauge, then you will lose the initial tension of the spring inside the Clickbox. In this case you must assemble the cable by placing it around the carrier cylinder with an additional winding (Fig. 5).

- Position the cover (3, Fig. 12) and tighten up with the cover screw (2). Torque 0.35 – 0.45 Nm (3.1 – 4.0 in.lbs.). Screw in the adjusting screw (1) completely.
- Loosen the knurled screw on the Clickbox and pull the adjust gauge off.
- Push on Clickbox on the hub axle. Tighten up the knurled bolt by hand.

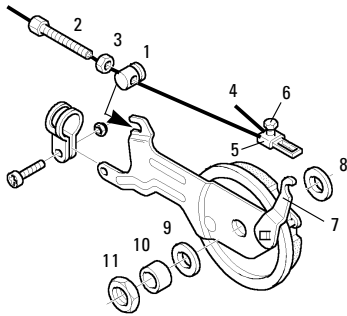
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12



13



DRUM BRAKE

Install brake anchor plate (or exchange it):

- Place thrust washer (8, *Fig. 13*) over the axle on the adjusting cone and fit complete brake anchor plate. Position washer (9) distance sleeve (10) and screw on locknut (11).
- Push brake lever (7) to the stop and hold it there to center the brake jaws in the brake drum – tighten up locknut with a torque of 15 – 20 Nm (133 – 177 in.lbs.).

ADJUSTMENT DRUM BRAKE

- Unscrew adjusting screw (2, *Fig. 13*) until the brake pads drag lightly.
- Actuate the hand brake lever forcefully several times and then, if necessary, turn the adjusting screw further in just until the wheel starts spinning freely.
- Lock hex nut (3).

Caution:

Check that all the brake system components are functioning properly!

MAINTENANCE / LUBRICATION

Caution:

The Spectro hubs are provided with permanent lubrication and under normal conditions is maintenance-free. If the coaster brake is loaded excessively its effect can be too strong, the hub may lock. In such a case the brake shell should be lubricated with a special grease (Part No. 0369 135 201). Renew brake shell, when rhombic pattern is worn out.

Cleaning of parts:

- All parts – except for the planetary gear carrier – can be degreased in a cleaning bath.
- The planetary gear carrier only needs to be cleaned on the outside with a brush so as not to degrease the planetary gear bearing.

Caution:

Do not use high-pressure water when cleaning the gear hub (e.g. strong water jets, high-pressure cleaners etc.) – if water penetrates it could lead to functional problems.

Lubrication of parts:

- To lubricate the bearing points on the planetary gear sets, position the planetary gear carrier on its crown and apply 2 – 3 drops of oil to the bearing points – at the same time turning the planetary gears so that the bearing points are completely wet. Oil axle through the axle bore and axle slot, apply a thin coating of grease to the outside.
- Oil the inside of the sun gears, grease the outside teeth (fill the gaps in the teeth).
- Oil outside teeth and carrier plate on the coupling gear and lightly grease the borehole from right and left.
- Do not apply grease to ring gear but just oil the pawl pockets.
- Grease the brake cone in the borehole and the friction spring.
- Spread grease on the inside and outside of the brake shell.
- Fill lever cone with grease reserves for brakes.
- Regrease ball retainer, line ball bearing running tracks with grease.

Advice:

The Spectro P5 hubs complete with shifting component have been modified in such a way that the shifting forces are considerably lower than was previously the case.

The new shifting component (shifter / Clickbox) is shown in Fig. 7, Page 23. Identification of the new hubs: red grub screw (14, Fig. 1, Page 24) in the left axle end and new spring (15) in the axle. In order to achieve the maximum reduction in shifting forces with a combination of new shifting component / old hub, the new spring (15) and the red grub screw (14) should be installed in the hub axle (see description "DISMANTLING/ REASSEMBLY HUB").

TROUBLESHOOTING

Problem	Cause	Remedy
Shifting difficulties	Damaged control cable	Replace control cable
	Incorrect gear setting	Adjust shift system
	To much additional axle attachments between hub and axle nut	Beginning of axle thread must be visible in front of the axle nut
Pedals are carried forward when free-wheeling	Bearings set too tight	Re-adjust bearings
	Loose lock nuts	Tighten lock nuts (15 – 20 Nm)
	Chain is over-tensioned	Reduce chain tension
Hub locks when braking (coaster brake)	Brake shell has run dry	Wash out hub sleeve, repolish and relubricate brake cylinder, renew brake shell

SPECTRO P5 CARGO

TECHNICAL DATA / ASSEMBLY REQUIREMENTS



Caution:

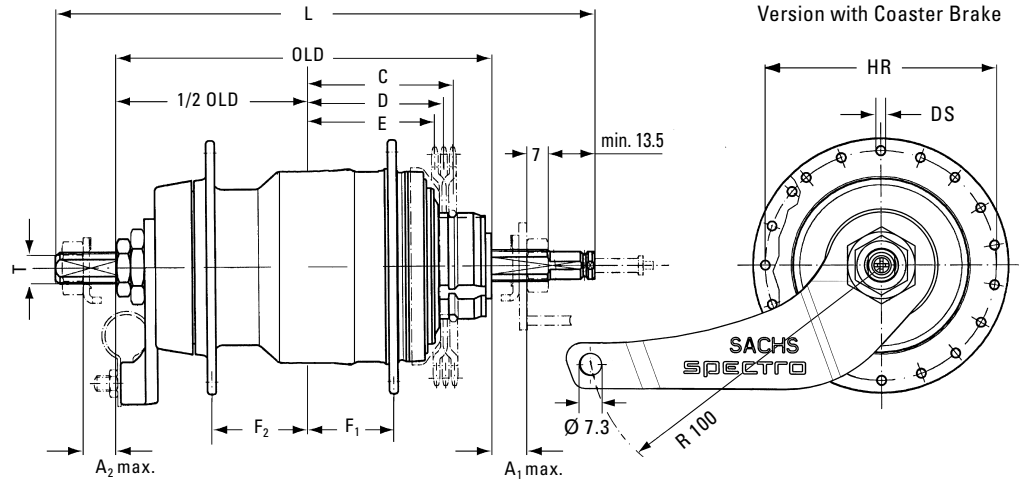
The Spectro P5 Cargo is suitable for tandems, trademen's delivery bicycles and similar. An additional external rear brake is necessary due to the high load.

Tolerable stress:

Axle load: max. 120 kilograms
Torque/driver body: max. 85 Nm (750 in.lbs.), no continuous stress.

Identification Spectro P5 Cargo:

Yellow grub screw inside the axle end.



Version Spectro P5 for normal bikes:
see page 21.

Caution:

Use always 2 retaining washers.
Alternatively assemble both retaining washers on the left axle end (Fig. 5).

Cycle frame:

- Dropouts must be parallel.
- Slot width at rear dropout max. 10,5 mm.
- The strength must be such that with a maximum braking torque of 250 Nm (2200 in.lbs.) on the rear wheel no residual deformation can occur on the rear structure.

HUBS

		Spectro P5 Cargo with coaster brake	Spectro P5 with drum brake
	Typ	MH 5215 Cargo	MH 5225 Cargo
	Brake	Coaster	Drum „D“
	Over Locknut Dim., OLD	122 mm	126 mm
Axle	Length, L	175 mm	179 mm
	Ends Diameter, T	FG 10.5 toothed cone	FG 10.5
	Dropout Width Dim.	A ₁ max. = 12.5 mm / A ₂ max. = 11.5 mm	A ₁ max. = 12.5 mm / A ₂ max. = 12.5 mm
Spoke	Holes	36	36
	Hole Diameter, DS	3.0 mm	2.9 mm
	Hole Ref. ø, HR	75 mm	89 mm
	Flange Dist. to 1/2 OLD	F ₁ = 28.5 mm / F ₂ = 29.5 mm	F ₁ = 30.5 mm / F ₂ = 29.5 mm
Gear Hub Ratio	Totally	224 %	←
	Speed 1	67 %	←
	Speed 2	78 %	←
	Speed 3	100 %	←
	Speed 4	128 %	←
	Speed 5	150 %	←
Chain	Usable Dimensions	1/2" x 1/8" or 1/2" x 3/32"	1/2" x 1/8" or 1/2" x 3/32"
	Line, C/D/E	49/45.5/43 mm	51.5/48.5/45.5 mm
	Ratio	24", 26", 28" = 1.8–1.9 / 20" = 1.8–2.0	←
	Shifter Compatib.	Spectro Grip 5	←
	Clickbox Compatib.	Clickbox P5	←
	Tandem Compatib.	Yes	Yes
	Weight	1495 g	1536 g
Finish	Hub Shell Material	Steel	Aluminum
	Finish	Matt Chrome Plated	Clear Coat

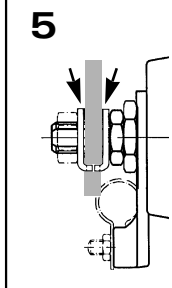
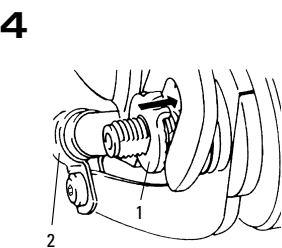
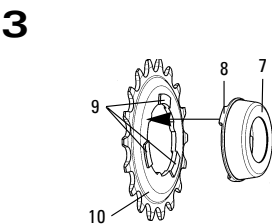
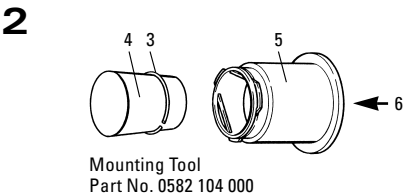
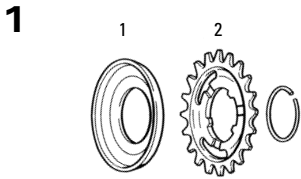
SPECTRO P5 CARGO

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

SHIFTERS

		Spectro Grip 5							
Design	Part No.	—	—	—	—	—	—	—	
	Shifter Type	Twist Shifter							
	Cable	1450 mm	1550 mm	1650 mm	1750 mm	1850 mm	1950 mm	2150 mm	2350 mm
	Gear Indication	Window							
	Clamping Diameter	22.3 mm							
	Handlebar, Straight Area	Minimum length for shifter = 150 mm							
	Weight	89g							
	Housing	Glass filled PA							
	Grip	PP							
	Grip Cover	Thermoplastic elastomer, Overmolded							
	Clamping Collar	Aluminum							

SPECTRO P5 CARGO ASSEMBLY



ASSEMBLY HUB

- Lace the wheel as normal. See spoke length table.
- Place the dust cap (1, **Fig. 1**) and sprocket (2) on the driver.
- Push sprocket circlip (3, **Fig. 2**) onto the cone of tool sleeve (4). Place tool sleeve with large diameter on the driver.
- Push the spring end of sliding sleeve (5) of the tool over the tool sleeve. Thrust sliding sleeve in direction (6), this forces circlip into the recess of the driver.
- Remove tool and check that the circlip is seated correctly.
- Turn dust cap (7, **Fig. 3**) until the three lugs (8) are between the three beads (9) on the sprocket (10).
- Position dust cap and push towards sprocket until it is felt to lock into place.
- Placing the wheel in the rear frame.
- Mount the chain.

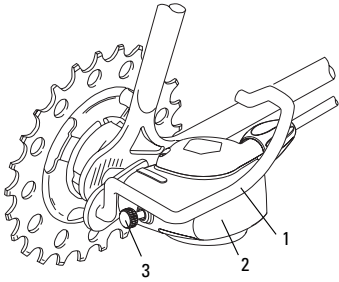
- Fit retaining washers (1, **Fig. 4**) on both axle ends. The serrations must bear against the dropout and the lug must engage in the dropout slot. In case of exceeding the dimension A₁ max. = 12.5 mm (**see Page 29**), e.g. by thick dropouts, both retaining washers should be assembled on the left axle end (**Fig. 5**).
- On the sprocket side fit the protective bracket (1, **Fig. 6**) directly below the fixing nut. Tightening torque on a con or hex nuts 30 – 40 Nm (266 – 350 in.lbs.).
- Mount the brake lever using a suitable frame clamp (2, **Fig. 4** resp. **Fig. 10**).
Caution:
Mount the brake lever between the two straps of the frame clamp.
The clamp must be seated on the frame without play.
Use a self-locking nut! Tightening torque: 2 – 3 Nm (18 – 27 in.lbs.).

Spoke length table:

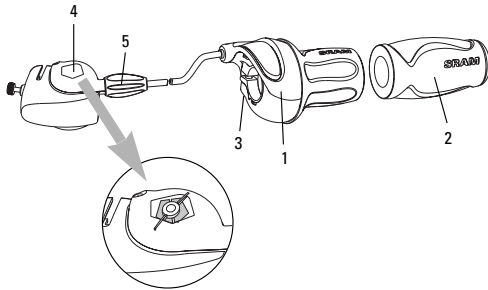
Tire Size	Cross	Length MH 5215	Length MH 5225
47-406	20" x 1.75 x 2	3 x	181 mm
37-490	22" x 1 3/8	3 x	225 mm
47-507	24" x 1.75 x 2	3 x	232 mm
37-540	24" x 1 3/8	3 x	251 mm
47-559	26" x 1.75 x 2	3 x	259 mm
37-590	26" x 1 3/8	3 x	275 mm
47-622	28" x 1.75	3 x	289 mm
37-622	28" x 1 3/8 x 1 5/8	3 x	289 mm
28-622	28" x 1 1/8	3 x	289 mm
32-622	28" x 1 5/8 x 1 1/4	3 x	289 mm
28-630	27" x 1 1/4 fifty	3 x	294 mm
32-630	27" x 1 1/4	3 x	294 mm

Spoke lengths are approximate values. They must be checked through lacing attempts and adjusted accordingly.

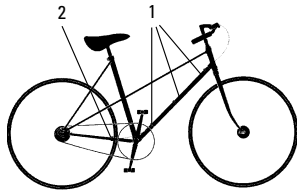
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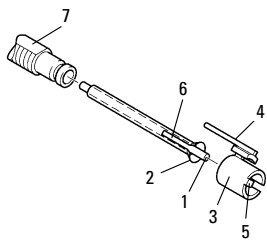
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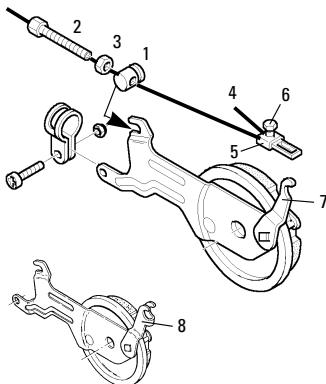
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9



10



Advice:

- If a different protective bracket (1, Fig. 6) is used the thickness of the attachment plate must be max. 3 mm.
- Do not use additional washers.
- At least the beginning of the axle thread must be visible in front of the axle nut.

ASSEMBLY SHIFTERS

Advice:

- Contrary to the old shifter version the shifter cable of the new version runs above the brake lever. Maybe you need 50 mm more cable length.
- 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 handlebar positions effects cable housing length.
- Slide shifter (1, Fig. 7) onto handlebar.
- Mount fixed grip (2) onto end of handlebar.
- Slide shifter against fixed grip, adjust shifter on handlebar and tighten with bolt (3) with a torque of 1.5 Nm (13 in.lbs.).

Caution:

- Never use lubricants or solvents to install fixed grips. Fixed grips provide an axial safety function. For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar.
- Check that the shifter and brake lever function properly and are unobstructed (realign if necessary).
- Never ride without the fixed grips. The turning grip may loosen from housing and slip off handlebar – this can result in severe injury or death.

- When fitting the cable avoid small radius. Attach the cable 3 times to the down tube (1, Fig. 8).
- Last attachment point is on the lower rear wheel fork (2, Fig. 8) immediately behind the chain wheel.

Cable housing must be movable inside attachment.

INSTALLING CLICKBOX

- Insert shift rod (1, Fig. 9) in shift tube (2) (oil parts lightly) and then push into axle bore as far as the stop. If the shifting rod is sticking up out of the axle end: apply slight pressure on the shift rod with its threaded section and screw inwards in a clockwise direction until it can again be moved axially (valid for older hub versions). Turn slot (6) in shift tube to a position where it is easily visible.

- Push locating sleeve (3) with guiding rib (4) to the front onto the hub axle – making sure that the internal lug (5) is guided in the slot (6) of the shift tube until it can be felt – and heard – to engage.
- Turn locating sleeve on the axle until the guiding rib (4) is facing roughly upwards.
- Place shifter in gear position “2”.
- Push on Clickbox (2, Fig. 6) to the stop on the hub axle. The guiding rib (4, Fig. 9) of the locating sleeve thereby engages in the slot on the housing. In the end position tighten up the knurled bolt (3, Fig. 6) by hand (0,3 Nm / 2,7 in.lbs.).

ADJUSTMENT

- Be sure to reset rotational shifter from 4th. to 3th gear.
- Match up the marks in the Clickbox viewing window (4, Fig. 7) by turning the adjusting screw (5).

CONNECTING DRUM BRAKE

Caution:

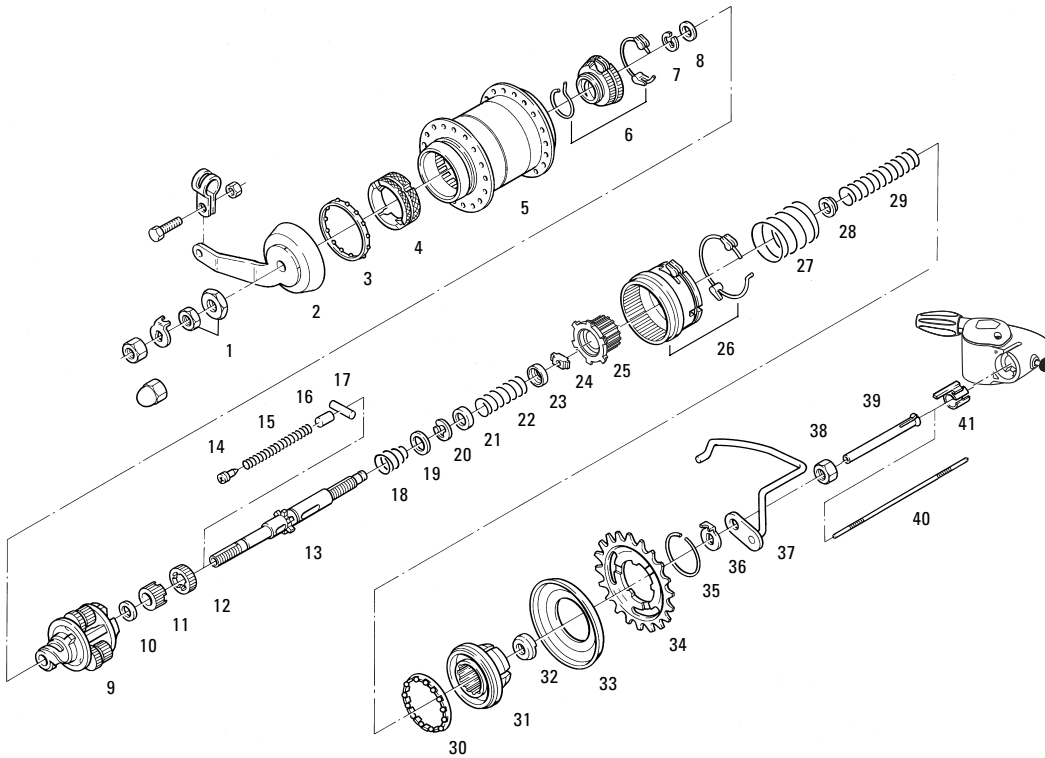
- Only use brake levers with a cable moving distance of at least 15 mm and a minimum leverage of 3.8.
- Fit cable stop (1, Fig. 10) with adjusting bolt (2) and nut (3) and insert into the slot on the brake anchor plate.
- Turn adjusting bolt down by approx. 2/3 and route the brake cable from the brake handle.
- Push lower brake cable end through adjusting bolt (2) and insert lower cable housing end into adjusting bolt.
- Thread brake cable end (4) into fork unit (5).
- Tighten screw (6) slightly.
- Attach fork unit to brake lever (7).
- Pull brake cable end taut with pliers so that fork unit can still be attached and removed (important for changing wheel).
- Tighten screw (6).

ADJUSTMENT DRUM BRAKE

- Unscrew adjusting screw (2, Fig. 10) until the brake pads drag lightly.
- Actuate the hand brake lever forcefully several times and then, if necessary, turn the adjusting screw further in just until the wheel starts spinning freely.
- Lock hex nut (3).

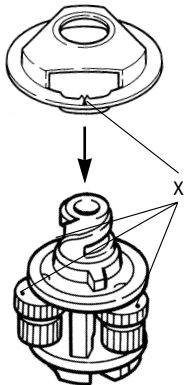
SPECTRO P5 CARGO MAINTENANCE

1



2

Spectro P5 mounting aid
Part No. 5024 300 000



REMOVE WHEEL

- Place shifter in gear position "2".
- Loosen the knurled screw and pull the Clickbox off the axle.
- Disengage the location sleeve and pull it off. Remove shift rod/tube, if necessary pull shift rod outwards and unscrew in a counter-clockwise direction.
- Remove wheel.

DISMANTLING HUB

see Fig. 1

- Remove circlip (35), sprocket (34) and dust cap (33).
- Clamp hub with sprocket side facing downwards with the two axle flats.
- Unscrew the two locknuts (1).
- Remove lever cone (2), ball retainer (3) and brake shell (4).
- Withdraw hub sleeve (5) upwards.
- Unscrew brake cone (6) from flat thread.
- Remove retaining washer (7), thrust washer (8).
- Remove planetary gear carrier (9) and thrust washer (10).
- Clamp other axle end.
- Unscrew fixed cone (32).
- Remove driver (31), compression spring (29), large compression spring (27) and ball retainer (30). – Withdraw gear ring (26) and coupling gear (25) and then remove cover (28) from the coupling gear.

- Take out thrust block (24), (to do this compress the spring). Remove spring (22) and the two covers (23/21).
- Dismantle retaining washer (20), washer (19), conical compression spring (18), and the large sun gear (12). Clamp other axle end (thrust block visible).
- Unscrew grub screw (14) – Dismantle spring (15), guide bolt (16) and thrust block (17).
- Remove small sun gear (11).

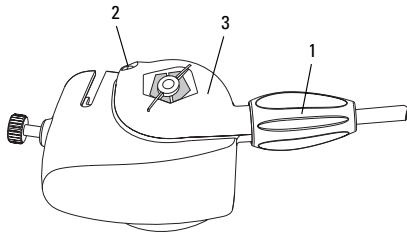
REASSEMBLY HUB

see Fig. 1

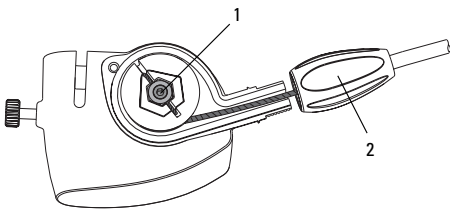
Lubrication see "MAINTENANCE/LUBRICATION".

- Clamp axle with internal thread upwards.
- Position small sun gear (11) with crown gears to the front.
- Position thrust block (17) in the slotted hole (is laterally guided when the sun gear is screwed in).
- Locate bolt (16), then spring (15) in the axle and screw in grub screw (14) until it is flush with the axle.
- Reclamp axle. Fit large sun gear (12) (it is the same both sides). Position conical compression spring (18), with the large diameter first. Press spring together and fit washer (19) and retaining washer (20).

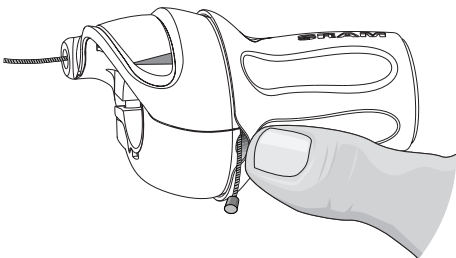
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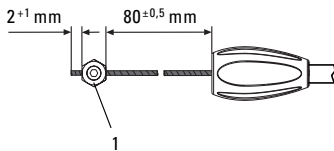
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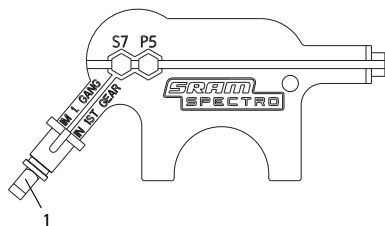
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7



8



- Assemble cover (21), compression spring with 7 turns (22) and the second cover (23, insides to the spring).
 - Compress spring and position thrust block (24) (it is the same both sides) in the center of the slotted hole.
 - Position coupling gear (25) with carrier plate facing downwards.
 - Fit cover (28, inside to the spring) for compression spring.
 - Position gear ring (26) over the teeth of the coupling gear.
 - Place ball retainer (30), with balls below on the gear ring.
 - Position large compression spring (27) on gear ring.
 - Mount compression spring with 13 turns (29) on the axle. (Is supported in the coupling wheel by the cover).
 - Locate driver (31), press it down and screw on fixed cone (32) as far as the stop. Tightening torque 20 Nm. (Then reclamp hub.)
 - Push on thrust washer (10) and fit planetary gear carrier (9). In doing this: Position mounting aid (Fig. 2) on the planetary gear carrier so that the (X) markings on the threeplanetary gears match with the mounting aid.
 - Insert planetary gear carrier, place thrust washer (8) on it and mount retaining washer (7) in recess.
- Only now remove the mounting aid.**

Advice:

If the gears are not accurately installed the hub may be tight to move. This could lead to damage to the gear-wheels in operation.

- Screw brake cone (6) onto flat threads.
- Mount hub sleeve (5), with a slight counter-clockwise turn.
- Locate brake shell (4, Fig. 1) – with retaining lugs uppermost –, then the friction spring on the brake cone must engage with the slot on the brake shell.
- Insert ball retainer (3) – with balls below.
- Position lever cone (2) – in doing this turn it clockwise until the retaining lugs engage.
- Screw on counter nuts (1), adjust bearings to be free of play and tighten lock nuts. Tightening torque 15 – 20 Nm (133 – 177 in.lbs.).

Advice:

The dismantly and reassembly of the hub type MH 5225 should be carried out in the same way. Differences: Instead of brake shell/cone a click-and-pawl carrier is installed on the planetary gear carrier here. Without flat thread – fixed with a retaining washer.

CABLE CHANGE

Dismantling shifter cable:

- Place shifter in gear position “2”.
- Do not remove the Clickbox from the axle end.
- Unscrew the adjusting screw (1, Fig. 4) completely. Unscrew the cover screw (2), brush aside the adjusting screw (1) and remove the cover (3).
- Withdraw shifter cable and clamping bolt (1, Fig. 5) upwards, loosen clamp and pull clamping piece from the cable.
- Slightly lift the grip cover (Fig. 6), push the cable out and discard.

Assembly shifter cable:

- Route new cable through shifter housing and pull cable to seat cable head completely into cable recess. Feed the cable through the new cable housing and adjusting screw.
- Position clamping bolt (1, Fig. 7) at a distance of 80 mm, tighten up with 1.5 Nm (13 in.lbs.) and cut off cable ends to 2 – 3 mm. For positioning the clamping bolt use adjust gauge (Fig. 8). (Part. No. 65 0324 107 000)
- Locate clamping bolt (1, Fig. 5) and place shifter cable around the carrier cylinder (counter-clockwise winding).
- Position the cover (3, Fig. 4) and tighten up with the cover screw (2). Torque 0.35 – 0.45 Nm (3.1 – 4.0 in.lbs.). Screw in the adjusting screw (1) completely.

Advice:

- *If you want to remove the Clickbox from the axle end for changing the cable, do as follows:*
 - Place shifter in gear position “2”.
 - Loosen the knurled screw and pull the Clickbox off the axle.
 - Now it's essential to push the end (1, Fig. 8) of the adjust gauge completely into the Clickbox and tighten up the knurled bolt (so that you maintain the initial tension of the spring inside the Clickbox).
 - Change cable as per description above.
- *If you remove the Clickbox from the axle and change the cable without using the end of the adjust gauge, then you will lose the initial tension of the spring inside the Clickbox. In this case you must assemble the cable by placing it around the carrier cylinder with an additional winding (Fig. 5).*

SPECTRO P5 CARGO MAINTENANCE

9

TILL 1998



Don't combine with newer versions!

EXCHANGEABILITY SHIFTER / CLICKBOX

Produced till 1998 (Fig. 9):

Don't combine with newer versions!

Produced till end 2002 and as of 2003 (Fig. 10):

Combine shifter and Clickbox only according to Fig. 10.

Distance of the clamping bolt:

Each Clickbox version needs its specific distance of the clamping bolt:

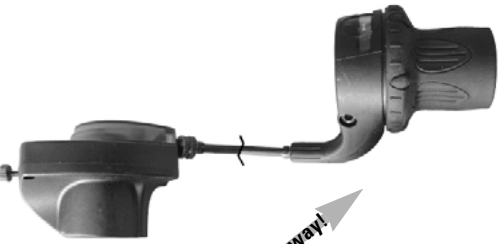
- Till 1998: Distance 68,5 mm
- Till end 2002: Distance 83 mm
- As of 2003: Distance 80 mm

ADJUSTMENT

- Be sure to reset rotational shifter from 4th. to 3th gear.
- Match up the marks in the Clickbox viewing window (Fig. 12) by turning the adjusting screw (1).

10

TILL END 2002



AS OF 2003



combine only that way!

REPLACEMENT BY A NEW CLICKBOX (AS OF 2003)

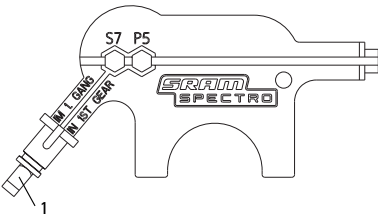
- Place shifter in gear position "2".
- Loosen the knurled screw and pull the Clickbox off the axle.
- Unscrew the adjusting screw (1, Fig. 12) completely. Unscrew the cover screw (2), brush aside the adjusting screw (1) and remove the cover (3).
- Push the end (1, Fig. 11) of the adjust gauge (Part. No. 65 0324 107 000) completely into the Clickbox and tighten up the knurled bolt (so you maintain the initial tension of the spring inside the Clickbox).
- Withdraw shifter cable and clamping bolt (1, Fig. 5) upwards.
- Locate clamping bolt (1, Fig. 5) in the new Clickbox and place shifter cable around the carrier cylinder (counter-clockwise winding).

Advice:

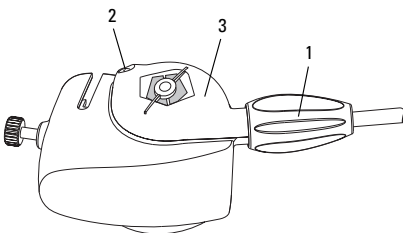
If you remove the Clickbox from the axle and change the cable without using the end of the adjust gauge, then you will lose the initial tension of the spring inside the Clickbox. In this case you must assemble the cable by placing it around the carrier cylinder with an additional winding (Fig. 5).

- Position the cover (3, Fig. 12) and tighten up with the cover screw (2). Torque 0.35 – 0.45 Nm (3.1 – 4.0 in.lbs.). Screw in the adjusting screw (1) completely.
- Loosen the knurled screw on the Clickbox and pull the adjust gauge off.
- Push on Clickbox on the hub axle. Tighten up the knurled bolt by hand.

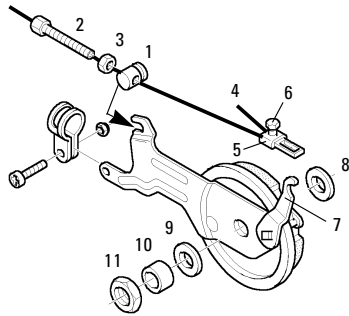
11



12



13



DRUM BRAKE

Install brake anchor plate (or exchange it):

- Place thrust washer (8, *Fig. 13*) over the axle on the adjusting cone and fit complete brake anchor plate. Position washer (9) distance sleeve (10) and screw on locknut (11).
- Push brake lever (7) to the stop and hold it there to center the brake jaws in the brake drum – tighten up locknut with a torque of 15 – 20 Nm (133 – 177 in.lbs.).

ADJUSTMENT DRUM BRAKE

- Unscrew adjusting screw (2, *Fig. 13*) until the brake pads drag lightly.
- Actuate the hand brake lever forcefully several times and then, if necessary, turn the adjusting screw further in just until the wheel starts spinning freely.
- Lock hex nut (3).

Caution:

Check that all the brake system components are functioning properly!

MAINTENANCE / LUBRICATION

Caution:

The Spectro hubs are provided with permanent lubrication and under normal conditions is maintenance-free. If the coaster brake is loaded excessively its effect can be too strong, the hub may lock. In such a case the brake shell should be lubricated with a special grease (Part No. 0369 135 201). Renew brake shell, when rhombic pattern is worn out.

Cleaning of parts:

- All parts – except for the planetary gear carrier – can be degreased in a cleaning bath.
- The planetary gear carrier only needs to be cleaned on the outside with a brush so as not to degrease the planetary gear bearing.

Caution:

Do not use high-pressure water when cleaning the gear hub (e.g. strong water jets, high-pressure cleaners etc.) – if water penetrates it could lead to functional problems.

Lubrication of parts:

- To lubricate the bearing points on the planetary gear sets, position the planetary gear carrier on its crown and apply 2 – 3 drops of oil to the bearing points – at the same time turning the planetary gears so that the bearing points are completely wet. Oil axle through the axle bore and axle slot, apply a thin coating of grease to the outside.
- Oil the inside of the sun gears, grease the outside teeth (fill the gaps in the teeth).
- Oil outside teeth and carrier plate on the coupling gear and lightly grease the borehole from right and left.
- Do not apply grease to ring gear but just oil the pawl pockets.
- Grease the brake cone in the borehole and the friction spring.
- Spread grease on the inside and outside of the brake shell.
- Fill lever cone with grease reserves for brakes.
- Regrease ball retainer, line ball bearing running tracks with grease.

TROUBLESHOOTING

Problem	Cause	Remedy
Shifting difficulties	Damaged control cable	Replace control cable
	Incorrect gear setting	Adjust shift system
	To much additional axle attachments between hub and axle nut	Beginning of axle thread must be visible in front of the axle nut
Pedals are carried forward when free-wheeling	Bearings set too tight	Re-adjust bearings
	Loose lock nuts	Tighten lock nuts (15 – 20 Nm)
	Chain is over-tensioned	Reduce chain tension
Hub locks when braking (coaster brake)	Brake shell has run dry	Wash out hub sleeve, repolish and relubricate brake cylinder, renew brake shell

SPECTRO T3

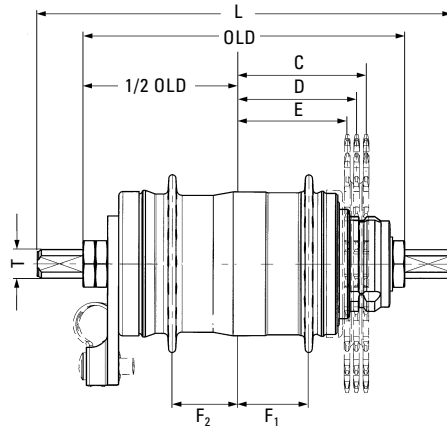
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

T3

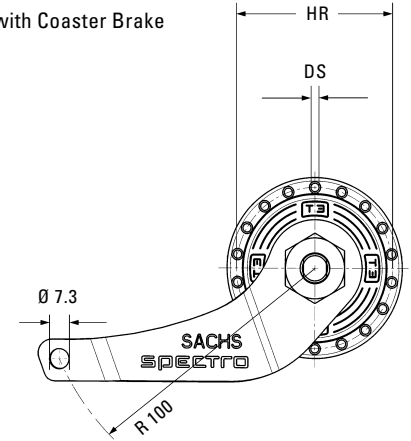
- Easy Adjust
- Superior Quality
- Matte Chrome Finish
- Most Efficient Hub In Its Class

Caution:
Spectro T3 hubs are not suitable for tandems, trademen's delivery bicycles and similar.

- Cycle frame:**
- Dropouts must be parallel.
 - Slot width at rear dropout max. 10,5 mm.
 - The strength must be such that with a maximum braking torque of 250 Nm (2200 in.lbs.) on the rear wheel no residual deformation can occur on the rear structure.



Version with Coaster Brake



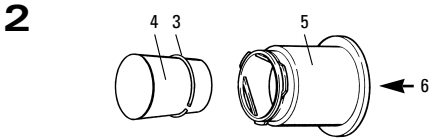
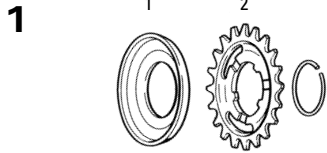
HUBS

	Spectro T3 with coaster brake	Spectro T3 with drum brake	Spectro T3 without brake
Type	MH 3115	MH 3125	MH 3105
Brake	Coaster	Drum „D“ „NL“	None
Over Locknut Dim., OLD	118 mm	118 mm	117 mm
Length, L	152/164 mm	164 mm	152 mm 164 mm
Ends Diameter, T	FG 10.5	FG 10.5	FG 10.5
Holes	36 28	36	36
Hole Diameter, DS	3.0 mm	2.8 mm	3.0 mm
Hole Ref. ø, HR	58 mm	89 mm	58 mm
Flange Dist. to 1/2 OLD	F ₁ = 24.5 mm / F ₂ = 25.5 mm	F ₁ = 25.5 mm / F ₂ = 32.5 mm	F ₁ = 24.5 mm / F ₂ = 25.5 mm
Gear Hub Ratio			
Totally	186 %	←	←
Speed 1	73 %	←	←
Speed 2	100 %	←	←
Speed 3	136 %	←	←
Chain			
Line, C/D/E	44.5/41.5/38.5 mm	44.5/41.5/38.5 mm	44/41/38 mm
Ratio	24", 26", 28" = 2.0 - 2.4 / 20" = 2.0 - 2.5	←	←
Shifter Compatib.	Spectro Grip 3/Spectro Bandix 3		←
Tandem Compatib.	—		—
Weight	1182 g	1270 g	911 g
Hub Shell Material	Steel	Aluminum	Steel
Finish	Matt Chrome Plated	Silver Painted	Matt Chrome Plated

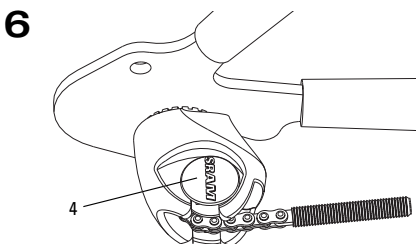
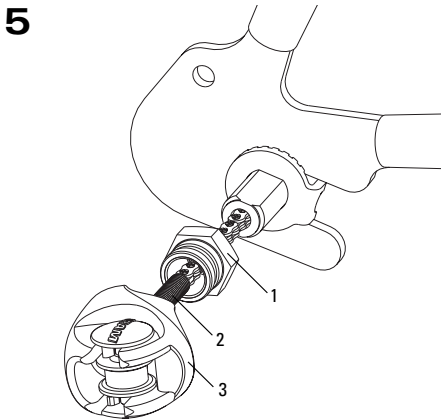
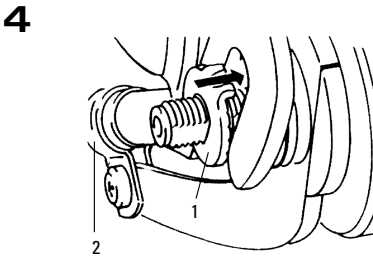
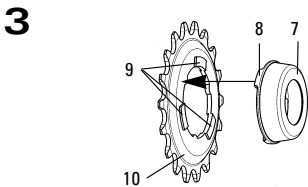
SHIFTERS

	Spectro Grip 3 (for adults)	Spectro Bandix 3 (for kids) NEW
Part No.	—	—
Shifter Type	Twist Shifter	Twist Shifter
Cable	ø 1.2 mm 2174 mm 2500 mm	ø 1.2 mm 2174 mm
Comp. Cable Housing	Capped, Compressionless with Resin Liner inside	
Gear Indication	Printed	Printed
Barrel Adjuster	Indexing	Indexing
Clamping Diameter	22.3 mm	22.3 mm
Handlebar, Straight Area	Minimum length for shifter = 145 mm	Minimum length for shifter = 125 mm
Weight	58 g	58 g
Housing	PA	PA
Grip	PA	PA
Grip Cover	Thermoplastic elastomer	Thermoplastic elastomer
Clamping Collar	Aluminum	Aluminum

SPECTRO T3 ASSEMBLY



Mounting Tool
Part No. 0582 104 000



ASSEMBLY HUB

- Lace the wheel as normal. See spoke length table.
- Place the dust cap (1, Fig. 1) and sprocket (2) on the driver.
- Push sprocket circlip (3, Fig. 2) onto the cone of tool sleeve (4). Place tool sleeve with large diameter on the driver.
- Push the spring end of sliding sleeve (5) of the tool over the tool sleeve. Thrust sliding sleeve in direction (6), this forces circlip into the recess of the driver.
- Remove tool and check that the circlip is seated correctly.
- Turn dust cap (7, Fig. 3) until the three lugs (8) are between the three beads (9) on the sprocket (10).
- Position dust cap and push towards sprocket until it is felt to lock into place.
- Screw tension chain (2, Fig. 5) into the axle end.
- Placing the wheel in the rear frame.
- Mount the chain.
- After positioning the wheel in the rear fork fit non-turn washer (1, Fig. 4) to the outside of the dropout (hub side opposite the sprocket). The serrations must bear against the dropout and the lug must engage in the dropout slot.
- Tighten up special type axle nut (1, Fig. 5) and axle nut at other axle end. Tightening torque 30 – 40 Nm (266 – 350 in.lbs.).
- Guide tension chain (2) trough deflection pulley (3).
- Position deflection pulley at axle nut and push until it is felt to lock into place. Turn deflection pulley until the yellow area is at the top (4, Fig. 6).

Advice:

The Spectro T3 hubs have been modified for the series launch of the new deflection pulley.

Identification: yellow counter nut on the driving end of the axle and modified compression spring (22 resp. 14, Fig. 1 / Page 40)

In order to prevent malfunctions, these modified hubs may no longer be combined with the chain guide nut.

The deflection pulley can also be used for the previous hub version (silver-coloured counter nut on the axle). In order to achieve the maximum reduction in shifting forces with this combination, the new, modified compression spring should be installed (description see „REASSEMBLY HUB“).

Caution:

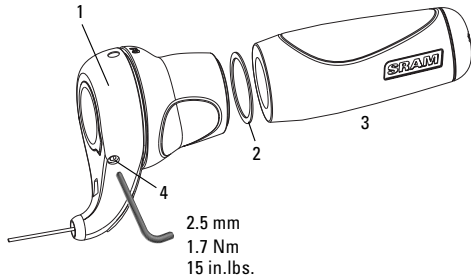
- **Only install additional axle attachments (e.g. struts) between nut and retaining washer.**
- **Cable stop bracket: dimensions see Fig. 9.**
- **Axle end must protrude by min. 1 mm to max. 4 mm beyond the nut (1, Fig. 5).**
- Mount the brake lever using a suitable frame clamp (2, Fig. 4 resp. Fig 10).
- **Caution: Mount the brake lever between the two straps of the frame clamp. The clamp must be seated on the frame without play. Use a self-locking nut! Tightening torque: 2 – 3 Nm (18–27 in.lbs.).**

Spoke length table:

Tire Size	Cross 28 / 36 Holes	Length MH 3115/3105		Length MH 3125 36 Holes
		28	/ 36 Holes	
47–406 20" x 1.75 x 2	2 x / 3 x	182 mm / 184 mm	—	—
37–490 22" x 1 3/8	— / 3 x	— / 228 mm	—	—
47–507 24" x 1.75 x 2	2 x / 3 x	234 mm / 235 mm	—	—
37–540 24" x 1 3/8	— / 3 x	— / 254 mm	—	—
47–559 26" x 1.75 x 2	2 x / 3 x	258 mm / 262 mm	253 mm	—
37–590 26" x 1 3/8	— / 3 x	— / 254 mm	273 mm	—
47–622 28" x 1.75	2 x / 3 x	289 mm / 292 mm	285 mm	—
28–622 28" x 1 1/8	— / 3 x	— / 292 mm	285 mm	—
32–622 28" x 1 5/8 x 1 1/4	— / 3 x	— / 292 mm	285 mm	—
37–622 28" x 1 3/8 x 1 5/8	— / 3 x	— / 292 mm	285 mm	—
28–630 27" x 1 1/4 fifty	— / 3 x	— / 297 mm	287 mm	—
32–630 27" x 1 1/4	— / 3 x	— / 297 mm	287 mm	—

Spoke lengths are approximate values. They must be checked through lacing attempts and adjusted accordingly.

7



ASSEMBLY SHIFTERS

- Slide shifter (1, Fig. 7) onto handlebar.
- Add thrust washer (2).
- Mount fixed grip (3) onto end of handlebar.
- Without applying pressure, slide shifter against fixed grip, adjust shifter on handlebar and tighten with bolt (4). Allen key 2.5 Nm, torque 1,7 Nm (15 in.lbs.)
- Not recommended for use on thin walled aluminum handlebars such as Hyperlite® type handlebars.

Caution:

- **Never use lubricants or solvents to install fixed grips.** Fixed grips provide an axial safety function. For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar.
- Check that the shifter and brake lever function properly and are unobstructed (realign if necessary).
- **Never ride without the fixed grips. The turning grip may loosen from housing and slip off handlebar – this can result in severe injury or death.**

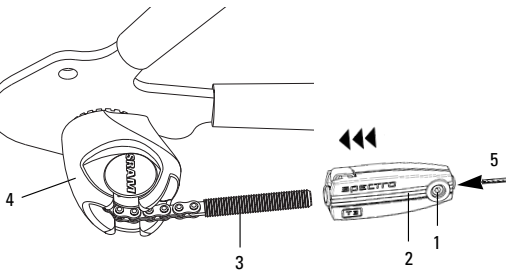
ADJUSTMENT

- Place the shifter in gear position "3". Move the crank to check that the gear is engaged.
- To make the adjustment, the cable must be taut in third gear to be able to transfer a shift movement directly to the hub.
- Push locating sleeve (2, Fig. 8) onto the small pull rod (3) until the control cable is taut. Make sure that you don't pull the indicator chain out of the deflection pulley (4).

Check:

- Place shifter in gear position "1" while moving the crank.
- Setting too loose: In gear position "1" the tension chain can be pulled out of the deflection pulley by hand.
- Setting too tight: It is difficult to place the shift lever in gear position "1".
- If required, readjust the shift mechanism (in third gear).

8



CONNECTING DRUM BRAKE

Caution:

Only use brake levers with a cable moving distance of at least 15 mm and a minimum leverage of 3.8.

INSTALLING CABLE

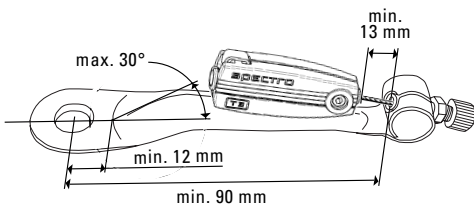
- When fitting the cable avoid small radius. Use only compressionless cable housings with resin liner inside and capped.
- Screw the cable stop clamp and cable pulley clamp on the down tube or seat tube.
- Secure the lubricated shift cable at equidistant intervals on the frame (in case of continuous cable housing).
- Feed the shifter cable into the locating sleeve (5, Fig. 8), fix at the appropriate length (cable stop bracket: see Fig. 9) using the clamping bolt (1). Allan key 2.5 mm, tightening torque 1.5 Nm (13 in.lbs.). Shorten any cable which is sticking out.
- Connect to the hub: push locating sleeve (2, Fig. 8) loosely onto small pull rod (3).

- Fit cable stop (1, Fig. 10) with adjusting bolt (2) and nut (3) and insert into the slot on the brake anchor plate.
- Turn adjusting bolt down by approx. 2/3 and route the brake cable from the brake handle.
- Push lower brake cable end through adjusting bolt (2) and insert lower cable housing end into adjusting bolt.
- Thread brake cable end (4) into fork unit (5).
- Tighten screw (6) slightly.
- Attach fork unit to brake lever (7).
- Pull brake cable end taut with pliers so that fork unit can still be attached and removed (important for changing wheel).
- Tighten screw (6).

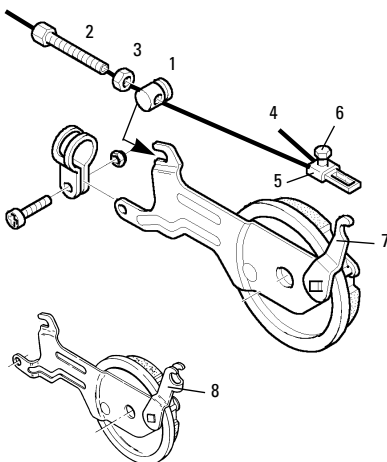
Caution:

For NL version drum brake hub with special lever (8), only use original NL brake cable (fork unit (5) is not suitable).

9



10

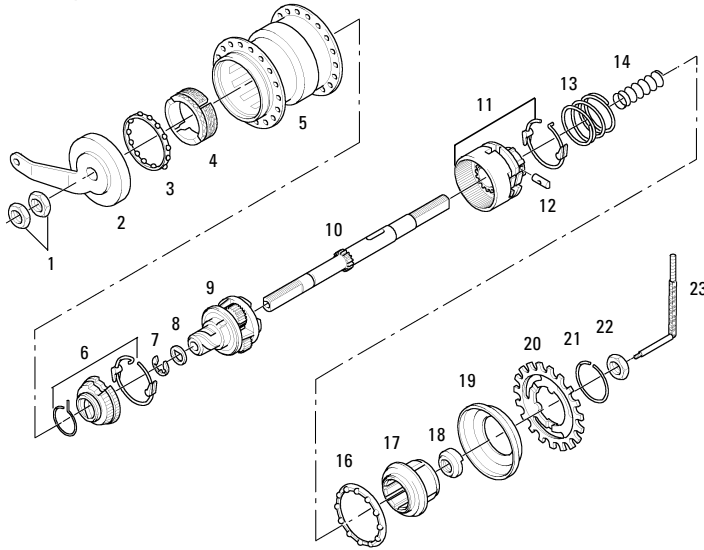


ADJUSTMENT DRUM BRAKE

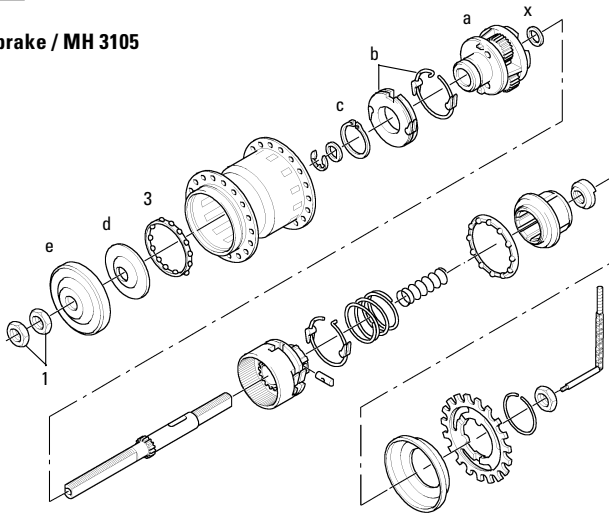
- Unscrew adjusting screw (2, Fig. 10) until the brake pads drag lightly.
- Actuate the hand brake lever forcefully several times and then, if necessary, turn the adjusting screw further in just until the wheel starts spinning freely.
- Lock hex nut (3).

SPECTRO T3 MAINTENANCE

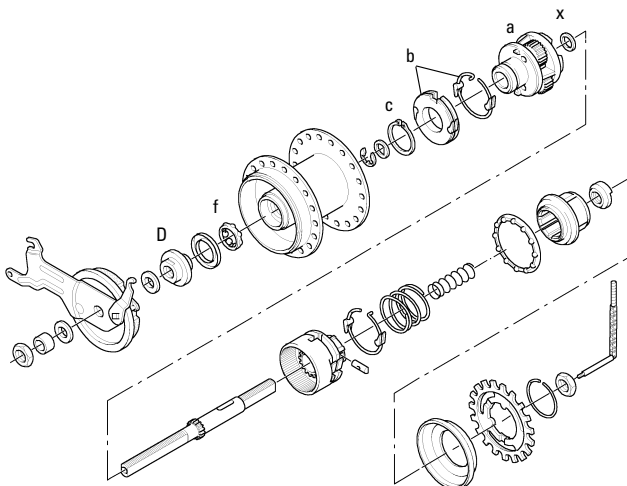
1 Coaster brake / MH 3115



2 Without brake / MH 3105



3 Drum brake / MH 3125



REMOVE WHEEL

- Apply fingertip pressure onto the metal key of locating sleeve to release it from the pull rod.
- Remove deflection pulley.
- Screw off both axle nuts and remove retaining washers.
- Remove wheel.

DISMANTLING HUB

see Fig. 1

- Unscrew indicator chain (23), remove circlip (21), sprocket (20), dust cap (19) and clamp axle (10) on the driver side.
- Unlock hexagonal nuts (1) and unscrew.
- Remove brake arm (2), ball retainer (3) and brake sleeve (4) and remove hub shell (5).
- Remove safety washer (7), thrust washer (8) and then the planet carrier (9) complete with brake cone (6). Unscrew the brake cone from the planet carrier.
- Clamp other axle end.
- Loosen the lock nut (22) and fixed cone (18) and remove.
- Remove driver (17), compression springs (14 and 13) and ball retainer (16).
- Push the sliding key (12) through the large bore in the coupling wheel of the ring gear (11) – the bore and thrust block must be aligned.
- Remove the gear ring (11) from the axle.

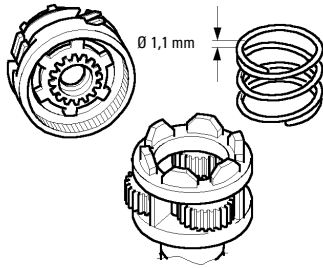
Advice:

The dismantling and reassembly of the hubs with drum brake and without brake should be carried out in the same way (Fig. 2 / 3).

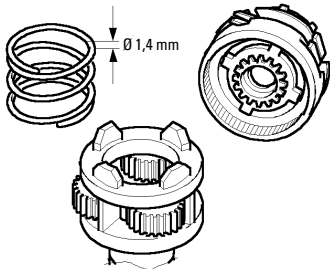
Differences

- There is no brake sleeve (4) and brake cone (6).
- The planet carriers (a) have a cylindrical shaft instead of a flat thread, which houses a pawl carrier (b) held by a safety washer instead of the brake cone.
- Further differences: instead of a lever cone (2) for type MH 3115, an adjusting cone (d) with dust cap (e) for type MH 3105 and a small adjusting cone (D) and corresponding ball retainer (f) for type MH 3125 are fitted.

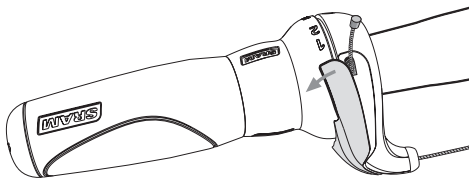
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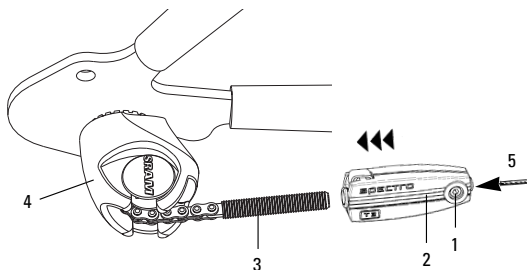
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6



7



REASSEMBLY HUB

see Fig. 1 / 2 / 3

Lubrication see "MAINTENANCE/ LUBRICATION".

- Clamp the hub axle (10) with the slot for thrust block upwards), fit ring gear (11) and align the large bore in the coupling wheel with the slot. Position the radius of the sliding key (12) facing downwards and turn the coupling wheel slightly.
- Fit the compression springs (13 and 14).
- Place ball retainer with balls in (16) on ring gear (11), mount driver (17), fit fixed cone and lock with hexagonal nut (22), tightening torque 15 – 20 Nm (133 – 177 in.lbs).
- Turn hub over and slide on planet carrier (9) – thrust washer (X) must first be fitted for types MH 3105/3125. (For type MH 3115, this washer is already integrated in the planet carrier). Mount thrust washer (8) and place safety washer (7) in the recess of the axle.
- Screw brake cone (6, type MH 3111) onto the flat thread – for types MH 3105/3125 mount pawl carrier (b) and secure in place using safety washer (c).
- Fit hub shell (5) – turning it counter-clockwise slightly to get past the stop notches – until the shell runs cleanly onto the ball retainer.
- For type MH 3115, insert the brake sleeve (4) so that the spring end of the friction spring on the brake cone (6) sits in one of the two slots on the brake sleeve. Insert the ball retainer and fit the lever cone – move the lever cone lightly until the lugs on the brake lever catch in the grooves on the adjusting cone.
- Adjust the hub clearance by screwing on hexagonal nut (1) until the hub shell runs free of play but not under tension. Lock with a second nut to a tightening torque of 15 – 20 Nm (133 – 177 in.lbs.).
- For type MH 3105 insert ball retainer (3), mount adjusting cone (d) with dust cap (e) and hexagonal nuts (1). Adjust the hub clearance as for type MH 3115.
- For type MH 3125, the ball retainer (f) and dust cap (pressed in) normally remain in the hub shell. The hub clearance is set with adjusting cone (D) as for type MH 3115.

CABLE CHANGE

Dismantling shifter cable:

- Use only new cable and compression-less cable housing
- Detach the cable from the internal hub.
- Remove the cable housing. Cut the cable off 15 cm (6") from the shifter barrel adjuster. Discard the old cable and cable housing.
- Line up the '3' gear number mark with the indicator mark.
- From the edge, pull open the cable change hatch (Fig. 6).
- Remove and discard the rest of the old cable.

Assembly shifter cable:

- Feed the new cable through the shifter.
- Feed the cable through the new cable housing and stops.
- Feed the shifter cable into the locating sleeve (5, Fig. 7), fix at the appropriate length using the clamping bolt (1). Allan key 2.5 mm, tightening torque 1.5 Nm (13 in.lbs.). Shorten any cable which is sticking out.
- Connect to the hub: push locating sleeve (2, Fig. 7) loosely onto small pull rod (3).

ADJUSTMENT

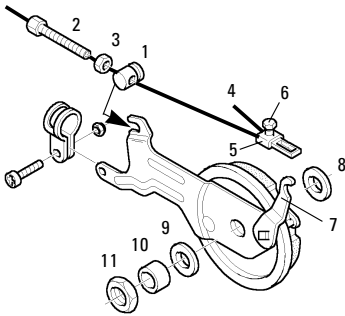
- Place the shifter in gear position "3". Move the crank to check that the gear is engaged.
- To make the adjustment, the cable must be taut in third gear to be able to transfer a shift movement directly to the hub.
- Push locating sleeve (2, Fig. 7) onto the small pull rod (3) until the control cable is taut. Make sure that you don't pull the indicator chain out of the deflection pulley (4).

Check:

- Place shifter in gear position "1" while moving the crank.
- Setting too loose: In gear position "1" the tension chain can be pulled out of the deflection pulley by hand.
- Setting too tight: It is difficult to place the shift lever in gear position "1".
- If required, readjust the shift mechanism (in third gear).

SPECTRO T3 MAINTENANCE

8



DRUM BRAKE

Instal brake anchor plate (or exchange it):

- Place thrust washer (8, **Fig. 8**) over the axle on the adjusting cone and fit complete brake anchor plate. Position washer (9) distance sleeve (10) and screw on locknut (11).
- Push brake lever (7) to the stop and hold it there to center the brake jaws in the brake drum – tighten up locknut with a torque of 15 – 20 Nm (133 – 177 in.lbs.).

ADJUSTMENT DRUM BRAKE

- Unscrew adjusting screw (2, **Fig. 8**) until the brake pads drag lightly.
- Actuate the hand brake lever forcefully several times and then, if necessary, turn the adjusting screw further in just until the wheel starts spinning freely.
- Lock hex nut (3).

Caution:

Check that all the brake system components are functioning properly!

MAINTENANCE / LUBRICATION

Coaster Brake:

Improved braking in third gear after production date CW 38/96

- In case of repair, older hub models (**Fig. 4**) can be converted with a repair set (**Fig. 5**). It is important that all three parts are replaced at the same time – new, reinforced compression springs, planet carrier with 4 lugs and ring gear with 4 lugs on the driving plate.

A change at the new or converted hubs:

- When braking in third gear, the indicator chain moves out of the deflection pulley by approx. one chain link – after braking, the tension chain returns immediately to its normal position.

Caution:

The Spectro hubs are provided with permanent lubrication and are maintenance-free under normal conditions. For type MH 3115, however, particularly high loading of the coaster brake can cause to overcompensate. In this case, apply special grease (Part No. 0369 135 201) to the brake sleeve or replace it. Renew brake shell, when rhombic pattern is worn out.

Cleaning of parts:

- All parts – except for the planetary gear carrier – can be degreased in a cleaning bath.
- The planetary gear carrier only needs to be cleaned on the outside with a brush so as not to degrease the planetary gear bearing.

Lubrication of parts:

- To lubricate the bearing points on the planetary gear sets, position the planetary gear carrier on its crown and apply 2 – 3 drops of oil to the bearing bolts – at the same time turning the planetary gears so that the bearing points are completely wet. Oil axle through the axle bore and axle slot, apply a thin coating of grease to the outside.
- Oil the inside of the sun gears, grease the outside teeth (fill the gaps in the teeth).
- Oil outside teeth and carrier plate on the coupling gear and lightly grease the borehole from right and left.
- Do not apply grease to ring gear but just oil the pawl pockets.
- Grease the brake cone in the borehole and the friction spring.
- Spread grease on the inside and outside of the brake shell.
- Fill lever cone with grease reserves for brakes.
- Regrease ball retainer, line ball bearing running tracks with grease.

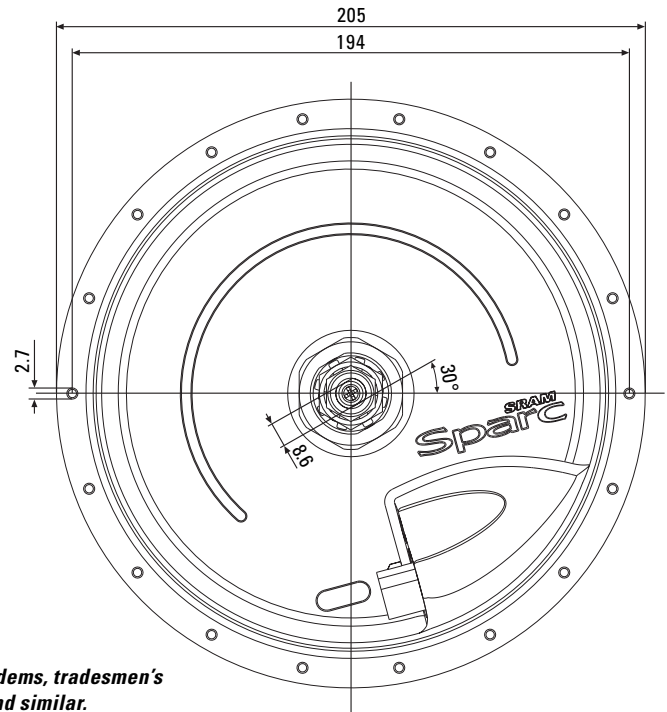
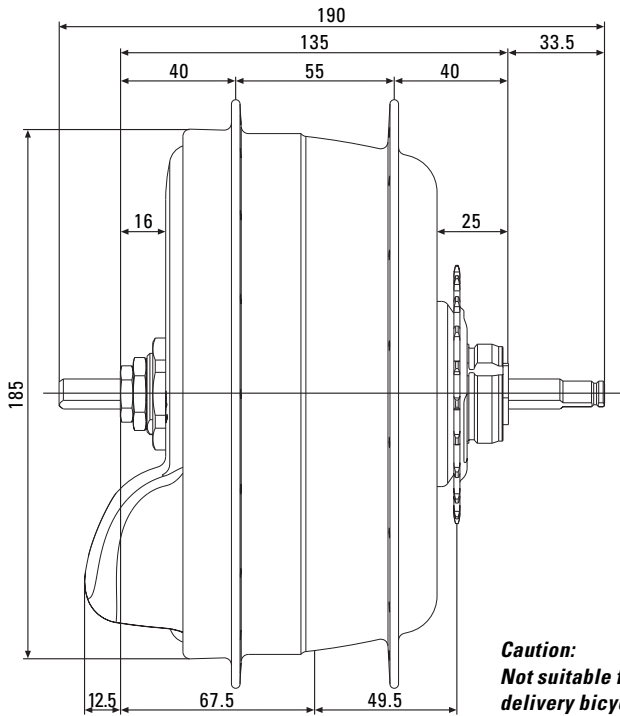
Caution:

Do not use high-pressure water when cleaning the gear hub (e.g. strong water jets, high-pressure cleaners etc.) – if water penetrates it could lead to functional problems.

TROUBLESHOOTING

Problem	Cause	Remedy
Shifting difficulties	Incorrect gear setting	Adjust shifting system, oil control cable, check that cable stop is fastened correctly.
Pedals are carried forward when freewheeling	Bearings set too tight	Re-adjust bearing
	Loose lock nuts	Tighten lock nuts (15 – 20 Nm)
	Chain is overtensioned	Reduce chain tension
Ccoaster brake: Hub locks when braking	Brake shell has run dry	Wash out hub sleeve, re-polish and relubricate brake cylinder, renew brake shell
Pedals yield slowly during braking (does not impair safety).	Brake cone / brake sleeve	Replace brake cone and brake sleeve

SPARC TECHNICAL DATA / ASSEMBLY REQUIREMENTS



Caution:
Not suitable for tandems, tradesmen's delivery bicycles and similar.

BUCH

		Sparc hub <i>NEW</i>			
Electric Drive	V max.	Version	Europe 28"	Europe 20"	USA 26"
		Econ Mode	18 km/h	18 km/h	14 mph
		Speed Mode	24 km/h	24 km/h	18 mph
		Engine Type	2 x 12V DC engines		
		Power	2 x 100 W max.		
		Assist Type	Pedal controlled		
		Assist Ratio	Econ / Speed		
		Brake	None		
		Over Locknut Dim.	135 mm		
		Length	190 mm		
Axle		Ends Diameter	FG 10.5		
		Holes	36		
		Hole Diameter	2.9 mm		
Spoke		Hole Reference ø	194 mm		
		Totally	249 %		
		Speed 1	63 %		
Gear Hub Ratio		Speed 2	78 %		
		Speed 3	100 %		
		Speed 4	128 %		
		Speed 5	158 %		
		Usable Dimension	1/2" x 1/8" or 1/2" x 3/32"		
Chain		Line	49.5 mm (only off-set sprockets)		
		Ratio	1.7-1.9	2.3-2.6	1.8-2.6
		Shifter Compatib.	Sparc Shifter		
	Frame Compatib.	Dropouts max. 7 mm / OLD 135 mm			
	Weight	2500 g			

SHIFTER

		Sparc Shifter		
	Part. No.	—	—	—
	Shifter Type	Twist Shifter		
	Cable	1500 mm	1600 mm	1700 mm
	Gear Indication	Window		
	Clamping Diameter	22.3 mm		
	Handlebar, Straight Area	Minimum length = 150 mm		
	Weight	70 g		

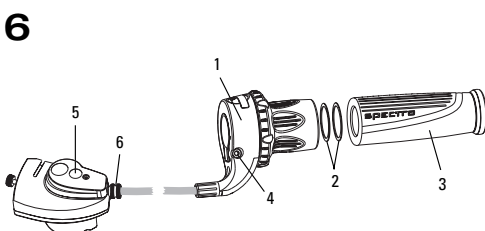
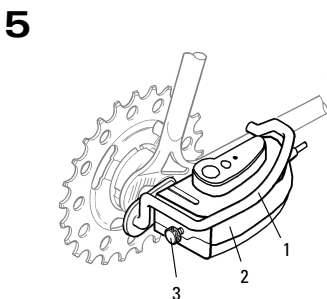
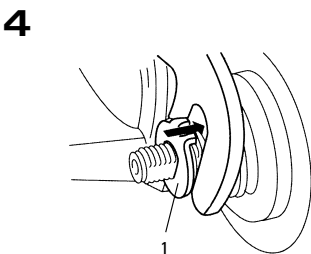
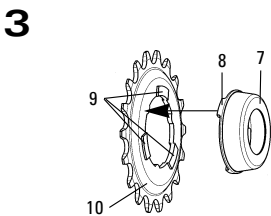
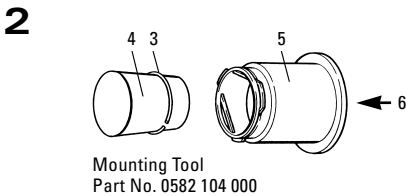
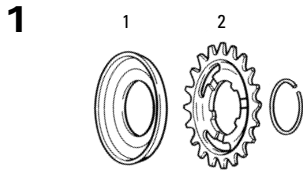
REMCON

		Sparc Remote Control Unit				
	Part. No.	—	—	—	—	—
	Cable	1500 mm	1600 mm	1700 mm	1800 mm	2200 mm
	Mode Selector	Off / Econ / Speed				
	Mode Indication	Printed				
	Clamping Diameter	22.3 mm				
	Cable Connection	3.5 mm stereo jack				
	Weight	45 g				

BABOX

		Sparc Battery Box				
	Part. No.	—	—	—	—	—
	Cable	650 mm	750 mm	850 mm	1400 mm	1950 mm
	Battery	12V / 7Ah lead battery				
	Charger	12V / 1.5A			12V / 2.0A	
	Charging time	4 hours 45 minutes			3 hours 30 minutes	
	Luggage carrier comp.	Struts: ø 8 mm / dist. 68 mm center to center / parallel				
	Weight	3000 g				

SPARC ASSEMBLY



LACING THE WHEEL

Version Europa 28" / USA 26":

1-cross only.
All spoke heads must be positioned at the outside of the spoke flange.
Spoke tension about 1000 N recommended.

Version Europa 20":

- 1-cross:
Use only rim „Rigida 20x406 59 (L 01 12 E)“ (or contact SRAM).
All spoke heads must be positioned at the outside of the spoke flange.
Spoke tension about 1000 N recommended.
- Radial lacing:
No restrictions.
Spoke tension about 1000 N recommended.

ASSEMBLY HUB

- Place the dust cap (1, Fig. 1) and sprocket (2) on the driver. Toothing close to the hub (only sprocket version off-set).
 - Push sprocket circlip (3, Fig. 2) onto the cone of tool sleeve (4). Place tool sleeve with large diameter on the driver.
 - Push the spring end of sliding sleeve (5) of the tool over the tool sleeve. Thrust sliding sleeve in direction (6), this forces circlip into the recess of the driver.
 - Remove tool and check that the circlip is seated correctly.
 - Turn dust cap (7, Fig. 3) until the three lugs (8) are between the three beads (9) on the sprocket (10).
 - Position dust cap and push towards sprocket until it is felt to lock into place.
 - Placing the wheel in the rear frame.
- Advice:**
Dropouts must be parallel.
- Mount the chain.
 - Fit non-turn washer (1, Fig. 4) to the outside of the dropouts. The serrations must bear against the dropout and the lug must engage in the dropout slot.
 - On the sprocket side fit the protective bracket (1, Fig. 5) directly below the axle nut. Tightening torque on acorn or hex nuts 30 – 40 Nm (266 – 350 in.lbs.).

Advice:

- **If a different protective bracket is used the thickness of the attachment plate must be max. 3 mm.**
- **Do not use additional washers.**
- **At least the beginning of the axle thread must be visible in front of the axle nut.**

ASSEMBLY SHIFTER

- Slide shifter (1, Fig. 6) onto handlebar.
- Add 2 thrust washers (2).
- Mount fixed grip (3) onto end of handlebar.
- Without applying pressure, slide shifter against fixed grip.
- Adjust shifter on handlebar and tighten with bolt (4) with a torque of 1.5 Nm (13 in.lbs.).

Caution:

- **Never use lubricants or solvents to install fixed grips.**
Fixed grips provide an axial safety function. For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar.
- **Check that the shifter and brake lever function properly and are unobstructed (realign if necessary).**
- **Never ride without the fixed grips. The turning grip may loosen from housing and slip off handlebar – this can result in severe injury or death.**

- When fitting the cable (1, Fig. 7) avoid small radius.
- Last attachment point is on the lower rear wheel fork (2, Fig. 7) immediately behind the chain wheel.

Cable housing must be movable inside attachment.

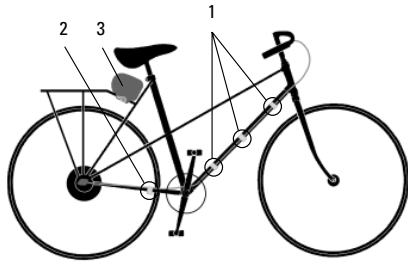
INSTALLING CLICK BOX

- Insert shift rod (1, Fig. 8) in shift tube (2) (oil parts lightly) and then push into axle bore as far as the stop. Turn slot (6) in shift tube to a position where it is easily visible.
- Push locating sleeve (3) with guiding rib (4) to the front onto the hub axle – making sure that the internal lug (5) is guided in the slot (6) of the shift tube until it can be felt – and heard – to engage.
- Turn locating sleeve on the axle (7) until the guiding rib (4) is facing roughly upwards.
- Place shifter in gear position "2".
- Push on clickbox (2, Fig. 5) to the stop on the axle. The guiding rib (4, Fig. 8) of the locating sleeve thereby engages in the slot on the housing. In the end position tighten up the knurled bolt (3, Fig. 5) by hand (0,3 Nm / 2,7 in.lbs.).

ADJUSTMENT HUB

- Be sure to reset rotational shifter from 4th. to 3rd gear.
- Match up the arrow marks in the Clickbox viewing window (5, Fig. 6) by turning the adjusting screw (6).

7



ASSEMBLY BATTERY BOX

- Pull both quick releases outward and turn them to the „open“ position (*Fig. 9*).
- Position battery box onto luggage carrier struts (3, *Fig. 7*).
- Push quick releases inwards and turn them to the „closed“ position.
- Slide plug of battery cable in the slot of the battery box until it snaps in.
- Attach cable along the frame or luggage carrier strut.

Advice:

Last attachment point of the cable at the rear fork: approx. 8 cm away from the axle end.

Do not jam the cable between frame and rear hub and keep it away from the rotating hub shell.

- Slide plug in the slot on the hub until it snaps in.

Advice:

Closed elements such as brazed-on eye bolts are not suitable because plug will not pass through.

STORING THE BATTERY

If you intend to not use your bicycle for a while, e.g. during the winter, the battery box should be stored fully charged in a dry and cool place.

We recommend to recharge the battery once a month. Recharge the battery at least every 6 months.

ASSEMBLY REMOTE CONTROL UNIT

- Slide remote control unit (1, *Fig. 10*) onto handlebar.
- Mount brake lever (2) and fixed grip (3).
- Adjust remote control unit on handlebar and tighten the bolt (4) with a torque of 1.5 Nm (13 in.lbs.).
- Slide plug of remote control cable in the slot (5) of the remote control unit until it snaps in.
- Attach cable along the frame.

Advice:

Last attachment point of the cable at the rear fork: approx. 8 cm away from the axle end.

Do not jam the cable between frame and rear hub.

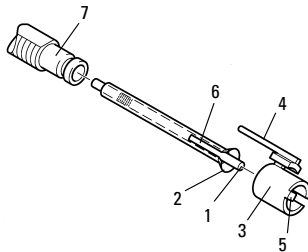
Make a cable loop between plug and cable attachment point to avoid tensile load.

- Slide the plug straightly in the slot on the hub until it snaps in. Angular installation may damage the slot.

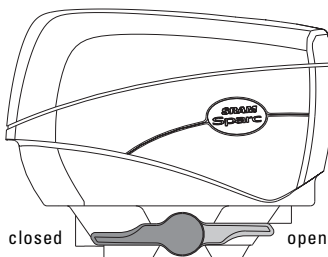
Check:

Switch remote control to „Speed“ position and rotate the rear wheel. At least 2 green and 1 red LED must gleam. If not, assemble plugs again completely. If not, assemble plugs again completely / right.

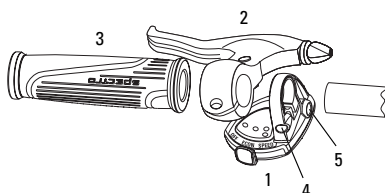
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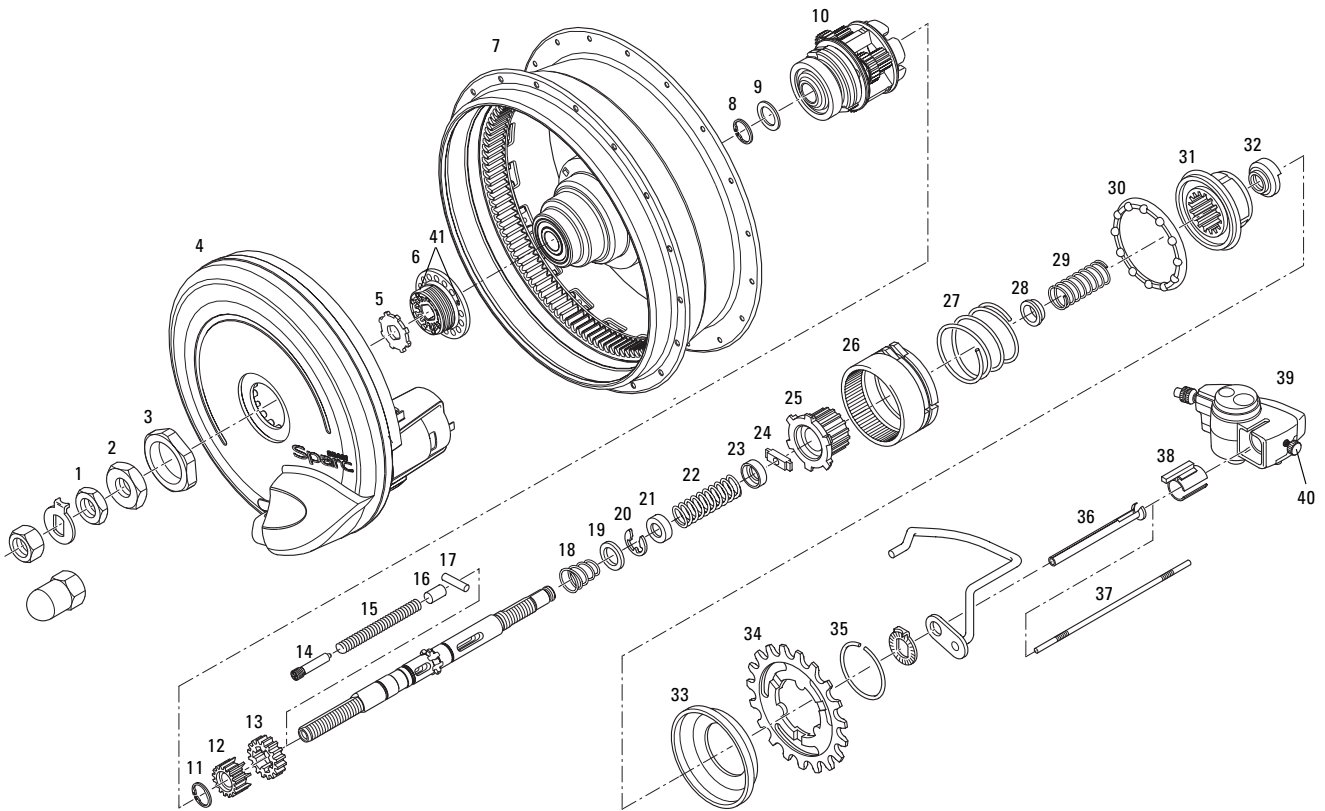


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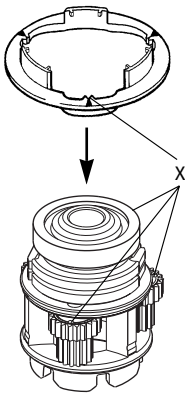
SPARC MAINTENANCE

1



2

Sparc mounting aid
Part No. 3024 001 000



REMOVE WHEEL

- Pull the remote control cable plug off the hub.
- Apply fingertip pressure onto the tap and pull battery cable plug off the hub.
- Loosen the knurled screw (40, **Fig. 1**) and pull the Clickbox off the axle.
- Disengage the locating sleeve and pull it off. Remove shift rod/tube (37/36), pull shift rod out of the axle bore.
- Remove wheel.

ELECTRIC DRIVE

Remove:

- Unscrew resin nut (3, **Fig. 1**).
- Remove electric drive (4).

Caution:

Do not disassemble and do not lubricate the electric drive.

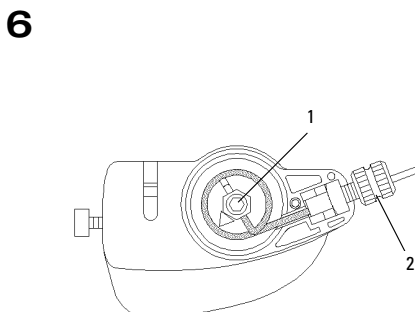
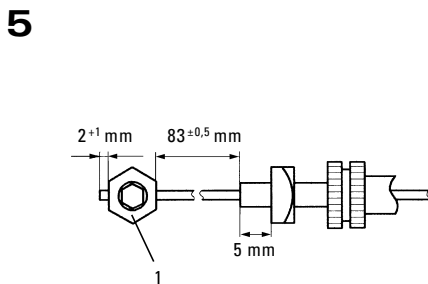
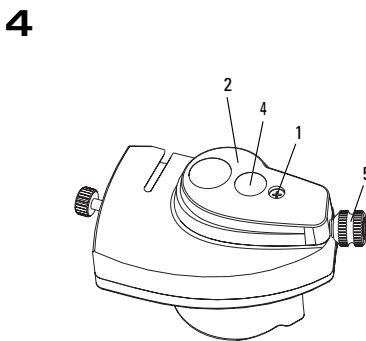
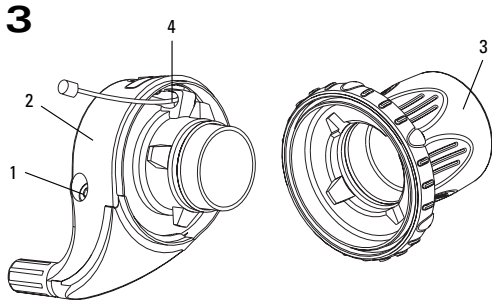
Reassembly:

- Position electric drive onto hub.
- While rotating the electric drive push it inside until the two small inside pins engage in corresponding small holes (41). Check: The thread must be visible at least 8 mm.
- Screw on resin nut (3) with a torque of 3 – 5 Nm (27 – 44 in.lbs.).

DISMANTLING GEAR HUB

see **Fig. 1**

- Remove circlip (35), sprocket (34) and dust cap (33).
- Clamp hub with the two axle flats sprocket side facing downwards.
- Remove electric drive (4).
- Unscrew the locknuts (1+2).
- Remove plate (6) with washer (5).
- Remove hub shell (7).
- Remove circlip (8) and washer (9).
- Remove planetary gear carrier (10) and circlip (11).
- Clamp other axle end.
- Unscrew fixed cone (32).
- Remove driver (31), compression spring (29), large compression spring (27) and ball retainer (30). – Withdraw gear ring (26) and coupling gear (25) and remove cover (28) from the coupling gear.
- Take out thrust block (24), (to do this compress the spring). Remove spring (22) and the two covers (23/21).
- Dismantle retaining washer (20), washer (19), conical compression spring (18), and the large sun gear (13).
- Clamp other axle end.
- Unscrew grey grub screw (14) – dismantle spring (15), guide bolt (16) and thrust block (17).
- Remove small sun gear (12).



REASSEMBLY HUB

see Fig. 1

Lubrication see "LUBRICATION GEAR HUB", next page.

- Clamp axle with small internal thread upwards.
- Position small sun gear (12) with crown gears to the front.
- Position thrust block (17) in the slotted hole (is laterally guided when the sun gear is mounted).
- Locate bolt (16), then spring (15) in the axle and screw in grey grub screw (14) until it is flush with the axle end.
- Clamp other axle end. Fit large sun gear (13). Position conical compression spring (18), with the large diameter first. Compress spring and fit washer (19) and retaining washer (20).
- Assemble cover (21), compression spring with 7 turns (22) and the second cover (23, insides to the spring).
- Compress spring and position thrust block (24) (it is the same both sides) in the center of the slotted hole.
- Position coupling gear (25) with carrier plate facing downwards.
- Fit cover (28, inside to the spring) for compression spring.
- Position gear ring (26) over the teeth of the coupling gear.
- Place ball retainer (30), with balls below on the gear ring.
- Position large compression spring (27) on gear ring.
- Mount compression spring with 13 turns (29) on the axle. (Is supported in the coupling wheel by the cover.)
- Locate driver (31), press it down and screw on fixed cone (32). Tightening torque 20 Nm.
- Clamp other axle end.
- Push on thrust washer (11) and fit planetary gear carrier (10). In doing this: Position mounting aid (Fig. 2) on the planetary gear carrier so that the (X) markings on the three planetary gears match with the mounting aid.
- Insert planetary gear carrier, place thrust washer (9) and mount circlip (8) in recess.

Remove the mounting aid.

Advice:
If the gears are not accurately installed the hub may be tight to move. This could lead to damage to the gear-wheels in operation.

- Mount hub shell (7), with a slight counterclockwise turn.
- Fit plate (6) and washer (5).
- Screw on counternuts (2+1), tightening torque 15 – 20 Nm (133 – 177 in.lbs.).
- Reassemble electric drive.

CABLE CHANGE

Dismantling shifter cable:

- Place shifter in gear position "2".
- Loosen clamping bolt (1, Fig. 3) on the shifter and slide the complete shifter inwards towards the middle of handlebar 20 mm or more. (It may be necessary to loosen and move the brake lever.)
- Separate housing (2) from turning grip (3).
- Unscrew bolt (1, Fig. 4), remove cap (2).
- Withdraw shifter cable and clamping bolt (1, Fig. 6) upwards, loosen clamp and pull clamping piece from the cable.
- Remove the old cable (4, Fig. 3).

Assembly shifter cable:

- Route new cable through shifter housing and pull cable to seat cable head completely into cable recess.
- Reassemble shifter by aligning four tabs on shifter housing with matching recesses on turning grip and snap together (Fig. 3).
- Feed the cable through the new cable housing and adjusting screw.
- Position clamping bolt (1, Fig. 5) at a distance of 83 mm, tighten up with 1.5 Nm (13 in.lbs.) and cut off cable ends to 2 – 3 mm.
- Locate clamping bolt (1, Fig. 6) (screw head not visible) and place shifter cable around the carrier cylinder (counterclockwise winding).
- Insert the square nut of the adjusting bolt (2) in the housing and completely screw in the knurled bolt.
- Position cap (2, Fig. 4) and tighten up with bolt.

Advice:

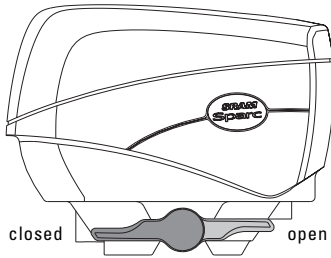
To set the clamping bolt / adjusting screw distance a setting piece can be used (Part No. 65 0324 105 001).

ADJUSTMENT

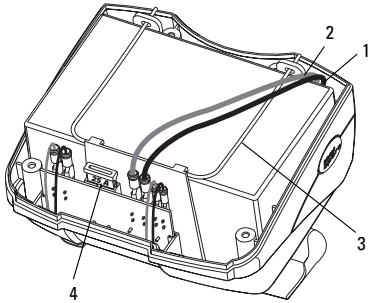
- Be sure to reset rotational shifter from 4th. to 3rd gear.
- Match up the arrow marks in the Click Box viewing window (4, Fig. 4) by turning the adjusting screw (5).

SPARC MAINTENANCE

7



8



LUBRICATION GEAR HUB

Cleaning of parts:

- All parts – except for the planetary gear carrier – can be degreased in a cleaning bath.
- The planetary gear carrier only needs to be cleaned on the outside with a brush so as not to degrease the planetary gear bearing.

Lubrication of parts:

Use only SRAM grease (Ref. No. 0369 135 201) and standard bicycle oil.

- To lubricate the bearing points on the planetary gear sets, position the planetary gear carrier on its crown and apply 2 – 3 drops of oil to the bearing bolts – at the same time turning the planetary gears so that the bearing points are completely wet.
- Oil axle through the axle bore and axle slot, apply a thin coating of grease to the outside.
- Oil the inside of the sun gears, grease the outside teeth (fill the gaps in the teeth).
- Oil outside teeth and carrier plate on the coupling gear and lightly grease the borehole from right and left.
- Do not apply grease to ring gear but just oil the pawl pockets.
- Regrease ball retainer, line ball bearing running tracks with grease.

Advice:

Do not use high-pressure water when cleaning (e.g. strong water jets, high-pressure cleaners etc.) – if water penetrates it could lead to functional problems.

BATTERY CHANGE

Disassembly:

- Apply fingertip pressure onto the tap and pull battery cable plug off the battery box.
- Turn quick releases to the „open“ position (**Fig. 7**) and pull them outward.
- Take off battery box from luggage carrier.
- Unscrew the 4 bottom screws (slotted screwdriver / Torx T10) and take off battery box cover.
- Hang out stirrup (3, **Fig. 8**).
- Take out battery and pull off plugs (1+2).

Advice:

Do not pull off any plug from card modul.

Reassembly:

- Connect plugs to new battery:
 - black cable: Negative Pole (1, **Fig. 8**)
 - red cable: Positive Pole (2)and put battery inside.
- Assemble stirrup (3) (bulge downward).
- Mount battery box cover by the 4 screws.
- Pull both Quick Releases outward and turn them to the „open“ position (**Fig. 7**).
- Position battery box onto luggage carrier struts.
- Push Quick Releases inwards and turn them to the „closed“ position.
- Slide plug of battery cable in the slot of the battery box until it snaps in.

Advice:

Use only batteries as specified.



CHARGING THE BATTERY

- Insert the plug of the charger into the socket of the battery box.
- Insert the charger into an electric mains socket.

The LED will glow red during charging, changing to green when the battery is fully recharged.

A trickle charge prevents self-discharge of the battery.

Therefore, the charger can be permanently connected to the battery.

Advice:

- **We recommend to recharge the battery once a month.**
- **The battery should only be operated or charged in a temperature range of +5°C to +40°C.**

Caution:

- **Only charge the battery in the operating position.**
- **Recharge the battery at least every 6 months.**
- **Only use in dry internal areas.**

- **Do not use in rooms (garages) with an explosion risk.**
- **Do not dismantle the charging unit and battery box yourself. Incorrect assembly can lead to electric shock or fire.**
- **The charging unit should not get into the hands of children.**
- **Charging should only be carried out in sufficiently well ventilated areas.**
- **When not in use always withdraw the mains plug for the charging unit from the socket (do not pull on the charging unit's cable).**
- **Regularly check the cable and protect it from sharp edges. If it is damaged have it renewed immediately by a specialist workshop.**
- **Protect the unit from oil, grease, aggressive cleaning agents and paint thinners since they can destroy the housing.**
- **If it falls, from a bench for example, the unit must immediately be given a safety check by a specialist workshop. This is also necessary if contact pins become loose.**

- **The battery must never be burned. Risk of explosion!**
- **The battery must be disposed of according to the waste disposal regulations.**
- **Only ever use the Sparc charging unit with the Sparc battery.**
- **In the USA only use the "USA charging unit".**

STORING THE BATTERY

If you intend to not use your bicycle for a while, e.g. during the winter, the battery box should be stored fully charged in a dry and cool place.

We recommend to recharge the battery once a month. Recharge the battery at least every 6 months.

REMOTE CONTROL UNIT

Do not disassemble the remote control unit.

TROUBLESHOOTING

Problem	Cause	Remedy
Gear hub: Shifting difficulties	Damaged control cable	Replace control cable
	Incorrect gear setting	Adjust shifting system
	To much additional axle attachments between hub and axle nut	Beginning of axle thread must be visible in front of the axle nut
Pedals are carried forward when freewheeling	Bearings set too tight	Readjust bearings
	Loose lock nuts	Tighten lock nuts (15 – 20 Nm)
	Chain is overtensioned	Reduce chain tension
Electric system: Electric drive does not work	Remote control in position OFF	Switch to ECON or SPEED
	Remote control defect	Replace remote control
	Plugs not engaged	Slide all plugs completely in slots
	Cable defect	Replace defect cables
	Battery discharged	Charge battery
	Battery inside not connected	Connect battery inside
	Battery defect	Replace battery
	Fuse blasted	Replace fuse (4, Fig. 8) in battery box (25 A)
Electric drive defect	Replace electric drive	
Electric drive emits unusual noise	Foreign body in electric drive	Take out foreign body
	Electric drive defect	Replace electric drive

SPECTRO VT 5000 / VT 3000

TECHNICAL DATA / ASSEMBLY REQUIREMENTS



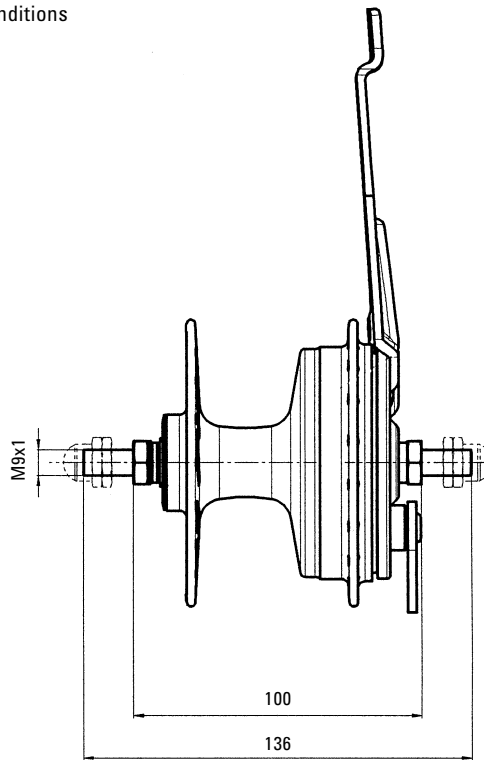
- Reliable Brake Performance In All Weather Conditions
- Practically Maintenance Free
- Sealed Cartridge Bearing

Front fork:

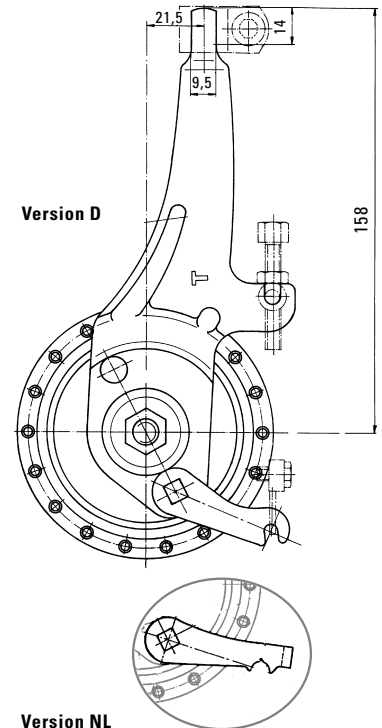
The strength must be such that with a maximum torque of 300 Nm (2700 in.lbs.) on the wheel no residual deformation can occur on the front fork.

Warning:

- *There is a risk of accident if unsuitable forks are used!*
- *Not suitable for tandem use.*
- *Wheel size: only 24"/26"/28" wheels are suitable for use.*



Typ VT 5000



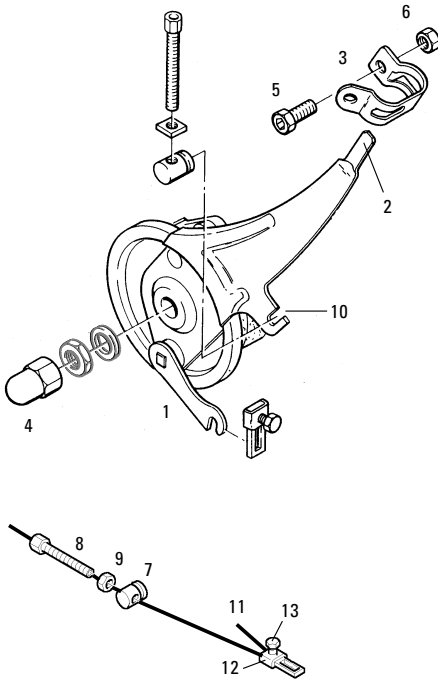
Version NL

DRUM BRAKE

	Part No.	VT 5000		VT 3000			
		Version D	Version NL	Version D	Version NL		
Brake anchor plate		Version D	Version NL	Version D	Version NL		
Over Locknut Dim.		100 mm	100 mm	100 mm	100 mm		
Axle	Length	135 mm	135 mm	135 mm	135 mm		
	Type	Solid	Solid	Solid	Solid		
	Material	Steel	Steel	Steel	Steel		
Spoke	Ends Diameter	M9x1	M9x1	M9x1	M9x1		
	Holes	36	36	36	36		
	Hole Diameter	2.9 mm	2.9 mm	3/3.3 mm	3/3.3 mm		
	Hole Reference ø	89 mm	89 mm	86 mm	86 mm		
	Bearing	Cartridge	Cartridge	Cartridge	Cartridge		
Finish	Sealing	Lip Seal	Lip Seal	Lip Seal	Lip Seal		
	Weight	750 g	750 g	770 g	770 g		
	Hub Shell Material	Aluminum	←	Aluminum/ galvananized Steel			
	Finish	Clear Coat	←	Aluminum/Silver	Silver	Silver	Black

SPECTRO VT 5000 / VT 3000 ASSEMBLY

1



FITTING WHEEL IN FRONT FORK

- Lace the wheel as normal.
- Placing the wheel in front fork. The brake lever (1, Fig. 1) goes on the left side viewed from behind the rear of the bicycle. Guide the top end of brake anchor plate (2) into the brazing part of the fork if fitted. If there is no brazing part, use VT pipe clamp (3).
- Slide washers or snap rings onto axle ends.
- Fit axle nuts (4) with wrench 15 mm, torque 30 – 40 Nm (266 – 350 in.lbs.).
- Tighten screw connections on VT pipe clamp (5/6), torque approx. 3 Nm (27 in.lbs.).

Caution:

The clamp must be seated on the fork with no play.

CONNECTING DRUM BRAKE

Caution:

Only use brake levers with a cable moving distance of at least 15 mm and a minimum leverage of 3.8.

- Fit cable stop (7, Fig. 1) with adjusting bolt (8) and nut (9) and insert into the slot on the brake anchor plate (10).
- Turn adjusting bolt down by approx. $\frac{2}{3}$ and route the brake cable from the brake handle.
- Push lower brake cable end through adjusting bolt.
- Insert lower cable housing end into adjusting bolt.
- Thread brake cable end (11) into fork unit (12).
- Tighten screw (13) slightly.
- Attach fork unit to brake lever (1).
- Pull brake cable end taut with pliers so that fork unit can still be attached and removed (important for changing wheel).
- Tighten screw (13).
- For NL version drum brake hub with special lever (1, Fig. 2), only use original NL brake cable (fork unit (12, Fig. 1) is not suitable)

ADJUSTMENT DRUM BRAKE

- Unscrew adjusting screw (8, Fig. 1) until the brake pads drag lightly.
- Actuate the hand brake lever forcefully several times and then, if necessary, turn the adjusting screw further so that the brake once again brushes the wheel as it turns.
- Lock hex nut (9)

Caution:

Check that all the brake system components are functioning properly!

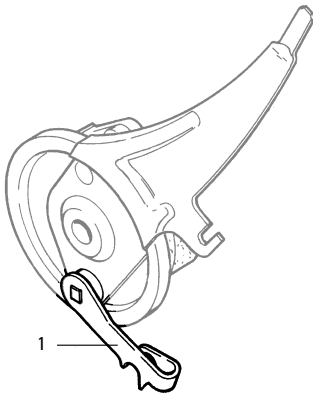
OPERATION

To get used to the new brake, operate the brake lever carefully to acquire a feel for the drum brake's deceleration.

Caution:

- **If the bicycle is left standing for long periods, surface rust in the brake drum may increase braking effect. For this reason, start by braking gently a few times the next time the bicycle is used to remove the surface rust. This will prevent the brake from aggressive braking.**
- **On long, steep downhill stretches, also use the second brake (rear wheel) alternately to prevent the brakes from heating up excessively.**
- **Do not touch hub after cycling – risk of burning!**

2



SPECTRO VT 5000 / VT 3000 MAINTENANCE



MAINTENANCE

- Bearings is sufficiently lubricated and essentially maintenance-free.
- Cable housing without inner tube: lubricate regularly.

Advice:

- ***Do not use high-pressure water when cleaning the hub (e.g. strong water jets, high-pressure cleaners etc.) – if water penetrates the unit it could lead to functional problems.***
- ***Do not rinse hub with benzine, petroleum etc. as this could produce impurities in the brake pads.***

Caution:

The brake anchor plate must be replaced if oil or other substances containing grease get into the brake pads. Oily brake pads reduce braking effect and cause the brake to fail completely. This may result in accidents with extremely serious injuries.

TWO-AXIS BRAKE LEVER

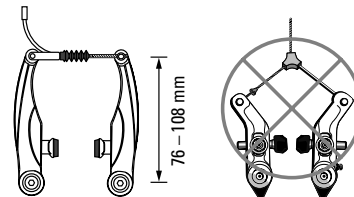
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

T
W
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S

		Two-Axis	
Part No.	—	—	—
Brake Lever	Left	Right	
Lever Size	4 Finger	←	
Brake Compatibility	i-Brake/Linear Pull	←	
Leverage Adjust	Single Position	←	
Cable Pull	28 mm	←	
Pivot Bushing	I-Glide	←	
Reach Adjust	Yes	Yes	
Barrel Adjuster	Ergonomic Indexing	Ergonomic Indexing	
Clamping Diameter	22.3mm	22.3mm	
Weight	155 g	155 g	
Housing	Grilon Composite	←	
Lever	Forged Aluminum	←	

Design

Caution:
SRAM Brake Levers are designed for use with linear-pull brakes. Do not use SRAM Brake Levers with conventional cantilever brakes (those with arms measuring less than 76 mm and utilizing a non-linear straddle cable). Use of SRAM Brake Levers with conventional cantilever brakesets, drum brakes or roller brakes will result in faulty braking performance.



Designed for use with linear-pull brakes.

Do not use conventional cantilever brakes.

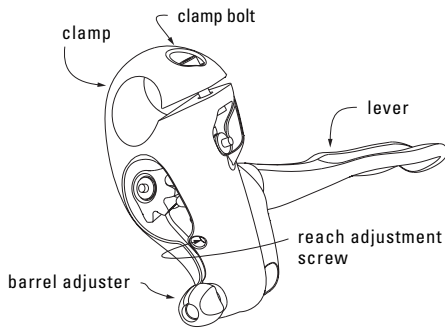
CABLE HOUSING

- Use only new brake cable and cable housing.
- 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.

TWO-AXIS BRAKE LEVER ASSEMBLY / MAINTENANCE



BRAKE LEVER ANATOMY



INSTALLATION

- When sliding the brake lever onto the handlebar, allow enough room for the shifter, the handlebar grip, and the bar end.
- Using a 3 mm hex wrench, tighten the clamp bolt to 3.4 Nm (30 in.lbs.) (**Fig. 1**).
Be careful not to over tighten!
- Line up the barrel adjuster and the brake lever housing cable slots.
- Pull on the lever and push the brake cable head through the opening in the brake lever housing (**Fig. 2**).
- Install the brake cable head into the cable socket in the lever.
- Set up the brakes and brake pads per brake instructions.
- Actuate each brake lever 5 – 10 times.

REACH ADJUSTMENT

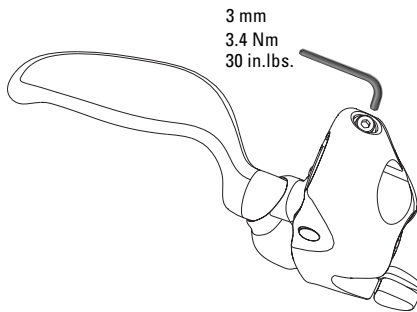
Using a 2 mm hex wrench (**Fig. 3**):

- Turn the reach adjustment screw clockwise to bring the lever closer to the handlebars.
- Turn the screw counterclockwise to move the lever further away.

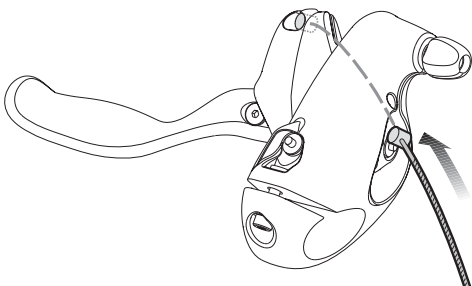
Caution:

After any adjustment to the reach always check the brake cable tension to ensure proper brake system performance. Readjust the cable tension if necessary.

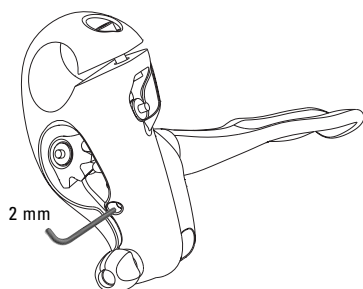
1



2



3



SMARTBAR

TECHNICAL DATA / ASSEMBLY REQUIREMENTS



- New Style
- ErgoFit – allows for height, reach, and rise adjustment
- ErgoFunction – improved control, enhanced ergonomics and safety
- Upgradeable – full suite of integrated accessories



QUILL

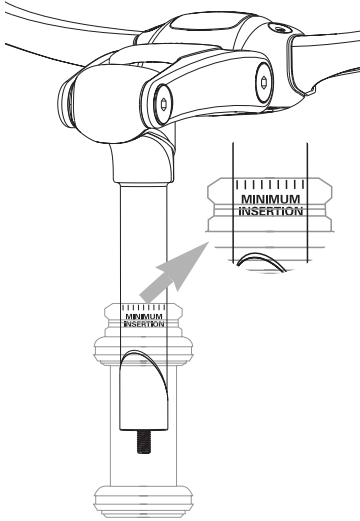
		SmartBar Quill Stem							
Part No.		—	—	—	—	—	—	—	—
Shifter	Stem diameter 1"	●	●	●	●				
	Stem diameter 1 1/8"					●	●	●	●
	Brake Compatibility	2:1 (linear pull) leverage only ← ← ← ← ← ← ← ←							
	Rear, 9spd ESP	●	●			●	●		
	Rear, 8spd ESP			●	●			●	●
	Front, Micro Adjust	●		●		●		●	
	Front, Index		●		●		●		●

CLAMP

		SmartBar Clamp-On Stem							
Part No.		—	—	—	—	—	—	—	—
Shifter	Stem diameter 1"	●	●	●	●				
	Stem diameter 1 1/8"					●	●	●	●
	Brake Compatibility	2:1 (linear pull) leverage only ← ← ← ← ← ← ← ←							
	Rear, 9spd ESP	●	●			●	●		
	Rear, 8spd ESP			●	●			●	●
	Front, Micro Adjust	●		●		●		●	
	Front, Index		●		●		●		●

SMARTBAR ASSEMBLY ERGOFIT STEM (QUILL STEM)

1



Caution:

The SmartBar requires a knowledgeable and trained bicycle mechanic for proper installation and adjustment.

To ensure rider safety, all stem adjustments should be made by a trained mechanic using a calibrated torque wrench to verify required tightening torque.

- Lightly grease the outside of the stem quill tube below the MINIMUM INSERTION mark before assembly.
- Slide the stem into the steerer tube of the front fork making sure that it is inserted past the "MINIMUM INSERTION" mark on the stem quill (**Fig. 1**).
- Align the SmartBar assembly so that the stem centerline is in line with the centerline of the front wheel (**Fig. 2**).

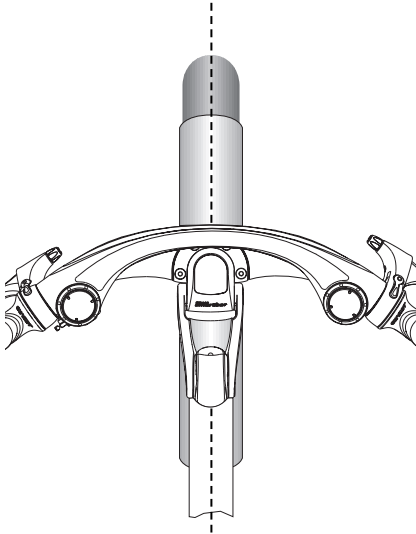
- Rotate the elastomer quill cover upward to allow access to the 6 mm hex wedge bolt (**Fig. 3**).

- Tighten the 6 mm hex wedge bolt to 20 – 30 Nm (177 – 270 in.lbs).

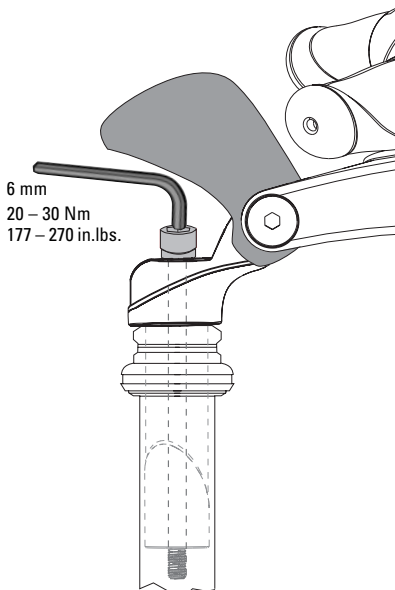
Caution:

- **Always check that the stem cannot slip up/down or rotate in/on the steerer tube when the handlebars are turned.**
- **If the handlebars can be turned so that the stem does not line up with the front wheel, check and re-tighten the hex wedge bolt.**
- **Re-tighten and check again for proper attachment and operation!**

2



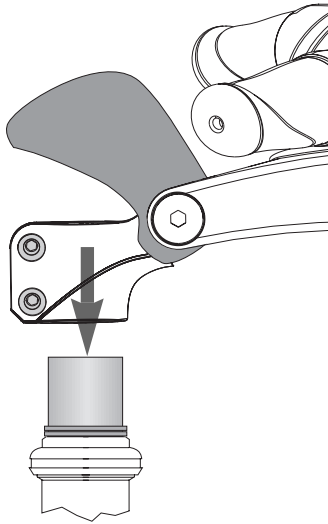
3



SMARTBAR ASSEMBLY ERGOFIT STEM (CLAMP-ON STEM)



4



Caution:
The SmartBar requires a knowledgeable and trained bicycle mechanic for proper installation and adjustment.

To ensure rider safety, all stem adjustments should be made by a trained mechanic using a calibrated torque wrench to verify required tightening torque.

- Make sure that there is at least 37 mm of threadless steerer tube above the headset (and spacers) for clamping the stem.

Advice:
Use several headset spacers between the headset and stem to allow for more height adjustment.

- Slide the stem over the steerer tube of the front fork (Fig. 4).
- Make sure that the top of the stem clamp is no more than 5 mm above the top of the steerer tube (Fig. 6).

- Rotate the elastomer quill cover upward to allow installation of the headset top cap and access to the two 5 mm hex clamp bolts (Fig. 6).

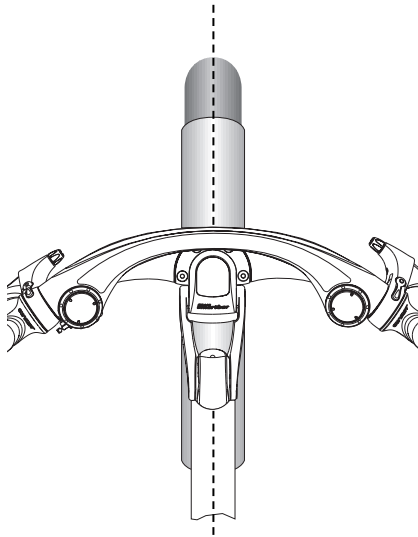
Advice:
Adjust the headset bearings and top cap tension following the headset manufacturers' recommendations.

- Tighten the two 5 mm hex clamp bolts to 15 – 20 Nm (133 – 177 in.lbs) (Fig. 6).

Caution:

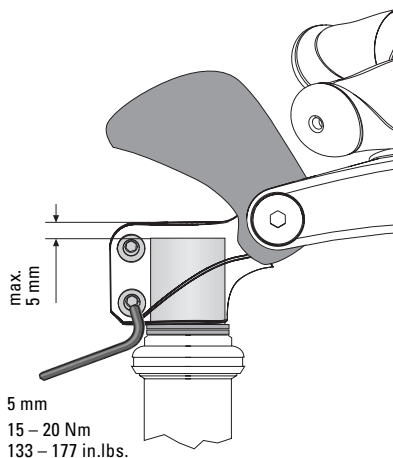
- *Always check that the stem cannot slip up/down or rotate in/on the steerer tube when the handlebars are turned.*
- *If the handlebars can be turned so that the stem does not line up with the front wheel, check and re-tighten the hex clamp bolts.*
- *Re-tighten and check again for proper attachment and operation!*

5



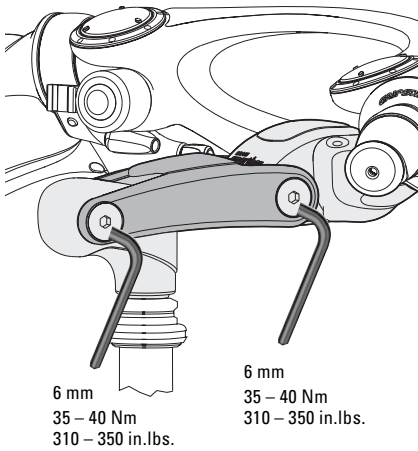
- Align the SmartBar assembly so that the stem centerline is in line with the centerline of the front wheel (Fig. 5).

6



SMARTBAR ADJUSTMENT ERGOFIT STEM (REACH ADJUSTMENT)

7



The ErgoFit stem has two rotating adjustment bolts and a “Flip-Flop” design that allow for a very wide range of adjustments.

FORE-AFT POSITION

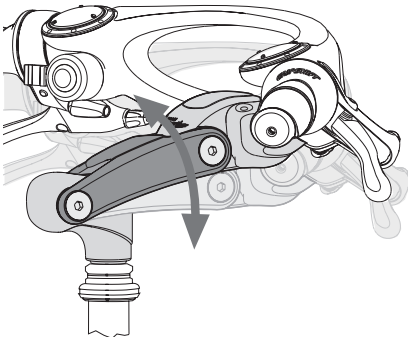
- To fine-tune the fore-aft position of the handgrips adjust the ErgoFit rotation adjustments (**Fig. 7**).
- Loosen the two 6 mm hex adjustment bolts just enough that the links can be rotated freely.
- Rotate the main structure and links forward and down or backward and up until the desired fore-aft position is achieved. Choose any one of the locking positions that are evenly spaced in 15-degree increments (**Fig. 8**).
- Tighten the 6 mm hex **rear** adjustment bolt just enough to hold the desired position.

- Tighten the 6 mm hex **front** adjustment bolt to 35 – 40 Nm (310 – 350 in.lbs) (**Fig. 7**).
- Tighten the 6 mm hex **rear** adjustment bolt to 35 – 40 Nm (310 – 350 in.lbs).

Caution:

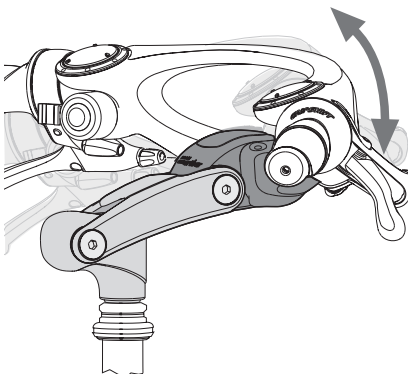
- **Always check that the stem rotation adjustments cannot be rotated up or down after tightening.**
- **If the handlebars can be moved up or down or rotated forward or backward after tightening the adjustment bolts, check and re-tighten both the adjustment bolts making sure that they are in one of the locking positions.**
- **Re-tighten and check again for proper attachment and operation!**

8



- Rotate the main structure and grips so that lower flat section of the main structure is nearly level with the ground and the gear indicators are clearly visible from the riding position. Locking positions are evenly spaced in 15-degree increments (**Fig. 9**).

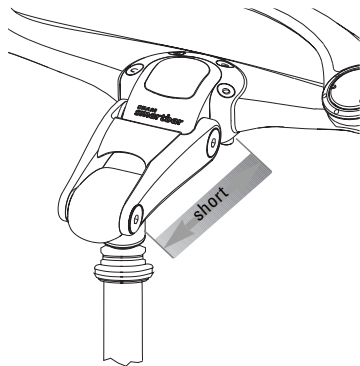
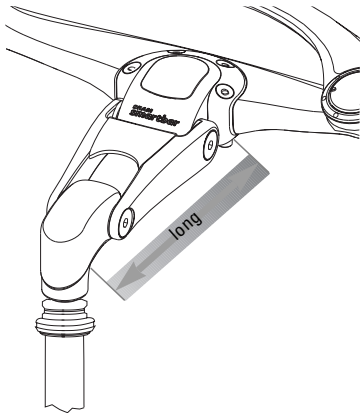
9



SMARTBAR ADJUSTMENT ERGOFIT STEM (REACH ADJUSTMENT)



10



FLIP-FLOP POSITION

- To make a large change to the fore-aft position adjust the "Flip-Flop" position to **long** or **short** adjustment (**Fig. 10**):
- Loosen the 6 mm hex wedge bolt or the two 5 mm hex clamp bolts to allow the stem to rotate freely on the steerer tube (**Fig. 3 / Fig. 6**).
- Loosen the two 6 mm hex adjustment bolts just enough that the links can be rotated freely (**Fig. 11**).
- Loosen the 6 mm hex **rear** adjustment bolt and **remove** the bolt completely.

Advice:

You will have to support the main structure while you make this change.

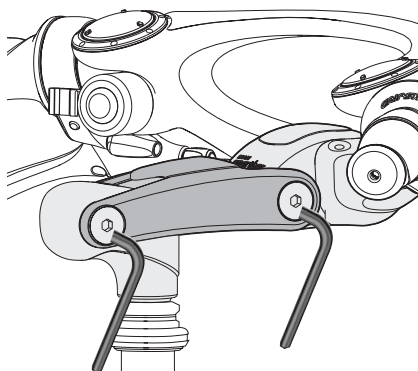
- Change the Flip-Flop stem quill or stem clamp 180 degrees to the desired short or long position.
- Re-insert the 6 mm hex **rear** adjustment bolt and tighten just enough to hold the desired position.
- Follow the prior instructions to fine-tune the fore-aft position.
- Tighten the 6 mm hex **front** adjustment bolt to 35 – 40 Nm (310 – 350 in.lbs).

- Tighten the 6 mm hex **rear** adjustment bolt to 35 – 40 Nm (310 – 350 in.lbs).
- Align the SmartBar assembly so that the stem centerline is in line with the centerline of the front wheel (**Fig. 2 / Fig. 5**).
- Quill stem: Tighten the 6 mm hex wedge bolt to 20 – 30 Nm (177 – 270 in.lbs) (**Fig. 3**).
- Clamp-On stem: Tighten the two 5 mm hex clamp bolts to 15 – 20 Nm (133 – 177 in.lbs) (**Fig. 6**).

Caution:

- **Always check that the stem rotation adjustments cannot be rotated up or down after tightening.**
- **If the handlebars can be moved up or down or rotated forward or backward after tightening the adjustment bolts, check and re-tighten both the adjustment bolts making sure that they are in one of the locking positions.**
- **Re-tighten and check again for proper attachment and operation!**

11

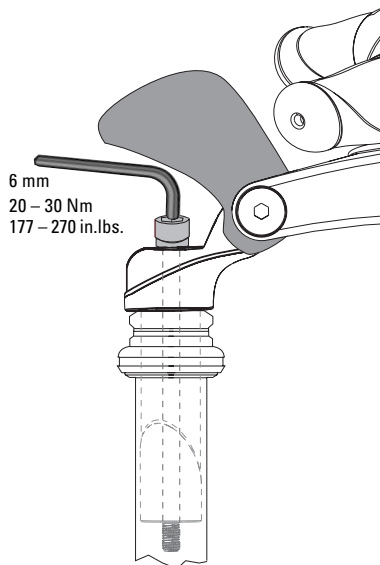


6 mm
35 – 40 Nm
310 – 350 in.lbs.

6 mm
35 – 40 Nm
310 – 350 in.lbs.

SMARTBAR ADJUSTMENT ERGOFIT STEM (HEIGHT ADJUSTMENT)

12



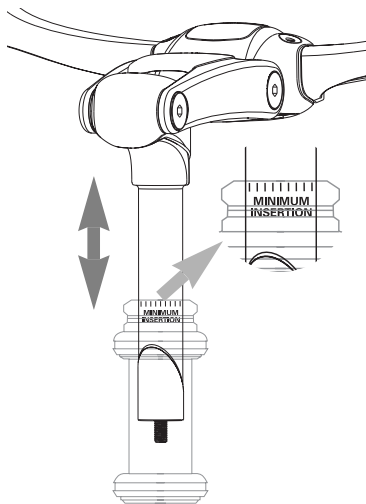
To fine tune the up-down position of the handgrips of a quillstem SmartBar adjust the stem up or down on the steerer tube.

- Loosen the 6 mm hex wedge bolt (**Fig. 12**).
- Move the stem to the desired position up or down making sure that it is inserted past the "MINIMUM INSERTION" mark on the stem quill (**Fig. 13**).
- Align the SmartBar assembly so that the stem centerline is in line with the centerline of the front wheel (**Fig. 14**).
- Tighten the 6 mm hex wedge bolt to 20 – 30 Nm (177 – 270 in.lbs) (**Fig. 12**).

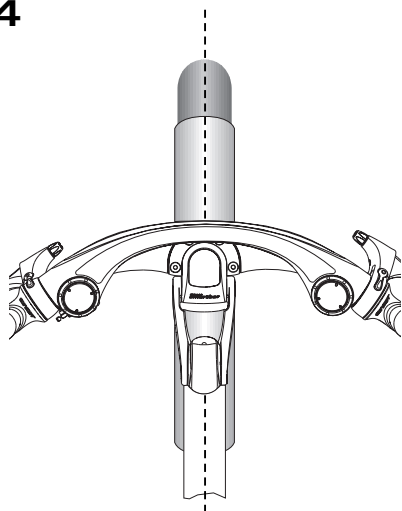
Caution:

- **Always check that the stem cannot slip up/ down or rotate in/on the steerer tube when the handlebars are turned.**
- **If the handlebars can be turned so that the stem does not line up with the front wheel, check and re-tighten the hex wedge bolt or hex clamp bolts.**
- **Re-tighten and check again for proper attachment and operation!**

13



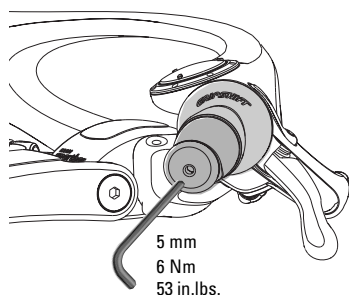
14



SMARTBAR ADJUSTMENT CONTROL POD



15



Verify that the rotational position of the brake levers is desired as assembled.

If no position change is required:

- Insert a 5 mm hex wrench into the hole in the end of the handgrip. Tighten the 5 mm hex bolt to 6 Nm (53 in.lbs) (Fig. 15).

If a different position is desired:

- Insert a 5 mm hex wrench into the hole in the end of the handgrip (Fig. 15). Loosen the bolt five complete turns. This is enough to allow the control pod to be pulled a few millimeters away from the main structure without disassembly of the control pod unit.

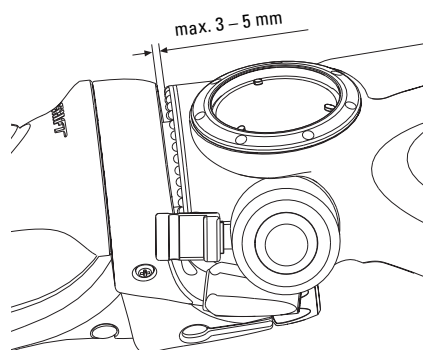
Caution:

- **Do NOT rotate the control pod assembly outside of the allowed adjustment range of 20 – 60 degrees down from horizontal (Fig. 17)!**
- **Rotating the pods beyond their allowed adjustment range will damage the gear indication cables and function.**

- The pods can be adjusted in increments of 10 degrees within the range of 20 – 60 degrees down from horizontal.

- Once desired position is determined tighten the 5 mm hex bolt to 6 Nm (53 in.lbs) (Fig. 15).

16



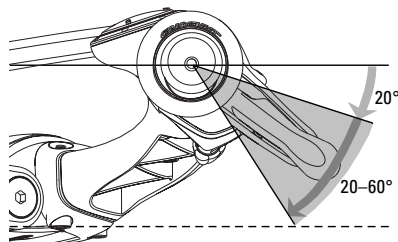
Caution:

Do NOT disassemble the control pod!

The gear indication cables are set at the factory, and improper disassembly will damage the gear indication cables and function.

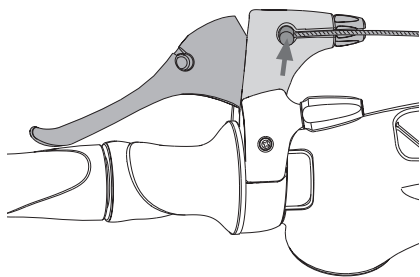
- Pull the control pod slightly away (3 – 5 mm) from the main structure and rotate to the desired position (Fig. 16).

17



SMARTBAR ASSEMBLY BRAKE CABLE / BRAKE COMPATIBILITY

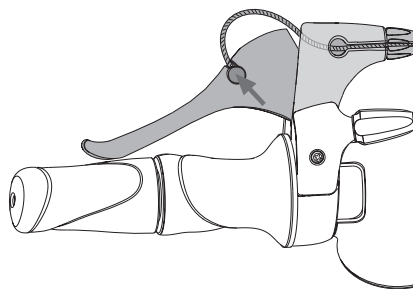
18



- Line up the barrel adjuster with the slot in the underside of the control pod housing.
- Pull on the brake lever and push the cable head through the opening in the brake lever housing (**Fig. 18**). Use only new cable and housing.
- Install the cable head into the cable socket in the brake lever (**Fig. 19**).
- Set up the brakes and brake pads per brake instructions.
- Actuate each brake lever 5 – 10 times and ensure proper operation.

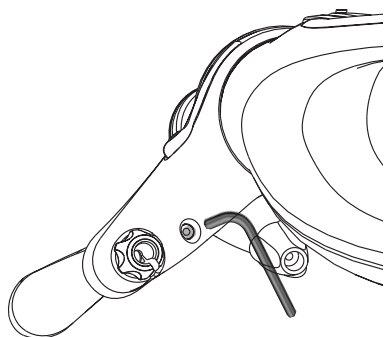
Caution:
All SmartBars are equipped to actuate two brakes with 2:1 (linear pull) leverage only.

19



SMARTBAR BRAKE LEVER REACH ADJUSTMENT

20



- Using a 2 mm hex wrench.
- Turn the reach adjustment screw clockwise to bring the lever closer to the handgrip (**Fig. 20**).
 - Turn the screw counterclockwise to move the lever further away.
 - Actuate each brake lever 5 – 10 times and ensure proper operation.

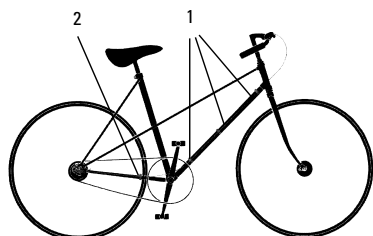
Caution:

- **Do NOT force the screw past its normal stop!**
- **After any adjustment to the reach always check the brake cable tension to ensure proper brake system performance.**
- **Readjust the cable tension if necessary.**

SMARTBAR ASSEMBLY SHIFTER CABLE INSTALLATION



21



24spd and 27spd ESP systems

- Feed the cable through the cable housing and stops.
- Attach the cable to the derailleur. Use only new cable and housing.
- Adjust indexing per derailleur instructions.

7 Speed Spectro Gearhubsystems

- The cable, housing and Clickbox are pre-assembled at the factory.

Advice:
When fitting the cable avoid small radius.

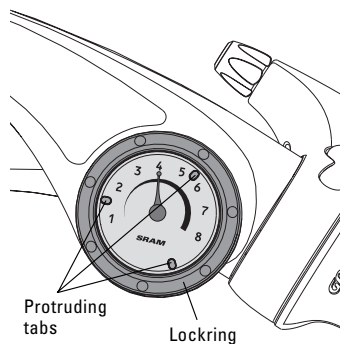
- See figure for cable attachment points (1, **Fig. 21**).
- Last attachment point is on the lower rear wheel fork (2, **Fig. 21**) immediately behind the chain wheel.

Advice:
Cable housing must be movable inside attachment.

- CLICKBOX INSTALLATION AND ADJUSTMENT per Technical Manual / Spectro S7.

SMARTBAR ADJUSTMENT GEAR INDICATION

22



Caution:
Do NOT disassemble the gear indication display!

The gear indicators and cables are set at the factory and improper disassembly will damage the gear indication and its function. In the event of external damage or adjustment problems not solved by the following procedures, please call technical service for detailed repair instructions.

- While holding the lockring stationary turn the clear gear indication dome until the middle gear number is exactly lined up with the gear indicator needle.
- Use the three protruding tabs on the clear gear indication dome to turn the dome and the gear display beneath it while holding the lockring stationary (**Fig. 22**).

- Check all gears are shifting well, shift the derailleur or internal gear hub into the middle gear:

Gear 4 = middle gear for 7spd internal hub

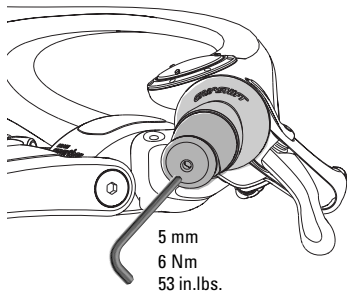
Gear 4 = 4th largest sprocket on 8spd cassette

Gear 5 = 5th largest sprocket on 9spd cassette

Gear 2 = middle chainring for front derailleurs for triple chainrings (left side gear indication).

SMARTBAR GRIP REPLACEMENT

23



STATIONARY GRIP:

Removal

- Rotate the shifter fully in the cable release direction. (Gear "1" on the front shifter, gear "1" on the Spectro 7spd shifter, gear "8" on the 8spd shifter, and gear "9" on the 9spd shifter).

Caution:

Do NOT disassemble the control pod!

- The gear indication cables are set at the factory, and improper disassembly will damage the gear indication cables and function.
- Insert a 5 mm hex wrench into the hole in the end of the handgrip (**Fig. 23**).
- While pressing the twist grip toward the center of the handlebar, unscrew the bolt completely until the stationary grip can be pulled straight off (**Fig. 24**).

Replacement

- Align the flat keyed feature on the new stationary grip assembly with the flat keyed feature on the end of the Smart-Bar and push the grip assembly onto the SmartBar until it makes contact with the spacer tube (**Fig. 24**).
- Tighten the 5 mm hex bolt to 6 Nm (53 in.lbs) (**Fig. 23**).

TWIST GRIP:

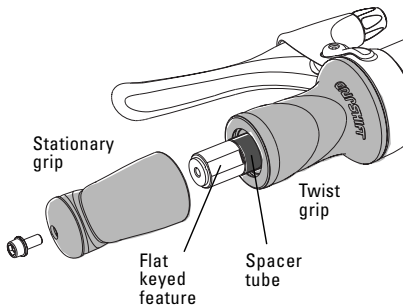
Removal

- Remove stationary grip, see left.
- Pull the spacer tube straight off the SmartBar (**Fig. 24**).
- Next, while pressing the control pod housing toward the center of the handlebar, slowly pull the twist grip straight off, taking care to keep the coil spring from falling out.

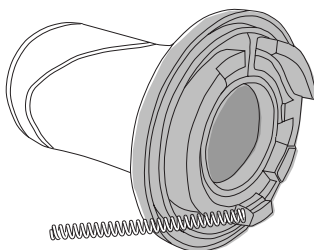
Replacement

- Slide new twist grip over SmartBar.
- Slide the spacer tube back onto the SmartBar and part way through the new grip, making sure that the flange is on the outboard side toward the stationary grip (**Fig. 24**).
- Replace rear end of coil spring onto spring tab of new grip (**Fig. 25**).
- While sliding the grip towards the housing, align the free end of the spring into the spring cavity in the spool (already in the housing).
- Push the spacer tube all the way into the grip assembly.
- Rotate grip forward slightly compressing the coil spring and push the grip towards the housing until there is no gap between the housing and grip.
- Align the flat keyed feature on the stationary grip assembly with the flat keyed feature on the end of the Smart-Bar and push the grip assembly onto the SmartBar until it makes contact with the spacer tube (**Fig. 24**).
- Tighten the 5 mm hex bolt to 6 Nm (53 in.lbs) (**Fig. 23**).

24



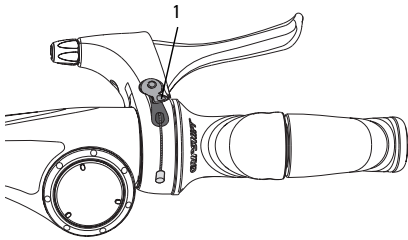
25



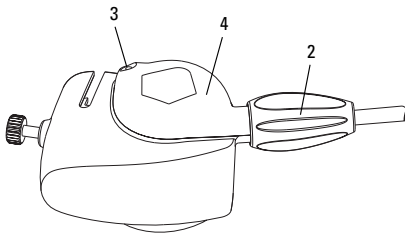
SMARTBAR CABLE CHANGE / CLEANING



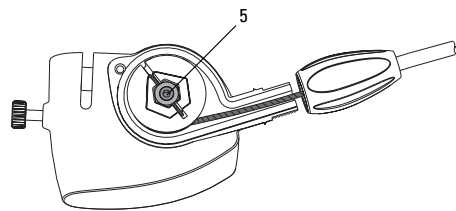
26



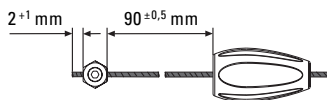
27



28



29



24SPD & 27SPD ESP SYSTEMS

Removal

- Detach the cable from the derailleur.
- Cut cable off 15 cm (6") from shifter barrel adjuster. Discard old cable and housing.
- From the top edge pull open the cable change hatch (1, **Fig. 26**).
- Rotate the shifter fully in the cable release direction. (Gear "1" on the front shifter, gear "8" on the 8spd shifter, and gear "9" on the 9spd shifter.)
- Look for cable head and push cable up / out of the shifter and discard (**Fig. 26**).

Replacement

- Feed the new cable through the cable entry and out the barrel adjuster. Be sure to thread the cable through the small hole in the spool.
- Pull the cable snug to seat the cable head in the shifter.
- Replace the cable change hatch.
- Feed the cable through the new cable housing and frame stops.
- Attach the cable to the derailleur.
- Adjust indexing per derailleur instructions.

7 SPEED SPECTRO GEARHUBSYSTEMS

Removal

- Rotate the shifter fully in the cable release direction. Gear position "1".
- Do not remove the Clickbox from the axle end.
- Unscrew the barrel adjuster (2, **Fig. 27**) completely.
- Unscrew bolt (3, **Fig. 27**), remove cap (4).

- Withdraw shifter cable and clamping bolt (5, **Fig. 28**) upwards, loosen clamp and pull clamping piece from the cable.
- From the top edge pull open the cable change hatch (1, **Fig. 26**)
- Look for cable head and push cable up / out of the shifter and discard.

Replacement

- Feed the new cable through the cable entry and out the barrel adjuster.
- Pull the cable snug to seat cable head in the shifter.
- Replace the cable change hatch.
- Feed the cable through the new cable housing and adjusting barrel.
- Position clamping bolt at a distance of 90 mm, tighten to 1.5 Nm (13 in.lbs.) and cut off cable end to 2 – 3 mm (**Fig. 29**).
- Locate clamping bolt (5, **Fig. 28**) (screw head not visible) and place shifter cable around carrier cylinder (counter-clockwise winding).
- Position cap (4, **Fig. 27**) and tighten with bolt (3), torque 0.35 – 0.45 Nm (3.1 – 4.0 in.lbs.).
- Screw the barrel adjuster (2) completely onto the clickbox.
- CLICKBOX INSTALLATION AND ADJUSTMENT per Technical Manual Gear Hub Systems / Spectro S7.

CLEANING

- Clean all parts with soapy water only.
- It is recommended that you clean the bike in a upright position, this allows the water to drain out correctly.
- After cleaning, if moisture does impair the clarity of the gear indication lens cap it is not recommended to remove the lens, instead leave your bike in a warm dry room, until the moisture disappears from the lens.

POWER CHAINS

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

POWER CHAINS

	PC 99	Hollow Pin ¹	PC 89R	Hollow Pin ¹	PC 69	PC 59	PC 49
Part No.	—	—	—	—	—	—	—
Application	MTB		Road		MTB	MTB	MTB
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
Max. No. of sprockets	9 only		9 only		9 only	9 only	9 only
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"
Length	6.8 mm	6.35 mm	6.8 mm	6.15 mm	6.8 mm	6.8 mm	6.8 mm
Riveting	Cross Step	Cylindrical	Step	Cylindrical	Step	Step	Step
Chrome Hardened	Yes		Yes		Yes	Yes	Yes
Push Power	2000 N / 450 lbs.		1500 N / 340 lbs.		1500 N / 340 lbs.	1500 N / 340 lbs.	1500 N / 340 lbs.
Min. Tensile Strength	9000 N / 2023 lbs.		9000 N / 2023 lbs.		9000 N / 2023 lbs.	9000 N / 2023 lbs.	9000 N / 2023 lbs.
Weight (114 links)	297 g	284 g	290 g	271 g	297 g	297 g	297 g
External Pin Plate	Silver/Nickel Plated		Silver/Nickel Plated		Silver/Nickel Plated	Silver/Nickel Plated	Grey/Polished
Internal Pin Plate	Silver/Nickel Plated		Silver/Nickel Plated		Silver/Nickel Plated	Grey/Polished	Grey/Polished
Weight Reduced		Yes	Yes	Yes			
Connecting Method	Power Link Gold		Power Link Gold or Pin ¹		Power Link Gold or Pin	Power Link Gold or Pin	Power Link Gold or Pin

¹ Caution: Hollow Pin chain connecting method: with Power Link Gold only

POWER CHAINS

	PC 68	PC 58	PC 48	PC38 Saltshaker	PC 38
Part No.	—	—	—	—	—
Application	MTB	MTB	MTB	MTB	MTB
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
Max. No. of sprockets	max. 8	max. 8	max. 8	max. 8	max. 8
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"
Length	7.1 mm	7.1 mm	7.1 mm	6.9 mm	6.9 mm
Riveting	Cross Step	Step	Step	Step	Step
Chrome Hardened	Yes	Yes	Yes		
Push Power	2000 N / 450 lbs.	1500 N / 340 lbs.	1500 N / 340 lbs.	1100 N / 350 lbs.	1100 N / 350 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	300 g	300 g
External Pin Plate	Silver/Nickel Plated	Silver/Nickel Plated	Grey/Polished	Grey/Dacromet	Grey/Polished
Internal Pin Plate	Silver/Nickel Plated	Grey/Polished	Grey/Polished	Grey/Dacromet	Brown/Annealed
Connecting Method	Power Link Silver	Power Link Silver or Pin	Power Link Silver or Pin	Power Link Grey or Pin	Power Link Grey or Pin

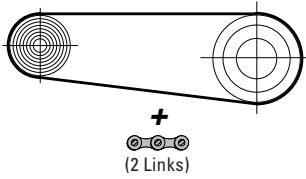
POWER CHAINS

	PC 10 Saltshaker	PC 10	PC7X	PC1 Saltshaker	PC1 Ni	PC1
Part No.	—	—	—	—	—	—
Application	MTB	MTB	BMX / Track	Gear Hubs	Gear Hubs	
Compatibility Front	HG	HG	Single	Single	Single	Single
Compatibility Rear	HG	HG	Single	Single	Single	Single
Max. No. of sprockets	max. 7	max. 7	1	1	1	1
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"	1/2" x 1/8"
Length	6.9 mm	6.9 mm	8.1 mm	7.8 mm	7.8 mm	7.8 mm
Riveting	Step	Step	Step	Step	Step	Step
Push Power	1000 N / 225 lbs.	1000 N / 225 lbs.	1500 N / 340 lbs.	800 N / 180 lbs.	800 N / 180 lbs.	
Min. Tensile Strength	9000 N / 2023 lbs.	9000 N / 2023 lbs.	11000 N / 2500 lbs.	9000 N / 2023 lbs.	9000 N / 2023 lbs.	
Weight (114 links)	300 g	300 g	345 g	330 g	330 g	330 g
External Pin Plate	Grey / Dacromet	Brown/Annealed	Gold / Gold Plated	Grey / Dacromet	Silver /	Brown /
Internal Pin Plate	Grey / Dacromet	Brown/Annealed	Grey / Polished	Grey / Dacromet	Nickel Plated	Annealed
Connecting Method	Power Link Grey or Pin	Power Link Grey or Pin	3 pcs. Connecting Link	Snap Lock or Pin	Snap Lock, 3pcs Link or Pin	

POWER CHAINS ASSEMBLY / MAINTENANCE



1



**1/2" x 3/32" AND 1/2" x 11/128"
(DERAILLEURS / SINGLE
AND MULTI-SPEED HUBS)**

**PC 1 1/2" x 1/8"
(SINGLE AND MULTI-
SPEED HUBS)**

Chain length:

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

SRAM derailleurs:

- Place chain over largest front chain-wheel 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.

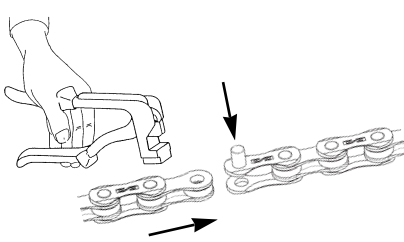
Closing chain with Snap Lock:

- 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.**

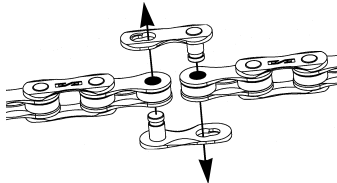
2



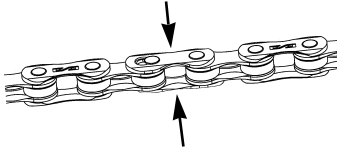
Closing standard version with clamping pin:

- 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.**
- The use of the SRAM assembly plier (Part No. 00 2799 980 001) is recommended for PC 68, PC 58 and PC 48.

3



4



Power Link connecting links:

Caution:

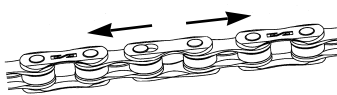
- **Use only as specified, to avoid material damage or the rider to fall off his bicycle resulting in injury.**
- **Use only Power Link Gold for closing Holow Pin chain versions (no pin).**

**PC 7 X 1/2" x 1/8"
(BMX / TRACK)**

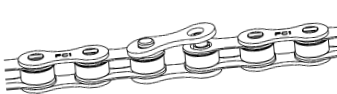
Closing chain:

- 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.

5



6

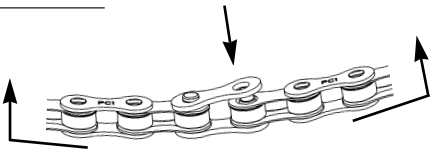


Power Link Grey	grey coloured for PC 38, PC 10
Power Link Silver	silver coloured for PC 68, PC 58, PC 48
Power Link Gold	gold coloured for PC 99, PC 89R, PC 69, PC 59, PC 49

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)

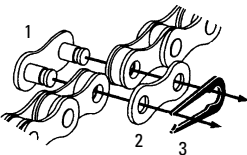
7



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.

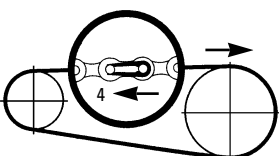
8



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.

9



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.

NOTICES

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www.merrysales.com

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www.olympicsupplycompany.com

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Fx: +27 21 761 5914

SUPPORT WHO TO CALL / SRAM WARRANTY / 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.

WARRANTY

1. SRAM settles warranty claims according to the legal EU regulations effective as of 01.01.2002, alternatively according to the legal regulations of the respective country.
2. Any other warranty claims not included in this statement are void. This especially includes any disassembly or assembly costs (for instance by the dealer), which shall not be covered by SRAM.
3. Warranty claims are only valid upon presentation of a proper proof of purchase.
4. Parts subject to normal wear and tear (for example brake sleeves, brake pads, chains, sprockets, shifter cables, handlebar grips etc.) and damage which is caused by improper use, specifically caused by disregard for our assembly and operating instructions, shall not be covered by this warranty. Furthermore, this warranty shall not cover damages caused by the use of parts of different manufacturers or otherwise which are not compatible or suitable resp. not authorized by SRAM for use with SRAM components.
5. If a defect is discovered, please contact the dealer where the bicycle or the SRAM component in question was purchased.

SPARE PARTS

You can find an extensive spare parts program in SRAM's Spare Parts List Model Year 2003 · Publ. Number 8503.

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

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