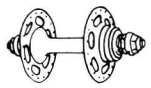


INTRODUCTION

HOW TO USE THIS SECTION

When working with a particular hub, follow the procedures under GENERAL NOTES below, then turn to the section devoted to that type of hub. Read the information in the section introduction, then proceed to the trouble chart and disassembly/assembly instructions for that hub.

When disassembling an unfamiliar hub without the aid of drawings, it is a good idea to thread the parts on a wire in the *order* and *orientation* that they were removed. Proceed carefully and note similarities and differences with hubs treated here.

Parts Interchangeability Charts

Charts are provided indicating interchangeability of individual parts between hubs or different models and from different manufactures. Parts names used are taken from manufacturer's literature and vary from brand to brand.

Assembly and Disassembly Instructions

Detailed instructions for overhauling most models of coaster brake and internally geared hubs are provided. Note that the assembly and disassembly instructions refer to the same drawings. Disassembly steps are numbered *down* the *left-hand* columns, assembly steps are numbered *up* the *right-hand* columns. Wherever possible, drawings show parts in the order they are to be removed and replaced. The same parts names are used in the associated parts chart.

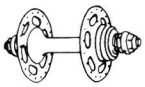
GENERAL NOTES

Chainline

Before removing a single-sprocket rear wheel check the chainline. A straight-edge held against the chainwheel should be parallel with the chain. If it is not, note amount and direction of misalignment so that it can be corrected later. *This test only works if chainwheel is true.* Out-of-true chainwheel will cause excessive wear just as a misaligned chain will.

Axle Nuts and Washers

When working on a wheel be sure to note the position of all axle spacers and nuts. If necessary, thread them on a wire to keep them in order and properly oriented.



HUBS

INTRODUCTION (cont.)

Bearing Adjustment

Proper tools are essential. *Never grip axle thread in steel vise jaws.* Use an axle vise or brass or wood inserts to avoid damaging threads. Where possible, grip axle by flats or locknuts. Use cone wrenches on cone and locknut flats; use hook wrenches on the round notched locknuts found on Sachs (F & S) hubs and Sturmey-Archer coaster brakes.

To adjust bearings, hold axle firmly and tighten cone finger tight. Back off 1/4 turn, hold it with cone wrench, and lock it in place with locknut. Check bearing operation and side play. Axle should turn smoothly between thumb and forefinger; installed wheel should show a trace of side play at the rim. Tighten or loosen 1/8 turn if necessary. Some unthreaded cones have two locknuts. Adjust cone position with the first locknut and lock in place with the second.

Sprockets, Spacers, Snap Ring and Dust Cap

Most sprockets are held on the driver by 3 lugs and a snap ring. To remove a lugged sprocket, pry snap ring loose with a thin-bladed screw driver. Place one finger over axle to prevent snap ring from flying off.

Older sprockets are right-threaded and held in place by a left-threaded lockring. To remove threaded sprocket, unscrew lockring *clockwise*, then unscrew sprocket *counter-clockwise* with sprocket tool. On freewheeling hubs without a coaster brake it is necessary to remove the driver to unscrew a threaded sprocket.

Note carefully the orientation of a dished sprocket (dished *in* or dished *out*) and the position of all spacers. Improper chainline can be corrected by rearranging spacers and/or reversing dished sprocket. Misaligned chain will cause excessive wear. For sprocket data see parts charts under the hub type and the Sprocket Interchangeability chart on 1-3.

Cleaning Parts

Never use gasoline. It is simply too explosive. An enclosed parts cleaning tank is essential for safe and efficient work. Find a supplier under *degreasing equipment* in the Yellow Pages of the phone book. Always clean the outside of the hub shell: it is the only part of the job that anyone will see.

INTRODUCTION (cont.)

INTERCHANGEABLE 3-LUGGED SPROCKETS, SNAP RINGS AND SPACERS

Sprockets	Sachs (dished 1/8")	Sturmey-Archer (dished 1/16")	Shimano (dished 1/8")	NK 3-speed (dished 1/16")	Sun Tour (dished 1/16")	Karat (specify flat or dished 1/8")
12T	see note[4]					170-12[3]
13T	see note[4]	**HSL 713**[3]	321 0380			170-13[3]
14T	see note[4]	**HSL 714**[3]	321 0300			170-14[3]
15T	see note[4]	**HSL 715**[3]	321 0310[2]			170-15
16T	1004 035 000[1]	HSL 716	321 0320	291	40111601	170-16
17T	1004 047 000[1]	HSL 717	321 0330			170-17
18T	1004 031 000[1]	HSL 718	322 0340	293	40111801	170-18
19T	1004 032 000[1]	HSL 719	322 0350	294	40111901	170-19
20T	1004 033 000[1]	HSL 720	322 0360	295	40112001	170-20
21T	1004 034 000[1]	**HSL 747**	321 0370			
22T	1004 046 000[1]	HSL 722	333 4900			
Spacer	0518 018 000, J116	HMW 127		30	40112901	
Snap Ring	0512 011 000, DR 616E	HSL 721	321 2100	31	40112911	108

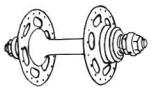
[1] Available flat under a different part number
[2] Also available flat as 321 0311
[3] Flat only
[4] Parts listed are all interchangeable although smaller dished sprockets may not fit with dish toward hub. Bendix, NK coaster brake and New Departure sprockets look similar but do not interchange with the above.

Torque settings

Hub locknut should be tightened to 175-220 inch pounds. Wheel mounting axle nuts should be tightened to 240-300 inch pounds.

Hub Shifters

Triggers, cables, bell cranks and indicator chains are not generally interchangeable between brands. Within each brand parts are interchangeable individually except as noted below. In addition, Sachs and Bendix 3-speed hubs and 3-speed coaster brakes (pages 5-1, 5-3) are copies of each other with all parts interchangeable; the same is true of the numerous Sturmey-Archer copies.



HUBS

INTRODUCTION
HUB SHIFTERS (cont.)

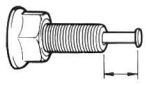
SHIMANO (all models, with or without coaster brake)

Except for Positron shifter parts, which must be used together or not at all, all Shimano triggers and bell cranks are individually interchangeable. Any hub, including Positron hubs, can be used with any shifter assembly.

Push Rods

With the appearance of different length axles, different length push rods have also been introduced. When inserted loosely, the proper length push rod protrudes 10–12 mm ($^{13}/_{32}$"–$^{15}/_{32}$").

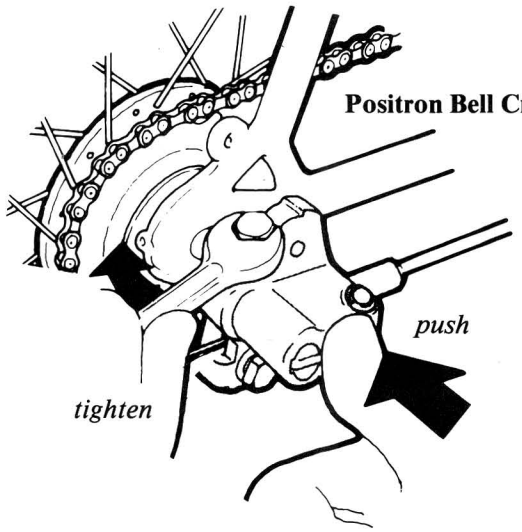
Push Rod Length



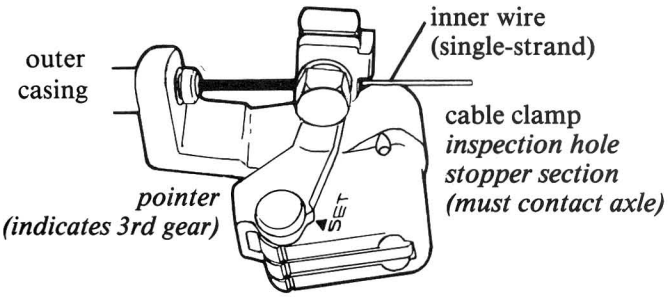
11 mm ($^{7}/_{16}$")

Bell Cranks

Positron bell crank. Positron bell cranks must be used with Positron cable and triggers, but the combination can be used on any Shimano hub. The indexing ("click") action is provided by the bell crank mechanism, rather than in the trigger as in all other systems. The trigger slides smoothly from *1* to *3* and the single-strand Positron cable pulls or pushes the bell crank paddle as required.



Positron Bell Crank (bottom view)



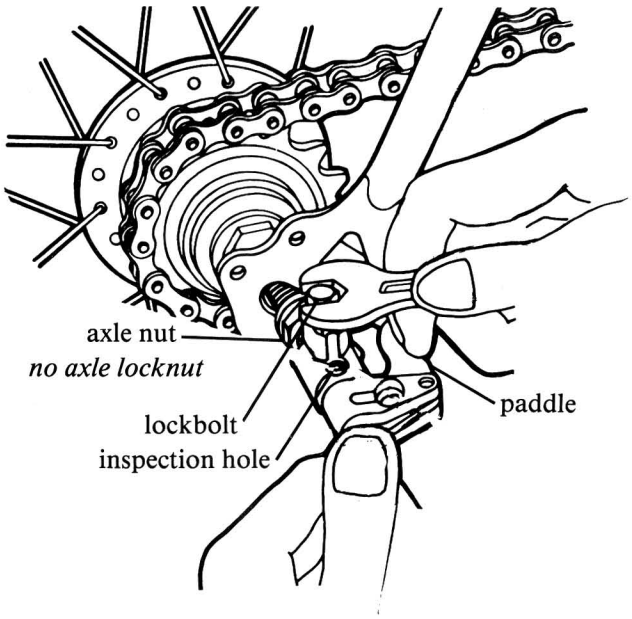
Cable Detail

To install the Positron bell crank, first make sure the lockbolt is backed out, then insert the proper length push rod and slip the bell crank over the end of the axle (coaster brake hubs take the bell crank on the left side). Rotate the bell crank to line up with the cable, push inward until bell crank stopper section contacts the end of the axle (as visible through inspection hole) and tighten lockbolt firmly. Be aware of damage to axle threads. Recheck for contact. Click bell crank into 3rd gear position (marked SET), then connect and adjust cable.

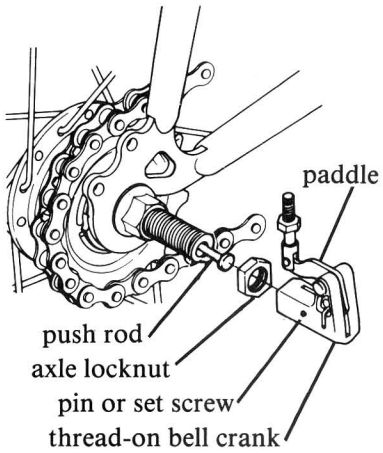
INTRODUCTION
HUB SHIFTERS
SHIMANO (cont.)

Lockbolt (non-threaded) bell crank. Lockbolt bell cranks cannot be used with Positron cable or triggers, but do work with Positron hubs. They install like Positron bell cranks (above) but use the cable and trigger indexing of the threaded bell cranks (below). Note that no axle locknut is used. Be sure to check inspection hole for contact between axle and stopper section.

Lockbolt Bell Crank
push on hard and tighten



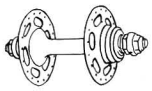
Threaded Bell Crank



Threaded bell crank. Threaded bell cranks cannot be used with Positron cable or triggers, but do work on Positron hubs. Thread on by hand until pins or set screws bottom on the end of axle (make sure locknut is clear of bell crank). Back off 1/8 to 5/8 of a turn to proper position for cable alignment. Tighten locknut counterclockwise against bell crank. Attach cable.

Triggers and Cable

All Shimano shifter parts except Positron are individually interchangeable, although single-ended cables require the universal cable clamp at the bell crank end. Positron shifter parts are not interchangeable individually with any others, but the Positron trigger-cable-bell-crank assembly can be used with any hub. Note that the special solid, push-pull cable has a minimum turning radius of 3″ (7.5 cm) and the 4″ (10 cm) nearest the trigger must be straight.



HUBS

INTRODUCTION

HUB SHIFTERS (cont.)

STURMEY-ARCHER

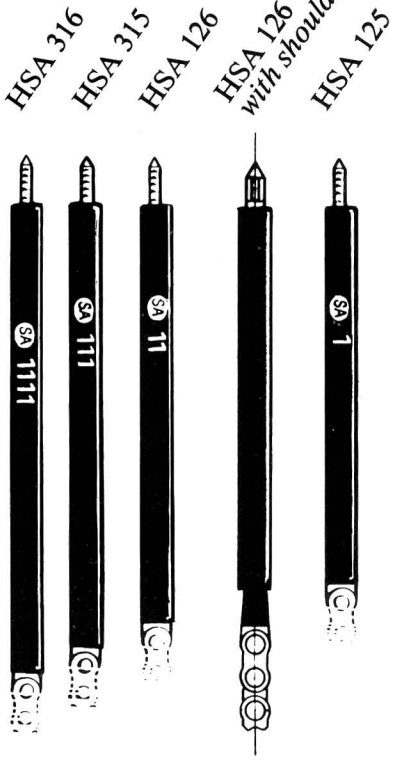
Sturmey-Archer and a number of other manufacturers make shifter parts for Sturmey-Archer-type hubs. These parts are generally all interchangeable.

Indicators and Push Rods

Hub Type \ Axle Length	mm	inches	mm	inches	mm	inches
	146	5 3/4	152	6	158.8	6 1/4
	148	5 13/16	154	6 1/16	160	6 5/16
	149.2	5 7/8	155.6	6 1/8	161.9	6 3/8
3-Speed	HSA	125			HSA	126
S3C			HSA	126	HSA	315
TCW	HSA	125			HSA	126
S5/2						
Right side	HSA	125	HSA	126	HSA	315
Left side	HSA	126	HSA	126	HSA	316
S5.1						
Right side	HSA	125	HSA	125	HSA	126
Left side	HSA	126	HSA	126	HSA	316
S5 (early)						
Right side	HSA	125	HSA	126	HSA	126
Left side*	HSA	266	HSA	266	HSA	267
S5 (late)						
Right side	HSA	125	HSA	126	HSA	126
Left side†	HSA	287	HSA	287	HSA	288
4-Speed	HSA	136‡			HSA	137‡

*Threaded push rod under stamped bell crank.
†Push rod with head like a nail under machined bell crank.
‡Takes gear indicator coupling HSA 149.

Indicators



Actual Size
for direct comparison

Indicator chains (all models). Indicator chains come with four different length indicator rods (see charts). Older units may not bear the length markings now in use. Use the proper length indicator whenever possible. If the correct length is not installed, the hub must be adjusted by centering the "dead spot" instead of aligning the ends of the rod and axle (see page 4-3 or 5-3). An undersized indicator rod will always work, though it may be difficult to thread in. An oversized indicator rod may prevent low gear from engaging properly. This occurs if the rod protrudes so far past the end of the axle that the indicator chain pulls it at an angle. The shoulder present on some HSA 126 indicator rods marks the length of the shorter HSA 125 and can be used for adjustment when that substitution is attempted.

Push Rods and Bell Cranks (S5 only). Four different push rods and three bell cranks were made for the left-side control of the S5 five-speed hub, but replace by indicator chains in the S5.1 and S5/2. See page 4-23 for parts interchangeability and conversion information. Push rods are listed with indicators in the chart above.