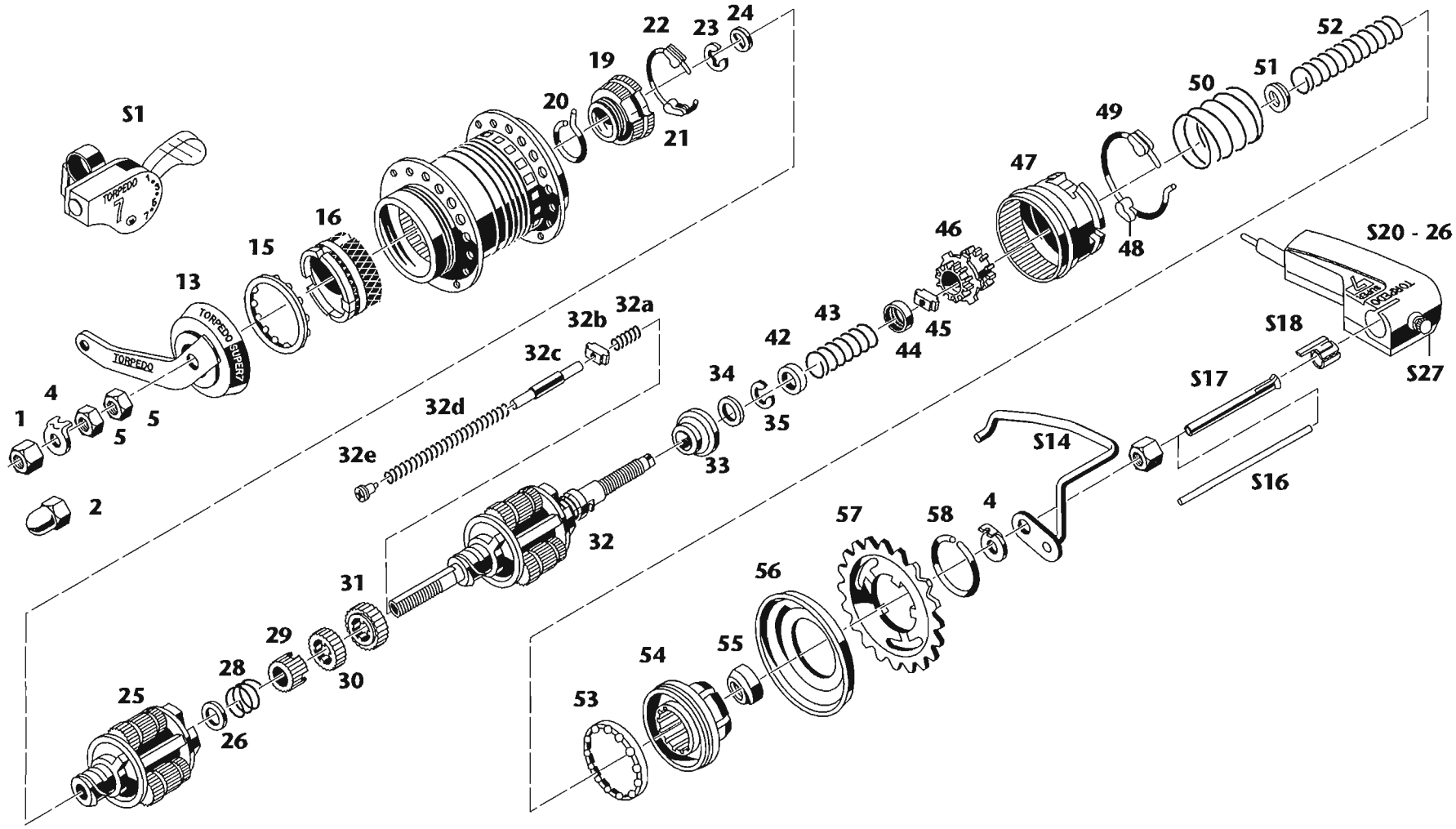


SUPER 7 SACHS

SACHS TORPEDO SUPER 7-SPEED COASTER BRAKE/CLICK BOX HUB

How It Works

Operation of the right side of the hub is similar to that of Sachs three-speeds:

In the lower gears, the sliding clutch connects the driver with the gear ring, but pulls the gear ring to the right so its pawls are disengaged from their ratchet inside the hub shell. Drive is through the planetary gear system to the pawls on the brake cone assembly at the left side of the hub.

In 4th (middle gear), the sliding clutch still connects the driver to the gear ring, but the gear ring is released to the left so it drives its pawls directly, while the brake cone pawls freewheel backward slowly.

In the higher gears, the sliding clutch connects the driver to the planet carrier, and drive is through the planetary gear system to the gear ring; the brake cone pawls freewheel backward.

Drive to the coaster brake is through the gear train: there is no special set of rear-facing pawls as with the Sturmey-Archer S3C hub. Brake effectiveness therefore is the same in the three highest gears (1/1 drive to planet carrier), better in 4th and 3rd (1.236/1) and better yet in 2nd (1.479/1) and 1st (1.685/1). Brake drive is, however, positive, as the gear ring is spring-loaded in both directions: the clutch engages the gear ring and planet cage at the same time during the only shift with a possible "neutral" position, between 4th and 5th. If the planetary gear train fails, brake drive will, however, be lost in 1st through 4th gears.

Alignment

This hub has an overlocknut spacing of 130 mm, a rear chainline of 48 mm and a minimum front chainline of 44mm (when the sprocket dishing faces toward the wheel). **Many retrofits of this hub will require realignment of the rear triangle and a longer bottom-bracket axle.** Spoking flange diameter is 75 mm. The hub is available only with 36 spoke holes, according to Sachs literature.

The wide gear range of this hub requires a lower chain drive ratio than other multi-speed hubs. A 24-tooth sprocket is provided. For example, this will provide a gear range of 31 to 87 inches (2.45 to 6.96 meters development) when used with a 46 tooth chainwheel and 27-inch rear wheel. Other, smaller Sachs, Sturmey, Shimano etc. sprockets will fit and are useful when installing this hub in a small wheel. Generally, the direct drive, middle gear should be about 51 inches (4.10 meters).

The provided 24-tooth sprocket is usable with 3/32" derailleur-type chain or with 1/8" chain, though it is stamped around the mounting hole to make it take up the same space on the driver as a thicker sprocket made only for 1/8" chain.

Shift Levers and Cables

Improper adjustment is the most common cause of problems with 3-, 4-, 5- and 7-speed hubs. Many people have quit riding bikes because their hub slipped out of gear when they were standing up on the pedals. Always check trigger and cable operation before deciding to overhaul a hub.

For the 7-speed's push-pull cable to work properly, all fittings must be tight enough not to creep along the frame and the cable must be free of kinks and knots.

Three types of shift levers are listed in the literature: a single-lever thumbshifter, with mounting hardware for the front or rear of the handlebar, and a twist shifter. A push-pull shifter cable is used, like the old Shimano Positron cables (Refer to Sutherland's Handbook of Coaster Brakes and Internally Geared Hubs).

Cable lengths in the parts list are about 55 through 67 inches in increments of 50mm. The cable and its housing cannot be shortened or otherwise altered, hence the multiple assemblies with different stock numbers. **Measure the old cable before ordering a new one.**

The cable's motion is translated into motion of two concentric pushrods by a cam assembly in the clickbox which attaches to the right end of the hub axle.

The shift lever is sold as a separate item. Clickbox and cable are a single item, though they could be disassembled, allowing clickbox or cable to be replaced independently (see instructions below). The clickbox, with its plastic shell, is somewhat vulnerable even when equipped with the protective steel guard provided.

Testing Shifter Operation

Check shift lever/cable/clickbox assembly for straightness of cable, cracks to housings and other obvious problems.

The inner pushrod (16) selects which sun gear is in use, and the outer pushrod (17) selects the direction in which power passes through the gear train. Pushrod (and clickbox paddle) positions are (o = out, m = middle, i = in):

Gear	1	2	3	4	5	6	7
outer	o	o	o	m	i	i	i
inner	o	m	i	i	i	m	o

To inspect the clickbox for correct operation: with the clickbox disconnected from the hub, shift to 4th gear and then to 1st. Now push both paddles inside the axle hole of the clickbox as far away from you as possible. They should move smoothly and easily. Now shift from first through third gear; the central paddle should move toward you in two distinct steps. As you continue to fourth and fifth gear, the outer paddle should move toward you in two distinct steps.

Now shift to 7th gear and push the central paddle down. It should not be possible to push the outer paddle down. As you shift down from 7th to 6th and 5th, the central paddle should move toward you in two distinct steps. Note: you may test the clickbox and the shifter parts of the hub at the same time by installing the axle, guide sleeve and pushrods into the clickbox after installing both axle keys and the clutch but before installing the gear ring.

WHEEL REMOVAL AND DISASSEMBLY OF SHIFTER AND SPROCKET PARTS:

Loosen the knurled bolt on the clickbox (S27), and pull the clickbox off the end of the axle. Remove guide sleeve (S18) (snap fit). Remove inner and outer pushrods (S16, S17). Remove these parts before removing the wheel to avoid possible damage.

Remove wheel as usual after loosening axle nuts and removing brake arm clip bolt.

Remove axle nuts, tab washers and clickbox guard if hub will be rebuilt.

Note the direction of sprocket dish. Remove snap ring, sprocket and large dust cap from driver if necessary to replace.

REINSTALLATION OF SPROCKET, WHEEL AND CLICKBOX

To avoid possible damage, do not install pushrods, clickbox guide or clickbox before installing wheel into forkends.

Check for correct direction of sprocket dish, then replace large dustcap, sprocket and snap ring.

Place wheel in forkends: for a new installation, place one tab washer on outside of each forkend, with tabs in closed end of forkend slot, unless forkend thickness is over 5.5 mm (7/32"); then place one tab washer inside and one outside left forkend. Install but do not yet tighten the brake arm clip on the left chainstay. Install clickbox guard on the right end of the axle, and then install the axle nuts. Adjust drive chain slack, making sure that brake arm does not bind. Tighten the brake arm clip bolt.

Oil pushrods (S16, S17) lightly and install them into axle, then install guide sleeve (S18) with protruding nose at inner end and internal tab in slot of outer pushrod. Rotate guide sleeve until the nose is at the top.

Place shift lever in 1st gear position. Push clickbox onto the axle, with nose of guide sleeve engaging in groove of clickbox housing. Tighten knurled knob. No cable adjustment is necessary.

REPAIR OF SHIFT LEVER/CABLE/CLICKBOX

Shift levers may be replaced and interchanged by removing the Phillips-head screw which holds the lever body together. The cable has a barrel head and may be slipped in and out of its mounting slot.

The clickbox end of the cable has a plastic rack gear molded onto it; adjustment of cable length is therefore not possible. However, it is possible with care to replace a cable or clickbox without replacing the other. After removing the several small screws which hold the clickbox together, the cable and rack gear may be lifted out. When reassembling, take care that the cams and cam followers are correctly installed. **You must time the clickbox gears with the shift lever in 4th gear position,** the upper cam follower is on middle land of its cam, and the lower one is pushing to max.

No boldface where circled

Troubleshooting Chart – Sachs 5 & 7 Speed Hubs

SYMPTOMS	Resulting from wear, improper lubrication or abuse	Resulting from improper assembly or installation
Slips in 1st — 3rd gear	Brake cone pawls (19) faulty	Brake cone pawls (19) improperly installed
	Clutch (46) teeth broken	
Slips in 4th gear	Improper lubrication — gummed or dirty	
Slips in 5th — 7th gear	Gear ring spring (49) damaged	Gear ring spring (49) missing
Jumps from 4th to 3rd	Gear ring pawls (48) faulty	Gear ring pawls (48) improperly installed
Jumps from higher gear to 4th	Wear or damage to clickbox	Clickbox improperly installed
4th instead of higher gears	12-turn ~~small~~ spring (52) damaged	12-turn ~~small~~ spring (52) missing
Jumps from lower gear to 4th	Wear or damage to clickbox	Clickbox improperly installed
Jumps from 4th to higher gear	7-turn spring (43) weak or damaged	
Pedals driven forward while coasting	Chain too tight	
	Bearings too tight or loose	
Stiff running, noisy	No/wrong lubrication	Planet gears (25) mistimed
	Ball cage damaged/broken	Ball cage reversed
	Dustcap damaged	Dustcap reversed
	Brake lever (13) forcing cone out of line	Axle E-clip (24) missing
Jammed	Loose or broken parts inside hub	Friction spring (20) reversed
	Axle C-clip (35) broken	Axle C-clip (35) missing
Sluggish shifting	Axle bent	
	Clickbox damaged	Clickbox guide (S18) absent
	Pushrods bent or dirty	
Shift lever will not move above 4th gear	Plastic washer (33) on wrong side of C-clip (35)	
Too much play in axle	Bearings loose or damaged	
No brake	Friction spring (20) weak or worn	Friction spring (20) missing
Weak brake	Wrong lubricant	
	Brake parts glazed or worn	

Parts numbers in parentheses refer to parts chart and exploded drawing.

SUTHERLAND'S

Troubleshooting Chart – Sachs 5 & 7 Speed Hubs

SYMPTOMS	Resulting from wear, improper lubrication or abuse	Resulting from improper assembly or installation
Brake too strong or jerky	Brake lever (13) loose at chainstay Brake cylinder (16) unlubricated Axle (32) loose in dropouts	
Brake does not release	Unlubricated thrust surface between axle (32) and planet carrier (25) Planet carrier (25) and brake cone (19) threads worn or chipped	Thrust washer (26) missing
No brake in 1st — 4th gears No drive except 4th gear	Left axle key (32B) broken or stripped	Left axle key (32B) missing or misaligned
1st instead of 2nd and 3rd 7th instead of 6th and 5th	Damaged or worn clickbox Short (center) left axle key spring (32a) damaged	Inner pushrod (17) absent Short left axle key spring (32a) (toward middle of axle) missing
3rd instead of 1st and 2nd 5th instead of 6th and 7th	Left axle key long return spring (32d) jammed Axle key guide rod (32c) bent	Left axle key long return spring (32d) missing
Slips in 2nd and 6th gear No brake in 2nd gear	Middle sun gear (30) stripped Spring (28) weak, damaged	Middle sun gear (30) reversed Spring (28) missing
2nd instead of 3rd, 6th instead of 5th	Small sun gear (29) reversed	

for consistency Small B

capital B

17

But note they're all capital letters in the exploded drawing

Parts numbers in parentheses refer to parts chart and exploded drawing.

SACHS 5 & 7-SPEED HUBS - PARTS LIST

Hub	H 7213 7-Spd. Coaster, clickbox	H 5213 5-Spd. Coaster, clickbox	H 5113 5-Spd. Coaster, pull chains	H 5100 5-Spd. No Brake	H 5120 5 Spd. Drum brake
Sachs parts list number	188.6/2	180.6	177.6/4	178.6	179.6/2
Sachs parts list dated	Nov. 10, '93	Nov. 2, '93	Apr. 18, '91	Apr. 4, '91	May 10, '90

Part		Part no.	compat.	Part no.	compat.	Part no.	compat.	Part no.	compat.	Part no.	compat.
1	Hex nut (10.5 mm) or	0516 003 000	14567	0516 003 000							
2	Acorn nut (10.5 mm): optional, left end of axle	0516 107 000		0516 107 000							
3	Chain guide nut (10.5 mm)					0516 300 001	4567* I	0516 300 000		0516 300 000	
4	Serrated washer with tab	0517 107 000	14567*	0517 107 000	14567*	0517 107 000	14567*	0517 107 000	14567*	0517 107 000	14567*
5	Hex locknut	0516 111 000	14567*	0516 111 000	14567*	0516 111 000	14567*	0516 111 000	14567*	0516 111 000	14567*
6	Lockwasher							0517 005 001	7		
7	Washer (10.6 x 20 x 3.3 mm)									0518 113 000	8
8	Adjusting washer									0517 103 000	8
9	Cable holder with adjusting barrel and hex locknut									0599 100 084	
10	Drum brake assembly									0577 002 200	8
11	Washer (14.4 x 21 x 2.5 mm)									0518 112 000	8
12	Adjusting cone							0574 302 001	I	0508 302 000	
13	Lever-cone assy. with dustcap	0574 301 101	C	0574 301 100		0574 301 100					
14	Dustcap	. . . . .	C	0534 300 000		0534 300 000			I	0121 112 000	8
15	Ball retainer, lever-cone side	0576 104 200	1234567*	0576 104 200	1234567*	0576 104 200	1234567*	0576 104 200	1-7* I	2376 003 000	8
16	Steel brake cylinder	0573 300 100		0573 300 100		0573 300 100					
17	Locking							2512 007 000	7	2512 007 000	7
18	Pawl carrier							0504 301 000		0504 301 000	
19	Brake cone assy.	0574 106 100	345	0574 106 100	345	0574 106 100	345				
20	Friction spring	0513 102 000	345	0513 102 000	345	0513 102 000	345				
21	Pawls	0536 104 100	1234567*	0536 104 100	1234567*	0536 104 100	1234567*	0536 104 100	1234567*	0536 104 100	1234567*
22	Pawl spring (32.5 x 0.8mm)	0512 102 100	234567	0512 102 100	234567	0512 102 100	234567	0512 102 100	234567	0512 102 100	234567
23	E-clip	0517 002 100	4567*	0517 002 100	4567*	0517 002 100	4567*	0517 002 100	4567*	0517 002 100	4567*
24	D-hole washer (thrust)	0518 103 000	4567	0518 103 000	4567	0518 103 000	4567	0518 103 000	4567	0518 103 000	4567
25	Planet carrier assy.	0372 105 000	I	0572 305 200	I	0572 305 100	I	0572 304 100		0572 304 100	
26	Washer (10.65 x 15 x 1 mm)	0518 106 000	1456	0518 106 000	1456	0518 106 000	1456	0518 106 000	1456	0518 106 000	1456
27	Spring cap, flanged, (15mm OD) (Same as to 51)			See Set A,line59		0521 301 000	S	0521 301 000	S	0521 301 000	S
28	Compression spring	See Set A,line59	I	See Set A,line59		See set below		See set below.		See set below	
29	Sun gear no. 1, 21T, 4 ext dogs	0333 105 000									
30	Sun gear no. 2, 30T, 4 int. dogs	0333 102 100									
31	Sun gear no. 3, 33T, 4 int. dogs	0333 103 100									
32	Axle assy w/left axle key parts,	0371 107 100		0571 300 000							
	32a Short compression spring										
	32b Axle key(same as 45)	0327 101 000									
	32c Axle key guide rod										
	32d Long compression spring										
	32e Phillips head screw										
33	Plastic washer	0334 101 000									
34	Washer (18 x 12.5 x 0.6 mm)	0318 101 000		0318 101 000							
35	C-clip H1210.(55 x 14.35 x 1 mm)	0512 301 000		0512 301 000		0512 301 000		0512 301 000		0512 301 000	

OK, 36A, 36B— yet if you want it that way!

Part		Part no.	compat.	Part no.	compat.	Part no.	compat.	Part no.	compat.	Part no.	compat.
36	Sun gear set			0591 302 001		0591 302 001		0591 302 001		0591 302 001	
36A	Sun gear, 6 end dogs			0533 305 000		0533 305 000		0533 305 000		0533 305 000	
36B	Sun gear, 30T, 6 int. dogs			0533 307 000		0533 307 000		0533 307 000		0533 307 000	
39	Axle 159 mm				I	0509 300 001	I	0509 300 000			
40	Axle 168 mm					0509 301 000					
41	Axle 171 mm									0509 303 000	
42	Spring cap	See Set A,			I	0521 308 000	S	0521 308 000	S	0521 308 000	S
43	Compression spring	See Set A		See Set A	I	See set below		See set below		See set below	
44	Spring cap	See Set A		See Set A, line59	I	0521 300 000	S	0521 300 000	S	0521 300 000	S
45	Axle key (same as 32b)	0327 101 000	I	0527 301 100	I	0527 100 200	456*	0527 100 200	456*	0527 100 200	456*
46	Splined clutch	0572 301 000		0572 301 100		0572 301 000		0572 301 000		0572 301 000	
47	Gear ring assy. with	0381 100 000	I	0581 300 000		0581 300 000		0581 300 000		0581 300 000	
48	Pawls	0536 109 100	47	0536 109 100	47	0536 109 100	47	0536 109 000	47	0536 109 100	47
49	Ring spring	0512 303 000		0512 303 000		0512 303 000		0512 303 000		0512 303 000	
50	Large compression spring	See Set A	I	See Set A, line59		See set below		See set below		See set below	
51	Spring cap, flanged (15mm OD), 27	0521 301 000	A	0521 301 000	A	0521 301 000	S	0521 301 000	S	0521 301 000	S
52	Compression spring	See Set A		See Set A, line59	I	See set below		See set below		See set below	
53	Ball cage- driver side	0376 102 000	I	0576 300 000		0576 300 000		0576 300 000		0576 300 000	
54	Driver assy.	0372 104 000	I	0572 302 000		0572 302 000		0572 302 000		0572 302 000	
55	Fixed cone (7-spd: serrated)	0308 024 000	+>	0508 300 000		0508 300 000		0508 300 000		0508 300 000	
56	Sprocket dustcap	0321 101 000	I	0521 303 000		0521 303 000		0521 303 000		0521 303 000	
57	Sprockets X	1004		1004		1004		1004		1004	
58	Circlip X	0512 011 000		0512 011 000		0512 011 000		0512 011 000		0512 011 000	
59	Spring set (no axle springs) including items 27, 28, 43, 44, 50, 51, 52			0591 304 000 (Set A)							
59	Set compression springs					0591 301 001		0591 301 001		0591 301 001	
60	Spring cap set - flanged (15 mm OD); flanged (21 mm OD); two-step (21 mm OD)					0591 302 000		0591 302 000		0591 302 000	
61	Spring set (no axle springs) including items 28, 42, 43, 44, 50, 51, 52	0391 004 000 (Set A)									
62	Planet gear timing aid	— 0324 103 000 blue	I	— 0524 300 000 red	—	0524 300 000 red	—	0524 300 000 red	—	0524 300 000 red	
63	Special grease type A, 35g	— 0369 135 100		— 0369 135 100	—	0369 135 100					
64	Special grease type A, 2 x 250g	— 0369 135 101		— 0369 135 101	—	0369 135 101					

INTERCHANGES WITH:

1. Duomatic 102 and 101 (if brake part, 102 only)
2. Automatic R 2110
3. Automatic A 2110
4. 3 spd. coaster H 3111
5. 3 spd. coaster 515
6. 3 spd. 415
7. 3 spd. H 3102, and 3 sp. drum brake H 3120 except brake assembly and left side bearing parts
8. These brake assembly and left side bearing parts interchange with 3 spd. drum brake H 3120

+> Interchangeable in one direction.

A. Also see parts set A below

C. Cosmetic difference only.

X. See Sprocket Interchangeability page 1-3 Sutherland's Handbook of Coaster Brakes and Internal Geared Hubs

S. Also see parts set below

Z. New style plastic adjuster/cable clamp works with new style pull rod.

***** Appears fully interchangeable despite part number difference. Has been checked against H3111, but not other 2-and 3-speeds

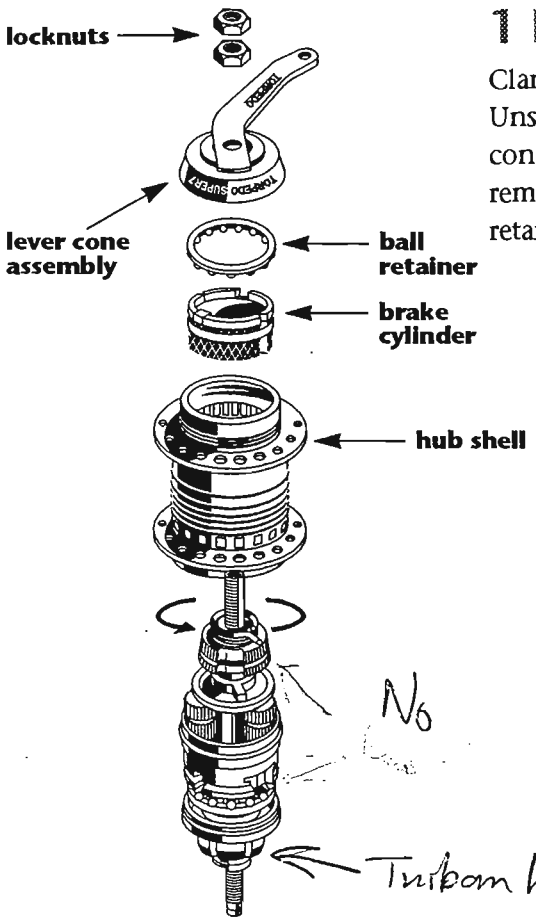
I Vertical lines between numbers indicates parts are not interchangeable.

+ Included in axle set #32 from Sachs.

SHIFTER PARTS – SACHS 5 & 7-SPEED HUBS

Hub	H 7213 7-Spd. Coaster, clickbox		H 5213 5-Spd. Coaster, clickbox		H 5113 5-Spd. Coaster, pull chains		H 5100 5-Spd. No Brake		H 5120 5 Spd. Drum brake	
Sachs parts list number	188.6/2		180.6		177.6/4		178.6		179.6/2	
Sachs parts list dated	Nov. 10, '93		Nov. 2, '93		Apr. 18, '91		Apr. 4, '91		May 10, '90	
Part	**Part no.**	**compat.**	**Part no.**	**compat.**	**Part no.**	**compat.**	**Part no.**	**compat.**	**Part no.**	**compat.**
S1 Trigger, front of handlebar	0386 008 000	I	0586 318 000							
L 5501 black					00 0586 307 030		00 0586 307 030		00 0586 307 030	
L 5501 white/gray					00 0586 307 001		00 0586 307 001		00 0586 307 001	
L 5501 black/pink					00 0586 308 100		00 0586 308 100		00 0586 308 100	
S2 Trigger, rear of handlebar	0386 004 000	I	0586 311 000							
S3 Twist-grip shift control		—	0586 321 000							
S4 Stem shifter, 1-lever										
with bolt					0586 301 000		0586 301 000		0586 301 000	
L 5502 black					00 0586 301 300		00 0586 301 300		00 0586 301 300	
L 5502 white/gray					00 0586 304 100		00 0586 304 100		00 0586 304 100	
S5 Stem shifter, 2-lever, L 5502 black					88 1186 740 089		88 1186 740 089		88 1186 740 089	
S6 Left ATB trigger, MA 82 2-position					82 1186 837 021		82 1186 837 021		82 1186 837 021	
S7 Right ATB trigger, MA 82 3-position					82 1186 836 021		82 1186 836 021		82 1186 836 021	
S8 Adjuster/cable clamp (2x)					0570 117 000	4567 Z	0570 117 000	4567 Z	0570 117 000	4567 Z
S9 Pull chain/rod (long)					0187 102 000	Z	0187 102 000	Z	0187 102 000	Z
S10 Bolt, M6 x 16	1615 001 004	12345	1615 001 004	12345	1615 001 004	12345				
S11 Clamp	0326	12345	0326	12345	0326	12345				
S12 Hex nut M6	0242 129 002	12345	0242 129 002	12345	0316 057 002	12345				
S13 Pull chain/rod (short)					0587 102 000	4567 Z	0587 102 000	4567 Z	0587 102 000	4567 Z
S14 Clickbox guard	0520 302 000		0520 302 000							
S15 Set B: shift parts	0391 004 001	I	0591 304 001							
S16 Inner pushrod	See Set B	I	See Set B							
S17 Outer pushrod	See Set B	I	See Set B							
S18 Clickbox guide	0334 103 000									
S19 Clickbox with 1300 mm cable			0586 319 007							
S20 Clickbox with 1400 mm cable	0386 009 000	I	0586 319 003							
S21 Clickbox with 1450 mm cable	0386 009 001	I	0586 319 004							
S22 Clickbox with 1500 mm cable	0386 009 002	I	0586 319 000							
S23 Clickbox with 1550 mm cable	0386 009 003	I	0586 319 006							
S24 Clickbox with 1600 mm cable	0386 009 004	I	0586 319 001							
S25 Clickbox with 1650 mm cable	0386 009 005	I	0586 319 005							
S26 Clickbox with 1700 mm cable	0386 009 006	I	0586 319 002							
S27 Knurled bolt for clickbox	0515 307 000		0515 307 000							

DISASSEMBLY AND ASSEMBLY INSTRUCTIONS FOR SACHS TORPEDO SUPER 7 HUB

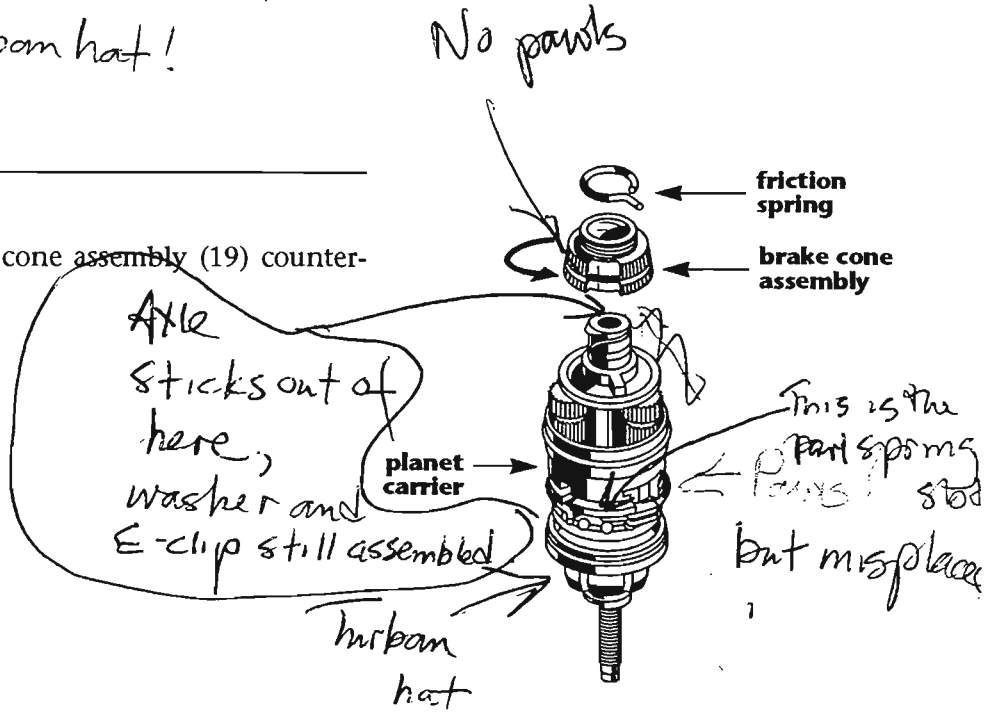


1 DISASSEMBLY

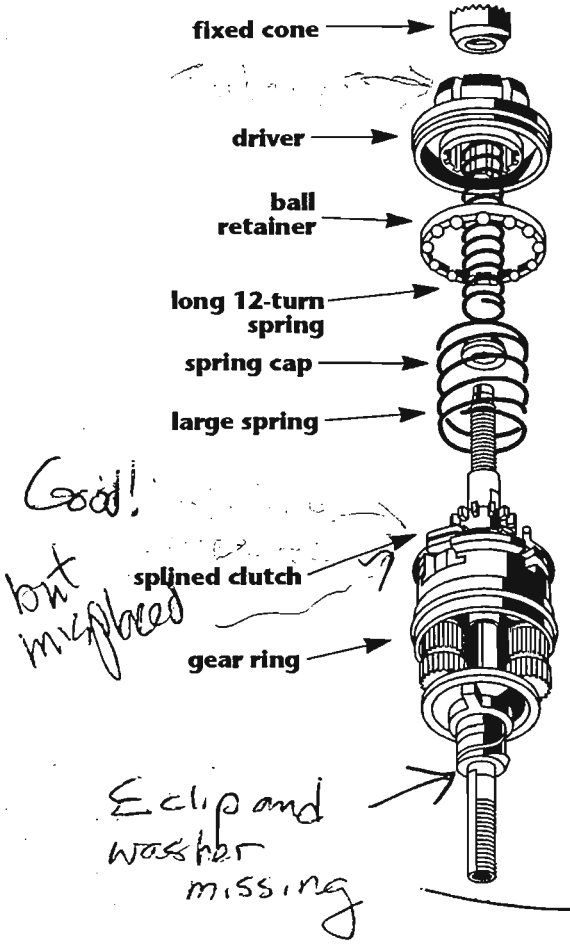
Clamp axle in axle vise, Phillips screw head end facing up. Unscrew the two locknuts (5) from each other using a 17 mm cone wrench and a 17 mm open end or box-end wrench; remove the locknuts. Remove lever cone assembly (13), ball retainer (15) and brake cylinder (16).

2 DISASSEMBLY

Lift off hub shell. Rotate brake cone assembly (19) counter-clockwise and remove.



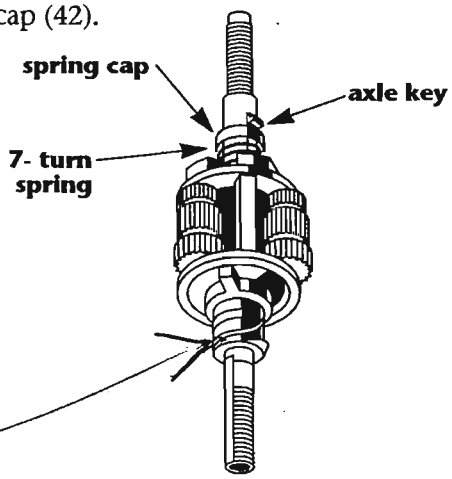
SACHS TORPEDO SUPER 7 (CONT'D)

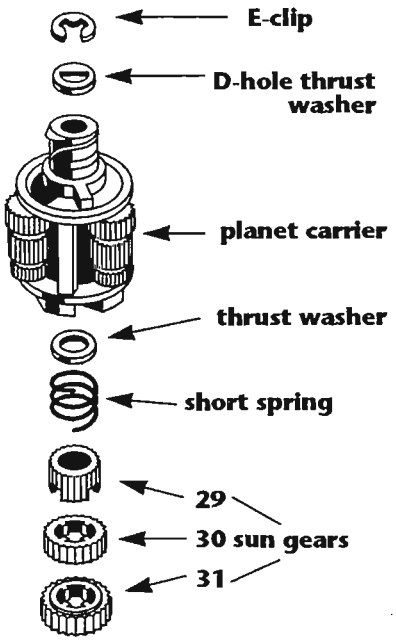


3 DISASSEMBLY

Invert assembly in axle vise — end of axle with Phillips head screw down, grooved end up. Using a 17mm open-end wrench, unscrew the fixed cone (55). Remove the driver (54), long 12-turn spring (52) with spring cap (careful – spring cap can stick in splined clutch)(51), large spring (50), ball retainer (53), gear ring (47) and splined clutch (46).

Compress 7-turn spring with spring cap (43) and remove axle key (45). Remove outer spring cap (44), 7-turn spring (43) and inner spring cap (42).





4 DISASSEMBLY

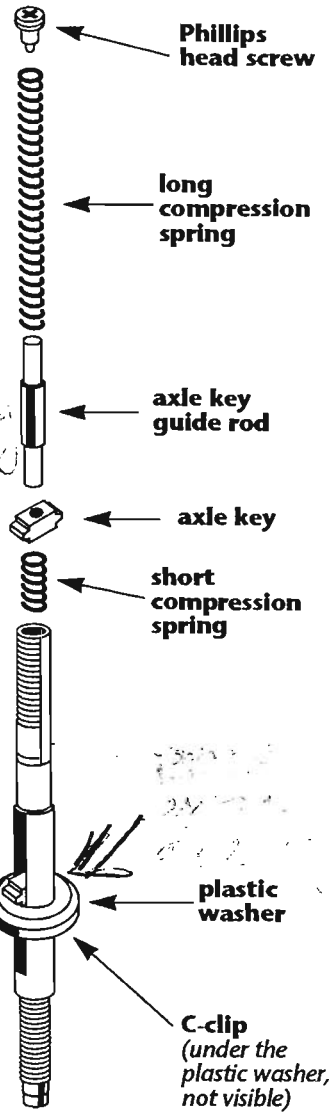
Invert assembly in axle vise — Remove axle E-clip (23) and D-hole thrust washer (24). Lift off planet carrier (25). Remove the round-hole thrust washer (26) from inside the planet carrier or from the axle. Sometimes grease causes washer to stick to planet carrier. The planet carrier is a unit. Do not attempt to remove the planet pinions. Remove short compression spring (28) and the small diameter, medium diameter and large diameter sun gears (29, 30, 31).

SACHS TORPEDO SUPER 7 (CONT'D)

SUBDISASSEMBLIES

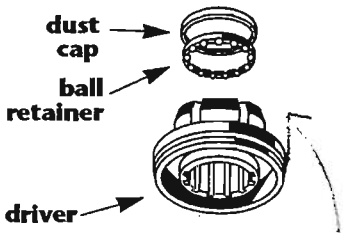
Axle

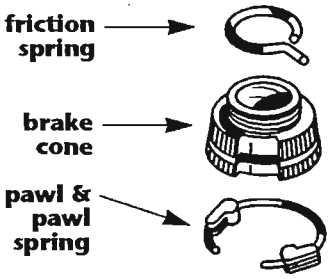
To prevent the spring behind Phillips head screw (32e) from flying out, grasp the screw with one hand as you turn it with the other, then release the spring carefully. Carefully remove the Phillips head screw (32e). Remove long compression spring (32d), axle key guide rod (32c), axle key (32b), and short compression spring (32a). Remove formed plastic washer (33) and steel washer (34). Only if necessary for replacement, remove C-clip (35).



Driver

Remove dustcap with a thin-bladed screwdriver. Work slowly around dustcap to avoid deforming it. Lift out ball retainer. **Note:** parts list shows driver as an **assembly** with the internal ball cage and dustcap. The same ball cage is found also in the 5-speed hubs, different from that used in Sachs 3-speed hubs. A mechanic could replace the bearing balls or the cage (Star 0103 251).



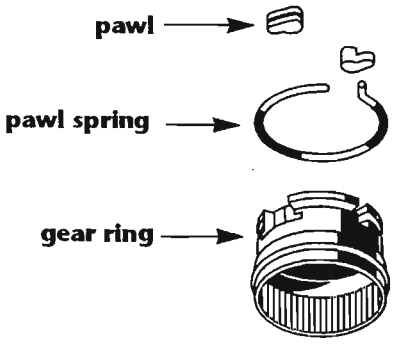


Brake Cone

To remove pawls (21), pull outward until end of pawl spring (22) clears groove, then ease pawl spring off the end of brake cone. Remove friction spring (20) from brake cone only if it is to be replaced.

Gear Ring

To remove pawls (48), pry straight end of pawl spring (49) out of groove and ease over end of gear ring (47).



SACHS TORPEDO SUPER 7 (CONT'D)

Cleaning

Clean all parts, including outside of hub shell, in a suitable solvent. Be very careful not to introduce dirt or grit after cleaning. Clean the planet cage with a brush or air, not by immersion.

Points to check

1. Pawls (21, 48) and ratchets for rounding and chipping.
2. Gear ring (47), planet gears of planet carrier (25) and sun gears (29, 30, 31) for worn and chipped gear teeth.
3. Planet carrier (25), gear ring (47), clutch (46), inside of driver (54) sun gears (29, 30, 31), brake cylinder (16) and lever cone (13) for worn or rounded splines or dogs.
4. Bearing surfaces of lever cone (13), hub shell, driver (54), fixed cone (55), ball retainers (15, 53), and inside driver (54) for wear or pitting.
5. Brake cylinder (16) and braking surface inside hub shell for wear and glazing.
6. Brake cone (19) for worn serrations.
7. Friction spring (20), compression springs (28, 43, 52), two internal axle springs (32a, d) and pawl springs (22, 49) for size and tension (manufacturer recommends replacing pawl springs at overhaul).
8. Axle (32), axle key guide rod (32C) and pushrods (S16, S17) for straightness.
9. Dust caps of lever cone and driver (13, 54), sprocket dustcap (56), spring caps (42, 44, 51), circlips (23, 35, 58) and ball retainers (15, 53), and inside driver (54) for straightness.
10. All threaded parts for worn or damaged threads.
11. Axle keys (32b, 45) and axle slots (32) for rounding or chipping.

Lubrication

To lubricate the planet gear bearings, stand the planet carrier on its wide end and apply 2 to 3 drops of oil at the bearing pins where visible under retaining ring, turning the gears to aid the oil in penetrating.

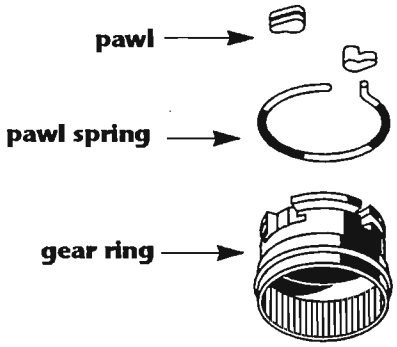
Lubricate ball cages by filling the spaces between balls with grease. Be careful not to grease pawls or clutch. Lubricate hub shell, brake shoe and friction spring liberally with a high-temperature grease for steel brake shoes. Oil, never grease, brake cone and gear ring with a good cycle oil. (WD-40 is too light for lasting lubrication, 3-in-1 oil gums up with age)

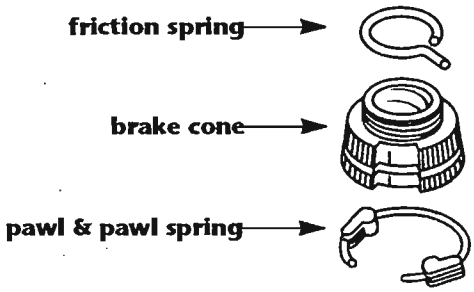
SACHS TORPEDO SUPER 7 (CONT'D)

SUBASSEMBLIES

Gear Ring

Install pawls (48) under hooked, circular pawl spring (49). Pawls must point clockwise when viewed from small end of gear ring. Hooked end of pawl spring should lie in the slot that intersects pawl spring groove.





Brake Cone

Install friction spring with hooked end clockwise from gap. Incorrect installation will cause excess drag, wear and possible brake failure.

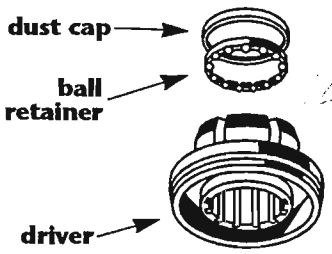
Install pawls (21) under circular pawl spring without hooked end (22). Pawls must point counterclockwise when viewed from friction spring end of brake cone. Ends of pawl spring should lie adjacent to tabs that block pawl spring groove.

Driver

If starting with a replacement driver assembly, skip to the next section: the steps in this section have already been done for you.

Ball retainer is not available as a separate part from Sachs. If necessary, replace driver assembly. The ball cage is a Star 0103 251, or you might replace the bearing balls in the old cage. Install ball retainer flat side up. Start dustcap straight, flat side up*, and tap home with a soft hammer.

* opposite Sturmey alignment



SACHS TORPEDO SUPER 7 (CONT'D)

SUBASSEMBLIES (cont'd)

Axle

If starting with replacement axle kit, skip to the next section; the steps in this section have already been done for you.

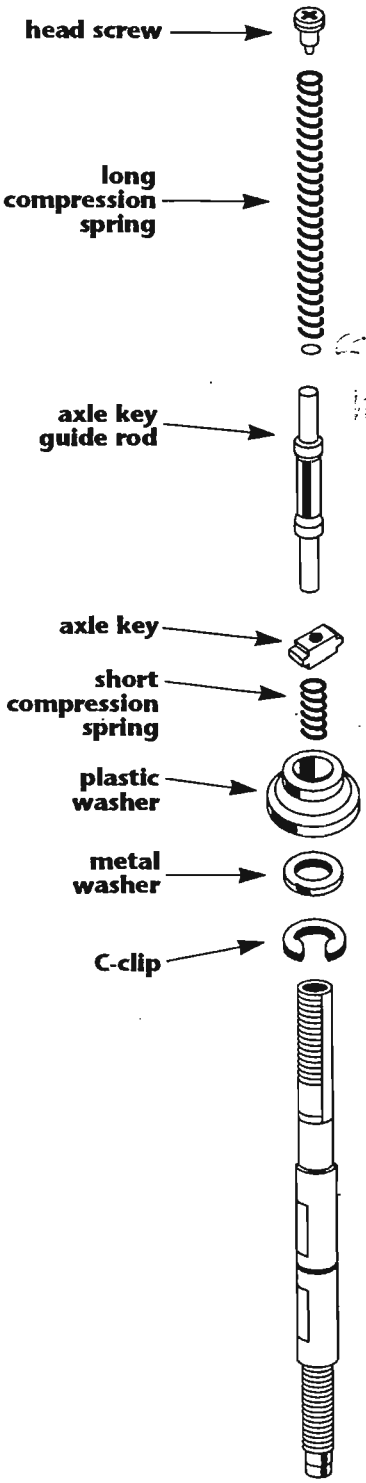
If rebuilding old axle put the axle in an axle vise, replace C-clip (35); then from the internally threaded end of axle, replace: larger round-hole metal washer (34) and then formed plastic washer (33), large side down.

Replace thin, short compression spring (32a) in long-slot (internally threaded) end of axle. With a small screwdriver blade or a spoke, compress spring inside slot toward center of axle. Install axle key (32b) (the two axle keys are identical) with its hole aligned with the axle, and then release the spring against the axle key.

Drop axle key guide rod (32c) into axle. Its end should pass through hole in the axle key and be visible inside spring.

Place long, thin compression spring (32d) over a spoke to guide it into axle hole. Make sure that the spring slips over the end of axle key guide rod. Hold end of the spring with fingernails and insert Phillips-head grub screw (32e). Tighten screw firmly into the end of the axle.

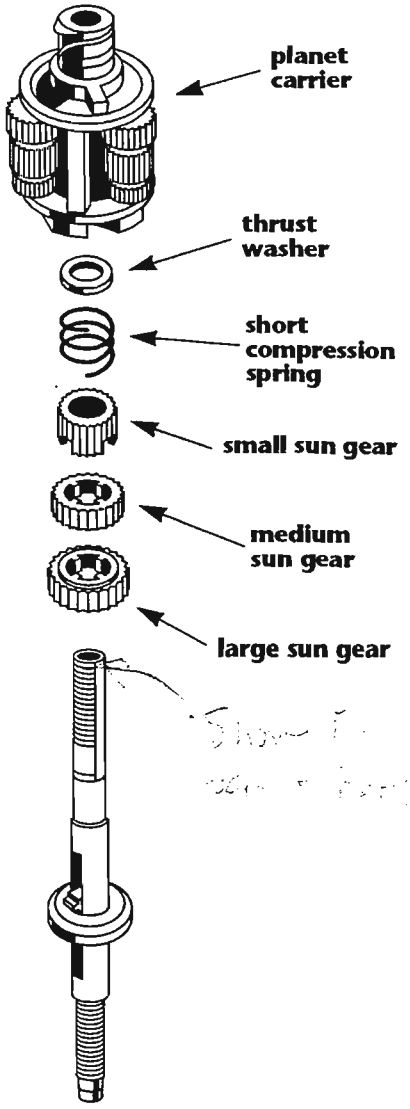
Test your work by pushing formed plastic washer toward end of axle. It should push axle key smoothly against spring force, almost all the way to outer end of slot.

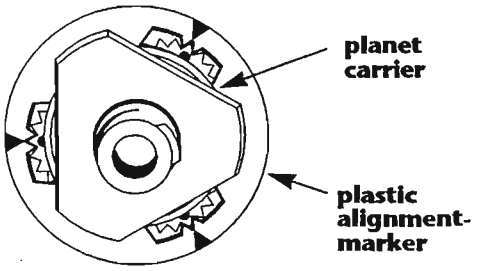


SACHS TORPEDO SUPER 7 (CONT'D)

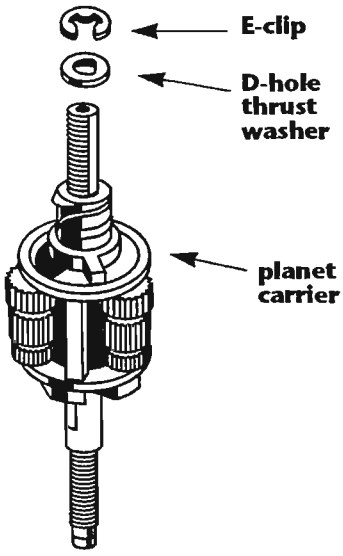
1 ASSEMBLY

Place axle in an axle vise by its flats, notched end down and Phillips head screw up. Install large diameter sun gear (31), bevels upward. Axle key should engage in slots of gear. Then install medium diameter sun gear (30), bevels upward; and small diameter sun gear (29), slots downward. Install shortest compression spring (28) Install remaining, round-hole thrust washer (26).





Align planet gears with timing marks facing precisely outwards and install planet carrier (25). Carrier must engage fully over sun gears and turn smoothly. Recheck timing marks after installation. **Caution: if planet gears are incorrectly timed, hub will sustain damage in use.** Sachs parts list mentions a blue timing aid (62) which aligns the gears during installation; correct assembly is, however, possible without using this. If the timing aid is not available, just be sure to have all dots on planet gears facing outward.



Install D-hole thrust washer (24) and then install E-clip washer (23). Planet carrier should turn freely, with very slight lengthwise play on axle.

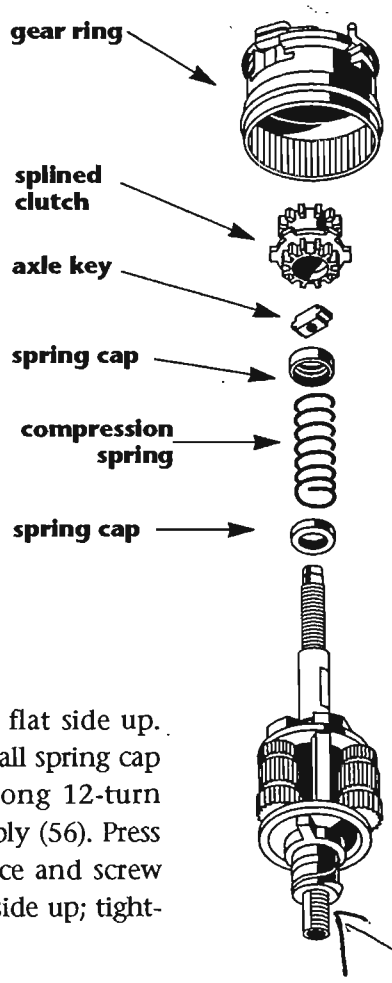
SACHS TORPEDO SUPER 7 (CONT'D)

2 ASSEMBLY

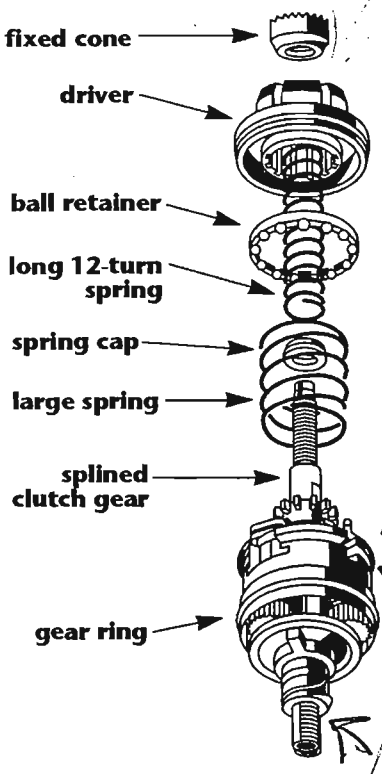
Turn axle over in the vise, so the open end is now upwards. Install spring cap (42), flat side toward center of axle. (The spring caps are identical.) Install 7-turn compression spring (43) and another spring cap (44), flat side up. Compress spring and insert remaining axle key (45) from side of axle slot, with its hole aligned with axle and its shoulders engaging spring cap.

Install splined clutch (46), larger end down.

Install gear ring (47), with pawls and pawl spring, over splined clutch.



Install larger ball retainer (53), flat side up. Install the large spring (50). Install spring cap (51), flat side down. Install long 12-turn spring (52). Install driver assembly (56). Press driver down against spring force and screw down fixed cone (55), serrated side up; tighten to 14.5 ft. lbs..



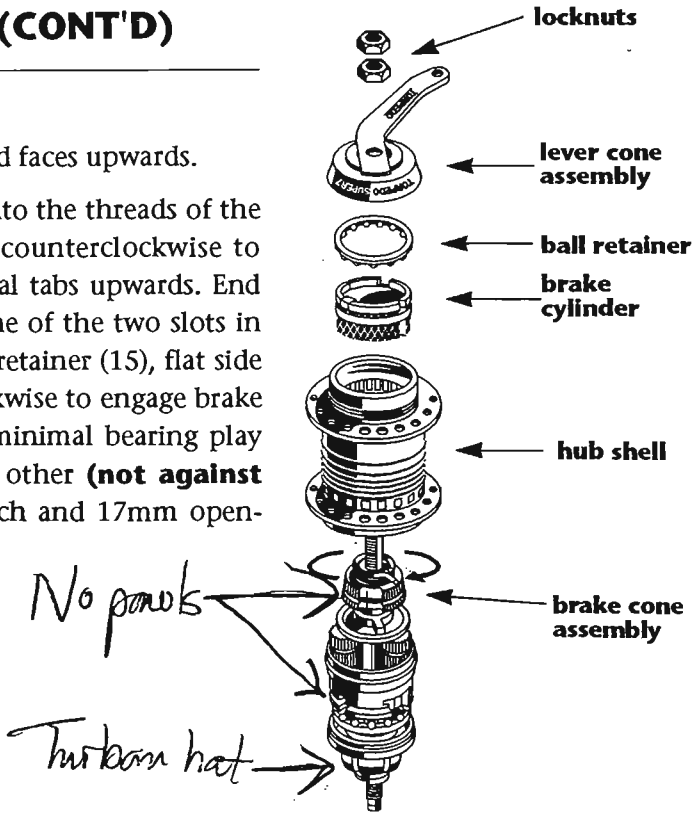
pawls are misplaced
should be lower
This is the pawl spring slot
Missing:
E clip
D-hole washer

SACHS TORPEDO SUPER 7 (CONT'D)

3 ASSEMBLY

Turn the axle over in axle vise, so Phillips screw head faces upwards.

Screw brake cone assembly (19), conical side up, onto the threads of the planet cage. Install hub shell, turning it slightly counterclockwise to clear pawls. Install brake cylinder (16), with internal tabs upwards. End of friction spring on brake cone must engage in one of the two slots in lower side of the brake shoe. Install remaining ball retainer (15), flat side up. Install lever cone assembly (13), turning it clockwise to engage brake shoe tabs. Screw on the two locknuts, adjust for minimal bearing play without binding, and lock the nuts against each other **(not against lever cone assembly!)** using a 17mm cone wrench and 17mm open-end or box-end wrench.



GEAR TABLE FOR INTERNALLY GEARED HUBS

Multiply by gear value obtained from chainwheel and rear sprocket gear charts

Gear	1	2	3	4	5	6	7
Sachs							
2-speed	1.00	1.36					
3-speed	0.73	1.00	1.36				
5-speed	0.67	0.78	1.00	1.29	1.50		
7-speed	0.59	0.68	0.81	1.0	1.24	1.48	1.68
Shimano							
3-speed	0.75	1.00	1.33				
7-speed	0.63	0.74	0.84	0.99	1.14	1.33	1.55
Sturmey–Archer							
3-speed	0.75	1.00	1.33				
4-speed	0.67	0.79	1.00	1.27			
5-speed	0.67	0.79	1.00	1.27	1.50		

If any line is shaded it should be this one.

Using this one line