

HUBS

SHIMANO F, G and CARTRIDGE TYPE 3-SPEED HUBS


CARTRIDGE TYPE


New Parts Summary
see parts list for full interchangeability

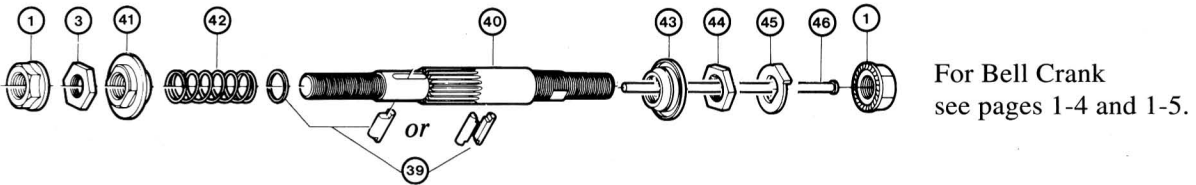
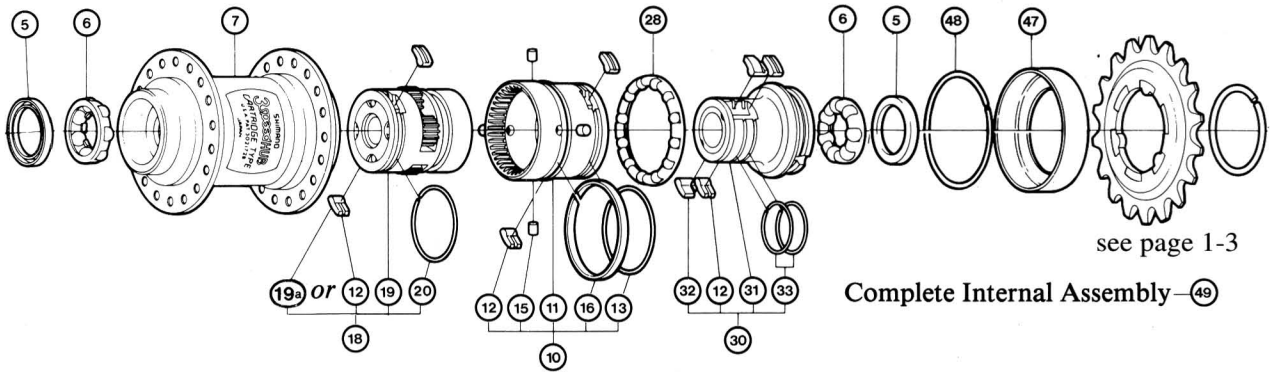
Model Year	1978-81	1982	1983
Driver*	Pawl A	Pawl I	
Planet Carrier	Pawl A	Pawl I	
Sliding Keys	2 A Keys or 1 BR Key & Washer		Key BR & Washer
Stop Ring Color	Gray		Black

*Driver F pawls and ring gear A pawls are unchanged.

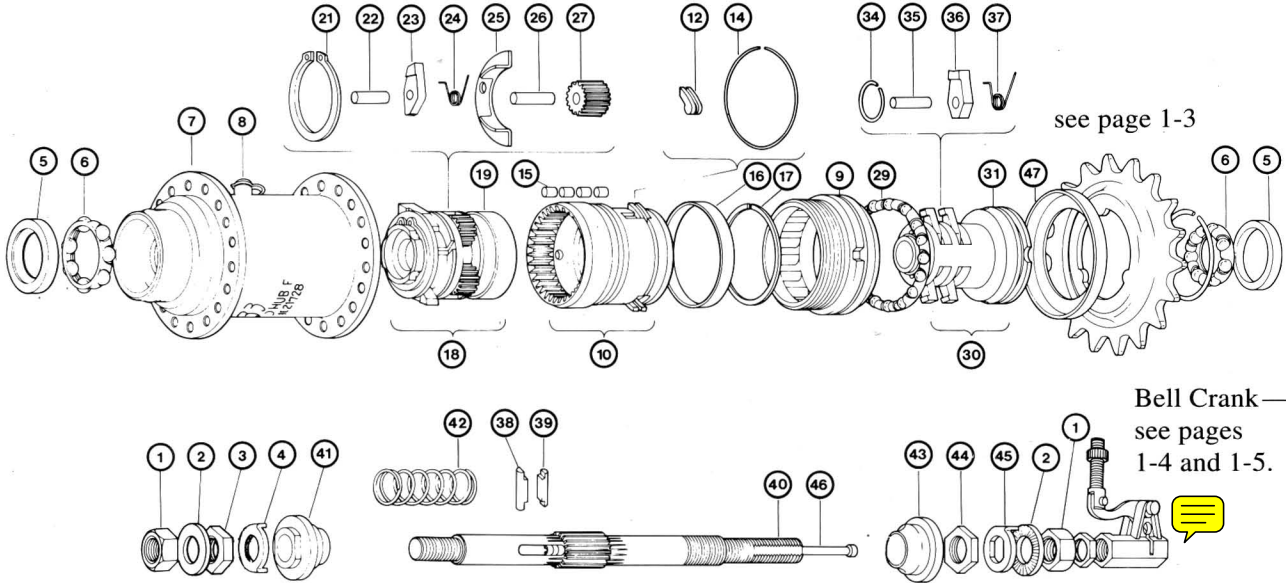
Pawls

A —  black, slot centered

I —  gray, slot off-center

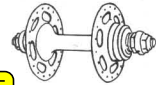


F TYPE & G TYPE



SHIMANO 3-SPEED HUB PARTS INTERCHANGEABILITY

HUBS



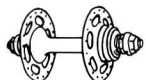
SUTHERLAND'S HANDBOOK OF COASTER BRAKES AND INTERNALLY-GEARED HUBS

	1983 G-3S23	Cartridge Type 1982 SG-3S21	1978-81	G Type	F Type	FA Type, 333†
1. Nut	220 1501-1	220 1501-1	220 1501-1	321 7000	321 7000	531
2. Washer				200 0500	200 0500	530
3. Locknut 3 mm (A)		321 3800	321 3800	321 3800	321 3800	529
Locknut 4.5 mm	220 1510-1					
4. Cone Stay Washer			321 6900	321 6900	528	
5. Dust Cap A	321 2700	321 2700	321 2700	321 2700	321 2700	125
6. Ball Retainer A	3-321 9022	321 9022	321 9022	321 9022	321 9022	124
7. Hub Shell						
with Left Cup 28H	*	*	322 9001	321 9001	321 9001	
36H	*	*	322 9002	321 9002	321 9002	102
40H				321 9003		
8. Lubricator				321 0400	321 0400	101
9. Ball Cup				321 5600	321 5600	132
10. Complete Ratchet A-1 (Ring Gear)	3-322 9014	322 9014	322 9014	321 9012	321 9014	FAA-1
11. Ratchet A	*	322 9030	322 9030			
12. Pawl A	321 0500-2	321 0500-2	321 0500-2	321 0500-2		
13. Ring Spring A (33.5 mm)	322 1100	322 1100	322 1100			
14. Pawl Spring A					321 1100-1	
15. Roller	321 6200	321 6200	321 6200	321 6200	321 6200	217
16. Roller Cover	322 5900	322 5900	322 5900	321 5900	321 5900	218
17. Snap Ring D			321 2100	321 2100	219	
18. Complete Ratchet B-1 (Planet Cage)	3-322 9018†	322 9017-1	322 9017	321 9017	321 9017	FAB-2
19. Ratchet B-1	*	*	322 9031	321 5800	321 5800	209
Pawl A (also #12)			321 0500-2			
19a. Pawl I	322 0700	322 0700				
20. Ring Spring C (28 mm)	322 1300	322 1300	322 1300			
21. Snap Ring A				321 1800	321 1800	210
22. Pawl Pin C				321 1000	321 1000	206
23. Pawl C				321 0700	321 0700	104
24. Pawl Spring C				321 1300	321 1300	105
25. Pawl Plate				321 6100	321 6100	211
26. Pinion Pin B				321 6300	321 6300	208
27. Planet Pinion				321 5500	321 5500	107
28. Ball Retainer (3/16")	3-321 9081	321 9081	321 9081			
29. Ball Retainer B				321 9023	321 9023	134
30. Complete Driver	3-322 9009-2	322 9009	322 9009	321 9009	321 9009	S5
31. Driver	322 9032	322 9032	322 9032	321 7100	321 7100	538
32. Pawl F	322 0600	322 0600	322 0600			
33. Ring Spring B (19 mm)	322 1200	322 1200	322 1200			
Pawl A (also #12)			321 0500-2			
Pawl I (also #19a)	322 0700	322 0700				
34. Snap Ring B				321 1900	321 1900	142
35. Pawl Pin B				321 0900	321 0900	141
36. Pawl B				321 0600	321 0600	139
37. Pawl Spring B				321 1200	321 1200	140
38. Sliding Key B				321 2600	321 2600	122
39. Sliding Key A		321 2500	321 2500	321 2500	321 2500	120
Sliding Key BR	321 2501	321 2501				
40. Axle (153 mm)	322 5200	322 5200	322 5200	321 5200	321 5200	521
Axle (173 mm)	322 5000					
41. LH Cone with Dust Cap B	3-322 9025-1	322 9025	322 9025	321 9025	321 9025	527
42. Spring	321 3000	321 3000	321 3000	321 3000	321 3000	123
43. RH Cone with Dust Cap B	3-321 9024-1†	321 9024	321 9024	321 9024	321 9024	543,126
44. Locknut B (7/16" x 3 mm)	321 3900	321 3900	321 3900	321 3900	321 3900	544
45. Non-turn Washer	321 6400	321 6400	321 6400	321 6400	321 6400	545
46. Push Rod						
(108.4 mm for 153 mm axle)	321 7300-1	321 7300	321 7300	321 7300	321 7300	546
(113.4 mm for 173 mm axle)	321 7500-1					
47. Dust Cap	322 0400	321 2900	321 2900	321 2900	321 2900	135
48. Seal Spring	322 0410					
49. Complete Internal Assembly						
153 mm axle	3-322 9902	3-322 9010				
173 mm axle	3-322 9922					

Parts are interchangeable only if they are on the same line and do not have a vertical line between them.

* Not available separately. †Marked in black to indicate 1983 model.

†Type 333 hub parts are interchangeable with F-type except the two-piece planet cage and two-piece gear ring. These parts can be replaced as a unit with F-type complete ratchet A-1 and F-type complete ratchet B-1.



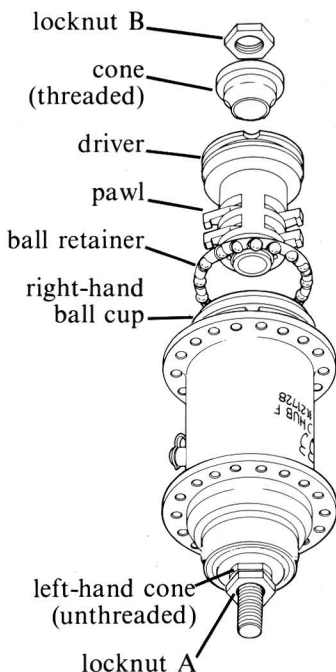
HUBS

SHIMANO F TYPE AND G TYPE 3-SPEED HUBS DISASSEMBLY AND ASSEMBLY

1 DISASSEMBLY

Remove right-hand locknut (B) and threaded cone. Lift off driver assembly. Remove ball retainer.

Slip Shimano ball cup tool (not shown) over axle to engage right-hand ball cup. Invert assembly, hold tool in vise and turn wheel counter-clockwise to loosen ball cup.



Slip spring, unthreaded cone and cone stay washer over axle. Hold washer down against spring and thread locknut A on axle a few turns only. Note that stay washer tabs engage cone flats. Be sure spring is tensioned enough to hold sliding key B in place. Replace the spring if it is too weak.

Lift hub shell about 1/2" (12mm) and tighten axle shoulder (not visible) against left-hand cone by turning axle clockwise with a wrench on axle flats. Lower hub shell to seat against left-hand cone.

Install ball retainer flat side up. Rotate driver pawls into operating position (full clockwise, viewed from above) and hold them in against their springs while inserting driver. Install right-hand (threaded) cone, non-turn washer and locknut. Adjust bearing.

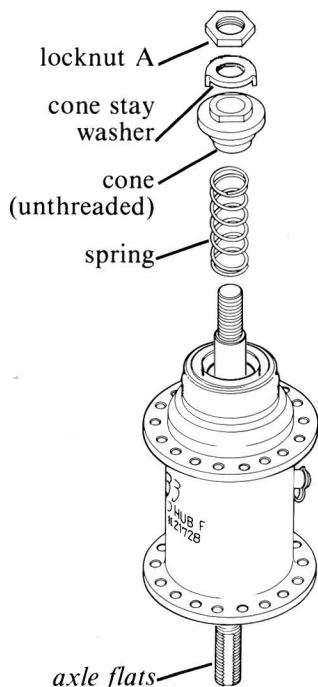
Next Step



ASSEMBLY 5

2 DISASSEMBLY

Invert assembly. Remove left-hand locknut (A), cone stay washer, unthreaded cone and spring.



Slip spring, unthreaded cone and cone stay washer over axle. Hold washer down against spring and thread locknut A on axle a few turns only. Note that stay washer tabs engage cone flats.

ASSEMBLY 4

Next Step

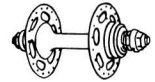


Next Step
Next Page



**SHIMANO F TYPE AND G TYPE 3-SPEED HUBS
DISASSEMBLY AND ASSEMBLY (cont.)**

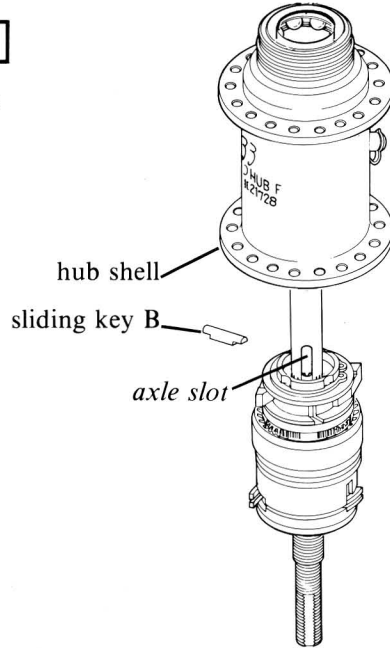
HUBS



Next Step
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Preceding Page

3 DISASSEMBLY

Lift off hub shell. Remove long sliding key (B) from axle slot.



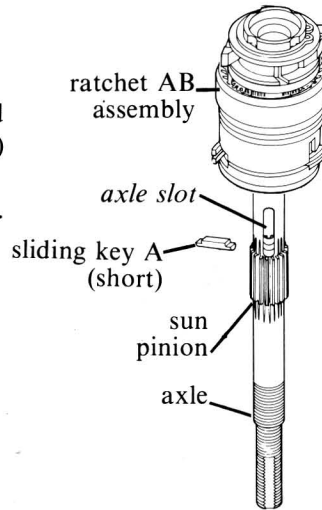
Insert long key (sliding key B) into axle slot, *rounded side up*. Slip hub shell over assembly.

ASSEMBLY 3

Next Step
↓

4 DISASSEMBLY

Remove axle from vise and dislodge short sliding key (A) from inside assembly. Separate assembly from axle.



Next Step
↑

Clamp axle by flats in vise. Insert short key (sliding key A) into axle slot, *half-round side down*.

Slip ratchet AB assembly over axle. If key interferes with planet pinions, rotate assembly slightly. When properly seated, sun pinion engages planet pinions and key is just visible in axle slot, *flat side up* with both ends covered by planet carrier.

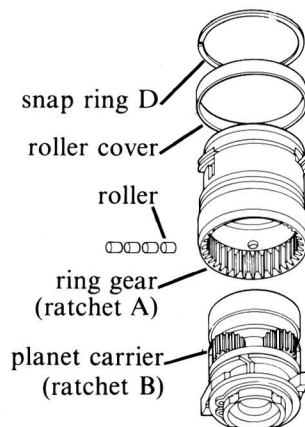
ASSEMBLY 2

Next Step
↓

5 DISASSEMBLY

Remove snap ring (D). Holding assembly vertically, lift off roller cover; tap out the four rollers beneath it.

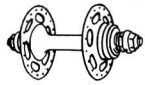
Separate planet carrier assembly (ratchet B) from ring gear assembly (ratchet A)



Next Step
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Insert planet carrier assembly (ratchet B) into ring gear assembly (ratchet A) so that planet pinions engage ring gear. Hold unit vertically and install the four rollers, roller cover and snap ring D.

ASSEMBLY 1



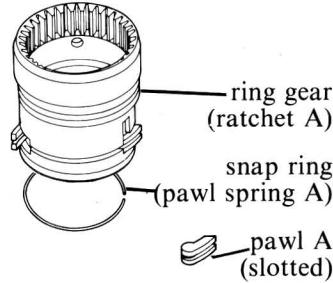
HUBS

SHIMANO F TYPE AND G TYPE 3-SPEED HUBS DISASSEMBLY AND ASSEMBLY (cont.) SUBASSEMBLIES

DISASSEMBLY

Ring Gear (ratchet A)

Remove snap ring (A). Tap out slotted pawls (A).



Ring Gear (ratchet A)

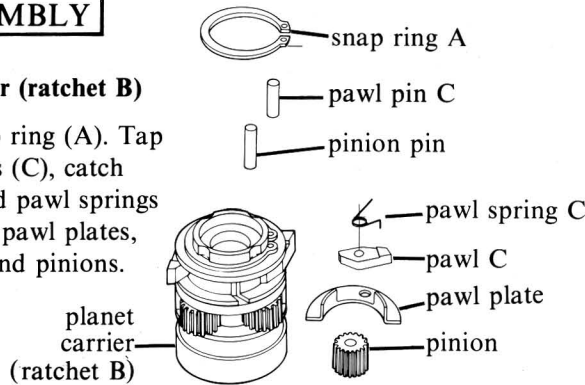
Install slotted pawls (A) and light gauge snap ring (pawl spring A). Position gap in snap ring over break in snap ring groove.

ASSEMBLY

DISASSEMBLY

Planet Carrier (ratchet B)

Remove snap ring (A). Tap out pawl pins (C), catch pawls (C) and pawl springs (C). Remove pawl plates, pinion pins and pinions.



Planet Carrier (ratchet B)

Install pinions and pinion pins. Install pawl plates, aligning plate holes with pawl pin holes. Place pawl spring (C) over recessed area of pawl (C), position over pawl plate and insert pawl pin (C). Install snap ring (A). Be sure snap ring covers pawl pin ends.

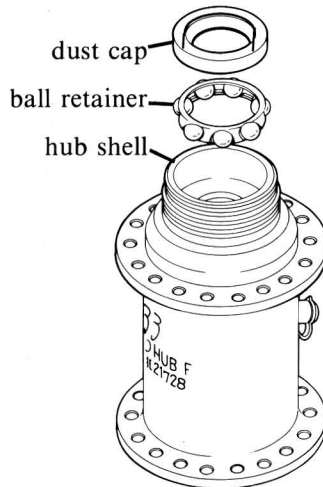
ASSEMBLY

DISASSEMBLY

Hub Shell and Driver

Bearings. Remove dust cover with a thin-bladed screwdriver. Work slowly around cover to avoid deforming it. Lift out ball retainer.

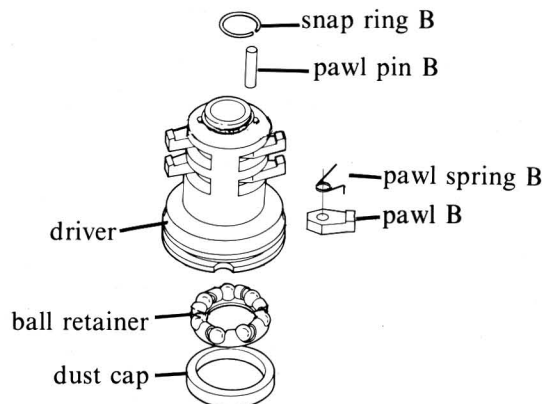
Pawls. To remove driver pawls, remove snap ring (B). Tap out pawl pins (B), remove pawls (B) and pawl springs (B).



Hub Shell and Driver

Bearings. Install ball retainer *flat side out*. Start dust cover straight and tap home with a soft hammer.

Pawls. To replace driver pawls, hold pawl springs (B) over recessed area of pawl (B) with hooked end against the *inside surface* of the *long end* of pawl.¹ (Viewed as shown, pawls point *counter-clockwise*.) Insert spring and pawl into first pawl slot and insert pawl pin (B) just far enough to pass through driver flange, pawl spring and pawl. Position second pawl and spring and push pawl pin all the way in. Repeat procedure for remaining two pawls. Replace snap ring (B). Be sure snap ring covers pawl pin ends.



ASSEMBLY

¹ Some older hubs have two driver pawl springs mirror image of those shown. On these hubs two pawl recesses face up, two down.

**SHIMANO F TYPE AND G TYPE 3-SPEED HUBS
DISASSEMBLY AND ASSEMBLY (cont.)**



CLEANING

Clean all parts, including outside of hub shell and axle bore, in a suitable solvent. Be very careful not to introduce dirt or grit after cleaning.

POINTS TO CHECK

1. Pawls for worn or chipped corners
2. Ratchets inside hub shell (7), planet carrier (18), ring gear (10) and ball cup (9) for worn or chipped teeth
3. Pinions (27), axle (40), ring gear (10) for worn or chipped gear teeth
4. Return spring (42) and ring spring (14) for size and strength (replace small pawl springs (24) (37) at overhaul)
5. Bearing surfaces of driver (31), right-hand ball cup (9), left-hand ball cup (7), cones (41) (43) and pinion pins (26) for wear and pitting (replace bearing retainers (6) (29) at overhaul)
6. All threaded parts for worn or damaged threads

LUBRICATION

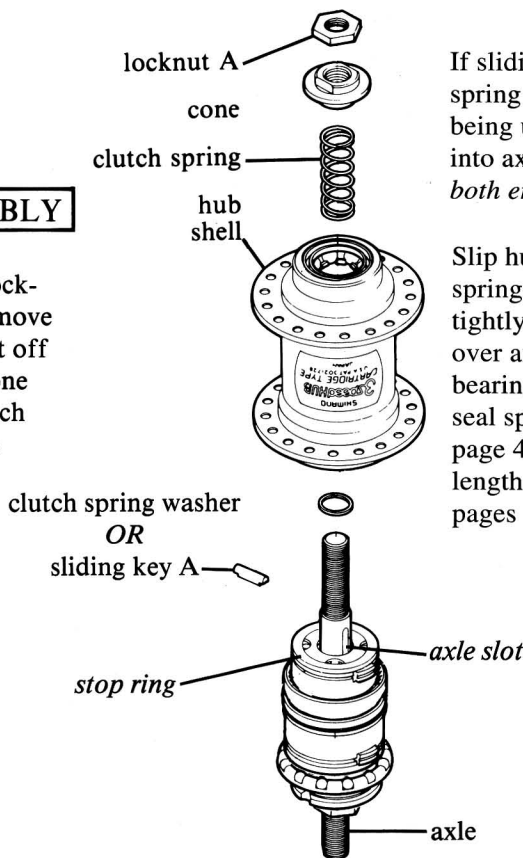
Lubricate ball bearings by filling the spaces between balls with grease. Be careful not to grease pawl springs. Lightly oil other internal parts with a *good* cycle oil. (WD-40 is too light for lasting lubrication, 3-in-1 Oil gums up with age.) Add about two teaspoons (8 ml) of oil when assembled.

HUBS

SHIMANO CARTRIDGE TYPE 3-SPEED HUB DISASSEMBLY AND ASSEMBLY

1 DISASSEMBLY

Remove left-hand locknut A and cone. Remove clutch spring and lift off hub shell. Remove one sliding key A or clutch washer, whichever is present.



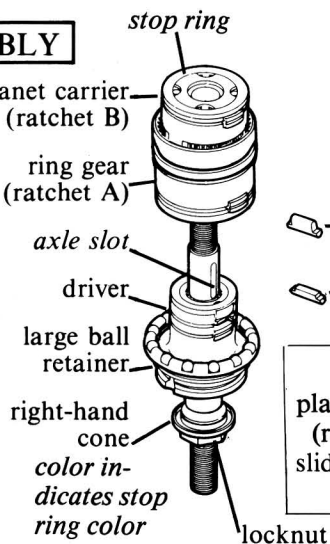
If sliding key BR is being used, slip clutch spring washer over axle. If sliding keys A are being used, omit washer and insert second key into axle slot; position key *flat side down* with *both ends* visible outside ratchet B.

Slip hub shell over assembly. Examine clutch spring carefully; if one end is wound more tightly, position spring *tight end up*. Slip spring over axle. Install cone and locknut A. Adjust bearing. If sprocket has been removed, replace seal spring (if present) and dust cap (shown on page 4-8). Do not forget to install correct length pushrod when mounting wheel (see pages 1-4 and 1-5).

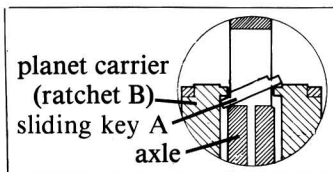
ASSEMBLY 2

2 DISASSEMBLY

Lift off ratchet AB assembly and dislodge the sliding key beneath it. Remove large ball retainer and driver assembly. Remove locknut and cone from right-hand end of axle.



- sliding key BR
- OR
- sliding key A



If planet carrier stop ring is finished in black, sliding key BR and clutch spring washer *must* be used. Insert sliding key BR in axle slot *small end up*. Press in driver pawls and install ratchet AB assembly.

If planet carrier is not finished in black, *either* a pair of sliding keys A or a sliding key BR with a clutch spring washer may be used. To install sliding keys A, press in driver pawls and install ratchet AB assembly. Lift driver $\frac{1}{8}$ " (3 mm) and insert first sliding key A *flat side up* with *one end* covered by ratchet B (see detail). Lift driver an additional $\frac{3}{16}$ " (5 mm) to allow sliding key A to drop into a horizontal position with *both ends* covered by ratchet B. Continue assembly without dislodging this key.

↑
Next Step

Install right-hand cone and locknut. Position axle *right-hand (hollow) end down* and install driver assembly. Install large ball retainer *flat side down*.

ASSEMBLY 1

**SHIMANO CARTRIDGE TYPE 3-SPEED HUB
DISASSEMBLY AND ASSEMBLY (cont.)
SUBASSEMBLIES**

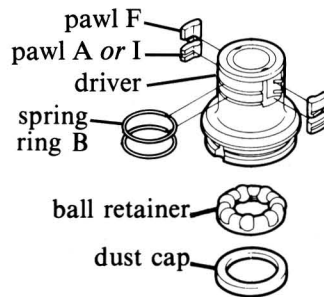
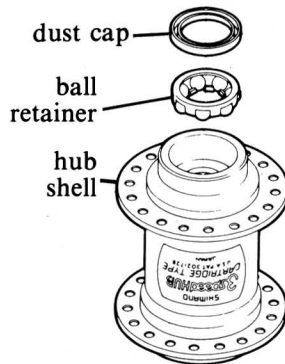


DISASSEMBLY

Hub Shell and Driver

Remove dust cap with a thin-bladed screwdriver. Work slowly around cap to avoid deforming it. Lift out ball retainer.

Slip driver ring springs B over small end of driver (to avoid deforming them) and catch pawls. Note that driver uses a pair of F pawls and a pair of either A or I pawls.*



Hub Shell and Driver

Install ball retainer *flat side out*. Start dust cap straight and tap home with a soft hammer. Repeat for other bearing.

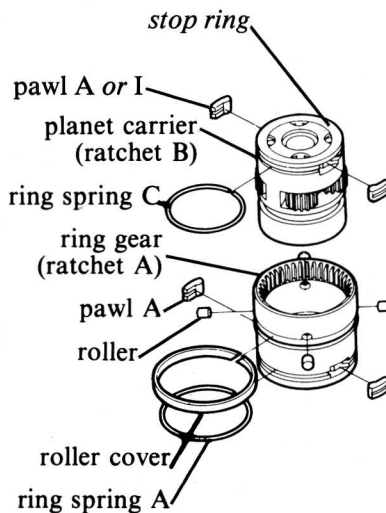
Position driver *large end down*. Driver takes two F pawls and either two A pawls or two I pawls.* I and F pawls are not interchangeable but complete drivers are. Place one of the lower pawls (I or A) in its socket and start ring spring B in groove, sliding it over the small end of the driver to avoid deforming it. Insert second pawl and slip spring over pawl to seat in groove. Viewed as shown, driver pawls must face *counterclockwise*. Ring spring gap must be positioned over closure in groove. Repeat for driver F pawls.

ASSEMBLY

DISASSEMBLY

Ratchet AB

Remove pawls only if necessary. Ease ring spring A over the end of ring gear (ratchet B) to avoid deforming it and catch ring gear A pawls. Planet carrier (ratchet A) takes either A or I pawls.* Remove ring spring C and planet carrier pawls in the same manner. Holding assembly vertically, pry off split roller cover. Tilt and tap out the four rollers. Separate ring gear and planet carrier. Pinions and pinion pins are not designed to be removed.



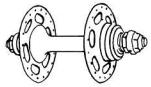
Ratchet AB

Insert internal ratchet end of planet carrier into ring gear. Install rollers and roller cover. Position assembly with *planet carrier up*. Planet carrier (ratchet B) takes either A or I pawls. A and I pawls are not interchangeable, but complete planet carriers are *if they have the same color stop ring*.* Ease ring spring C over the end of planet carrier and install planet carrier pawls. Repeat for ring gear A pawls and ring spring A. Viewed as shown, pawls must point *counterclockwise*. Ring spring gaps must be positioned over closures in ring spring grooves.

ASSEMBLY

pawl I		gray, slot off-center
pawl A		black, slot centered

*Pages 4-8 and 4-9 give complete interchangeability information. Detail above summarizes pawl identification.



HUBS

SHIMANO CARTRIDGE TYPE 3-SPEED HUB DISASSEMBLY AND ASSEMBLY (cont.)

CLEANING

Clean all parts, including outside of hub shell and axle bore, in a suitable solvent. Be very careful not to introduce dirt or grit after cleaning.

POINTS TO CHECK

Numbers in parenthesis refer to parts chart and exploded drawing.

1. Pawls for worn or chipped corners
2. Ratchets inside hub shell (7), planet carrier (18) and ring gear (10) for worn or chipped teeth
3. Pinions (27), axle (40) and ring gear (10) for worn or chipped gear teeth
4. Return spring (42) and ring springs (13) (20) (33) for size and strength

5. Bearing surfaces of driver (31), right-hand ball cup (9), left-hand ball cup (7) and cones (41) (43) for wear and pitting (replace bearing retainers (6) at overhaul)

6. All threaded parts for worn or damaged threads

LUBRICATION

Lubricate ball bearings by filling the spaces between balls with grease. Be careful not to grease pawl springs. Lightly oil other internal parts with a *good* cycle oil. (WD-40 is too light for lasting lubrication, 3-in-1 Oil gums up with age.) Add about two teaspoons (8 ml) of oil when assembled.