

Westclox Big Ben and Baby Ben Repair Tips

Repair Tips

This page gives some hints about Big Ben and Baby Ben alarm clock repair. For the names of some excellent clock repair books, see the [recommended reading page](#).

Don't use ammonia based cleaner on hairsprings. Use waterless non-ammoniated watch cleaning solution, or use alcohol. Ammoniated cleaners tend to eat away the hairspring material, changing the rate.

Terminology

I number wheels starting at the main wheel. F and B refer to front or back, and T and A refer to time train and alarm train. For example, T2F refers to the front pivot of the second wheel in the time train (which is the center wheel in a Big Ben or Baby Ben).

Cleaning Pivots

After disassembly and cleaning the movement, use a narrow strip of crocus cloth to clean each of the wire pivots (fold the strip around the pivot and rotate the pivot by hand). This will

remove oxidation.

The center wheel pivots usually need to be put in a lathe and smoothed with a pivot file, then polished or burnished.

Lubrication

These are my preferred lubricants. There has been controversy about using synthetic motor oil for clocks. My experience, and that of others has show that synthetic motor oil works extremely well for clocks. (References [Stephen Nelson](#) and [Ken Reindel](#)).

Synthetic motor oil types I use:

- 10W-60: Castrol Edge TWS European Formula full synthetic 10W-60 motor oil
- 5W-40: Mobile 1 5W-40 Turbo Diesel Truck?Advanced Full Synthetic Motor Oil

Oiling Locations for Big Ben Style 1, 1a, 2 and Loud Alarm Movement:

- 10W-60 synthetic motor oil on mainsprings.
- Grease ratchet wheels, trip cam, and where trip spring pushes repeat lever.
- 10W-60 synthetic motor oil on T1, T2, T3, A1, alarm escape wheel pivots.
- 5W-40 Synthetic Motor Oil: T4 pivots, alarm verge

pivots (pivots in plates and linkages), alarm escape wheel teeth, repeat lever pivots and where tension spring bears on repeat lever, center of alarm trip wheel, washer on trip staff inside back plate (makes it so it won't fall out in handling if trip staff is removed), clicks (under rivet head, underneath, and where click spring bears on it), center friction assembly.

- Synta-Visco-Lube (thick synthetic watch oil) on T5 pivots, escape wheel teeth (a dot on 3 teeth), impulse pin (small dot on each side).
- 5W-40 synthetic motor oil on balance pivots.
- No oil on pallet pivots – causes drag.

Balance

- Don't leave balance pivots too sharp or they will cut into the end screws.
- Center the hairspring in regulator slot when balance is at rest. If rate is erratic, check for rust on hairspring – replace if necessary. (Another cause of an erratic rate can be a slightly loose center friction.)
- Adjust the balance endshake so it is very small (just enough freedom so the balance is free when the movement is in the case). Sometimes the oil in the balance screws turned rusty, and I think it was because there was too much endshake, causing the point on the staff to revolve in the less well finished part of the

screw, abrading the point. Has anyone had this experience?

Bushings

Use KWM sized bushings, DON'T use Bergeon bushings! Bergeon bushings require a large hole to be reamed, and it looks bad.

I recommend "American System" bushings in KWM sizes (available from the major clock parts suppliers), for the larger bushings such as #13, #21 and #26. I use KWM brand bushings for the small sizes such as #59, #5 and #6.

Many pivot holes in Big and Baby Bens have a curved recess inside the front plate. Especially on a Baby Ben, you will need to recess the inside of the bushings similarly to the original recess, or the endshake may be too little when the movement is cased. I put each bushing in the lathe, and, turning the lathe by hand, first start the recess with a chamfering tool, then finish it with an oil sink cutter. Then I install the bushing in the plate.

Big Ben Loud Alarm:

- T3 pivots: Bushing #13, 1.8 mm outside diameter and a 0.9 mm hole. This bushing is slightly longer than the plate, making it obvious that a bushing has been

installed. The length can be turned down to match the plate, or you can leave it long to reduce future wear.

- T4, T5 and pallet pivots: Bushing #05, 1.2 mm outside diameter, 0.6 mm hole. These bushings are almost invisible after installation.

Baby Ben:

- Center Wheel front pivot: #21 bushing, shorten in the lathe to be just slightly longer than the plate thickness, then insert and rivet flush with the front and back of the plate.
- T3 (time third wheel): pivot diameter about .69mm; bushing #06. (Earlier Baby Bens have a smaller pivot and need a smaller bushing.)
- T4 (time 4th wheel): pivot diameter .5mm, bushing #05 (or #60 may be better).
- T5 and pallet pivots: pivot diameter .39 mm, bushing #59.

Big Ben Chime Alarm:

- Center Wheel front pivot: #26 bushing, shorten in the lathe to be just slightly longer than the plate thickness, then insert and rivet flush with the front and back of the plate.
- T3 (time third wheel): pivot diameter about .69mm; bushing #06.

- T4 (time 4th wheel): pivot diameter .5mm, bushing #05.
- T5 and pallet pivots: pivot diameter .39 mm, bushing #59.

Parts to smooth while clock is apart

1. Repeat lever where it is pushed by trip spring (Loud Alarm movement)
2. Trip spring edge which pushes repeat lever aside (Loud Alarm movement)
3. Trip staff cam where it pushes down on trip wheel
4. Burnish slot of pallet fork (lever). A sewing needle works well.

Do Before Assembly

1. Make sure center friction is tight enough.
2. Oil front center pivot (T2F) if cannon (shuck) pinion is in place.

Check after assembly

- Repeat lever must not rub on plate or wheel arbor.
- (On Loud Alarm) repeat lever must clear repeat cam when trip spring is depressed.
- Trip spring points between the alarm escape wheel teeth when the alarm is shut off by the switch (you'll need to put the movement in the case without the dial

to test this on style 1a and 2.

Don't bend the dial tabs on Big Ben or Baby Ben clocks!

Bending them isn't necessary, will cause them to break off if done repeatedly, and makes it a pain for the next repair shop.

Polishing Nickel Cases

Use "Rubin-Brite" metal polish. Produces best polish on nickel that I've seen.

Take the movement out of the case before using metal polish. Thoroughly wash off all metal polish when done.

Removing Old Luminous Hands

Coat old luminous hour and minute hands (style 6 and earlier) with a thin layer of Elmer's glue to help prevent the paint from flaking off during removal and installation. (Old luminous paint gets dried and cracked, and can easily fall off when the hand is disturbed. The thin layer of glue will stabilize the paint.)

Removing Time Set Knob on model Big Ben model 75 movement (single key wind introduced in 1956).

Remove movement from case. Bend a brass strip in half and put it over the center arbor between the knob and the back plate. Firmly grasp the center arbor (on top of the brass strip) with Vice-grip pliers. Lever the knob off using 7" diagonal cutters, using the vice grips at the fulcrum.

The regular way of prying off the knob will compress the tension spring, as there is no shoulder on the center arbor. Also, if the movement has an aluminum back plate, it may bend.

Alarm Trip Assembly

The later alarm trip assemblies - the one in which the cam on the trip staff is a steel disc with a cutout, and the trip wheel is steel with a stamped out projection - can be troublesome. I had so much trouble with these parts on a 1970 Big Ben leg model reproduction that I replaced them with the old style trip assembly having the brass finger on the trip staff and a brass trip wheel. This solved the problem of the trip staff being carried around with the trip wheel.

I'm still trying to find a way to make the trip wheel move up and down easier on these steel trip assemblies - please tell me [let me know](#) if you have any hints! I've tried polishing the lifting surfaces, and chamfering and smoothing the hole on the trip wheel. You can hold these parts in your hand and tell that the old style works much better than the new style.

Dealing with Glued Hairsprings (Red cement used starting in the 1960's)

The red cement may be dissolved with lacquer thinner to remove the hairspring from the stud. A convenient way to refasten the hairspring to the stud when reassembling the clock is to use orange shellac (in liquid form from a can). This can be removed with denatured alcohol the next time the clock is taken apart.

Jim Galazka has suggested using fingernail polish to glue the hairspring, which is an excellent idea. It is easily available, can be removed easily, and you could probably match the original red color if desired!

Removing the Small Alarm Hand

Use a pair of Wiha 26810 5.7-Inch Precision Chip Lifters (or similar devices) for the small alarm hand on **style 3 through 6 Bens**. First, put a dial protector (a business card with a v-slot in it) beneath the hand. Set the clock face up in a stand to hold it securely. With one lifter on each side of the hand engaging with the hand (with the curved part of the lifters resting on the dial protector) press the handles of the lifters inward (to be sure they stay engaged with the hub) and down, and the hand will pop off. *(Note: this method works with Bens style 3 through 6 because their alarm hands have a hub which extends to the edge of the hand. Styles 1 and 2*

have a small hub, and this method will cause the hand to come off the hub.) **Note: this won't work on a style 3 Baby Ben, as the hand has a narrow hub.** If the hand pops off the hub. it can be pressed back on.

Removing the Staked Alarm Set Knob of a Big Ben Style 6

While the clock is still in the case, remove the winding keys and the bell back. Use a side cutting pliers (about 7 inches long) as a puller. Put a couple strips of wood (to bring the jaws of the cutters just above the knurled part of the knob) as a fulcrum on top of the inner back about 3/4 inch away from the knob, set the side cutters with the jaws below the knurled part of the knob, and press the handles down to make the jaws pull the knob upward. It may take a few tries to get the positioning just right.

Thread Sizes

Baby Ben trip staff: 2-56. (2-48 up to ca. December 1912).

Baby Ben Style 3 and 4 top case clamp screw: size 3-40; overall length 7/32 inch (5.5 mm), body (threaded part) length 3/16 inch. Head diameter 4.13 mm.

Baby Ben Style 4 bottom case clamp screw: size 3-40; overall length 13/32 inch (10.3 mm), body is 11/32 inches

long with 7/32 inches threaded (and some have the entire body length threaded). Head diameter 4.55 mm.

Big Ben Style 1 Case Front Screw: Originals are 1-56 thread, 1-64 will work as a replacement. Round head (except that early examples have square sided flat heads) about 3.55 to 3.59 mm diameter.

Baby Ben Style 1 and 2 Case Front Screw: 1-56 thread, 2.5 to 2.7 mm round head, body length 4 mm (5/32").

Big Ben Style 2 Base Screw: 6-40 thread, 5.5 mm round head (7/32"), body length 5.84 MM (7/32").

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