Section 5

The Pendulum

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5. The Pendulum.

Photo 5/1

We can now disassemble the pendulum (**photo 5/1**) starting with the top end suspension block. This is locked in place by a nut locked underneath (**photo 5/2**). You will need to secure the block against the torque applied when trying to undo the nut.

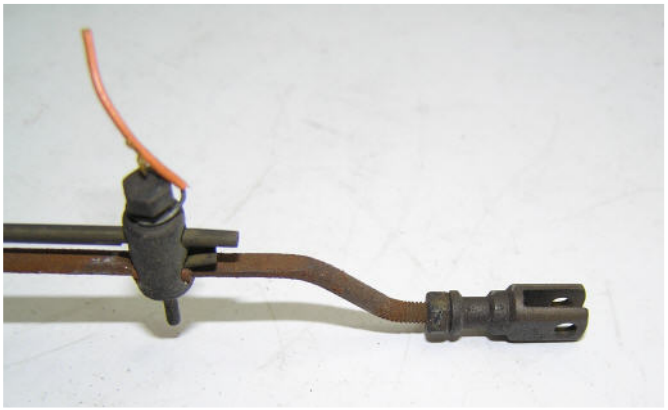

Photo 5/2

Use a screwdriver shaft that is a close fit in the hole that secures the ribbon (**photo 5/3**). Undo the nut a turn or so and the block itself can then be unscrewed. Then remove the nut. In the case shown here the steel rod was exceptionally heavily rusted and the block and nut took some separating and subsequent removal. Be careful you don't damage the thread.

Next comes the contact pin assembly (**photo 5/4**). This contains six parts one of which is not visible until the contact is partly disassembled. There are two things that will happen to this part. The first is that it will be jammed inside the body of the contact and you will not know it's there. This could prove difficult to remove (**photo 5/5**). The second is that it will be nice and loose and you can bet your Bottom Dollar that it will immediately fall out and roll onto the floor where it will then join all those other important clock parts in the 'GFE' part drawer.

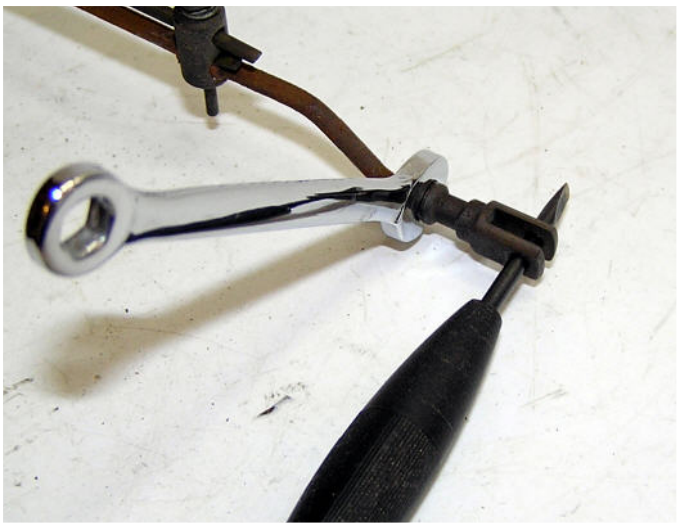

Photo 5/3

So be prepared and make sure the workbench and floor are clean and tidy before you start on this one. *(The 'GFE' reference is a link back to my days as a Pick programmer. This language had a fault code that no one wanted to see. It actually meant "**G**roup **F**ormat **E**rror" and was a disaster if it happened to you*

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*cos' it meant that all your work, for the last hour or so, couldn't be filed and was "**G**one **F**or **E**ver". Just thought I'd add that useless piece of info for you. I don't know why I thought of it actually. Probably just Brain Damage. Nothing serious).*

Photo 5/4

Undo and remove the small hex head screw from the back of the block. Do this with the pendulum flat on the bench as the small 'GFE' part is hidden in the hole and could pop out at any time. The block should then be free to slide up and down the pendulum rod. Remove the "T" shaped steel piece and slide the block as far up the rod as it will go so that the brass rod will come loose through the bottom of the block. Do not lift the block clear or lift the pendulum off the bench. Now turn the block so the the threaded hole is face down on the bench and tap a few times. Gently!. A small cylindrically shaped piece of brass should fall out (the GFE). If not then investigate very carefully.

If it is found to be stuck inside as this one was then it will need to be punched out. If it was free it should have fallen out by now and of course placed in a plastic wallet. There are a lot of small pieces like this in a Bulle so be warned. They will all need a safe place to reside. Some of the pieces are so small that even the slightest breeze will blow them off the bench (as happened to me once).

Photo 5/5

The photo above shows the dreaded 'GFE' piece stuck inside the body. It will either resist all attempts at removal or will make it's presence known by a very light 'tinkling' sound as it disappears under the bench.

The function of the cylindrical piece of brass is to act as a packer that applies the pressure from the Hex head screw through to the "T" bar piece of steel that abuts a fibre insulator around the pendulum rod. When the pressure is applied by the screw it passes across the "D" section of the Brass rod, down the "GFE" and onto the "T" piece. This piece then squeezes against the fibre and grips the Pendulum rod tightly. The fibre acts as an electrical insulator as described earlier. The "T" piece is there purely to stop the fibre from ripping or being pierced by the "GFE".

Photo 5/6

The "T" piece is missing in this clock and a small piece of brass strip has been used instead. That will need to be replaced later (**photo 5/6**).

Photo 5/7

The photo also shows the contact block nearing complete disassembly. The small cylindrical pin is still locked inside at this point and the silver contact pin is still attached. This has a small right hand thread

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and should easily be unscrewed in the normal way. You may need to grip the silver with a pair of smooth jaw pliers if it is too tight. The block with the silver pin and cylindrical packing piece removed can be seen in **photo 5/7**.

Photo 5/8

I show in **photo 5/8** the staking set I used to remove the packing piece. A few knocks and it was out. All that remains is to slide the fibre collar off of the pendulum rod and put with the rest of the contact pin assembly. Remember you should have six pieces in this assembly.

1. *Block*
2. *Hex screw*
3. *Cylindrical brass packing piece*
4. *"T" piece*
5. *Silver contact pin.*
6. *Fibre collar.*

We now move on to the Isochron spring bracket. This is attached to the pendulum with a small brass bracket insulated from the rod itself by a gritty fibre jacket that has the same purpose as the fibre one in the Contact pin assembly. The only difference is that this one needs to grip the rod and yet be slid up and down to adjust the spring. To help in this function it is made from a material with one side covered in something akin to 400 grit emery cloth (**photo 5/9**).

Photo 5/9

The clamp is normally secured by a steel nut that has two slots at 180 degrees to one another. This is where the special tools come into play. That screw-driver in **photo 3/2** with the centre ground out now makes more sense.

Photo 5/10

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Undo this but be careful not to over strain the thread especially if it is rusted in place like this one. Use a bit of easing oil first and leave it for 24 hours if it shows signs of too much resistance. Once the nut is removed you can remove the assembly and prize open the brass clamp and release it from the pendulum (**photo 5/10**).

The whole unit itself consists of nine items the first three of which are the nut, emery cloth and brass bracket. The rest are contained in the rocking bar assembly (**photo 5/11**). This consists of another steel nut, steel arbour, two hard steel discs, rocking bar body and the rocking "T" bar itself. It should be disassembled using the same modified screwdriver on the nut whilst the arbour is held securely. Be careful you do not damage the fine thread on the end of the arbour. It is very easy to apply too much pressure or slip and break the end off. The same rules apply here as to the contact unit. There are lots of small pieces to fall on the floor.

Photo 5/11

After the nut is removed the first steel washer is removed followed by the body. The final washer will then slide off. The small swinging "T" bar is hung between two holes in the body and is prevented from sliding sideways by the two hard steel washers. Obviously it must be allowed to swing freely and therefore the bar will not protrude out of the sides of the holes in the body. When the washers are removed the "T" piece can be moved to one side until the other end comes free. It is then angled down with a pair of tweezers and pulled gently free of the other hole.

Again I cannot stress too strongly that these parts are small and will disappear very quickly if you don't look after them. This is particularly so when using tweezers. Misplaced pressure result in the tweezer arms pinging together with the "T" bar disappearing into the black hole of 'GFE' land. Or worse still lodging itself in one or other of your eyes.

BE CAREFUL.

So at this stage you should have the following parts ready to be put away.

1. *Bracket nut.*
2. *Emery cloth insulating collar.*
3. *Brass bracket.*
4. *Arbour.*
5. *Arbour nut.*
6. *Outer hard steel washer*
7. *Body.*
8. *Inner hard steel washer*
9. *Rocking "T" bar.*

Now that the brass contact rod is disconnected from the top contact pin assembly it can be disconnected from the terminal block at the other end. This threaded end is normally pushed into the insulation sleeve that protrudes through the bottom bracket and carries one end of the coil wire (**photo 5/12**. The wire is clamped between the two nuts and washers on the threaded rod. Undo these nuts with the appropriate spanners. Be very careful not to strain the copper wire. On this clock most of the insulating sleeve is missing and the wire covering has been changed at some point in the past with a yellow replacement. Once the wire is free the connecting brass rod can be removed and put to one side.

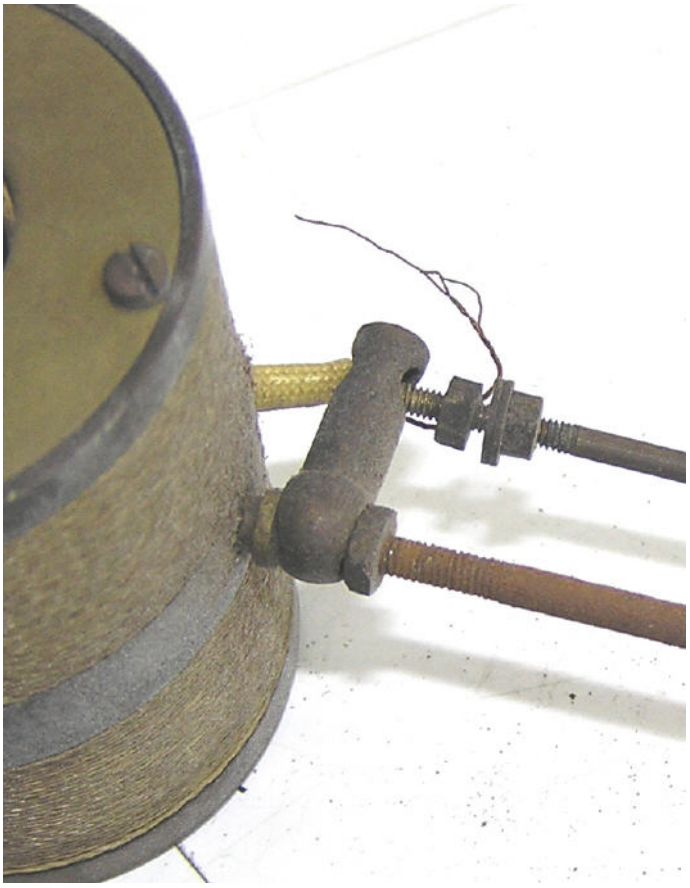

Photo 5/12

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The bottom bracket can now be attempted (**photo 5/13** The steel pendulum rod is threaded for the last inch of its length and passes right into the bob casing where it terminates in the pendulum cap spacing bar which is threaded to receive it. The rod is locked in position by a threaded spacer that sits on the barrel of the bob.

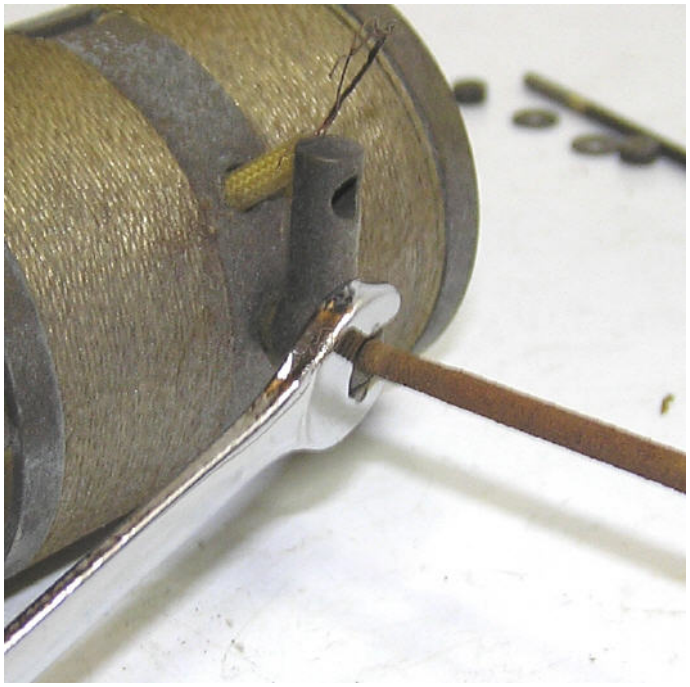

Photo 5/13

This spacer is then partly covered by the bottom bracket which in turn is secured by the nut visible on the steel rod. So this must be released first. (**photo 5/16**).

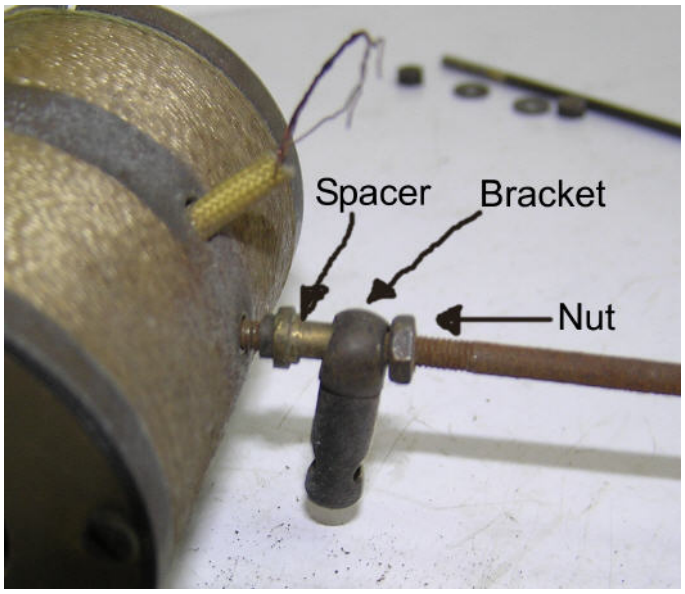

Photo 5/14

You may need to hold the other end of the steel pendulum rod to resist the torque when trying to undo the nut. Undo the nut as far is it can travel up the thread. Then lift the bracket until you can see the threaded spacer fully exposed. You should make sure that the coil wire is slowly pulled back through the hole in the bracket until it is clear. Do not be surprised if any insulation still left at this point crumbles away. It is not unusual and will have to be replaced. Again be careful not to put strain on the copper wire (**photo 5/13**) Once the wire is clear move the bracket as high up the rod as possible.

Photo 5/15

The spacer will have two flats for use with a spanner. Undo the spacer for a turn or two until the steel rod becomes loose and can be removed (**photo 5/14 & 5/15**). The nut, washer (if present) and spacer can now be removed from the steel pendulum rod. The washer was missing on this clock and will need to be replaced. The three remaining pieces can be seen in **photo 5/16**. The steel rod will need to be cleaned of rust.

Photo 5/16

Next comes the end caps from the coil casing. These are secured by four screws visible in the end caps themselves (**photo 5/17**). These screw into two

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spaces that not only secure the caps but also act as securing nuts for the steel rod which was just removed and the rating nut screwed rod. Be careful when removing these screws because there may be some paper washers between the cap and the coil (**photo 5/18 & 5/19**)

Photo 5/17

Keep the barrel flat on the bench at this stage. This particular clock had two paper washers inside one end cap. These make sure that there is enough pressure on the coil to stop it moving when the caps are put back and tightened. Now remove the other cap in the same way. I show the barrel with both covers removed in **photo 5/20.** Note that the cap spacer into which the steel pendulum rod was screwed has already been removed, leaving the one that secures the rating nut screwed rod.

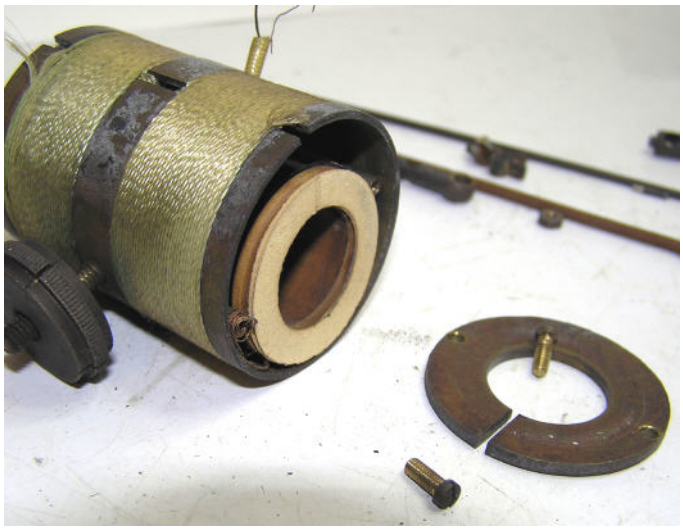

Photo 5/18

As already explained in the introduction, the coil is secured at one end to the barrel itself. This is achieved by it being wound around one or other of the cap spacers. In this case it was the Steel rod side. When the rod is unscrewed the spacer will probably fall out leaving one side of wire free. The coil wire is shown in **photo 73**. The coil is now only held by the other terminal wire passing through the hole in the barrel. Gently slide the coil out whilst easing the wire back through the hole. Again, don't worry about the insulation.

Photo 5/19

It will probably crack and splinter away to nothing. Once the coil is removed put it safely to one side. We'll check it a bit later.

Photo 5/20

The only other part to come off now is the rating nut and threaded rod. You will note that the rod is in fact split up its length so that it applies a slight resistance to the rating nut when it is turned up and down during normal rating of the pendulum, otherwise it may work loose over time and affect the timekeeping. So if it is tightly held in the barrel by the remaining cap spacer it will be difficult to remove because there

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will be nowhere to hold the rod securely whilst trying to undo it, especially if the rating nut is removed. Now, if we were to wind the rating nut right the way to the end of the rod then the two halves will come together tightly and form a nice little screw driver slot that we can use to unscrew the rod. The rating nut can then be removed easily. **Photo 5/23** shows a small screwdriver being used to achieve this.

Photo 5/21

Photo 5/22

Photo 5/23

The barrel is now free of any parts except the cord bound around the outside. It should be left in place if at all possible. It is a lot harder to work around it and polish the barrel but it can be done. It's no good trying to unwind it to rewind later because the inside of the cord that is bound against the barrel will have faded less than that facing the fresh air. So if you tried to rewind it you would get a nice criss cross pattern. Only remove it if it is incomplete or extremely worn. It doesn't matter so much if it's dirty because you can wash it gently in warm soap and water and leave it to dry for a few days.

Photo 5/24

The one on this clock needs a little attention to secure the ends but I think it will look OK when the barrel is cleaned. This barrel is going to need some work by the look of tarnish and verdigris in **photo 5/25** The original colour of the cord binding can be seen in **photos 5/26 & 5/27**.

Photo 5/25

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If you do decide that the barrel will need to be rewound then note the way the ends of the cord are knotted inside the barrel.

Photo 5/26

Photo 5/27

That's the pendulum disassembled so all we'll do now before cleaning and repairs is check the coil is not damaged by taking a resistance reading with a meter. Any meter will do including those that can be bought very cheaply at Model Engineering fairs and Electronic shops like Maplins or even at hardware stores like B&Q.

Any type will do as long as it will read up to 2000 ohms. Place a sensor on each end of the coil. It should read anywhere between 1000 and 1300 ohms. The ideal reading is 1100 ohms. So as long as it's in that range you can put it to one side for later. If not then obviously the coil is damaged in someway and unless you have the tools and skills it's probably better to find a company to rewind it for you. For the larger coil as on this clock it will need to have about 6500 turns of 42 Gauge enamelled wire. If you have a lathe you can have a go. But practice a few hundred turns first.

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