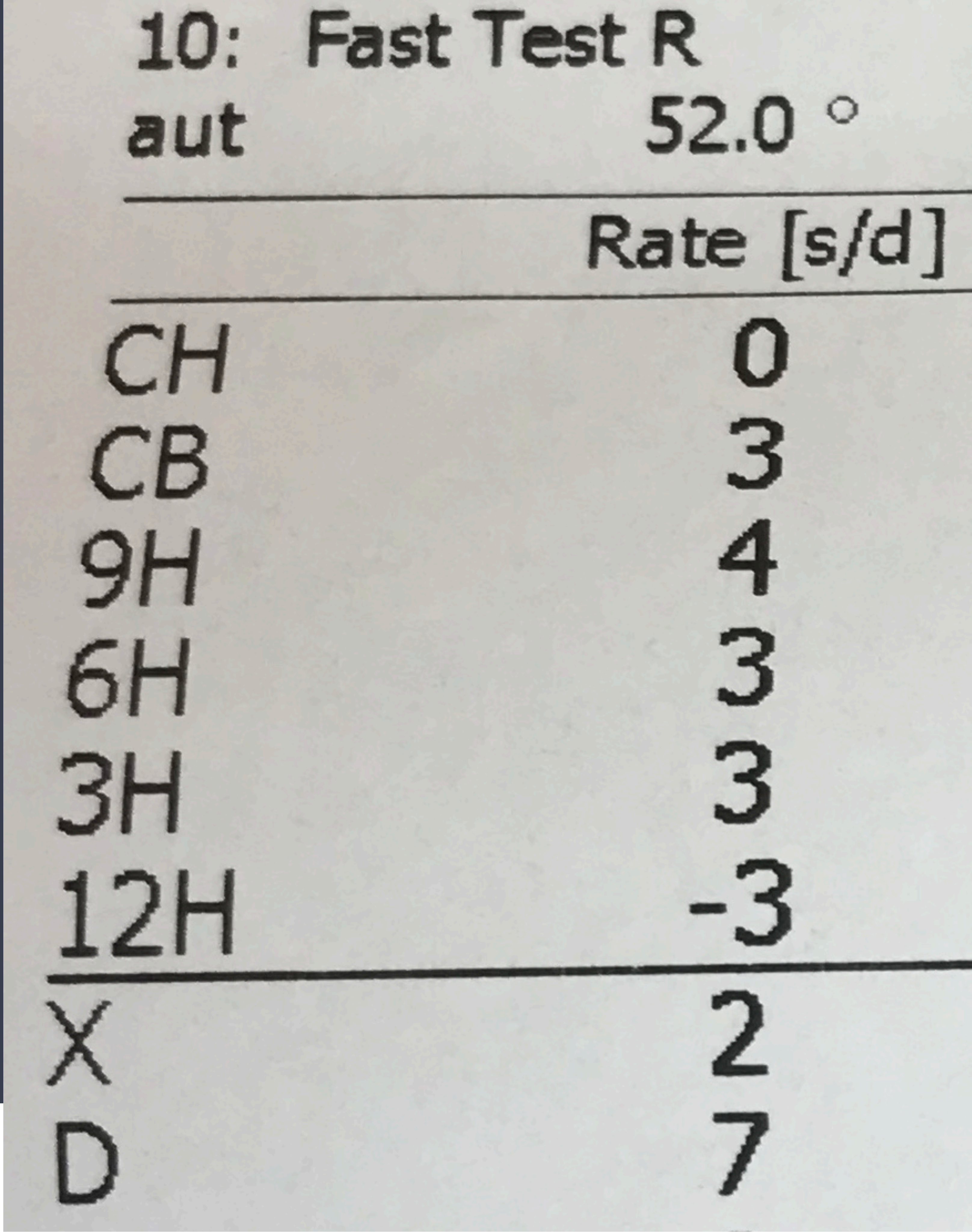
DECODING THE TIMING RESULTS

TIMING RESULTS REFERENCE SHEET



NO BS WATCH-MAKER

WATCHMAKING PROJECT

QUICK REFERENCE - AMPLITUDE
WHAT IS ACCEPTABLE?

AMPLITUDE SHOULD ALWAYS BE AROUND 275 TO ABOUT 315 DEGREES. ANYTHING LOWER THAN 275 IS NOT IDEAL. ANYTHING HIGHER THAN 315 IS CONSIDERED NOT IDEAL AS WELL.

EXCEPTIONS:
If it’s around 320, I would let it slide but anything higher is not good and would require a complete check and service again.

If it’s around 265 to 275, I’d let that slide as well. As long as it doesn’t dip any lower than 265. I wouldn’t consider 265 to 275 ideal though. It wouldn’t pass a bench test if those are the amplitude numbers in Dial Down or Dial Up.

QUICK REFERENCE - BEAT ERROR
WHAT IS ACCEPTABLE?

BEAT ERROR SHOULD ALWAYS 0.0 IN DIAL UP OR DIAL DOWN IF POSSIBLE.

0.2 the highest I'll accept. If we adjust the beat error to 0.0 in Dial Down and we notice that the beat error fluctuates a little bit in the vertical positions, that is fine. As long as the beat error in Dial Down or Dial Up is 0.0.

QUICK REFERENCE - RATE
WHAT IS ACCEPTABLE?

RATE SHOULD ALWAYS BE AROUND +0 TO +8 SECONDS.

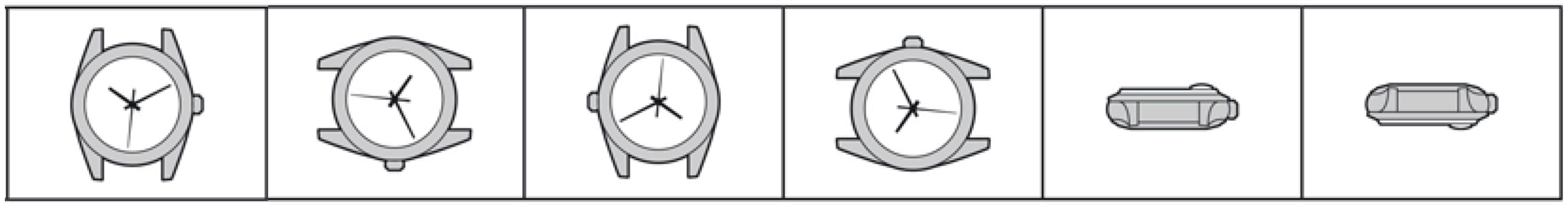
We don't want negative numbers. I wouldn't accept anything less or more in the Dial Up or Dial Down positions outside of +0 to +8 seconds during the regulating phase.

QUICK REFERENCE - AVERAGE & DELTA
WHAT IS ACCEPTABLE?

X SHOULD ALWAYS BE 0 TO 8 GIVE OR TAKE.
DELTA SHOULD AWLAYS BE 0 TO 20.

We want both of these numbers as close to zero as possible. Aim for it. Do not accept numbers in the negative.

PAST INDUSTRY TERMINOLOGIES FOR TIMING POSITIONS



CROWN RIGHT	CROWN DOWN	CROWN LEFT	CROWN UP	DIAL UP	DIAL DOWN
CR	CD	CL	CU	DU	DD

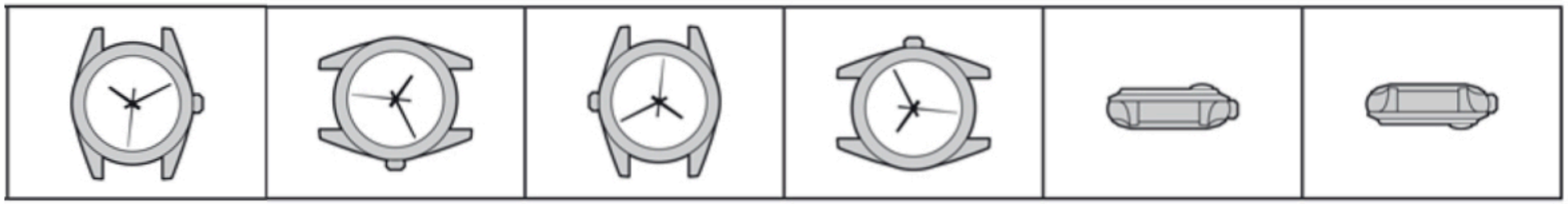
VERTICAL

Crown Right, Down, Left, and Up are considered Vertical or Pendant positions because the watch is positioned vertically on the microphone for the timing machine.

HORIZONTAL

Dial Up and Down are considered Horizontal positions because the watch is positioned horizontally on the microphone for the timing machine.

CURRENT INDUSTRY TERMINOLOGIES FOR TIMING POSITIONS



CROWN RIGHT	CROWN DOWN	CROWN LEFT	CROWN UP	DIAL UP	DIAL DOWN
CR	CD	CL	CU	DU	DD
12H	9H	6H	3H	CH	CB
12 HIGH	9 HIGH	6 HIGH	3 HIGH	CADRAN HAUT	CADRAN BAS

The terminology advanced towards using the hour markers as a reference point. The H in the vertical positions (12H, 9H, 6H, 3H) all signify when the hour marker is at the high point. Much like a wall clock. For example, when the watch's 12 o'clock marker is at the high point, we can see that the watch is in Crown Right.

WHY THE CHANGE?

There’s many speculations as to why there was a change in the terminologies and usage but one of the most logical ones is the slip up that occurs during the timing phase.

As you guys will see for yourselves, the timing and regulating phase of the watch takes place in the Dial Down position or Cadran Bas. If we leave it at that position when we test all 6 positions, the movement actually gets placed in opposite sides during the Crown Right and Crown Left positions. In theory, it is Crown Left/ Crown Right but the movement is placed upside down to begin with. When the movement is in a watch getting timed, the first position is Dial Up. When we regulate the movement outside of the watch case, the movement is actually in Dial Down. To avoid this mishap, the positions got changed to 12H or 12 High and 6H or 6 High. This way, we can’t get the positions messed up due to the hour marker leading the way

BONUS MATERIAL

TEST CROWN LEFT AND RIGHT FOR YOURSELF

As you guys will see during your own servicing, it's extremely easy to confuse Crown Left and Crown Right when you regulate in Dial Down during the regulating phase.

When the movement is placed in the timing machine microphone in Dial Up position, everything is good in the world. Since we regulate the movement in Dial Down, it's easy to forget that we're supposed to be testing the movement in Dial Up when we're done.

Conduct the experiment for yourself. Place the movement in Dial Down and go through the list of checks during the timing phase. You will notice that when your movement is in Crown Right or Crown Left that it does not actually match up with 12H or 6H as specified.

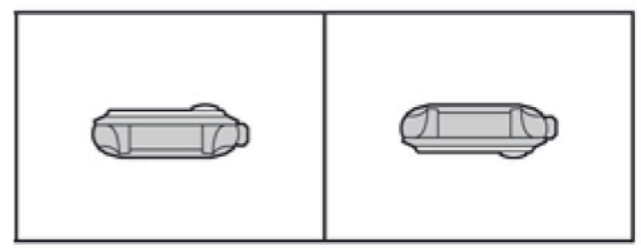
WHY CHANGE IT TO CADRAN HAUT & CADRAN BAS?

Because it’s the Swiss industry.... Need I say more?

But seriously....

Cadran Haut is the French way of saying Dial Up.

Cadran Bas is the French way of saying Dial Down.



DIAL UP	DIAL DOWN
DU	DD
CH	CB
CADRAN HAUT	CADRAN BAS

HOW MANY POSITIONS DO WE TEST?

FOR THIS COURSE, WE WILL BE TESTING ALL 6 POSITIONS AS OUTLINED ABOVE.

The industry has mixed opinions. Lots of brands will test only 5 positions and exclude Crown Right (I'll get to that in a second). Other companies like Rolex tests their watches in all 6 positions.

Hell, there are even some companies that test their watches in just Dial Down... (Don't do this.)

BONUS MATERIAL

WHY DOES THE INDUSTRY ONLY CHECK 5 POSITIONS?

CROWN RIGHT IS THE HARDEST POSITION ON THE BALANCE WHEEL

Crown Right is considered the hardest position on the balance wheel because of gravity. The balance wheel is positioned at the highest point on the movement when a watch is in Crown Right. This makes the balance wheel work even harder against the laws of gravity.

As you can see from the chart above, Crown Right is when the 12 o'clock marker is high. Let me ask you, how many times are you in Crown Right if you're wearing the watch on your left arm (like large majority of watch owners)? Very seldom. If you're checking the time, you're more likely to be in Dial Up than Crown Right (unless you prefer to hike your arm high up there to check the time).

WHAT DOES AMPLITUDE MEAN?

THINK OF AMPLITUDE AS THE HEART RATE IN A WATCH. THE AMPLITUDE IS A GOOD INDICATOR OF OVERALL HEALTH AND FITNESS. IT LETS US KNOW HOW WELL THE WATCH IS DOING.

Just like a heart, there's an optimal zone. We don't want the heart to beat too slow or too fast. The same applies for the amplitude. We find that the ideal amount of amplitude in a watch is around 270 (or 275) to about 315 degrees.

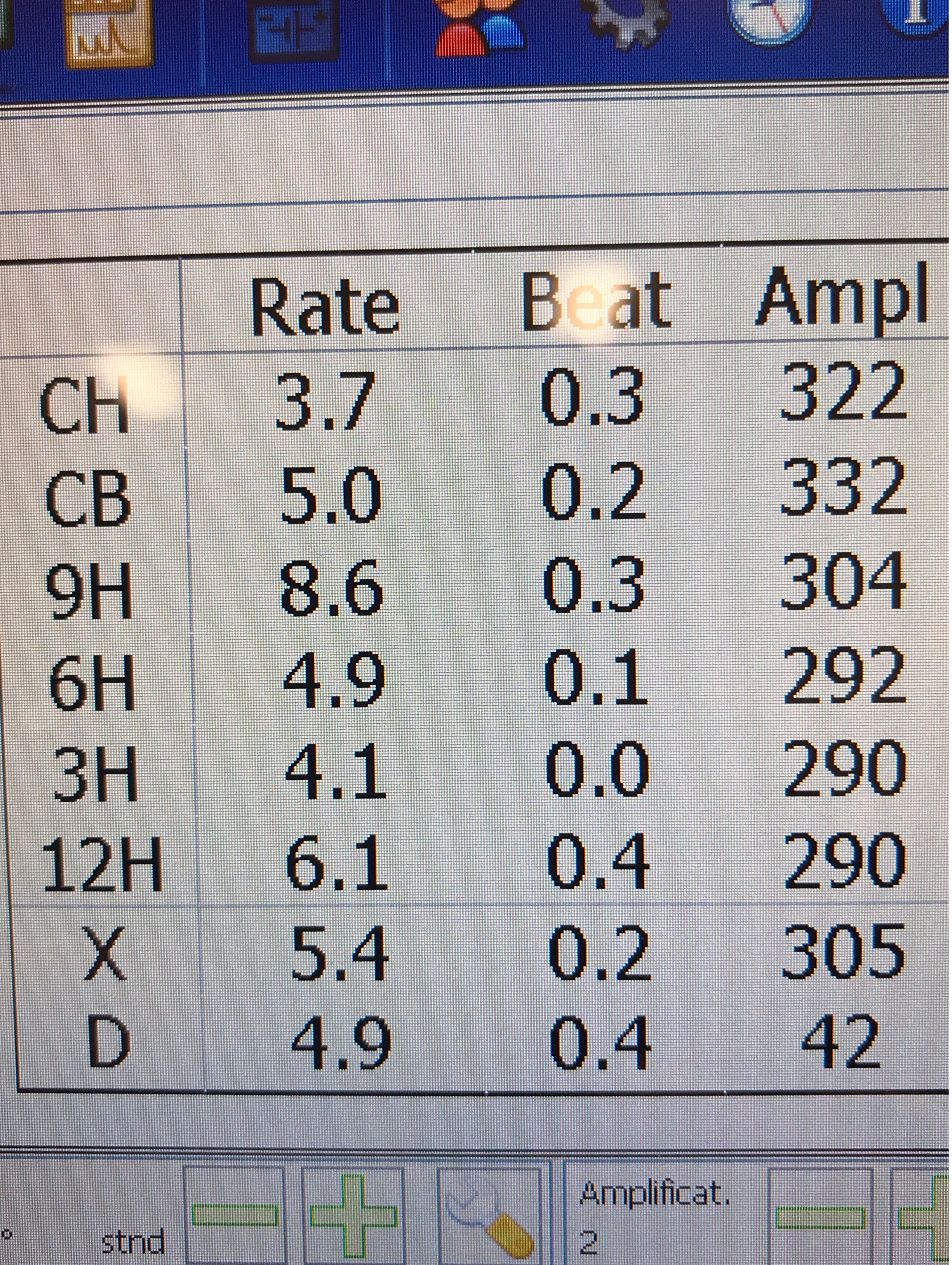
The amplitude is in degrees because that's how we're measuring how far the balance wheel moves from a complete stop. So if a watch has no power and the balance wheel is at a dead stop, we're starting at 0 degrees of amplitude.

When we wind the watch up, the balance wheel begins to oscillate from the point of dead stop. The amplitude is, in theory, how far the balance wheel moves from the point of deadstop or 0 degrees to the other end or generally around 275 to 315 degrees. In this way, you can see why a watch that runs any higher than 315 to 360 is not ideal. We don't want the chance of the balance wheel spinning all the way around. It will throw off all our mechanical readings

If the watch is running higher than 315 degrees of amplitude, good job. That was sarcasm. You oiled the movement so damn smooth with lubrications that the movement is running with almost no friction. This is not ideal. We need an ideal amount of friction to keep the balance wheel from ever reaching 360 degrees of amplitude.

The cut off for good amplitude is around 315. You can get away from 320 honestly. I haven't seen any adverse effects with 320 degrees of amplitude. The problem occurs when the amplitude starts creeping higher and it normally does after the oils sit and settle in. The cut off is around 315 because we know that the oils will eventually sit in and the movement starts to catch itself. The same way we let food marinate for the taste is the same way the oils will begin to coat the pivots and parts of a watch. By leaving it at 315, we can account for the margin of error that it might creep higher.

The general consensus for the minimum amount of amplitude to be considered good is around 270 to 275. I haven't seen any issues with ~265 but hey, we don't want just passing right? Aim for 275 as your bare minimum. If your amplitude is any lower than 275, you missed something.



	Rate	Beat	Ampl
CH	3.7	0.3	322
CB	5.0	0.2	332
9H	8.6	0.3	304
6H	4.9	0.1	292
3H	4.1	0.0	290
12H	6.1	0.4	290
X	5.4	0.2	305
D	4.9	0.4	42

IS THERE ANYTHING WRONG HERE?

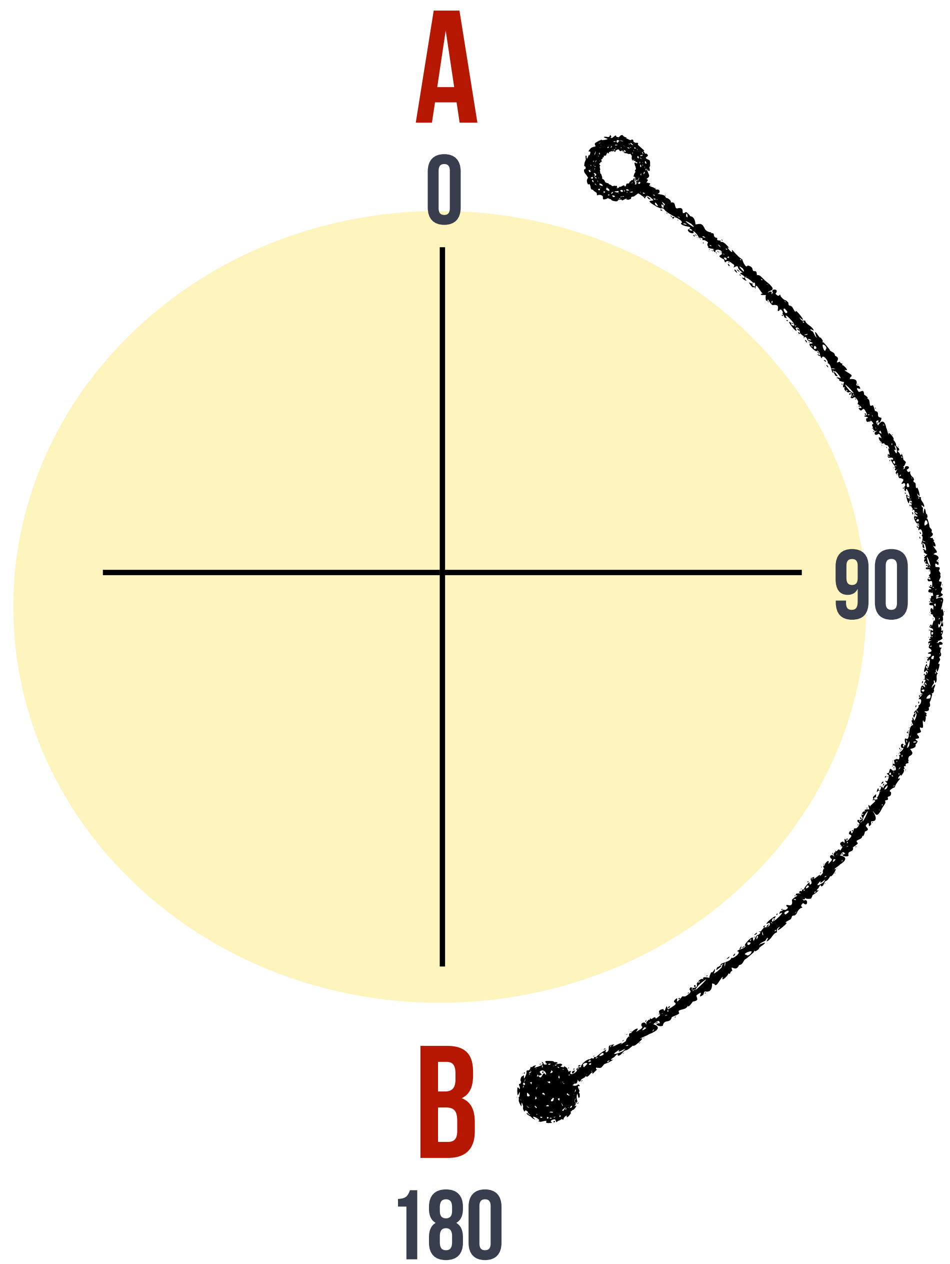
The amplitude looks a little high doesn't it? Remember that we said the ideal amplitude ranges is from 275 to about 315.

Let's say we let Dial Up slide with an amplitude of 322. What about Dial Down? 332 is extremely high.

We're running the risk of rebanking at this point. This watch will fail prematurely out in the field.

WHAT IS REBANKING?

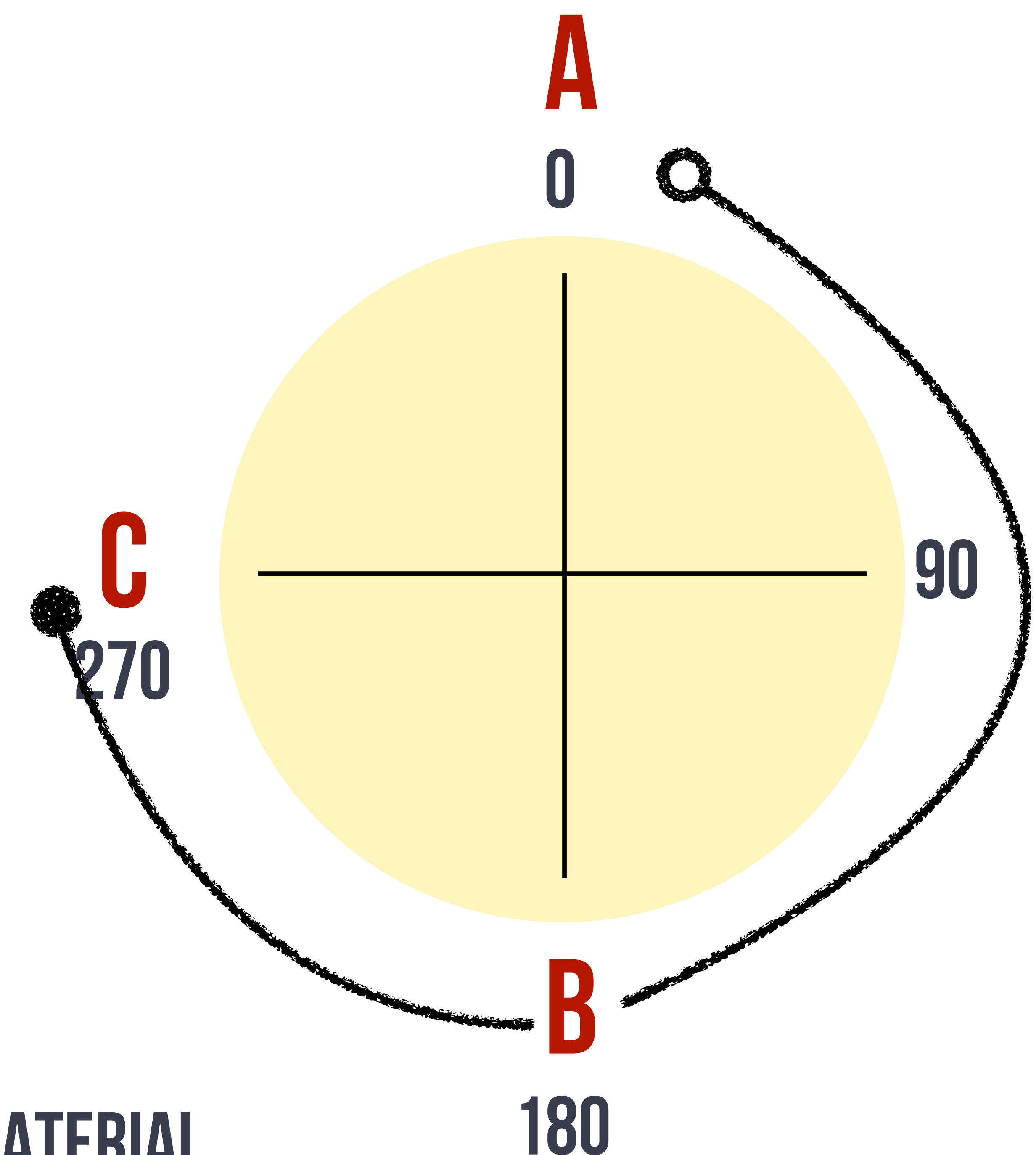
Most beginning watchmakers will not have this issue but it's important that I provide this as a bonus material for you guys to understand why we don't want anything higher than 320 degrees of amplitude.



Rebanking is an issue when the amplitude gets too high. Rebanking is when the balance wheel makes a near or complete 360 degree spin and touches the back side of the Pallet Fork horn. Don't focus too much on the complexities. Just know that once your amplitude numbers reaches greater than 320 degrees, you're running a high risk of the movement rebanking.

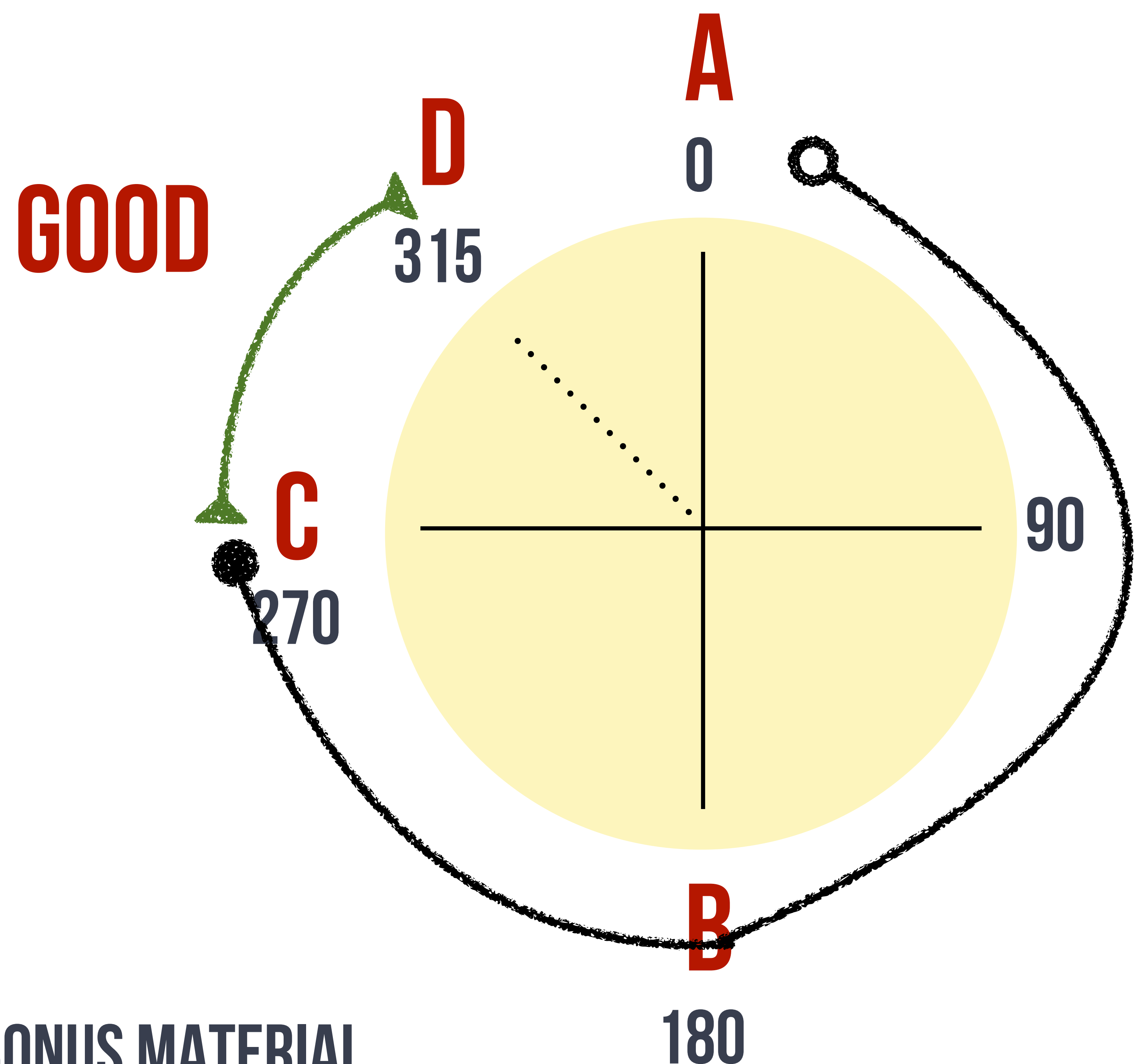
The easiest way I can explain it is by drawing this out step by step:

We know that the Balance Wheel moves in degrees. So let's say that A in this picture is dead point. By dead point, I simply mean the location in which the balance wheel is stationary with no power (no power reserve). From point A to point B, we can reasonably say that it's about 180 degrees correct? Good.



We can see here that from A to B is 180 degrees. From A to C is about 270 degrees. Can you see the issue now with the balance wheel coming a full 360 degrees?

Ideal amplitude is around 270 (I aim for minimum 275) to about 315. Can you see how we were able to get the ideal amplitude ranges now? If the Balance Wheel gets greater than 315, we're getting extremely close to 360 degrees. The Balance Wheel should never get to 360 degrees. If the Balance Wheel comes full circle, the roller jewel will knock the backside of the Pallet Fork horn and that would create a 3rd beat.



CAUSES FOR LOW AMPLITUDE

Unidentified Worn Pivots

Unidentified Worn Jewels

Unidentified Debris

Lack of sufficient oiling

Use of wrong oil

Escapement Issue

Bent or Damaged Mainspring

Problems with Hairspring

Problems with Balance Staff

Damaged Mainspring Barrel

Unnecessary Friction

Magnetism

Too Much Oil

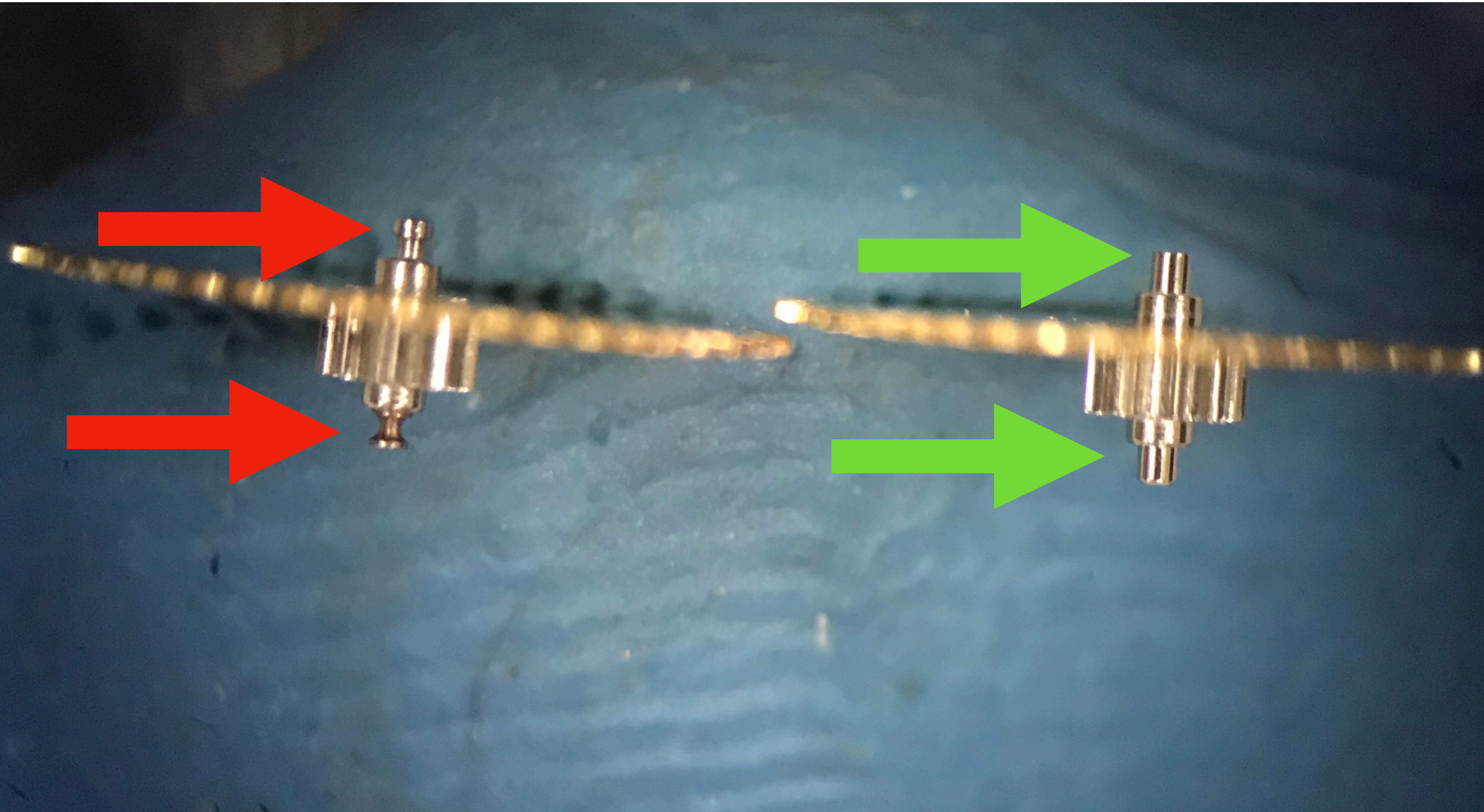
Too Little Oil

Too Much Endshake

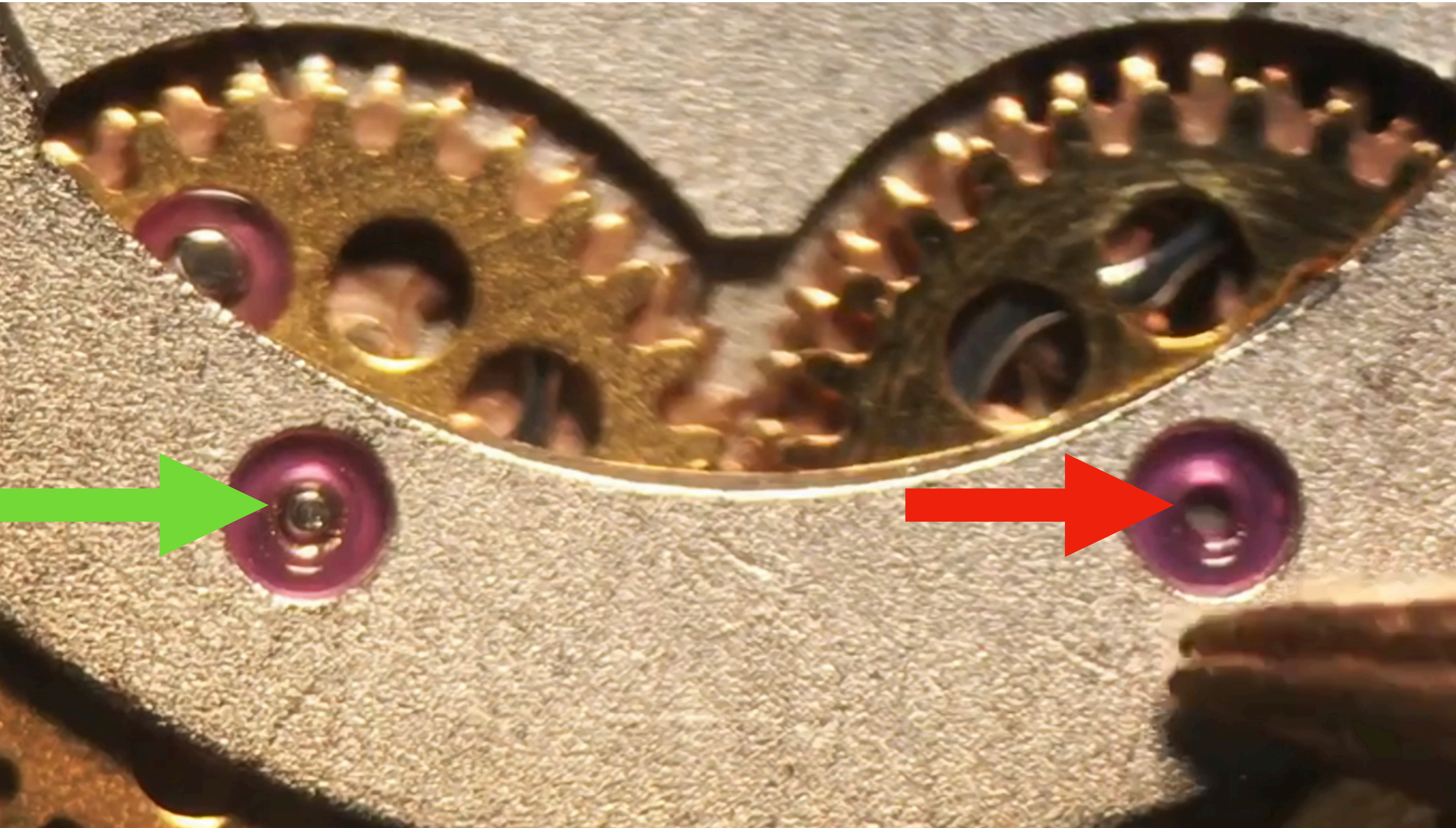
Insufficient Endshake

Hands Rubbing

UNIDENTIFIED WORN PIVOTS



UNIDENTIFIED BROKEN PIVOTS



DAMAGED MAINSPRING

USE OF WRONG OILS

WHAT DOES BEAT ERROR MEAN?

IF THE AMPLITUDE IS THE HEART RATE THEN THE BEAT ERROR IS THE BRAIN.

We can all agree that a healthy heart rate means nothing if the brain isn't functioning correctly. In the most laymen possible terms, the beat error is exactly that.

We always want the beat error to be as close to 0 as possible. 0.1 and 0.2 are in the good zones. 0.3 to about 0.6 is borderline and functional but not ideal. Anything higher than 0.6 is not good and requires either adjustment or some serious balance wheel work.

We want our brains to be as functional and on point as possible. Just like how we want our movements to be as accurate and sharp as possible with a 0.0 beat error. We'll go through some tough days where we're challenged mentally and we need to know that we can perform our best no matter what life throws at us. Just like how a watch will undergo different stressors in various positions.

By adjusting the movement to a 0.0 beat error, we can ensure that our watch can handle the different types of positions, shocks/impacts, and other stressors it might be subjected to. You'll notice that the beat error will vary in different timing positions. It's inevitable. We can't control it

But here's what we can control. We can make sure that we regulate the movement to the best of our abilities at Dial Down.

We regulate the beat error on the ETA 2892, 2824, and 7750 by moving the stud. The stud controls the beat error. When you're regulating the movement, make sure that the beat error is 0.0. If you do need some leeway, 0.2 should be the highest you ever let it go in Dial Down. By the time you're done regulating the movement in Dial Down, your beat error should be 0.0 to 0.2.

The beat error is also one of the things we look at during the diagnostic phase. Here's a common scenario, a customer brings in a watch that was recently purchased within a month and complains about the watch not keeping time**. A brand new watch generally follows the same timing specifications of 270 to 315 degrees of amplitude, 0 to 8 rate per day, and 0.0 to 0.2 beat error.** You check out the movement and put it on the timing machine. Amplitude is good. Rate is good. But the beat error is around 2.6. What is a possible scenario that could have occurred?

Here’s a tip, think about how you would regulate the beat error. You have to physically move the stud in order to adjust the beat error. So, if we know that the stud has to move in order to change the beat error, what could have occurred for the watch to go from within specifications of 0.0 to 2.6?

Impact damage, my friend. Knowing how we regulate the beat error, we know that there had to have been some form of shock to the watch that forced the stud to move. The only way the beat error is adjusted is by physically moving the stud. The watch sustained some form of impact damage that caused the stud to move ever so slightly. As you begin to regulate the beat error yourself, you’ll realize how little effort is required to go from 0.0 to 1.0 beat error.

WHAT DOES THE RATE MEAN?

THE RATE DETERMINES HOW MANY SECONDS THE WATCH WILL GAIN OR LOSE IN A DAY.

In other words, if we're still comparing it to the human body, think of the rate as how active you are. You'll find that some days you're faster and some days you're slower. For the most part, there's a baseline in which you operate from.

The rate is probably the easiest thing to understand for most people in watchmaking. It's one of those things that customers will come in and tell you. "My watch is running XYZ seconds fast a day!" or "My watch is running XYZ seconds slow a day!" Both are extremely common.

The rate is adjusted by moving the regulator pins. Much like the way we would adjust the stud or beat error, we would physically move the regulator on the balance wheel. Take caution in doing this. It's very easy to overcorrect or even damage the balance wheel in the process.


2892A2

WHAT IS THE DELTA & WHY DO WE NEED IT?

THE DELTA OF A WATCH IS THE DIFFERENCE BETWEEN THE SLOWEST AND FASTEST POSITIONS OR IN OTHER WORDS, THE LOWEST RATE COMPARED TO THE HIGHEST RATE.

The Delta is a good measure of how much the watch may fluctuate in all positions. It's an overall indicator in how much a watch can vary. It's denoted in the timing machine as a simple D. If you see a letter D, that's what it means.The industry standard for Delta is usually anything less than 20.

Let's say you have a Delta of around 10. We know that in any given position, the highest fluctuation in any given point is around 10. We know that the number is well within standards. The lower the Delta the better. It means that the rate of the movement is finely tuned with precision.

If a movement has a Delta of 40. Not ideal at all. In any given position, the movement can vary +/- 40 seconds a day. In this sense, can we really say the movement is precise?

BONUS MATERIAL

FULL WIND & HALF WIND IS KNOWN AS 0H & 24H

The industry will commonly refer to a fully wound watch as 0H or zero hour meaning that the mainspring barrel has been fully wound. It's commonly accepted as zero hour because that's the point of reference in which the watch is now beginning it's power reserve.

On the flip side, you'll realize that in a lot of technical documents there are positions called 24H or 24 hours. 24H denotes half wind. Like the 0H, it denotes where the watch is at now before the power reserve runs out. Since the power reserve is generally 48 hours long, when we say the watch in is 24H during the timing phase, we know that it's half way there to 48 hours.

Most companies check the Delta in full wind only. Other companies like Rolex would check their Delta between half wind and full wind.

HOW DO WE CALCULATE THE DELTA?

How do we get the delta?

It sounds more complicated than it is so here's the easiest way I can put it. It's the difference between the fastest position and the slowest position.

Take this timing result as an example:

	RATE	BEAT	AMPLTIUDE
CH	4	0.0	295
CB	4	0.1	294
9H	-8	0.3	270
6H	-9	0.2	269
3H	2	0.1	271
12H	-9	0.3	270

I've highlighted the section that I want you to focus on. Ignore the rest for now.

	RATE	BEAT	AMPLTIUDE
CH	4	0.0	295
CB	4	0.1	294
9H	-8	0.3	270
6H	-9	0.2	269
3H	2	0.1	271
12H	-9	0.3	270

These are the overall timing rates after you've completed regulating.

Can you tell me which position(s) is the slowest?

	RATE	BEAT	AMPLTIUDE
CH	4	0.0	295
CB	4	0.1	294
9H	-8	0.3	270
6H	-9	0.2	269
3H	2	0.1	271
12H	-9	0.3	270

Crown Left and Crown Right. We can see that they are both -9 seconds.

Is that the lowest (or slowest) so far? Yup.
Is there anything lower? Nope.

If there is anything lower then we need to make sure we identify it. If there was a position that had -10, you can be sure that would be considered the slowest position. It's very easy to glance over and miscalculate the lowest number. Again, we need to identify the lowest number in our timing results.

Now that we've identified that, **what is our fastest position(s)?**

	RATE	BEAT	AMPLTIUDE
CH	4	0.0	295
CB	4	0.1	294
9H	-8	0.3	270
6H	-9	0.2	269
3H	2	0.1	271
12H	-9	0.3	270

Is it Crown Up? +2? No.
We can see that in Dial Up and Dial Down, we have +4s.

Is there anything higher than that? Nope.

So we've now identified the slowest and fastest positions of -9 and + 4.

THE DEFINITION OF DELTA IS THE DIFFERENCE BETWEEN THE FASTEST AND SLOWEST POSITIONS.

So having said that, what is the difference between -9 and +4?

-9 MINUS +4 EQUALS -13
DELTA = 13

For the sake of easy math, the Delta is always a positive number. Simply because the number denotes the overall possible fluctuation. The negative or positive does not carry over or carry much weight.

WHAT IS THE AVERAGE & WHY DO WE NEED IT

THE AVERAGE IS A ROUGH CALCULATION OF SECONDS THAT THE WATCH WILL RUN DAILY

By knowing the average of a watch, we can have an overview of how well the watch will run on a day to day basis. It is usually denoted on the timing machine with an X. If you see an X in the timing machine results, that what it means.

If the average on a watch is +2. We can deduce that the watch will run on average +2 seconds in a given day. The acceptable tolerances for averages is around 0 to 8. As always, the lower the better.

HOW DO WE CALCULATE THE AVERAGE

The average is the sum of all the positions divided by the number of positions you're testing for. This let's us know the rates (in terms of seconds per day) that the watch will gain or lose in a day. Sticking with the same example for the Delta, let's calculate the average for the results below.

	RATE	BEAT	AMPLTIUDE
CH	4	0.0	295
CB	4	0.1	294
9H	-8	0.3	270
6H	-9	0.2	269
3H	2	0.1	271
12H	-9	0.3	270

4 PLUS 4 PLUS -8 PLUS -9 PLUS 2 PLUS -9 EQUALS -16

-16 DIVIDED BY 6 EQUALS -2.6667

We added all the rates in 6 positions and got a sum of -16. To calculate the average, we'll need to divide the sum by the number of positions we added. This is how we got -16 divided by 6 for an average of -2.6667.

BUT....

We know that our average is -2.6. That means that the watch is going to run a little slow on average. We want to keep the average in the positives so we'll need to adjust it.

Since we also know that +8 is the highest we should allow in the Dial Up and Dial Down positions, let's adjust our rates from +4 to +8 and see if anything changes.

	RATE	BEAT	AMPLTIUDE
CH	8	0.0	293
CB	8	0.1	295
9H	-4	0.3	269
6H	-5	0.2	271
3H	6	0.1	268
12H	-5	0.3	272

Our amplitudes and beat errors in certain positions will fluctuate just a tad bit and that is perfectly normal. As long as it isn't too drastic of a change. We can see that the amplitude changed slightly and that the beat error remained the same. No worries. We're focused on the rates column only for the average at the moment.

8 PLUS 8 PLUS -4 PLUS -5 PLUS 6 PLUS -5 EQUALS 8

8 DIVIDED BY 6 EQUALS 1.3333

X = 1.3333

Look what happened to our averages. It went positive! The -2.6 turned into a +1.3. This is ideal. You will come across situations like this where you'll have to gauge how much room you have left to play with.

As you come across more timing results from your own servicing, you'll start to get a rhythm in how to manipulate and play with the numbers so that you can get ideal readings.

FINAL TIMING CHECK LIST

1. Demagnetization of the Watch
2. Gear Train runs smoothly
3. Gear Train endshakes are good
4. Escapement oiling is good
5. Hairspring is Flat & Centered
6. Regulator Pins are Parallel with half the diameter of the hairspring
7. Regulate the movement in Dial Down
8. Make sure Beat Error is 0.0 to 0.2
9. Make sure Rate is adjusted to 0 to +8 Seconds
10. Amplitude is around 270 to 315
11. Calculate Timing Results for all 6 positions
12. Calculate Delta
13. Calculate Average

ETA CALIBERS

CALIBER	WINDING	Ratchet wheel turns to FW / & Up to" less 24 hrs" (rounded to .25)	THE BARREL MAKES 1 TURN IN (HOURS)	THEORETICAL RUNNING TIME (HOURS)	Lift angles in degrees
2000 -1	SELF	~9.10 / 4.25	4.86	~44.2	50
2004 -1	SELF	~9.10 / 4.25	4.86	~44.2	50
2094	SELF	~9.10 / 4.25	4.86	~44.2	50
2660	MANUAL	~7.60 / 3.50	6.03	~45.8	51
2671	SELF	~7.20 / 3.25	6.03	~43.4	51
2678	SELF	~7.20 / 3.25	6.03	~43.4	51
2681	SELF	~8.20 / 4.25	6.03	~49.4	51
2688	SELF	~8.30 / 4.25	6.03	~50.0	51
2801 -2	MANUAL	~8.50 / 4.50	5.86	~49.8	50
2804 -2	MANUAL	~8.50 / 4.50	5.86	~49.8	50
2824 -2	SELF	~7.70 / 3.50	5.86	~45.1	50
2834 -2	SELF	~7.70 / 3.50	5.86	~45.1	50
2836 -2	SELF	~7.70 / 3.50	5.86	~45.1	50
2846	SELF	~9.00 / 5.00	5.86	~52.7	50
2890A9	SELF	~8.10 / 4.00	5.86	~47.4	51
2891A9	SELF	~8.10 / 4.00	5.86	~47.4	51
2892A2	SELF	~8.10 / 4.00	5.86	~47.4	51
2893 -1	SELF	~8.10 / 4.00	5.86	~47.4	51
2893 -2	SELF	~8.10 / 4.00	5.86	~47.4	51
2893 -3	SELF	~8.10 / 4.00	5.86	~47.4	51
2894 -2	SELF	~8.10 / 4.00	5.86	~47.4	51
2895 -1	SELF	~8.10 / 4.00	5.86	~47.4	51
6497 -1	MANUAL	~6.75 / 3.50	7.30	~49.2	44
6497 -2	MANUAL	~8.30 / 5.00	7.30	~60.5	44
6498 -1	MANUAL	~6.75 / 3.50	7.30	~49.2	44
6498 -2	MANUAL	~8.30 / 5.00	7.30	~60.5	44
7001	MANUAL	~6.50 / 3.00	7.00	~45.5	50
7750	SELF	~10.50 / 5.75	5.00	~52.5	49
7751	SELF	~10.50 / 5.75	5.00	~52.5	49
7760	MANUAL	~10.50 / 5.75	5.00	~52.5	49

ANGLES OF LIFT, AMPLITUDES MAXI AND MINI IN ETA CALIBERS

SELF-WINDING CALIBERS	*AMPLITUDE MAXI (CH between 0.5 and 1.5 hours)*	*AMPLITUDE MINI (6H after 24 hours tol. – 0.5°)*	*ANGLE OF LIFT*
2000-1 & 2004-1	310°	190°	50°
2094	310° with chrono STOP	190° with chrono STOP	50°
2840--41	300°	190°	47°
2846	300°	190°	50°
2824--36	315°	200°	50°
2671 and derived ones	315°	190°	51°
2688	315°	190°	51°
2892A2 and derived ones	315°	210°	51°
2894-2	315° with crono STOP	190° with crono STOP	51°
7750 and derived ones	300° with chrono STOP	200° with chrono STOP	49°
MANUAL WINDING CALIBERS			
2660	320°	200°	51°
2801	320°	190°	50°
7760	300° with chrono STOP	200° with chrono STOP	50°
7001	320°	200°	50°
6497-1 6498-2	320°	180°	44°

DEVELOPMENT IN TURNS OF THE BARREL IN THE ETA CALIBERS

CALIBER	WINDING	DEVELOPMENT IN TURNS	THE BARREL MAKES 1 TURN IN (HOURS)	THEORETICAL RUNNING TIME (HOURS)
2000 -1	SELF	~9.1	4.86	~44.2
2004 -1	SELF	~9.1	4.86	~44.2
2094	SELF	~9.1	4.86	~44.2
2660	MANUAL	~7.6	6.03	~45.8
2671	SELF	~7.2	6.03	~43.4
2678	SELF	~7.2	6.03	~43.4
2681	SELF	~8.2	6.03	~49.4
2688	SELF	~8.3	6.03	~50
2801 -2	MANUAL	~8.5	5.86	~49.8
2804 -2	MANUAL	~8.5	5.86	~49.8
2824 -2	SELF	~7.7	5.86	~45.1
2834 -2	SELF	~7.7	5.86	~45.1
2836 -2	SELF	~7.7	5.86	~45.1
2846	SELF	~9	5.86	~52.7
2890A9	SELF	~8.1	5.86	~47.4
2891A9	SELF	~8.1	5.86	~47.4
2892A2	SELF	~8.1	5.86	~47.4
2893 -1	SELF	~8.1	5.86	~47.4
2893 -2	SELF	~8.1	5.86	~47.4
2893 -3	SELF	~8.1	5.86	~47.4
2894 -2	SELF	~8.1	5.86	~47.4
2895 -1	SELF	~8.1	5.86	~47.4
6497 -1	MANUAL	~6.75	7.30	~49.2
6497 -2	MANUAL	~8.3	7.30	~60.5
6498 -1	MANUAL	~6.75	7.30	~49.2
6498 -2	MANUAL	~8.3	7.30	~60.5
7001	MANUAL	~6.5	7.00	~45.5
7750	SELF	~10.5	5	~52.5
7751	SELF	~10.5	5	~52.5
7760	MANUAL	~10.5	5	~52.5

MAINSPRING DIMENSIONS IN THE ETA CALIBERS

CALIBER	WINDING	HEIGHT	THICKNESS	LENGTH	RUNNING TIME(MINI) IN HOURS
2000 -1	SELF	1.05	0.073	300	40
2004 –1	SELF	1.05	0.073	300	40
2094	SELF	1.05	0.075	280	36
2660	MANUAL	1.32	0.077	320	42
2671	SELF	1.32	0.077	290	38
2678	SELF	1.32	0.077	290	38
2681	SELF	1.32	0.077	290	38
2688	SELF	1.32	0.08	275	45
2801 -2	MANUAL	1.23	0.125	420	42
2804 -2	MANUAL	1.23	0.125	420	42
2824 -2	SELF	1.23	0.125	400	38
2834 -2	SELF	1.23	0.125	400	38
2836 -2	SELF	1.23	0.125	400	38
2846	SELF	1.23	0.11	450	45
2890A9	SELF	1.05	0.115	475	42
2891A9	SELF	1.05	0.115	475	42
2892A2	SELF	1.05	0.115	475	42
2893 -1	SELF	1.05	0.115	475	42
2893 -2	SELF	1.05	0.115	475	42
2893 -3	SELF	1.05	0.115	475	42
2894 -2	SELF	1.05	0.115	475	42
2895 -1	SELF	1.05	0.115	475	42
6497 -1	MANUAL	1.50	0.165	540	46
6497 -2	MANUAL	1.50	0.155	620	56
6498 -1	MANUAL	1.50	0.165	540	46
6498 -2	MANUAL	1.50	0.155	620	56
7001	MANUAL	1.02	0.12	300	42
7750	SELF	1.50	0.108	640	42
7751	SELF	1.50	0.108	640	42
7760	MANUAL	1.50	0.112	600	42