BASIC CHECKS AND SETTINGS OF A MECHANICAL WATCH

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1. Introduction

These instructions apply to the checks and basic settings that must be performed on a mechanical watch. The objective of this document is to assist watch service technicians in checking and adjusting the basic functions of a mechanical watch in a correct and efficient way. The chapters: **2.1 / 2.3 / 3.1 / 3.2 / 4.2** may also be used for the final check.

Here is the list of recommended devices:

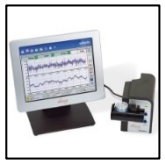
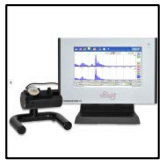
Image	Description	Use
	CHRONOSCOPE X1 (G2) WITSCHI 220/230V 5052000048	
	CHRONOSCOPE S1 (G2) 230V WITHOUT MICRO 5052000055	
	MICROPHONE MICROMAT S FOR S1 220/230V 5052000045	
	CYCLOMAT ELMA with 12 SUPPORTS 220 V 5059000131	

Image	Description	Use
	DEMAGNETIZER TESLASCOPE II 220V 505W000375	

2. Checks and settings for the rate

2.1. Preparation

Before performing any tests to measure the rate of the watch, you should make sure that:

- The devices are correctly calibrated and in perfect working order.

- The watch or movement is demagnetised.

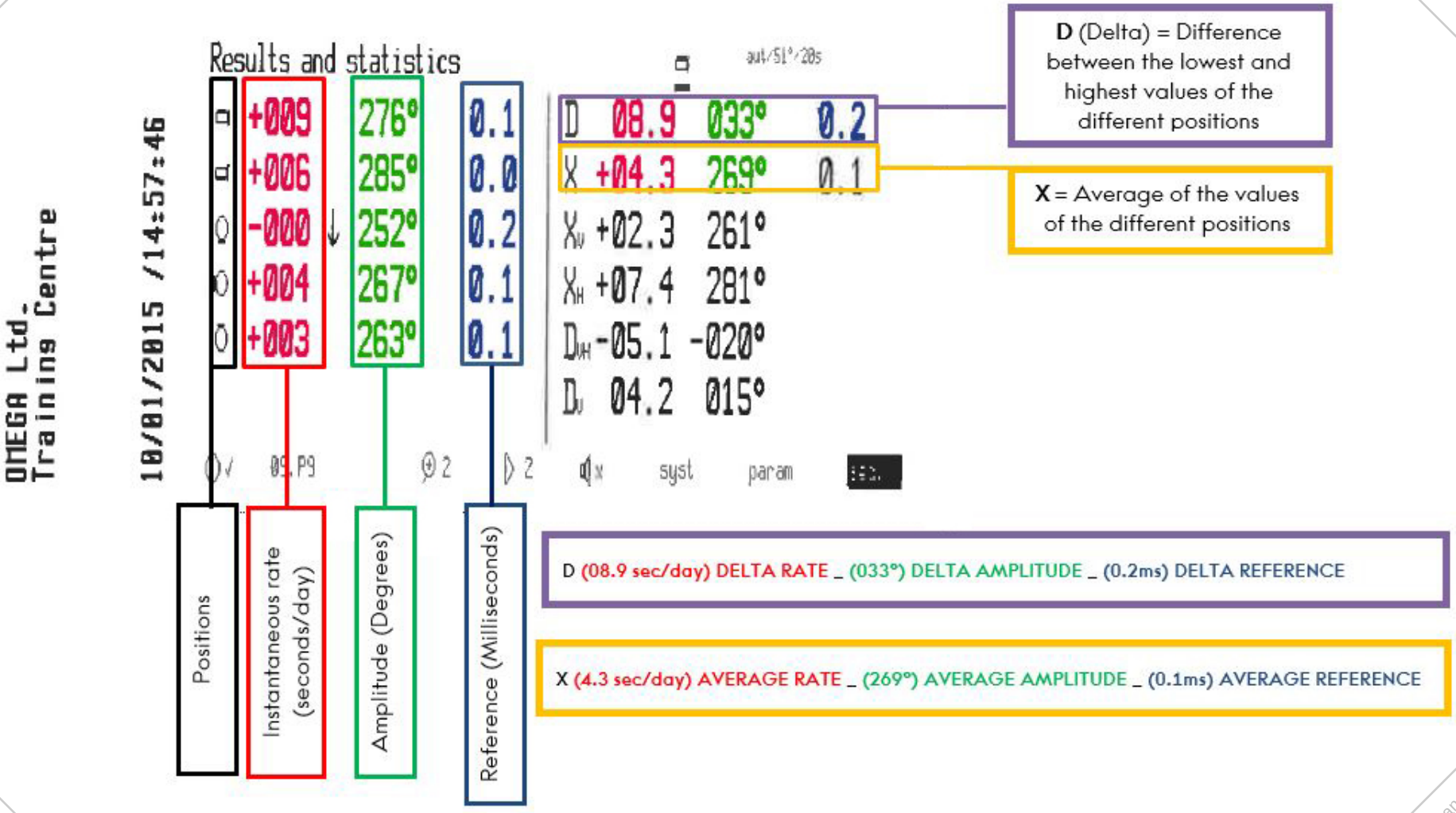
- The settings of the measuring instruments or programs are correctly adjusted to the type of movement.
- For example: lift angle, measuring time, positions that must be checked, etc.

All this information is given in: WORKING INSTRUCTION 28 RATE SPECIFICATION

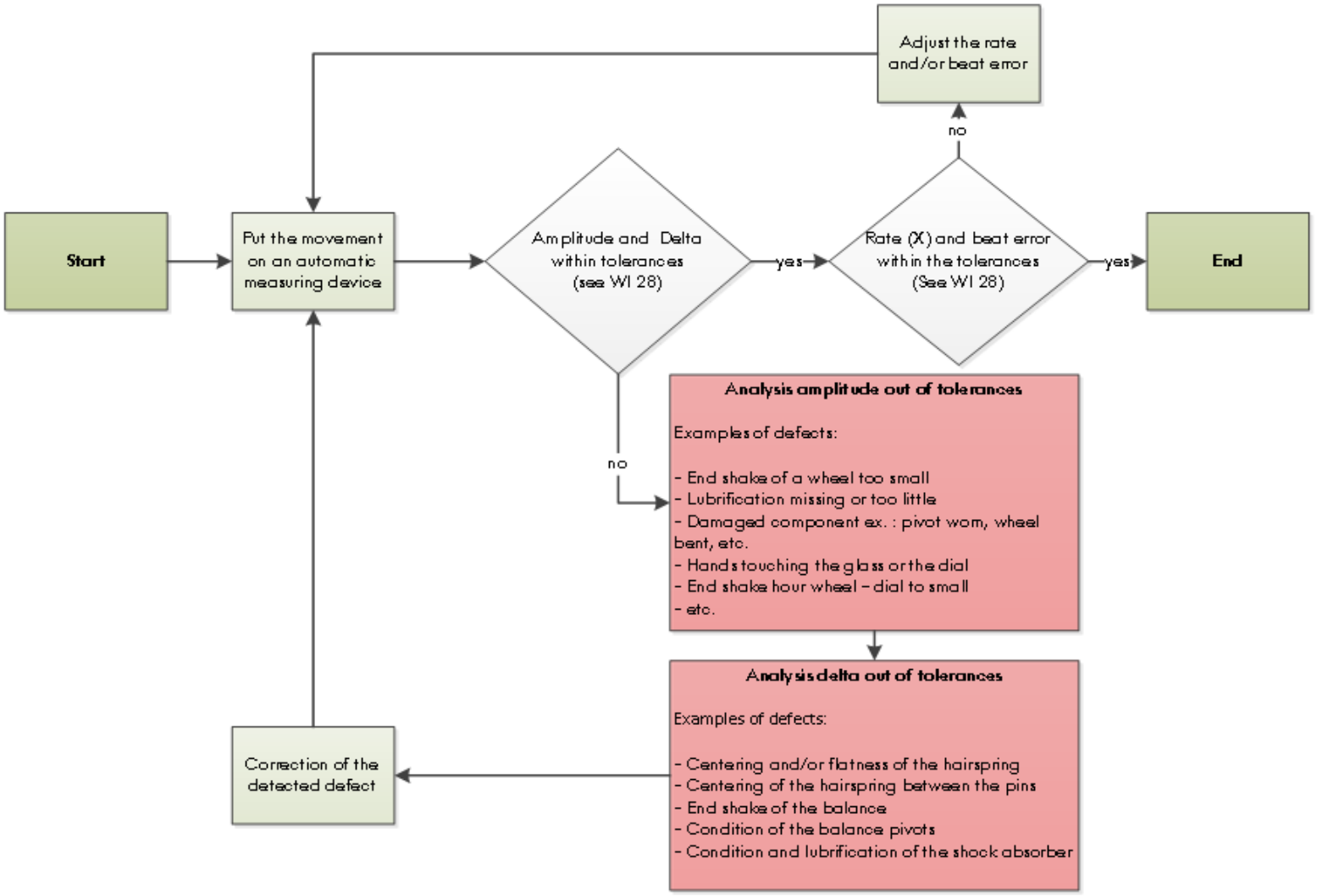
- The watch or movement should be correctly positioned on the measuring device:
  Dial at top and crown against the brace of the support (oriented toward the exterior of the support).

See the photos below:

2.2. Interpretation of results



2.3. Efficiently checking and correcting the rate



2.4. Checking 0h, 24h and power reserve

Exclusively for chronograph **Annex:** WORKING INSTRUCTION 49 CHECK LISTS FOR THE SERVICE FLOW OF A WATCH

1. *0H test*	2.	3.	4. 0H	5. Start chronograph
		 		
Completely raise the head of the watch and check the power (0H) (Tolerances: WI 28).	Engage the chronograph and stop it after 5 seconds.	Wait 10 minutes, the make sure that the hour counter is still lined up at 12h (control of the blocking mechanism). Then reset to zero.	Synchronization of the hour and date (to the second) using a reference clock. *Example: 05.09 / 9:29*	Engage the chronograph, synchronising it with the second hand.

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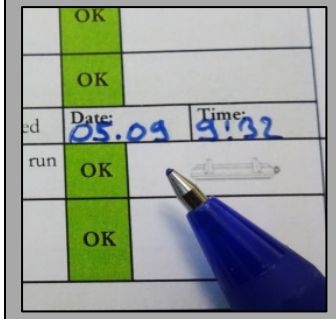
6.	7.	8.	9. 24H	10. Reset
				
Take note of the current reference date and time *Example 05.09 / 9:30*	Take note of the exact time that the chronograph was engaged *Example 9h32*	Place the watch in the FH position  and allow it to function for 24 hours.	After 24H (-0.5H/+1H): Check that the hour and date indicated are still synchronised with the clock of reference (+/- 30 sec.) *Example: 06.09 / 9:41*	Check the synchronization of the second hand compared to the chronograph hand, as well as the indication of the hour and minute counters compared to the time that has passed since 3.1. Then reset to zero.

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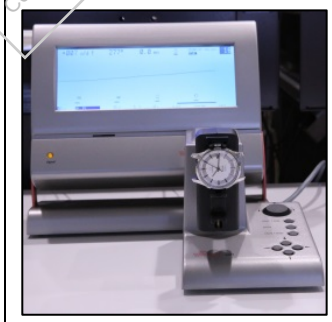
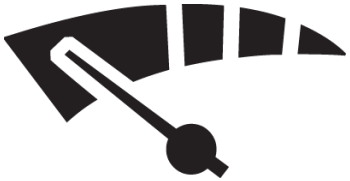
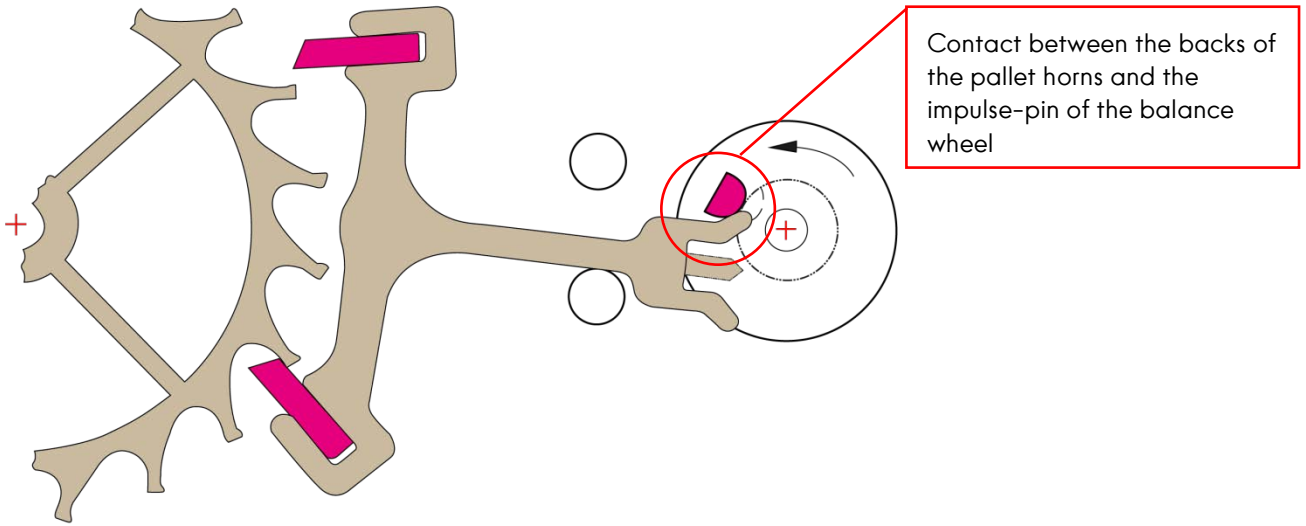
11. 24H test	12. *Power reserve*	13.
		
Checking that the watch is working after (24h) on an automatic measuring device (Tolerances WI 28).	Place the watch in the CH position  and allow it to operate until it stops. *Example: 07.09 / 22:30*	When the watch stops: Calculate the power reserve (the time that has passed from point 6 to point 12, for example: from 05.09 at 09:30to 07.09 at 22:30= 61 hours of power reserve). The power reserve should last at least as long as the power reserve time given by WI 28.

3. Detection and correction of knocking

3.1. Explanation of the case

Knocking is a defect arising from the balance wheel swinging at too high of an amplitude, making the impulse-pin of the balance wheel "knock" (make contact) with the backs of the pallet horns.



This defect causes a significant advance in the time displayed and in unstable rate.

In most cases, knocking is detected in horizontal positions when the movement is completely wound, and when the amplitude is over the maximum amplitude tolerance levels:

- **310° for self-winding watches**
- **325° for hand-winding watches**

3.2. Detection of defect

Hand-winding watch:

Completely wind the watch or movement, then place it in a horizontal position on a measuring device (check both horizontal positions).

- Check that the amplitude is not superior to **325°**
- Check that the chart of the rate remains stable.

Self-winding watch:

Completely wind the watch or movement, then place it in a horizontal position on a measuring device (check both horizontal positions).

Check that the amplitude is not superior to 310°

- Check that the chart of the rate remains stable.

To simulate the self-winding of the movement: it is necessary to test it by making a slight winding movement as you check the chart of the rate.

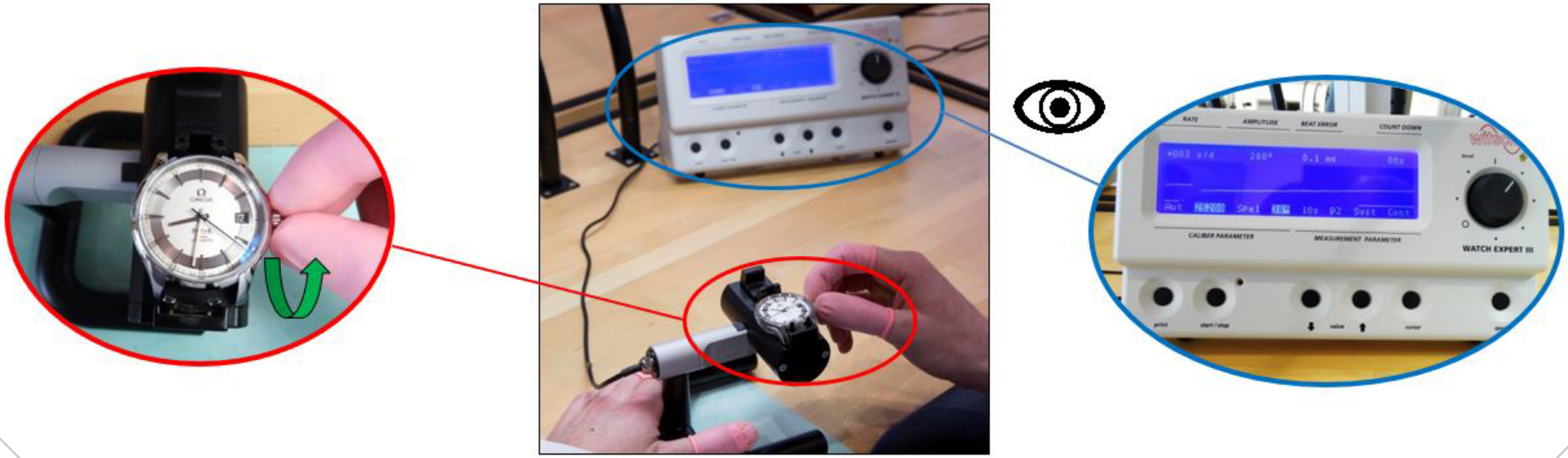
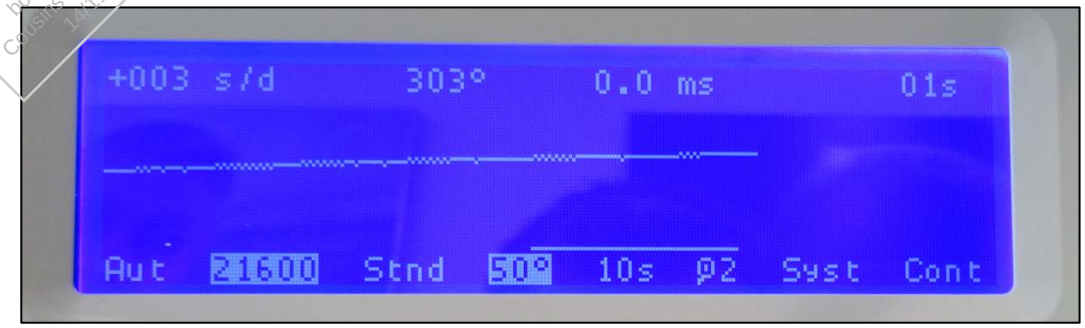
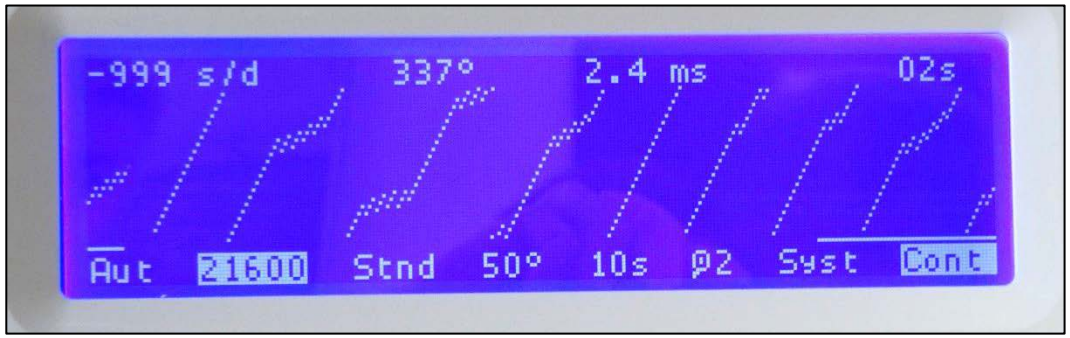


Chart of the rate analysis:



✓ No knocking observed, rate remains stable



✗ Knocking observed, rate is unstable and displays a significant time advance

3.3. How to eliminate knocking:

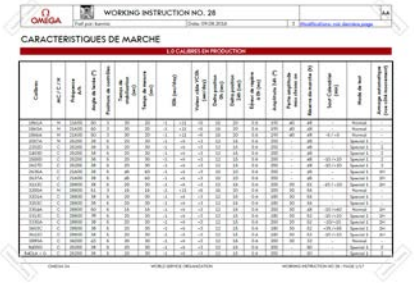
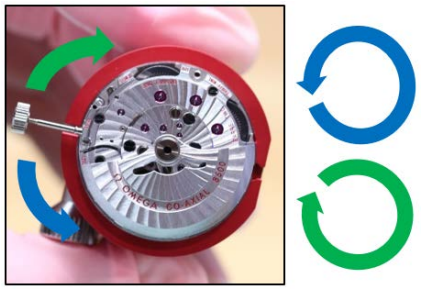
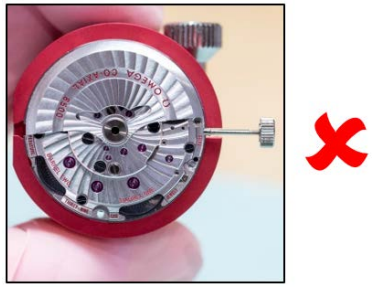
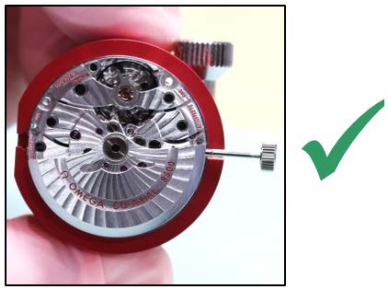
In most cases, the cause of knocking is directly related to the barrel and its mainspring.

In case of knocking it is therefore necessary to check again that the barrel is in good condition: the barrel arbour, drum, cover and mainspring. Exchange the components that are in poor condition or the entire barrel. Consult: WORKING INSTRUCTION 67 RECYCLING A COMPLETE BARREL

If the knocking continues: Replace the lubrication on the bridle facing the dial (or the movement if the dial is already installed) with colourless **Moebius SYNT-HP-1300** oil. This will reduce the amplitude by approximately 10-15°. If this operation is not sufficient, the bridle on the other side may be lubricated with colourless **Moebius SYNT-HP-1300** oil.

4. Winding test for self-winding watch

4.1. Checking of the free movement and functioning of the oscillating mass

1.	2.	3.
		
Consult WI 28 to find out whether the winding is: bidirectional (2) or unidirectional: (1H) = clockwise / (1AH) = counter-clockwise.	Turn the oscillating mass in the winding direction using a plastic pin. Perform this test in both directions if bidirectional (2).	Check that the ratchet or barrel turns when the oscillating mass is moved. (The barrel is wound by the self-winding system).
4.	**5.**	**6.**
		
Hold the watch in a vertical position, then turn the movement in the rotation axis of the mass. Perform this test in both directions. The test is performed: The barrel is completely wound.	KO the oscillating mass does not move back down, it is not moving freely.	OK The oscillating mass goes back down (moves freely) no matter what the vertical position of the watch is.

4.2. Checking on a self-winding device

- Place the **completely unwound** watch on a self-winding device.
- Allow the device to wind the watch. **Winding time is estimated according to the following table.**
- Use a winding device with a speed of **4 rotations/min**. Devices with 1 rotation/ min are too slow to simulate a realistic situation.

This table exclusively refers to a speed of: **4 tour/min.**	All watches with stop seconds: **The stem should be completely pulled out** (balance wheel locked)	Watches without stop seconds
Automatic system with **unidirectional** winding system	**6h20**	**7h30**
Automatic system with **bidirectional** winding system	**4h10**	**4h35**

- Remove the watch from the device and check the power reserve: See chapter **2.3 Checking 0h, 24h and power reserve.**

Conclusion:

Case 1: The power reserve is equal or superior to the values given in WI 28**:** This means that the self-winding mechanism is operating correctly.

Case 2: The power reserve is inferior to the values given in WI 28**.**

2A) This means that the self-winding mechanism is not operating correctly.

Example:

- Too much lubricant on the ball bearing of the oscillating mass; the oscillating mass is therefore blocked and/or is not completely free.
- The oscillating mass is coming into contact with a bridge or the bottom of the case; the rotation or rotation point of the mass is too loose.
- Defective reverser.
- Defective sliding wheel spring.

2B) Or there is a resistance/blockage in the movement.

Example:

- Resistance when calendar jumps (if the watch stopped when the date jumped).
- Too much tension in the jumper spring of the chronograph's minute counter (if the watch stopped when the minute counter jumped).
- Defective barrel (check: drum, cover, arbor and mainspring).

5. History of modifications

Document history		
Date	Made by	Miscellaneous modifications
01.02.2017	Hugism	This document has been almost completely redone. It includes the following Working Instructions. No. 5, No. 9 and No. 12.