

CALIBRE

1370

25.60 Q SCS CAL CORH CORM CORS 7 jewels

Description et performances

The caliber 1370, destined for a man's electronic watch with analogical display, is fitted with a quartz vibrating 32768 times per second which ensures an accuracy of 5 seconds per month during wear, adjusted to this degree if necessary.

This watch, which indicates the hour, minute, second and the date, is still relatively slim in spite of all the functions it offers.

Correction of the minute and second is a very simple process thanks to an electronic hand-setting system controlled by a pusher located in the crown.

In drawn-out position, the crown enables correction of the hour (time zone) and date to be effected without disturbing the function of the watch.

The very simple and entirely modular conception of the movement ensures maximum servicing facility.

1. PRINCIPLE

The quartz resonator (1) is maintained at its selfsame frequency of 32768 Hz by an oscillator circuit (2). The frequency is adjusted by a trimmer (4) which enables corrections to be made within limits of ± 1 second per day. Sometimes a fixed condenser (3) will be found, allowing the centering of the adjustment field.

The quartz oscillations are conveyed to the binary divider (5) which emits a signal at the frequency of 1 Hz. This signal is formed and amplified by a control stage (6) which sends

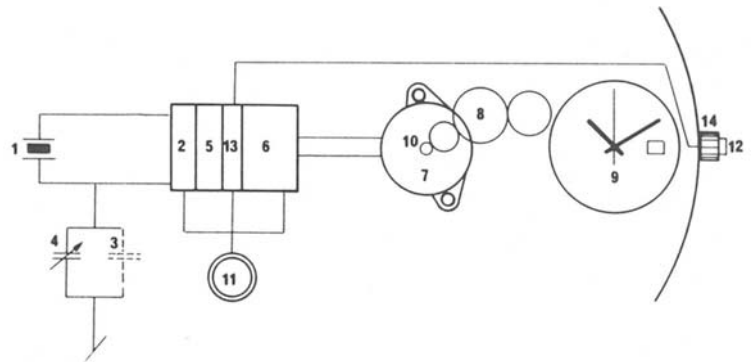
alternating polarity impulses to the motor coil (7). The magnetic field induced by these impulses causes the rotor to advance at the rate of one stop per second.

The motion of the motor is transmitted to the wheel-train (8) and display (9) through the medium of a pinion fitted on the rotor axle (10).

The battery (11) supplies the necessary energy to the integrated circuit which feeds both quartz and motor.

The push-button (12) located in the center of the crown controls a logical circuit (13) which conveys to the motor the necessary data for correction of the second (gain or loss). This same push-button also enables the motor to be set at fast rate for correction of the minute hand.

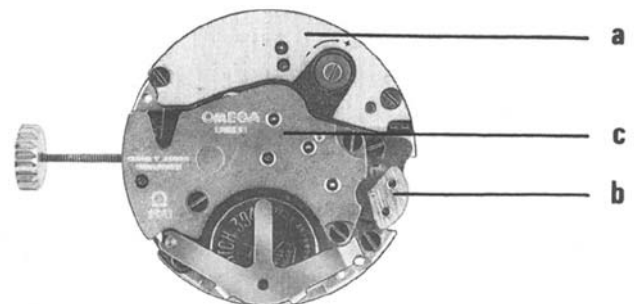
The crown (14) has a resting position without function. In drawn-out position, it allows correction of the hour hand and the date to be effected.



2. DESCRIPTION OF MOVEMENT

The movement is composed of three modules:

- The electronic module with its quartz forms the time basis.
- The motor module which converts electric time data into rotating mechanical motion.
- The display module grouping together the indicating and correcting systems.



a) Electronic module

The electronic components:

quartz Q
possible fixed condenser C
trimmer T
monolithic integrated circuit CI

are fixed on a printed circuit and together form the electronic module.

Connection with the motor is ensured by 2 contact bridges.

The battery feeds the module through the negative contact spring, return of the current being obtained through the gilt screws. The integrated circuit groups together approximately 400 transistors on a surface of 5 mm². It fulfils several functions which figure in the following block-plan (Fig. 1):

The oscillator circuit CO maintains vibration of the quartz at 32768 Hz.

The frequency dividing circuit CD, formed by 15 binary levers (divider by 2), converts the oscillator signal into impulses of 1 Hz. A connection on the 10th dividing stage enables the required frequency of 32 Hz to be used for time-setting purposes.

The control stage CM feeds the motor (M) with alternating impulses of suitable amplitude and duration.

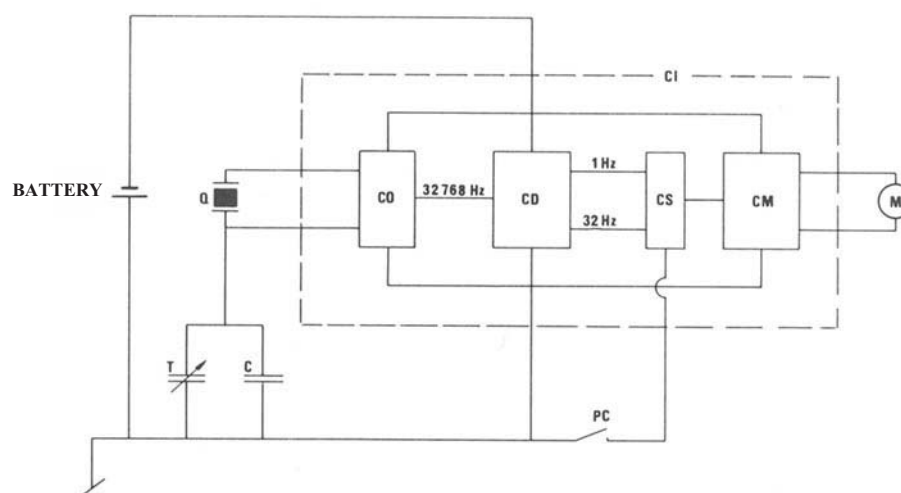
The rate selector CS is controlled by the crown pusher PC. This single pusher enables the following 3 functions to be carried out:

a) A brief push produces an additional impulse between 2 normal impulses, and the watch advances one second.

b) A prolonged push stops the impulse train. The motor remains at a stop as long as the pusher is pressed.

c) To switch the motor onto the fast rate at 32 Hz, the following operations must be carried out:

press the pusher for 5 seconds, release briefly, press again. The motor turns at fast rate as long as the said pressure is maintained, and then resumes its normal rate.



b) Motor module

This motor is of the electromagnetic, rotating, step-by-step type. When working normally, it receives a driving impulse every second.

However, when time correction takes place, the motor receives 32 impulses per second.

It consists chiefly of the following units:

magnetic circuit (1), (2), (3)
rotor (4)
pinion (5)
coil (6)
bridge (7)
printed circuit (8)

The motor functions in the following manner:

When a current goes through the coil (6), a difference in magnetic potential is set up between the parts (1) and (2) of the magnetic circuit, creating a magnetic field around the air-gaps (9). This field in its turn exerts forces on the rotor teeth (4), the result of which is a torsion couple.

Connection of the motor is ensured by the printed circuit (8) against which rest 2 blade-springs belonging to the electronic module.

c) Display module

This module comprises:

on the movement side:

the battery

the wheels: intermediate, second, third, center, as well as the minute wheel

the mechanism

on the dial side:

the remainder of the reducing wheel-train with the setting wheel

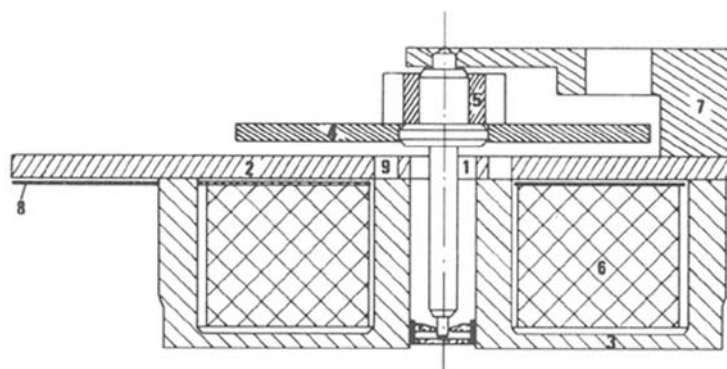
the date

Wheel-train

The motor pinion (1) drives, through the intermediate wheel (2): the second wheel (3), the third wheel (4), the center wheel (5), the double minute wheel (6 and 7), and the hour wheel (8). Fig. 2

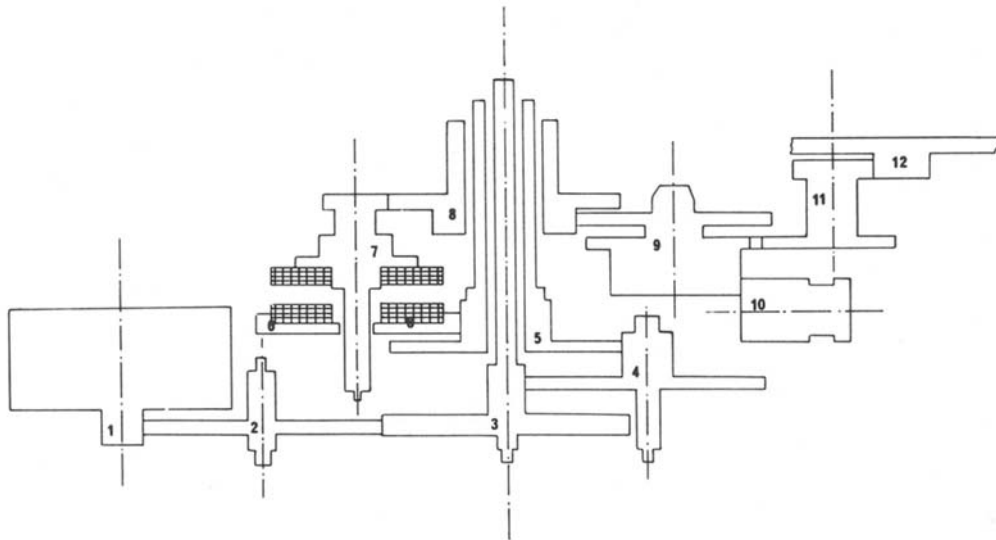
Date

The hour wheel drives the setting wheel (9) which on the one hand meshes with the clutch wheel (10) and, on the other hand - by means of a finger - with the date indicator driving wheel (11). A pinion forming part of the date indicator driving wheel drives the date indicator (12). Fig. 2

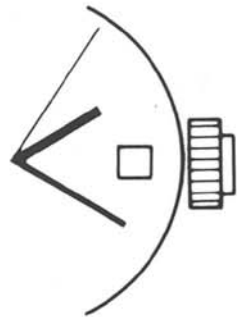


Time corrector

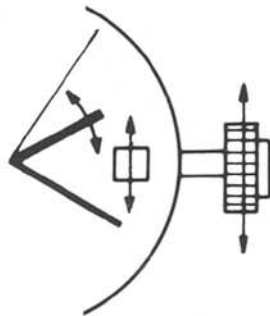
The minute wheel consists of 2 superposed units (6 and 7), magnetically coupled by means of the magnetized washers. When the hand-setting stem is in resting position, the wheel operates as one single unit. In drawn-out position of the stem, the hour wheel (8) as well as the minute wheel plate (7), are driven by the clutch wheel (10) and setting wheel (9) without losing the exact indication of second and minute, the magnetic couple of the minute wheel being weaker than the couple conveyed by the motor.



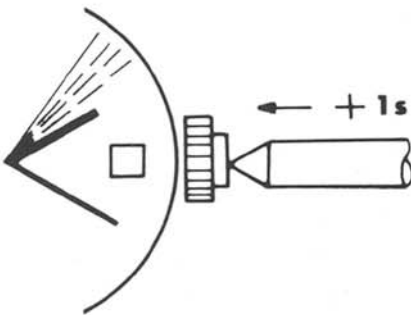
3. FUNCTIONING OF THE CORRECTING DEVICES



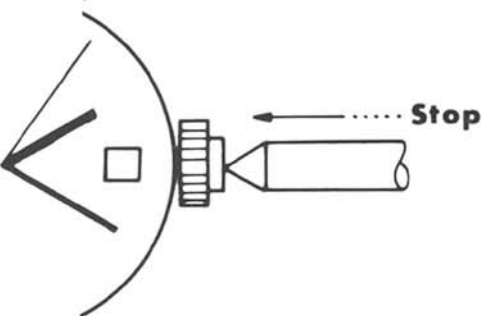
Stem in position 1
no function



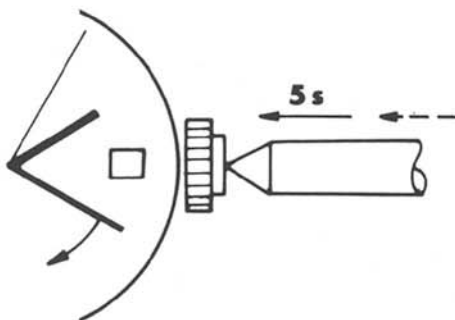
Stem in position 2
correction of the hour (time zone) and the date



Press pusher briefly several times
the second advances one step with each push



Continued pressing of pusher
the second stops



Press pusher for 5 seconds
release briefly
press again

rapid advancement of the minute hand (1 dial revolution in 2 minutes); after this operation correct position of the hour hand if necessary.

TECHNICAL DATA AND PERFORMANCE OF CALIBER 1370

Dimensions	Diameter 25,60 mm
	Height 4,80 mm
Frequency of resonator	32768 Hz = 2^{15}
Quality factor	Typical 100'000
Thermic coefficient	0.1 s/d for a variation of ± 5 C
Consumption	typical 3.4 μ A maxi 4.0 μ A
Running time with 67 mAh battery	guaranteed 12 months typical 24 months (SSIH battery No. 9917)
Variation during wear	better than ± 5 seconds par month
Resistance to shocks	shocks conforming to NIHS norms : residual affect recoverable through adjustment system
Resistance to magnetic fields	NIHS magnetism test : no affect
Temperature functioning limits	from 0 to + 60° C

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Checking and maintenance

DIAGNOSTICS

	No of operations to be followed
Disassembling	1.0 to 5.17
Assembling	6.0 to 11.4
Changing of battery	1.1 + 2.1 + 2.2 + 10.1 + 10.2 + 11.1 + 11.3 + 11.4
Rate adjustment	11.1 to 11.4
Exchange of motor	1.1 + 2.1 + 2.2 + 3.1 + 8.1 to 8.3 + 10.1 + 10.2 + 11.1 + 11.3 + 11.4
Exchange of electronic module	1.1 + 2.1 + 2.2 + 4.1 + 7.1 + 8.2 + 8.3 + 10.1 + 10.2 + 11.1 to 11.4
Exchange of movement	
a) removal of old movement	1.1 to 1.5
b) preparation for new movement	1.2
c) fitting of new movement	9.1 + 9.2 + 9.4 + 9.5 + 11.1 to 11.4

ORDER OF OPERATIONS	PART NO.	FIXING DEVICE	REMARKS
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DISASSEMBLING

1.0 EXTERIOR

1.1	Open the back			
1.2	Handsetting stem	1370.9100		Unscrew 2 turns the setting lever screw
1.3	Uncase			
1.4	Hands			
1.5	Dial			

2.0 BATTERY

2.1	Battery clamp	1370.9033	1 screw 2731	
2.2	Battery	9917 or Varta 524		

3.0 MOTOR

3.1	Motor	1370.9400	1 screw 2731	Between 2,5 and 3,5 K W
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4.0 ELECTRONIC MODULE

4.1	Electronic module	1370.9600	2 screws 2732	<ul style="list-style-type: none"> - Do not wash the electronic module - Observe position of the quartz earth clamp No 1370.9661 and replace it in the same position should it fall off during the cleaning of the plate, for example.
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ORDER OF OPERATIONS	PART NO.	FIXING DEVICE	REMARKS
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5.0 DISPLAY MODULE

5.1	Train wheel bridge	1370.9005	3 screws 2731	
5.2	Intermediate wheel	1370.9247		
5.3	Second wheel	1370.9242		
5.4	Third wheel	1370.9208		
5.5	Center wheel	1370.9240		
5.6	Maintaining ring	5204		
5.7	Minute wheel	1370.9221		See later under 5.7.0
5.8	Double-function spring	1370.9107	1 screw 2731	
5.9	Setting lever	1370.9102	1 screw	The screw and setting lever cannot be disassembled
5.10	Clutch wheel	1370.9101		
5.11	Stem bridge	1370.9007	1 screw 2731	
5.12	Setting wheel	1370.9217		
5.13	Date indicator driving wheel	1370.9232		
5.14	Date indicator maintaining plate	1370.9020	2 screws 2733	
5.15	Date indicator	1370.9235		
5.16	Friction spring	1370.9295		
5.17	Hour wheel	1370.9244		

5.7.0 Cleaning of the
minute wheel

1370.9221

For this operation, separate the axle from the wheel. The magnetic components should not be washed in the cleaning machine but in a benzine jar, this bath being perfectly clean and free from any metallic particles. The cleanliness of the magnets should, however, be checked.

ORDER OF OPERATIONS	PART NO	FIXING DEVICE	LUBRICATION		REMARKS
			POINT	CODE	

ASSEMBLING

6.0 DISPLAY MODULE

6.1	Main plate	1370.9000			Pillars on top
6.2	Stem bridge	1370.9007	1 screw 2731		
6.3	Clutch wheel	1370.9101		groove 1.03	
6.4	Handsetting stem	1370.9100		functions 1.03	
6.5	Setting lever	1370.9102	1 screw	functions 1.03	
6.6	Double-function spring	1370.9107	1 screw 2731		
6.7	Minute wheel	1370.9221		pivoting: 1.03 plate side	The 2 constituent parts of the minute wheel form a whole which must in no case be taken apart
6.8	Maintaining ring	5204			
6.9	Center wheel	1370.9240			
6.10	Third wheel	1370.9208			
6.11	Second wheel	1370.9242			
6.12	Intermediate wheel	1370.9247			
6.13	Train wheel bridge	1370.9005	3 screws 2731		
6.14	Date indicator driving wheel	1370.9232			
6.15	Setting wheel	1370.9217		post 1.03	Finger opposite to date indicator driving wheel
6.16	Date indicator	1370.9235			

ORDER OF OPERATIONS	PART NO	FIXING DEVICE	LUBRICATION		REMARKS
			POINT	CODE	
6.17 Hour wheel	1370.9244		Centre tube, housing of hour wheel	1.03 Exterior cogs of hour wheel	Apply with leather buff soaked in oil
6.18 Friction spring	1370.9295				
6.19 Date indicator maintaining plate	1370.9020	2 screws 2733			

7.0 ELECTRONIC MODULE

7.1 Electronic module	1370.9600	2 screws 2732			
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8.0 MOTOR

8.1 Motor	1370.9400	1 screw 2731			One screw only on electronic module side
8.2 Check consumption					$\leq 4,0 \mu A$
8.3 Check mini tension					$\leq 1,35 V$

9.0 EXTERIOR

9.1 Dial					
9.2 Hands					Support the pivot of the second wheel
9.3 Remove handsetting stem	1370.9100	1 screw			Unscrew 2 turns the setting lever screw
9.4 Case up		2 screws 2679 2 clamps			
9.5 Handsetting stem	1370.9100	1 screw			

ORDER OF OPERATIONS	PART NO	FIXING DEVICE	LUBRICATION		REMARKS
			POINT	CODE	




10.0 BATTERY

10.1 Battery	9917 or Varta 524				
10.2 Battery clamp	1370.9033	1 screw 2731			

11.0 ADJUSTMENT OF THE RATE

- 11.1 Open the case, place watch without back on the captor (movement side up) and press key " $\angle 15$ Hz" of Deltatest (1 Hz for ODT 1)
- 11.2 Adjust watch by means of trimmer, avoiding any possible pressure during this operation. Correct the rate according to the client's indications, or to + 0,20 s/d. (back open).
- 11.3 Close the case, and check that the rate is at + 0,20 s/d. (the effect of the back is negligible, thanks to the protection of the electronic module)
- 11.4 Water-resistant models : check water-resistance.

DIAGNOSTICS 1370

LEGEND :  INVESTIGATE FURTHER  FAULT DETECTED  CORRECTION (SEE ORDER OF OPERATIONS PAGE 1 CHECKING AND MAINTENANCE)

