

## **CALIBRE**

**1350**

**R13 Q CORH CORM 2 jewels (13 x 15.15 x 3.35)**

### **Description and performances**

Quartz watch of particularly small dimensions.

Its quartz resonator, vibrating 32,768 times a second, ensures an accuracy of a few seconds per month during wear. One section of the integrated circuit replaces all the parts of the conventional time-setting mechanism.

The caliber in question displays the hour and minute, the minute hand advancing one step each minute.

Only one button exists on the watch case. This control device permits correction of the hour or time zone, as well as adjustment of the minute-jump phase.

## 1. FUNCTIONING PRINCIPLE

The quartz resonator (1) is kept at its sound frequency (32.768 Hz) by the oscillator maintenance circuit (2). The frequency-adjusting condenser (3) makes it possible, to adjust the rate within limits of  $\pm 0.6$  s/d at the factory. The frequency issuing from the oscillator is then divided by binary stages (4) until 1 Hz and then until 1 impulse per minute.

A control stage (5) delivers the alternating impulses to the motor (6). The magnetic field induced by these impulses causes the rotor to advance at the rate of 1 step every minute.

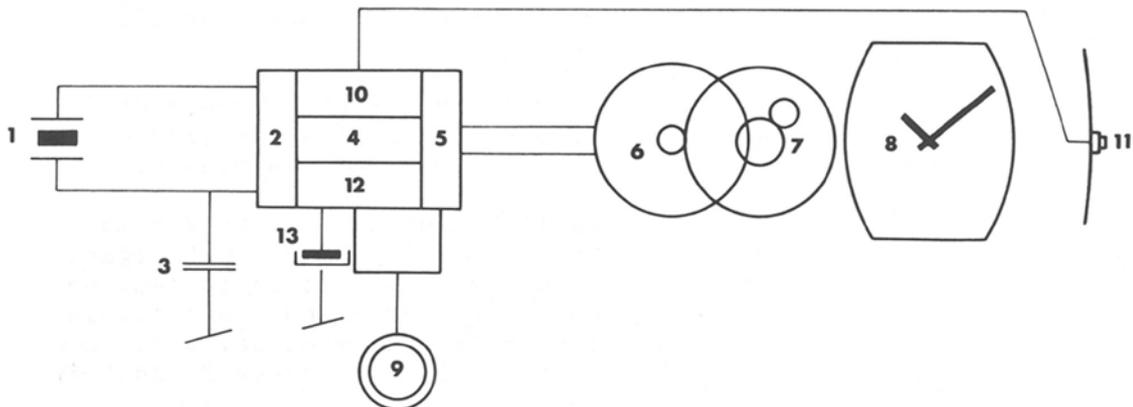
This motion is transmitted to the wheel-train (7) and display (8) through the medium of a pinion fitted on the motor axle. A differential wheel-train drives the hands.

The battery (9) supplies the necessary energy to the integrated circuit which feeds both quartz and motor.

The logical circuit (10) allows, by means of the pusher (11)

correction of the minute,  
correction of the hour or time zone,  
correction of the minute-jump phase.

The decoupling circuit (12) permits stabilization of the tension on the oscillator and dividing circuit by means of the electrolytic condenser (13).



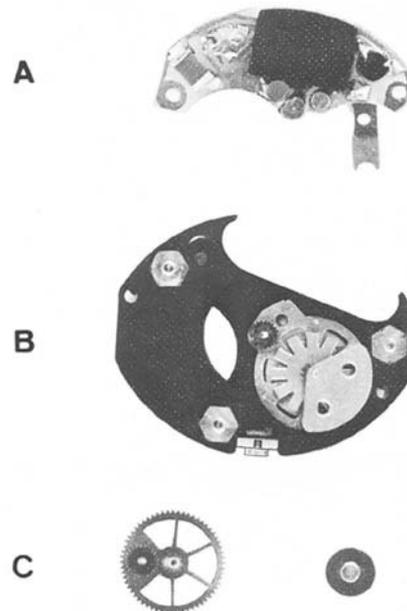
## 2. DESCRIPTION OF MOVEMENT

The movement consists of two modules and a set of wheels.

A) The electronic module with the quartz and integrated electronic circuit.

B) The motor module, fixed on a plastic framework, bearing in its center the fixed setting wheel, element of the differential wheel-train.

C) The display system consisting of the free cannon-pinion with its 2 satellite setting wheels as well as the hour wheel.



## 3. ELECTRONIC MODULE

The following are the electronic components of the module

Quartz "Q"

Frequency-adjusting condenser "Caj"

Tension-stabilizing condenser "C" for oscillator "CO" and divider "CD"

Monolithic integrated circuit "CI"

The integrated circuit comprises several functions which can be distributed as follows

CO: Oscillator circuit

CD: Dividing circuit

CS: Correction-selecting circuit

CP: Phasing + minute addition + normal rate circuit

CH: Hour correction circuit

CM: Motor circuit

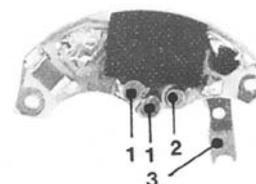
CC: Decoupling circuit

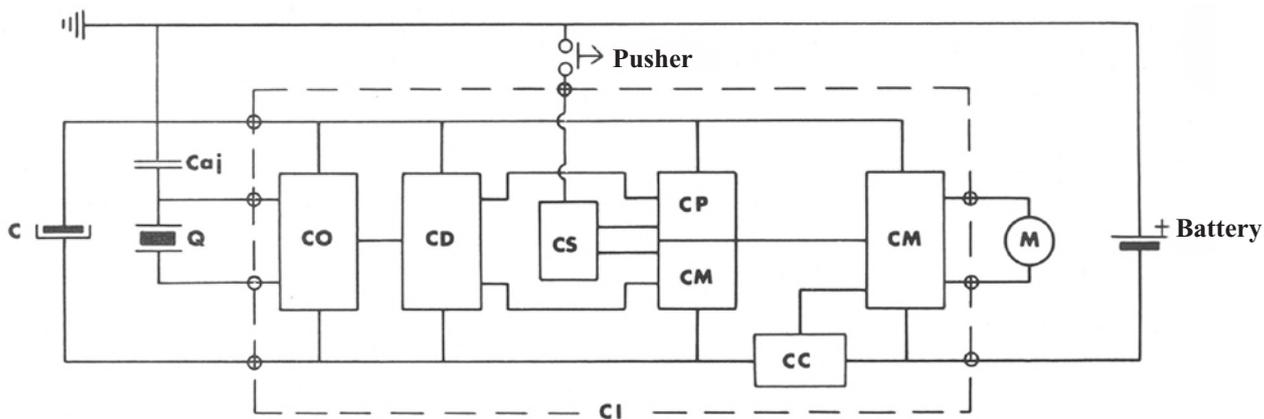
The connecting elements are

2 motor contact-studs (1)

Connecting-pin for control blade (2)

Negative conduction blade for the battery (3)





#### 4. MOTOR MODULE

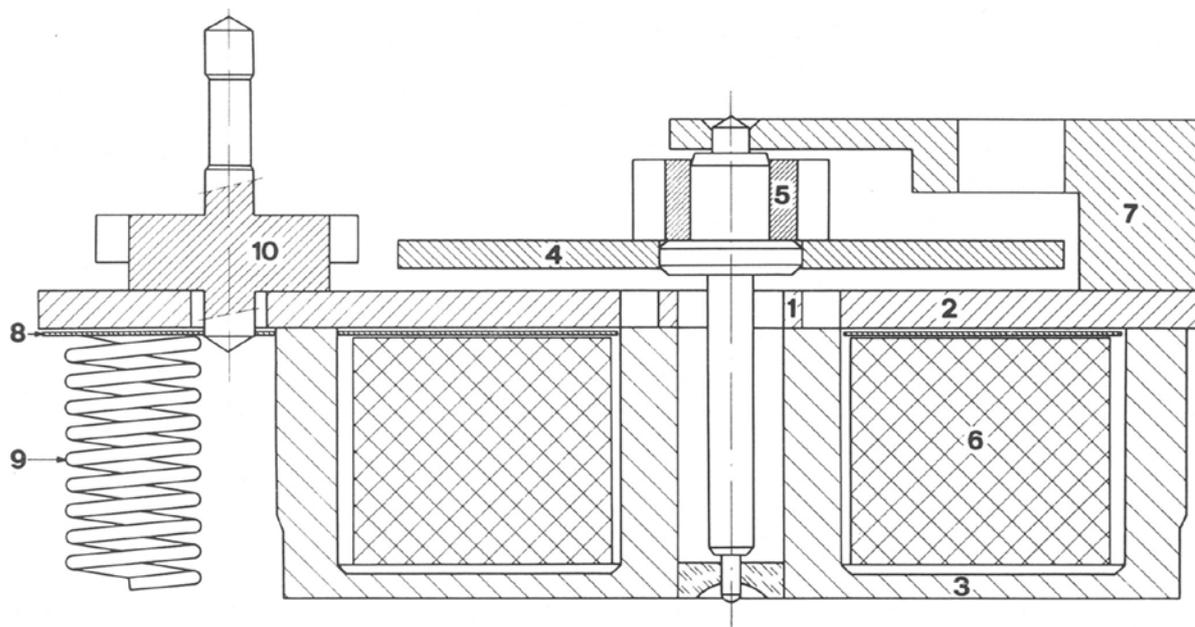
This motor is of the electromagnetic, rotating, step-by-step type. When functioning normally, it receives a driving impulse every minute.

When hour correction is effected, the motor receives 32 impulses per second.

The motor consists mainly of the following elements

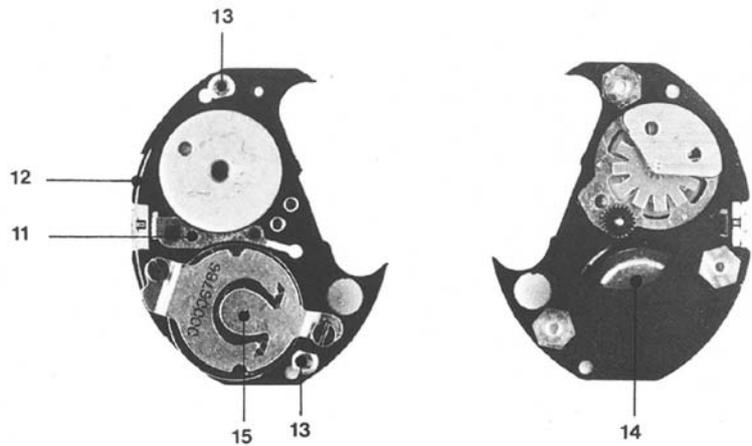
The motor consists mainly of the following elements

- magnetic circuit (1), (2), (3)
- rotor (4)
- pinion (5)
- coil (6)
- bridge (7)
- printed circuit (8)
- contact spring (9)
- fixed setting wheel (10)



It is interdependent of the framework which comprises or supports the other following elements

- control blade (11)
- corrector spring (12)
- dial fastener (13)
- battery (14)
- fixing clamp for battery (15)



## 5. DISPLAY

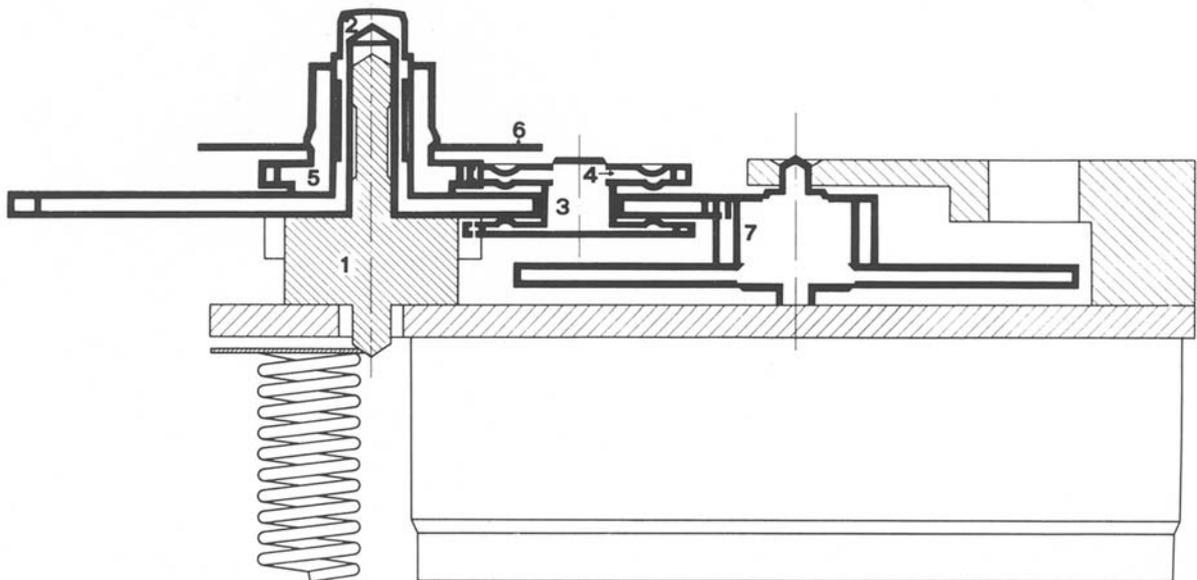
The differential wheel-train turns on an axle fixed centrally, in the extension of the fixed setting wheel (1).

It consists of the following mobiles :

free cannon pinion (2), with its 2 satellites (3), (4).

hour wheel (5) with its washer (6).

The motor pinion (7) turns at the rate of one stop every minute and drives the free cannon pinion (2) which carries the minute hand. In this motion, the satellite pinion (3), meshing with the fixed setting wheel (1), then starts turning and, through the satellite (4), drives the hour wheel (5). The washer (6) secures the hour wheel under the dial.



## 6. FUNCTIONING OF THE TIME SETTING AND CORRECTING DEVICE.

The time setting system is entirely electronic.

All adjustments are made by means of a single button only, recessed in the case, which button is pressed with a pointed object. (a ball-point pen for example).

### 3 EXAMPLES

#### 1. Passing from one time zone to zone to another

The hour can be modified very quickly and without losing the accuracy of the minute. By continued pressure on the button bring the hour hand to the required hour. Three seconds' pressure is sufficient for one hour's advance. For modifications involving more than one hour, maintain pressure on the button. In each case, the minute hand will stop at the exact minute.

#### 2. Loss

Make the minute hand advance by short pushes (less than 2 seconds) on the button.

#### 3. Gain

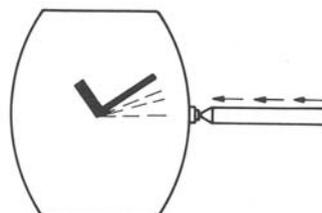
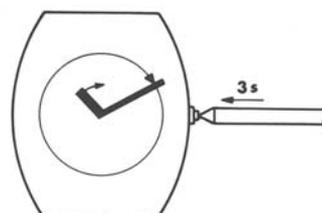
Effect a complete time setting operation.

### Complete time setting

By short pushes (less than 2 seconds), bring the minute hand to the desired minute, **less one**. When the time signal observed indicates 0 second, press button one last time.

The watch is perfectly synchronized: to the second.

By continuous pressure, bring the hour hand to the required hour. (see example No. 1)



### Phasing of the minute jump

In order to eliminate small variations of the watch, it is simply necessary to affect, from time to time - about once a month - at the 0 second time signal, a short push (less than 2 seconds) on the button. If, following this adjustment, the minute hand is one minute fast, a complete time setting operation should be effected.

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### 3. TECHNICAL DATA AND PERFORMANCE OF CALIBRE 1350

<b>Dimensions :</b>	Diameter : 15.15 x 13 mm Height of movement 3.35 mm
<b>Frequency of resonator :</b>	32.768 Hz = $2^{15}$
<b>Quality factor :</b>	Typical = 70'000
<b>Thermic coefficient :</b>	0.1 s/d for a variation of $\pm 5^{\circ}$ C, around reversal point.
<b>Consumption :</b>	Typical = 0.5 $\mu$ A
<b>Running time with 15 mAh battery :</b>	Typical = 36 months
<b>Variation during wear :</b>	Better than $\pm 30$ seconds/month
<b>Resistance to shocks :</b>	NIHS shocks test
<b>Resistance to magnetic fields :</b>	NIHS magnetism test: no effect
<b>Temperature functioning limits :</b>	From 0 to 60° C

## CALIBRE

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Checking and maintenance

DIAGNOSTICS	No. of operations to be followed
Disassembling	1.0 to 2.5
Cleaning	3.0
Assembling	4.0 to 5.11
Changing of battery	1.1 + 2.2 + 2.3 + 5.8 to 5.11
Adjustment of the rate	1.1 + 5.11
Exchange of motor module	1.1 to 2.4 + 4.2 to 5.11
Exchange of electronic module	1.1 + 2.1 to 2.4 + 4.2 + 4.3 + 5.8 to 5.11

ORDER OF OPERATIONS	PART NO	FIXING DEVICE	REMARKS
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### DISASSEMBLING

#### 1.0 EXTERIOR + WHEEL TRAIN

1.1 Open the case			
1.2 Uncase			
1.3 Hands			
1.4 Dial		2 dial holders No 1350.9034	
1.5 Hour wheel			For numbers, see spare- parts list
1.6 Free cannon pinion			For numbers, see spare- parts list

#### 2.0 ELECTRONIC MODULE

2.1 Earth connector	1350.9035	1 screw 2688	
2.2 Fixing clamp for battery	1350.9033	2 screws 2688	The movement number is on this part
2.3 Battery	9911 (Varta 531)		
2.4 Electronic module	1350.9600		
2.5 Framework with motor	1350.9002		

#### 3.0 CLEANING

Only the clamps and the 2 wheels may be treated in the cleaning machine, contact springs should be cleaned with a skin buff, and the fixed pinion with "Rodico" cleaning paste. If there is any metallic dust on the rotor, it should be removed by means of adhesive paper or cleaning paste (turn the rotor so as to check on its entire rim)

##### Note:

a) In the event of changing the wheel-train, accurate reference should be made to the numbers indicated on the spare-parts list in relation to hand-fitting height and type of unbalance of the free cannon pinion.

b) In the event of changing the complete movement, use as far as possible the former battery fixing-clamp which bears the movement number, as well as the free cannon pinion of which the unbalance corresponds with the minute hand.

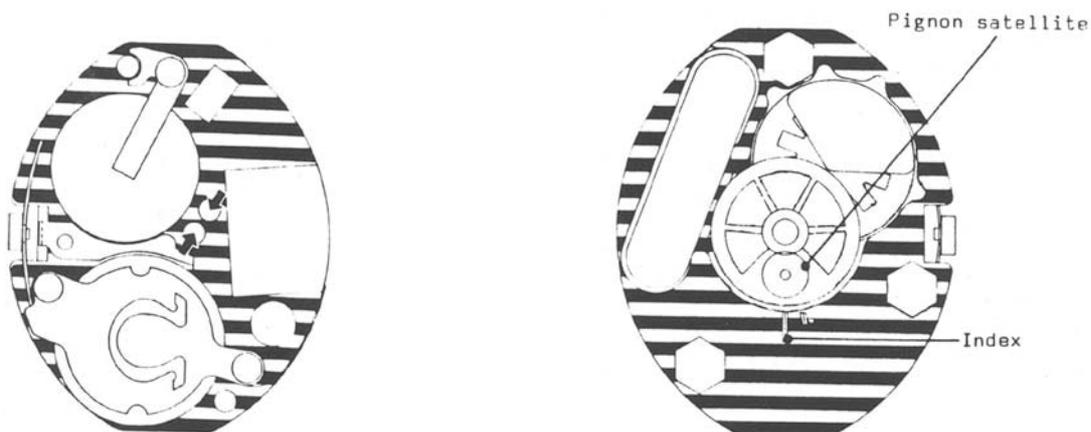
ORDER OF OPERATIONS	PART NO	FIXING DEVICE	REMARKS
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**ASSEMBLING**

**4,0 ELECTRONIC MODULE**

4.1 Framework with motor	1350,9002		
4.2 Electronic module	1350,9600		See drawing below
4.3 Earth connector	1350,9035	1 screw 2688	

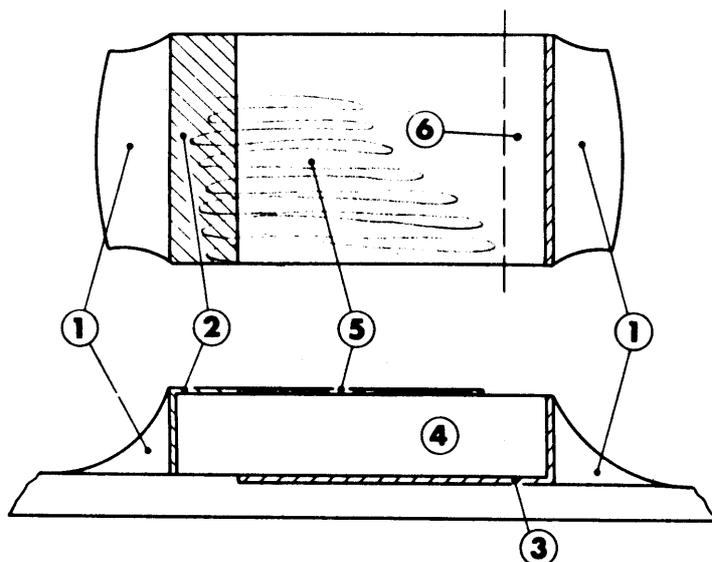
When the electronic module is assembled, ensure that the motor contact springs are correctly positioned in the studs by checking through the openings made between the latter.



**5,0 WHEEL TRAIN + EXTERIOR**

5.1 Free cannon pinion			For numbers, see spare-parts list
5.2 Hour wheel			- Same remark as for 5.1 - Check freedom of wheel-train
5.3 Set in position the free cannon pinion			The satellite pinion of the free cannon pinion must be in line with the index of the plastic framework located at 6 hours (see figure above)
5.4 Dial			Dial securely fitted on movement by means of the two holders

ORDER OF OPERATIONS	PART NO	FIXING DEVICE	REMARKS
5.5 Check endshake of hour wheel 0.02 - 0.04 mm			Do not touch free cannon pinion so as to prevent its changing position
5.6 Hands			At 12 hours
5.7 Check position of unbalance			Place satellite at 6 hours and check location of minute hand, through the seating for the battery. Admissible: 12 hours + or - 2 minutes
5.8 Battery	9911 Varta 531		Positive side (+) on top
5.9 Fixing clamp for battery	1350,9033	2 screws 2688	
5.10 Case up and close the back			
<b>5.11 Checking and adjustment of the rate</b>  Place watch crystal side on captor APU-2 (key 32 kHz) and press key $\leq 15$ Hz of Deltatest (1Hz) for ODT 1). The rate should be between + 0.10 and - 0.50 s/d.  If the watch gains, add some graphite on the condenser by means of a very hard pencil (6H); remove any possible graphite waste with "Rodico" cleaning paste.  If the watch is losing, remove all graphite from the condenser by means of a skin buff that has been dipped in F 45 or equivalent solvent; then again apply graphite until the desired frequency is obtained (see fig. below).  <u>Note:</u> The movements 37 860 000 to 37 863 660 are not equipped originally with graphite-bearing condensers; if the daily rate is not within the accepted tolerance, the electronic module should be changed. (± 0.6 s/d)			



#### Graphite treatable Condenser

- Index :
1. soldering
  2. upper metallization
  3. lower metallization
  4. ceramics
  5. pencilled graphite surface
  6. area not to be pencilled

The frequency of the Quartz depends upon the capacity of the condenser linked with the oscillator. The capacity of this condenser is dependent on the size of the graphite surface.

