INSTRUCTIONS

pour la recherche des dérangements
dans les Pendules et dans les distributions d'heure
"Electrique BRILLIÉ Frères"

Instructions for Troubleshooting Malfunctions in Clocks and Time Distribution Systems Electric Clocks

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Translation of Instructions pour la recherche des derangements dans les Pendules et dans les distribution d'heure "Electrique BRILLIE Freres" (https://clockdoc.org/gs/handler/getmedia.ashx?moid=28277&dt=3&g=1)

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1. REGULATORS

The Brillié electric regulator, when installed carefully and following all setup instructions, should function consistently until the battery is depleted. Once adjusted correctly, it can maintain time with a precision of about one second per day. With careful calibration—using, for example, the Eiffel Tower time signals—it is possible to achieve even greater precision, within a few seconds per month.

If the clock gains or loses significant time in the first few days or stops altogether, the cause must be identified and corrected.

Malfunctions can be either electrical or mechanical. We will examine both types in order.

ELECTRICAL CAUSES OF STOPPAGE

To simplify identifying electrical faults, a schematic of the clock's maintenance system is provided (see Figures 1 and 5).

As it moves from right to left and passes through the vertical, the pawl (C), which is attached to the pendulum, advances the ratchet wheel by one tooth, simultaneously pushing the grain (G), which is part of spring (r). The platinum pin (p) on the spring then contacts the two gold U-shaped contacts on the brush (b). This closes the battery circuit (P), allowing current to flow through coil (B), which magnetically attracts the magnet fixed at the end of the pendulum.

To test electrical operation, use a sensitive, low-consumption voltmeter, with a full-scale reading of 2 to 3 volts.

Before testing, stop the pendulum by gently catching the magnet at the end of its left swing and returning it slowly to vertical. Remove the movement as explained in the regulator installation instructions and separate it from the dial as follows:

- Remove the hands by pulling them forward from the central shaft.
- Unscrew the three nuts (e_1, e_2, e_3) that secure the dial to the movement frame (Figure 2).
- Remount the movement on its support; this will expose the pawl, ratchet wheel, and contacts through an opening.

Electrical Tests:

1. Connect one lead of the voltmeter (a) to one of the knurled screws (E) securing the movement to the support (the ground), and the second lead (A) to the central spring (R) of the battery holder. This measures the battery voltage, which should read between 1.2 and 1.4 volts, depending on the voltmeter's internal resistance.

- If voltage is too low or zero, remove the battery and test it directly: connect lead (b) to the central brass cap and lead (a) to the brass plate.
- If the reading is under 1.2 volts, the battery is depleted and must be replaced.
- If voltage is above 1.2 volts, but no current is flowing through the support, clean all contacts with fine sandpaper—especially the central cap—and check that the spring terminal (R) provides enough tension for proper contact.

Reinsert the battery and recheck the contacts.

2. If voltage from step 1 is satisfactory, connect the second voltmeter lead (b) to the brass brush (L) on the left of the movement, which links the maintenance contact to the marble base (Figure 4). (Do not confuse this brush with another, similarly shaped one used only in clocks with time distribution.)

- The voltmeter should now read a few tenths of a volt. If not, check whether the maintenance contacts are touching.
- The ratchet wheel (R) and the grain (G) of the spring (R) must be in the positions shown in Figures 5 and 9.

- If the contacts are not touching and the voltmeter reads zero, the maintenance circuit is broken.

- If it reads more than 1 volt, the maintenance coil is short-circuited.

To test further:

- Connect the two terminals of the coil on the marble base with a copper wire. If the voltmeter suddenly shows more than 1 volt, the break is inside the coil.

- If it still reads zero, the break is in the wiring.

In the case of a short or open circuit in the coil, it must be replaced. To do this, disconnect the two wires and loosen nut (E) (see Figure 7).

The wiring can be inspected by removing the movement and pendulum and examining the back of the marble support.

3. If the voltmeter shows a small voltage as described above, test the maintenance contact by swinging the pendulum manually. When the contact closes, the voltmeter should drop to zero.

- If the needle doesn't move or stays fixed, the contact is faulty.

- If the contact doesn't close, gently bend the wire holding the gold U contacts to the right using small pliers.

- If contact is made but ineffective, clean it:

    - Remove the movement cage and place it on a table.

    - Use a matchstick with a beveled tip soaked in petroleum ether or pure benzine to gently clean the platinum strip and gold U contacts.

    - Be careful not to bend or misalign the contacts.

    - Verify operation before reassembling the mechanism.

If electrical checks are satisfactory and issues persist, the problem is mechanical.

MECHANICAL CAUSES OF STOPPAGE

1. If the clock always stops at the same time, a fault exists in the gears that recurs in a specific position. Turn the gears manually to locate the issue. Ensure the hands do not rub against each other or the dial, and that the central shaft does not touch the glass.

2. Check the condition of the suspension spring by removing the movement cage and pendulum. One of the two fine springs in the suspension may be bent or broken, which can still allow the clock to run but cause irregular timekeeping. To replace it, unscrew the screw (V) and release the upper pin of the suspension bracket (Figure 6).

3. Ensure the pendulum has free movement. Make sure the magnet does not rub against the coil at either the top or the center hole. The coil may have shifted from a shock since it is only held by one point. Adjust it so that the magnet moves through the center of the coil's opening, then securely tighten nut (E) (Figure 7).

4. Check the pawl's action and adjust it if needed as explained below.

PAWL ADJUSTMENT

With the dial and hands removed and the movement mounted on its support, first ensure the clock is perfectly vertical, as described in the Brillié setup instructions.

Cut out the calibration paper shown in Figure 8 and place it on the coil so that zero aligns with the edge "a" of the magnet (Figure 10).

Set the ratchet wheel to its resting position (Figure 9).

Move the pendulum to the right slightly by pulling on the magnet. The pawl will ride up onto a tooth of the ratchet wheel, then fall off the edge. At the moment it falls, the magnet's edge should align with mark B on the paper.

There are three scenarios:

1. The pawl drops exactly when the magnet edge passes mark B (correct adjustment).
2. The pawl drops before reaching mark B (incorrect; pawl too short).
3. The pawl drops after passing mark B (incorrect; pawl too long).

For case 2, lengthen the pawl slightly by straightening it to reduce the curve at C (Figure 11). As this raises the point M of the pawl, press down on the pawl's tail (Q) to bring point M back to level with the axis.

For case 3, shorten the pawl slightly by increasing the bend at C, then raise point M so that it remains equidistant from the pendulum's attachment point.

Now swing the pendulum from right to left: the pawl should push the ratchet wheel one tooth forward and then release it as the magnet's edge passes mark C. The pawl tip should clear the next tooth by a few tenths of a millimeter.

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2. TIME DISTRIBUTION SYSTEMS

Three main situations may arise:

1. The entire distribution system is not working.
2. One or more secondary clocks have stopped or are running slow, while the rest function normally.
3. One or more (or all) secondary clocks are running fast.

CASE 3: SECONDARY CLOCKS RUNNING FAST

This rare situation is usually due to excessive line current, which causes the hands to advance too abruptly. Since the hands use a friction-based mechanism, they may slip slightly with each impulse, resulting in cumulative time gain.

Remedy: Insert a milliammeter into the main line and reduce the current to a normal value—between 55 and 60 milliamperes. This may be done by removing battery elements or inserting a suitable series resistor.

If a specific secondary clock still gains time, its friction spring is too loose. In this case, remove the movement cover and gently tighten the friction spring with pliers.

CASE 2: SECONDARY CLOCKS STOPPED OR DELAYED

If only a few clocks are affected while the rest function correctly, first check that the line current is between 55 and 60 milliamperes. If it is, the issue lies within the defective clocks' branch circuits.

Insert the milliammeter into the affected branch. The current should be about two-thirds of the line current—i.e., between 35 and 42 milliamperes.

If the current is zero, the circuit is open:

- Check wire connections at the rosette and at the clock.
- Test both wires in the branch.
- If the break is inside the clock, it's best to return it for repair. However, you may attempt repair as follows:

Remove the clock cover by unscrewing the two rear screws. Check the tightness of the connecting wires (see Figure 13). If the break is inside the movement, it is likely in one of the two flexible wires leading to the moving coil.

To access them:

- Remove the hands.
- Unscrew the two nuts securing the movement to the dial.
- Loosen nut E and pull the magnet (A) downward to remove it (see Figure 14).
- The two flexible wires will be visible between the plates.

Check their solder points and resolder if necessary.

Reinsert the magnet along with any metal shims and the brass clip that holds it in place. Tighten nut E.

When reassembling the movement, ensure the minute hand's counterweight is opposite the hand's direction.

If the branch current is too low but the main line is normal, suspect a bad contact. Check connections as before. Ensure the rosette used with the clock has a resistance at least twice that of the clock.

If the branch current is normal, inspect the clock during current pulses. Remove the cover and:

- Clean the gears with a dry brush.
- Clean the gap between the coil and its iron spacers.

If the mechanism seems faulty, it is best to return it for repair.

CASE 1: ENTIRE INSTALLATION STOPPED

Start by measuring the line current. Possible cases:

1. Current is completely absent.

2. Current is emitted at the correct moments (e.g., 0 and 30 seconds), but intensity is too low.

3. Current pulses are of average strength but inconsistent.

Case 1: This points to a break in the main line. To rule out the regulator, directly connect the battery terminals to the line terminals and use a voltmeter to check voltage:

- At the battery

- At the line connections

- At each rosette in succession

When voltage drops to zero, the break is in the previous section. Repair it with a splice or replace the wire. Check connections, especially at rosettes.

Case 2: Low current intensity may stem from low battery voltage or excessive resistance in the line.

- If the system worked previously and no new clocks were added, ensure the battery voltage matches the number of elements (minimum 1.2 V per element). Replace or recharge if needed.

- For a new installation, add more cells until current reaches about 60 mA.

To locate poor contacts (which are harder to spot than breaks):

- Use a milliammeter in series with a resistor. Adjust it so the needle reads maximum when across the battery.

- Disconnect the line at the last rosette and take successive measurements from the battery through each rosette.

- A drop in current identifies the faulty section.

Poor contacts are usually due to loose connections, especially under rosette terminals.

Case 3: If pulses are irregular or problems stem from the regulator, inspect the distribution contacts.

Refer to Figure 15 for the internal wiring diagram.

Remove the dial and movement as described in the installation manual. With the movement remounted on its support, the contact system at the top is visible through an opening (Figures 16 and 17).

Clean any dirty or blackened contacts carefully, just as with the maintenance contacts.

Check that line current does not exceed 60 mA, which could blacken contacts.

Also check the green flexible wires connecting the distribution brushes to the line. The wires may be unsoldered or have pins that slipped out.

Figure 18 shows the brush positions at seconds 29, 30, 31, and 59, which may aid in understanding contact operation.

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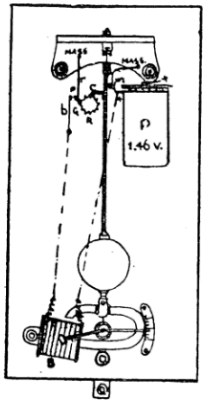

FIG. 1

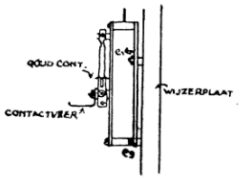

FIG. 2

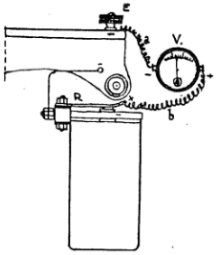

FIG. 3

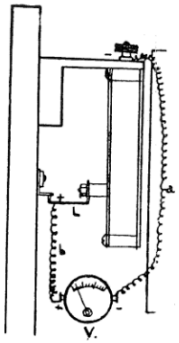

FIG. 4

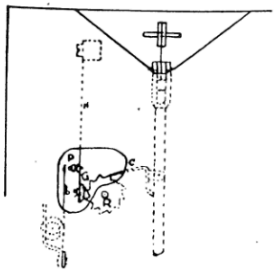

FIG. 5

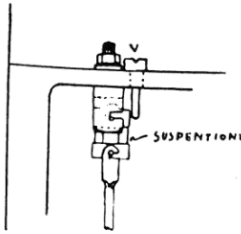

FIG. 6

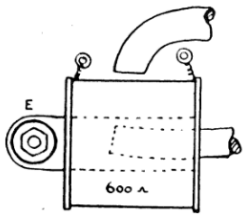

FIG. 7

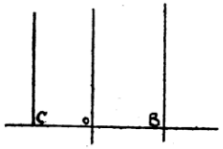

FIG. 8

FIG. 9

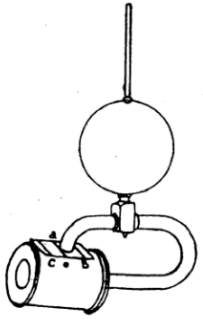

FIG. 10

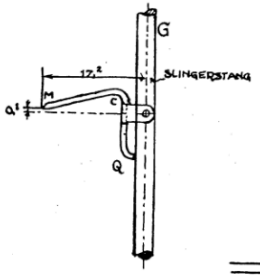

FIG. 11

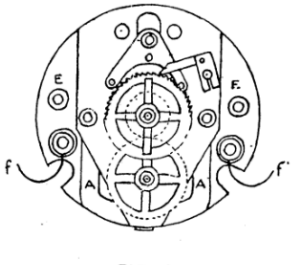

FIG. 13

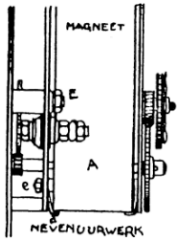

FIG. 14

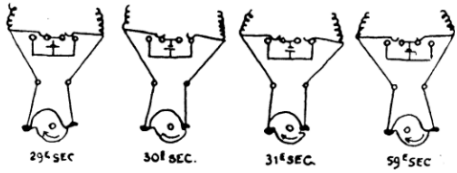

FIG. 18

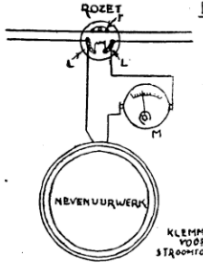

FIG. 12

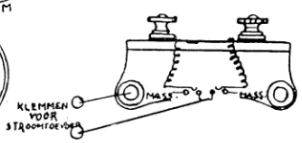

FIG. 15

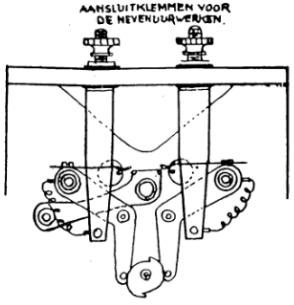

FIG 16

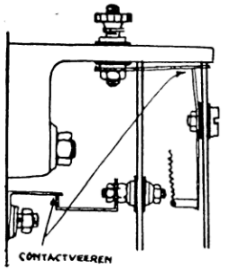

FIG. 17