

General Instructions

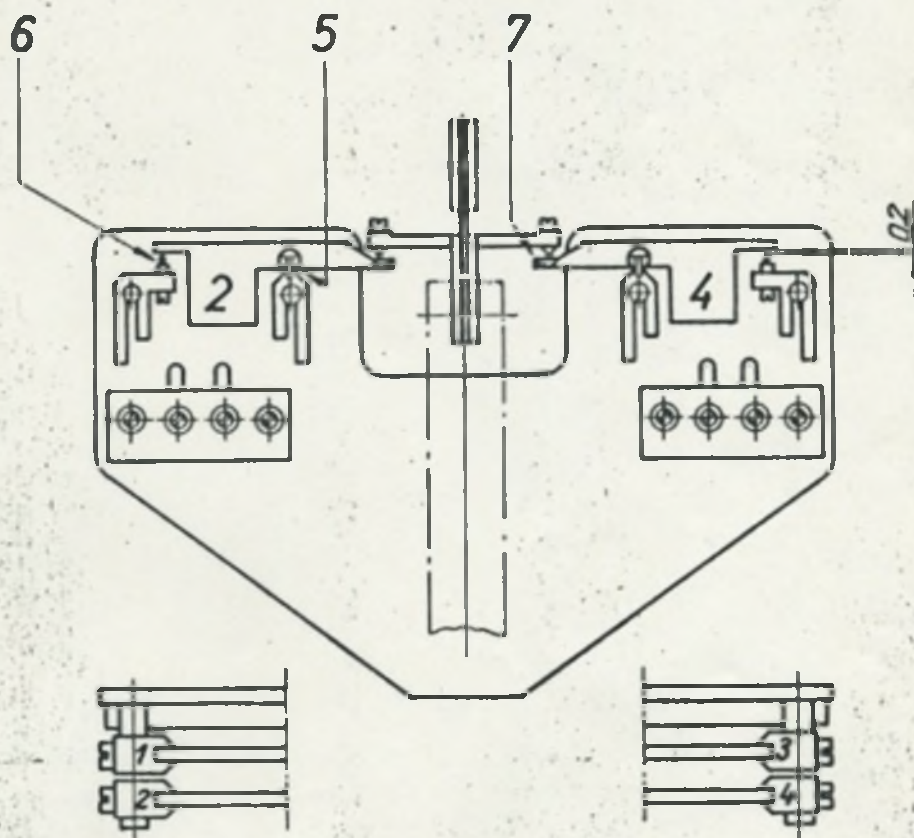
for the installation, starting up and maintenance of the Favag system electrical master clock with a pendulum beating seconds, type 17.3002.067 with 1 polarized second line, 1 polarized minute line and a regulating potentiometer.

1. Installation and starting up

(Follow the order of operations exactly.)

- 1.1 Carefully take the master clock out of its packing case and remove any shavings before opening the cabinet. The following items will be found in a small packet next to it: 2 keys for opening and closing the cabinet, 4 plugs for fixing to the wall, 4 threaded rods, 8 washers, 8 nuts and the bottles and grease needed for maintenance.
In another small packet, attached to the body of the movement, are the contact levers, the weights for adjusting the pendulum beat and the tool for cleaning the contacts..
- 1.2 Open the cabinet with the 2 keys.
- 1.3 On the wall where the clock is to be fixed (a rigid masonry or concrete wall in a dry cool room free of vibration) mark the fixing points as indicated in drawing 17.3002.067 e..
- 1.4 Drill the holes for the fixing plugs at the places marked and insert the plugs together with the threaded rods (screw the latter about $5/8"$ into the plugs): on each threaded rod, at about $5/8"$ to $3/4"$ from the wall place 1 nut and washer.
- 1.5 Place the master clock in position and hold it there with a washer and 1 nut on each rod, tightening lightly by hand.
- 1.6 Set the back plate parallel to the wall in the transversal direction and, with a plumb line, vertical at the front and sides (see sheet 2). Then moderately tighten the front nuts taking care not to buckle the plate. Make the 2 hexagonal headed screws situated at the back rest against the wall in order to keep the back properly straight.
- 1.7 Remove the pin locking the movement, turn the latter on its hinge to free the suspension.
- 1.8 Carefully remove the packing from the electro-magnet "a" (see fig. sheet 2) and remove the fastening wires. Remove the band holding the nut "b" to the pendulum bob "c", suspend the pendulum holding it vertical all the time by the rod "d", with the bob hanging down. Do not twist the suspension "e", which is fragile. The opening of the hook on the rod must point backwards.
Do not turn the nut "b", this having already been adjusted at the works. Place a weight of 1 g. and 1 of 0.5 g. on the pendulum disc.
- 1.9 Check that the escapement jewel "f" coincides with the middle of the pallet "g" and that the two coils of the electro-magnet lie exactly underneath the soft iron armature "h", situated at the bottom of the pendulum. If this is not the case, slightly correct the perpendicularity of the back plate by moving the nuts on the bottom 2 threaded rods forward or backward. If the armature does not correspond with the electro-magnet laterally, carefully push the back plate in the required direction by the small amount necessary: this is possible thanks to the play remaining between the fixing rods and the holes drilled in the plate.

- 1.10 The air-gap "1" between the polar parts of the electro-magnet and the armature of the pendulum must be 2.3 ± 0.1 mm. If this were not the case, in spite of having been set beforehand in the factory, the electro-magnet would have to be moved slightly upwards or downwards on its base.
- 1.11 Make the outside connections as indicated in the wiring diagram corresponding to the order.
- 1.12 Fit on the levers of the seconds contact device, with the battery disconnected, as indicated in the diagram (sheet 3), taking care to place on each blade "5" the contact lever marked with the same number. The levers and the contact screws "6" are carefully adjusted in our works so that no adjustment of these levers should be undertaken. If however an adjustment of the contact parts were to become necessary it should be done by turning screws "6" in the required direction in order to obtain a contact clearance of 0.2 mm. the levers of each pair having to close their contact exactly together.
- 1.13 Clean all the contact points with the shammy leather cleaning tool so as to remove any dust, and connect up the battery.



- 1.14 Place the movement in position again, securing it with its pin.
- 1.15 Start up the pendulum by giving it a slight push with the hand so that the jewel "f" is outside the pallet "g". The pallet should engage every 200 to 300 seconds approximately to maintain the pendulum beat. If the pallet engages at appreciably shorter intervals, check that the air-gap and the voltage at the terminals of the electro-magnet are normal.

1.16 Set the master clock to the right time.

- a) The hour hand and the minute hand can be put backward or forward to the right time. The second hand however can only be put forward. To move the second hand, it is necessary to disengage the driving rotor by pressing on the flat spring, painted red, at the back of the movement.
- b) Set the minute hand (the hour hand follows) to the right time + 1 minute and stop the second hand at the second 01 by disengaging the rotor. Allow the rotor to engage again when the second 60 has just passed at the exact minute (the pip of a timing signal for example).

N.B. When pushing the second hand forward by hand only move it between 10 and 58 seconds in order to avoid upsetting the timing system.

2. Starting up

- 2.1 Once operations 1.1 to 1.16 have been completed, allow the master clock to run and check for a few minutes to see that all the secondary clocks are working properly.
- 2.2 Set the switches "Line 1" and "Line S" on the master clock to the position "Time-setting", all the secondary clocks then stop at whatever time they happen to be indicating.
- 2.3 Now set all the secondary clocks to the exact time for starting up, i.e. for example, that of the master clock + 15 minutes.. In the case of secondary clocks with synchronized minutes and seconds, push axially and turn the minute hand: for the secondary clocks indicating seconds disengage the rotor by pressing on the special spring, and turn the seconds wheel until the second hand is at 60, then allow the rotor to engage normally in the wheel.
- 2.4 Wait until the right time corresponds to the time indicated for starting up and set the switches "Line 1" and "Line S" to "normal timing" at the precise moment the second hand of the master clock passes the 60. If any clock does not indicate the correct time, set it to the right time individually. If a whole group of clocks shows the wrong time, set the switch for the line in question to "Time-setting" and transmit the necessary number of impulses by switching the bottom switch from left to right and back again. Maximum rate 1 impulse per second for secondary clocks indicating minutes; 2 impulses per second for secondary clocks indicating seconds.
- 2.5 Close the glass cabinet of the master clock with the 2 keys.

3. Adjusting

- 3.1 To verify the timing of the system, check the time each day with a chronograph, at the precise moment the second hand of the master clock passes the 60, and compare it with the right time broadcast by an observatory. Keep a timing bulletin, according to the specimen below, for a period of at least 15 days before undertaking any fine adjustment. On leaving the works the clock is adjusted to run correctly, with the regulating potentiometer situated at the top of the right-hand side of the cabinet set to 0. Only very slight corrections to the timing of the clock should ever be necessary.,

Timing Bulletin (specimen)			
Date	Time	Daily Variation + or -	Remarks Any alterations to the setting, etc.
Mon 11/2	8 AM		reset - 1 second fast 2 weeks
Sat 1/21	3 AM	set - 1 sec	reset - 1 second fast 2 weeks
Sat 2/10	11 AM	1 sec slow/1 wk	reset - 1 second fast 2 weeks
Sat 2/12	10 AM	1 sec fast/1 wk	no action

3.2 If, as a result of local influences, the timing of the clock varies appreciably, proceed as follows:

If it is continually fast, turn the adjusting nut "b" (sheet 2) from right to left so as to lower the bob "c", if on the contrary the clock is slow, turn the nut from left to right to raise the bob.

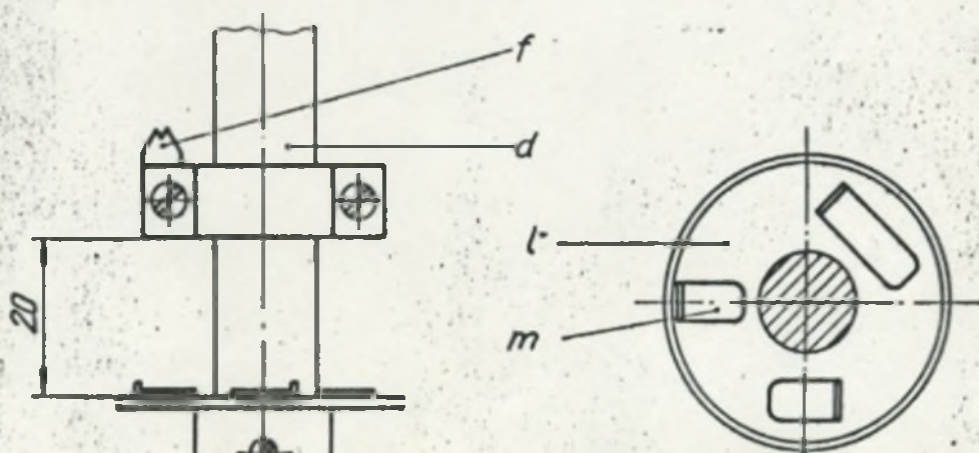
Hold the bob firmly while turning the nut so as not to twist the suspension "e", a vital part of the clock.

A complete turn of the adjusting nut puts the clock forward or backward depending on the direction by 21.5 seconds in 24 hours.
1 div. \approx 0.8 sec/24h

3.3 Fine adjustment of the clock by means of the disc system

a) Principle (see figure below)

A small disc "l" is fixed on the pendulum rod "d", and small adjusting weights "m" are placed on the disc whose position in relation to the other parts of the pendulum is indicated in the figure; this position must be strictly observed (20 mm from the bottom edge of the escapement holder). By means of this device, it is possible to adjust the pendulum accurately, without any need to stop it and without affecting the oscillations, in order to correct small regular errors in timing.



b) Adjustment

If, as a result of the adjustment carried out as indicated in 3.2, small differences of timing are noted, proceed as follows:

If the clock is regularly fast, remove a number of weights.

If the clock is regularly slow, add weights.

A variation in weight of 0.8 grams gives a variation in time of about 1 second in 24 hours.

The weights must be added or removed extremely carefully by means of tweezers, without stopping the pendulum or jerking it in any way.

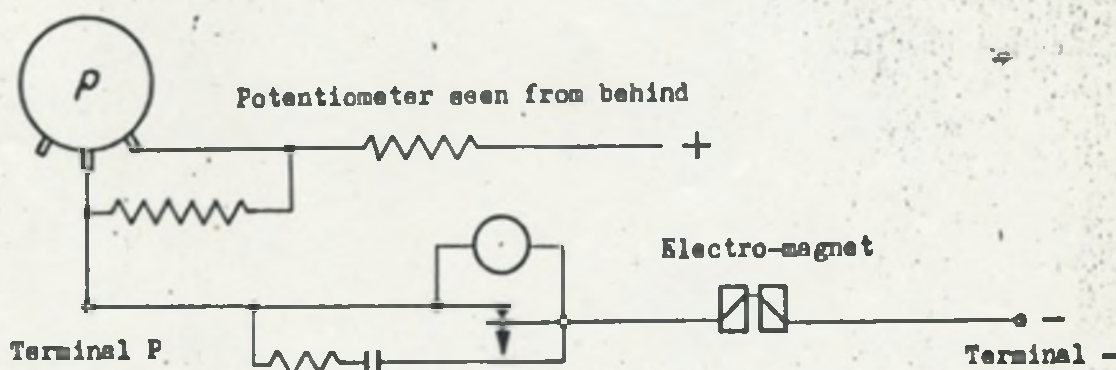
4. Gradual time-setting by potentiometer

4.1 Principle

A potentiometer P is connected up in series with the electro-magnet ensuring the oscillation of the pendulum.

For 24 V, a resistance R1 is connected up in parallel

For 48 V, a resistance R1 is connected up in parallel and a resistance R2 in series (see diagram below)



Value of the resistances

Voltage	P	R1	R2	Electro-magnet
12 V	100 Ω	-	-	2 coils of 46 Ω = 92 Ω
24 V	500 Ω	1500 Ω	-	2 coils of 175 Ω = 350 Ω
48 V	2500 Ω	2200 Ω	220 Ω	2 coils of 500 Ω = 1000 Ω

4.2 Adjustment

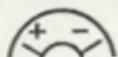
The clock must first of all be adjusted according to instructions 3.2 and 3.3 with the potentiometer set to 0 (see diagram below)

If, after a long while, small differences in timing have accumulated to the extent of several seconds difference from the time indicated by an observatory, the master clock may be set to the right time without touching the pendulum by proceeding as follows:

If the clock is fast, switch the potentiometer to - ;

If the clock is slow, switch the potentiometer to + ;

As soon as the time lost or gained has been made up for, set the potentiometer to 0.



5. Maintenance

- 5.1 Open the clock cabinet, remove the fuses + and - ; stop the pendulum.
- 5.2 A complete overhaul of the master clock must be carried out every 3 years by cleaning the wheels, pivots and bearings and replacing the old oil by new. Also clean the tip and the cam of the reverse contact of the electrical movement, and replace a light coat of fresh grease round the edge of the cam. Use only special clock oil and grease (Oil "B" and "Olyt J - 20" grease supplied by our firm with each system)..
- 5.3 The electrical contacts must be overhauled once a year, by cleaning the contacts of the escapement, the relay and the distributor as follows:
- a) Rub the points of contact lightly with the dull side of tool 11.0010.064
 - b) Clean the points of contact with the shammy leather of the cleaning tool 11.8070.002 so as to remove all dust.
 - c) Repolish the points of contact with the shiny side of tool 11.0010.064.
- 5.4 In the same way as indicated in para 5.2, clean the lever contacts after releasing them from the blades (see fig. sheet 6), and the contact screws "6".
- 5.5 Replace the fuses + and - , start the system up again according to instructions 1.14 to 1.16 and 2.1 to 2.5
- 5.6 The secondary movements must be overhauled every 4 to 5 years (or more frequently if they have to operate under difficult conditions: dust, damp, heat, etc...) by cleaning the wheels, pivots and bearings and replacing the old oil by new at the pivots and bearings (Oil "B").
- 5.7 These overhauls must be carried out only by a completely reliable and competent person. Our firm has organized a maintenance service by subscription and gladly supplies all necessary information on this subject.
(Tel. Neuchâtel 038 - 5 66 01, department 12)

6. Consumption of current

- 6.1 Maintenance of the oscillations: about one impulse every 5 minutes, length 0.35 seconds with a current of:

At 12 V	105 Milliampères,	i. e. per week	0.021 Amp. h
" 24	53	" " " "	0.0106 " "
" 48	33	" " " "	0.0066 " "

Enclosure: diagram of the master clock

7. Charge on the contacts

- 7.1 Minute contacts = 250 mA
- 7.2 Second relay contact = 250 mA

Pression de contact / Kontaktdruck / Contact pressure : 8 - 10 g
 Chemin de contact / Kontaktspiel / Contact gap : 0,5 - 0,6 mm

Ligne 1
 Linie 1
 Line 1

Ligne 3
 Linie 3
 Line 3

Remise à
 l'heure
 Zeit -
 Nachstellung
 Time -
 setting

