

THE SYNCHRONOME MASTER CLOCK FOR  
OPERATING HALF MINUTE IMPULSE DIALS  
ONLY.

The Master Clock is fitted in a polished hardwood case, 50 inches long,  $10\frac{1}{2}$ " wide and 6 inches deep; it is fitted with a 7" diameter half minute impulse dial having minute and hour hands.

The pendulum movement consists of a substantial baseplate on which the pendulum impulsion and electrical switching mechanism is fitted and the pendulum suspended.

The pendulum is of one seconds length, that is to say, its length is such that it will take one swing from left to right or vice versa, in one second of time.

The pendulum rod is of Invar, a nickel steel alloy, having a negligible temperature coefficient, the pendulum bob is of steel and weighs 16 lbs. The construction of the pendulum is such that it is well compensated against temperature changes, and it is given impulse every 30 seconds from a detached gravity system which impulses the pendulum around the zero position, this combination enables the clock to keep time to within 2 seconds per week, and often much better.

The impulsion to the pendulum and the electrical switching every 30 seconds is illustrated and described on the enclosed Print No. 20007.

ERCTION.

Unpack the clock, the pendulum and the bob.

It is necessary to fit the clock on a substantial wall which is free from vibration if the best result in timekeeping is to be obtained. The clock should be erected so that the case is about 6 feet above the floor level; this will bring the clock movement to a convenient height for fitting up and for attention in the future.

The clock should first be hung on its hanging plate, drill and plug the wall, and fit a  $1\frac{1}{2}$ " x No. 12 wood screw into the plug so that the screw head projects about  $1/4$ " from the face of the wall. Hang the clock onto the screw by its hanging plate. Open the door of the clock and hang a plumb line from the top left side of the case and bring the clock to an upright position as indicated by the plumb line. Mark off the wall, thro' the three holes, two at the top, and one near the bottom in the backboard of the case. Remove the clock from the wall and drill & plug the wall in the three positions. Replace the clock on the wall, and screw back through the three holes firmly to the wall, for this purpose three  $2\frac{1}{2}$ " x No. 12 roundhead wood screws should be used.

Ascertain with the plumb line that the clock is not leaning out or in at the top, i.e. checking that the wall is upright. If the clock is not hanging right in this respect, the fixing screws should be slackened off and hardwood packing of the right thickness placed behind the top or bottom batten to bring the clock upright. Finally, tighten the screws.

Having got the clock firmly fixed to the wall, remove the ties from the gravity lever, backstop etc. and proceed with the assembly of the pendulum.

It will be seen that the pendulum rod is already fitted with the brass suspension spring chop at the top end; the impulse pallet and the bottom bob collar and pendulum bob supports or rating nut at the bottom end. Remove the rating nut and bottom bob collar from the thread at the bottom end of the pendulum rod. Get the pendulum bob and slide it over the thread and onto the rod until the rating thread projects well from the bottom of the bob, be sure that the brass domed collar fitted into the bob is at the top, place the bottom bob collar onto the rating thread and slide it onto the bottom of the bob so that the smaller diameter of it fits into the bottom of the bob. Screw the rating nut back onto its thread; allow the bob to rest on it and screw it up until the domed collar in the top of the bob is level with the mark on the pendulum rod. This will be about the right position of the bob to enable the pendulum to keep good time, altho' further adjustments will be necessary after a time, mainly owing to the difference in gravity between London and the place where the clock is being erected.

The trunnion, top chops and suspension spring will be found as one unit, clamped tight under the wing nutted straps at the top of the Master Movement frame, also the jewelled click and the case key in separate envelopes. Release the wing nuts and remove the trunnion fitting and proceed to fit it to the top end of the pendulum. To do this, first remove the screw passing through the bottom chop already fitted to the top end of the pendulum. Take hold of the top chop with the spring already fitted, and insert the spring carefully into the slot of the bottom chop until the hole in the spring exactly lines up with the screw hole in the bottom chop; at the same time, making sure that the spring clamping screw head in the top chop is on the same side as the spring clamping screw will be on the bottom chop. Tighten the screw in the bottom chop until the spring is clamped firmly but not gripped dead tight.

Now remove the jewelled click from its envelope and fit it into the special slotted screw at the back of the impulse pallet so that the arm of the click comes to rest at the bottom of the circular slot.

Hang the pendulum in position by placing the cross bar or trunnion on top of the pendulum bracket at the top of the movement frame or baseplate. Be careful to get the pivots of the trunnion resting on the bracket and see that the trunnion is square, i.e. is parallel to the back of the case, also that the pendulum is positioned so that the rod is centred at the same distance from the back of the baseplate as the 15 toothed wheel, in this position the gathering click will correctly engage the wheel at the centre of the 'D' shape on the jewel.

Having hung the pendulum satisfactorily, the impulse pallet should be in the correct position relative to the impulse roller on the gravity lever. The top corner of the impulse curve of the pallet should swing under the roller with a clearance of  $1/100$  of an inch when the gravity lever is supported on its catch. If necessary, the pallet should be re-adjusted on the pendulum for height to obtain the clearance of  $1/100$  of an inch if for any reason it is not so.

The position of the pendulum from right to left has been set correctly, but should be checked as follows: When the pendulum is hanging still at zero the gravity lever should be unlocked from its catch and the gravity lever roller allowed to rest on the curved part of the pallet. In this position, the pivot of the gravity lever roller should be level, horizontally with the top corner of the impulse curve of the pallet. If adjustment is required, slacken the suspension top chop and move it along the trunnion, tighten screw. Take great care if any adjustment is made to the pallet that it is finally tight on the rod and in line with the plane of the swing of the pendulum. The jewelled click should be in the correct position for gathering one tooth only, of the 15 toothed wheel for each complete swing of the pendulum, however large the arc. The click arm should be bent up or down slightly if the gathering action is too shallow or too deep.

The working current in the half minute switch circuit is .33 amp and the resistance in the Master Clock which is in the half minute circuit, can be adjusted to ensure this. The half minute circuit has a pair of output terminals which are bridged over to complete the series circuit.

Exterior half minute impulse dials, relays or other instruments may be added in series with the half minute impulse circuit by removing the bridge across the output terminals and connecting the external clocks etc. which should be connected in series to each other, to them. The resistance in the half minute circuit would require re-adjusting when external dials or instruments are added to maintain the required working current of .33 amps.

### THE MASTER CLOCK DIAL MOVEMENT.

The dial movement is fitted onto the dial on the door of the case.

The propelling of the dial wheel work is by means of reciprocating brass lever having the armature plate at its bottom end which is attracted at each impulse passed through the coil. At the top end of the reciprocating lever is fitted a driving clock which engages and drives the main centre wheel. The wheel is held steady and prevented from moving by the backstop lever, the steel squared end of which will be seen resting on a tooth of the wheel immediately below the driving click.

To set the hands to time, press with the finger on the left hand end of the backstop lever which will be seen projecting from the top lefthand corner of the movement, this will disengage the wheel work from the click and backstop square and leaves the large wheel free to revolve by hand. Set to time and release backstop.

### THE BEAT SCALE ON WOODEN BLOCK.

The beat scale block should be stood on the bottom of the case so that the '0' in the centre of the scale is exactly in line with the bottom point of the pendulum when the pendulum is hanging still at zero. The scale should be about  $1/8"$  behind the point of the pendulum, when in the correct position the block should be pressed on to the bottom of the case, it has two sharp projections on its underside which will hold it in position.

### BATTERY.

The Master Clock on its own requires 4Volts for its operation but if further dials or instruments are added to the outset terminals (all in series with each other) the battery voltage must be increased at the rate of 1 volt for every 3 ohms of circuit resistance.

Where an adjustable resistance is fitted in the Master Clock for the purpose of regulating the current in the half minute impulse circuit, more voltage may be in use than is required by the circuit. In this case, the resistance should be adjusted to keep the current at .33 amps.

When everything is ready to start the Master Clock, swing the pendulum until the pointer at its bottom end shows just over  $20 + 20$  millimetres on the scale, at which arc the gathering click will gather the 15 toothed wheel, one tooth for each complete cycle of the pendulum and the gravity lever will impulse the pendulum at each 30 seconds. Leave the pendulum to increase its arc, so that after about one hour, the arc should be  $36 + 36$  millimetres to  $40 + 40$  millimetres.

After one hour, the arc should remain perfectly steady. A constant arc between the figures given above indicates the clock is in good working order and very good timekeeping may be expected.