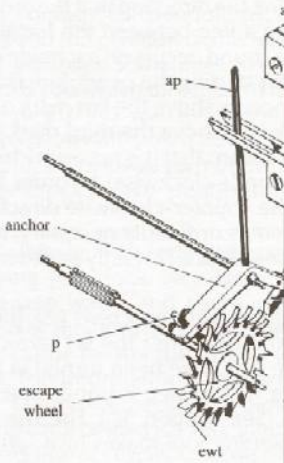
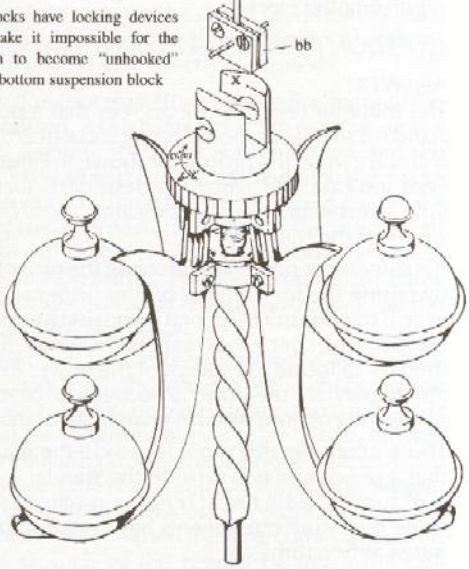


ESCAPEMENT

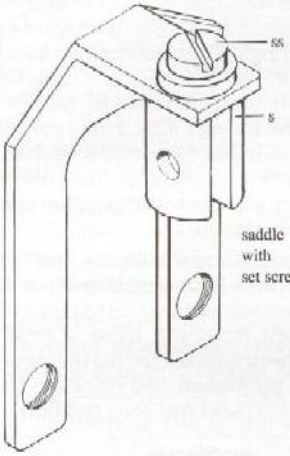
See Section 10 for other shapes and sizes of Complete Suspension Units

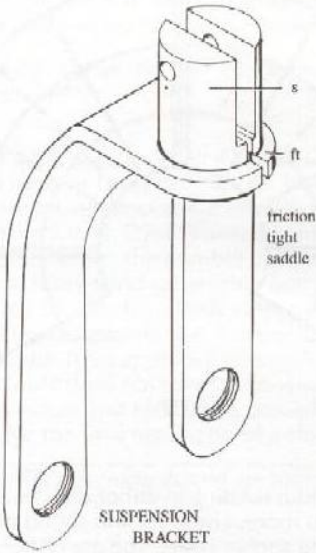
Some clocks have locking devices which make it impossible for the pendulum to become "unhooked" from the bottom suspension block



4-BALL PENDULUM

Figure 2





SUSPENSION
BRACKET

See Section 15 for other types of suspension brackets

be made only by giving the suspension spring (sp) a slight but permanent twist at a point near the top suspension block (tb), a rather delicate operation best accomplished with tweezers.

Here's how to find the correct position of the suspension unit which will put the pendulum in beat:

Check the clock to be sure that it's wound and that it is in a level position. Also, check the suspension spring (sp) to see that it is absolutely straight and that the two blocks (tb and bb) and fork (f) *are in the same vertical plane as the spring.* (If one of them is slightly out of line, it can be put back into position by twisting the spring a little. However, if the spring is badly bent or kinked, it should be replaced. If the spring is bent between the fork and the top suspension block, it should be replaced since it is nearly impossible to sufficiently straighten the spring in this area.

Next, copy the protractor shown in Figure 2 and cut it out so that it will fit on your clock base. Working from the back of the clock, allow the pendulum to come to rest and mark the pendulum ball farthest from you using a small piece of masking tape. Align the protractor so that the three marks lie directly beneath the pendulum ball opposite the marked ball. The three lines represent the zero position.

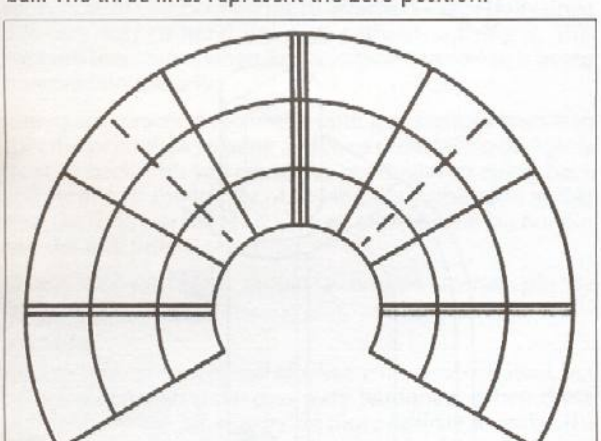


Figure 2

Start the pendulum rotating in either direction by giving it one full turn, no more. Listen for the sound of the escape wheel striking the anchor pallet. The use of a beat amplifier (See Section 17) makes it easier to hear this sound—the tic and toc. Note the position of the marked pendulum ball with respect to the protractor. When the beat is perfectly set, the sound of the escape wheel striking the anchor pallet will occur equally distant from the zero mark on the protactor (the three marks). If the beat is not set properly, adjust the

QUESTION (6): How do you put the pendulum in beat?

ANSWER:

First, it helps to know exactly what is meant by the pendulum being "in beat". This can best be understood by the following instructions with a reference to Figure 1.

Once the clock is started, it continues to run because the power, originating with the wound mainspring, is converted mechanically into a series of little impulses which individually push the rotating pendulum back and forth. This pendulum action originates with the escape wheel teeth (ewt) which, through the anchor pallets (p), pass alternate impulses on to the suspension fork (f) via the anchor pin (ap). The fork, in turn, transfers the back and forth motion of the anchor pin to a twisting motion of the suspension spring (sp). The twist ultimately passes down the length of the spring to the bottom suspension block (bb) where it ends as a little push of sufficient intensity to maintain the oscillation of the pendulum attached to it.

To keep this action continuous, the push must be given to the pendulum at an equal distance from its dead position in either direction. Otherwise the clock will soon stop. The adjustment by which the push is made equal in both directions of rotation is know as putting the pendulum "in beat".

Adjustment of the pendulum beat is made by turning the entire suspension unit with the pendulum attached on its axis (a-x). This is accomplished by one of several different methods depending upon the design of the clock. In all clocks, the suspension unit is held by its top block (tb) in some form of saddle (s). (See Section 15 for various types of suspension saddles.) Except in one or two of the very early models, provision has been made for this saddle to be turned. It may be necessary to loosen a set screw (ss) to move it, or the saddle may just be friction tight (ft).

In some old clocks, when the saddle is fixed, (for instance, Section 6, Clock 50; Section 9, Plate 1171), the adjustment can

saddle by turning it slightly. It takes very little motion of the saddle to greatly effect the beat of a 400-Day Clock. The graduations on the protractor are intended to help determine the location of the marked ball when the sound occurs. These marks are not intended as limits.

It is easiest to determine the direction that the saddle should be turned by visualing a line between the locations of the marked ball when the sound occurs on each side of the zero line. For example, after starting the pendulum rotating, you note that the sound occurs above the last mark on the right side of the zero mark and above the third mark on the left side of the clock. This means that it is necessary to rotate the "locations" of the sounds clockwise. In order to do this, rotate the saddle in the counter-clockwise direction. While only a small adjustment is ordinarily necessary, it may take several tries before the saddle is correctly positioned and the beat is properly set.

On clocks having saddles with set screws (ss), it is always a good idea to check the beat after the set screw has been tightened. The saddle may have been turned in tightening without your noticing it. This step is unnecessary if a beat setting tool is used. (See Section 17.) The use of a beat amplifier and a beat setting tool makes beat setting easier, faster, and more accurate.

For the time being, leave the protractor in place as it can be used to check the action of the clock and is very helpful in regulating the clock.

QUESTION (7): How much should the pendulum rotate?

ANSWER:

The minimum number of degrees that a pendulum of the standard size clock should rotate is about 270° or ¾ of a turn. If you are using the protractor shown in Figure 2, the dashed lines indicate 270°. Anything less, particularly if there is a little overswing, usually indicates a loss of power somewhere in the train.

It is sometimes possible to increase the turn of the pendulum by raising the fork slightly on the suspension spring. However, if this doesn't help, or if it impairs the functioning of the escapement, check the escapement action. If that is in order, then try to locate the source of the power loss. Look for too much play in the fork, a loose top block, a distorted mainspring or gummy oil in pivot holes or mainspring barrel.

There's considerably more leeway in the *maximum* amount that a pendulum will turn. In the standard clock, a 360° to 450° turn (1 to 1¼ turns) is not unusual. As a matter of fact, some miniature movements have pendulums that make as much as two turns.

In general then, if the pendulum of a clock makes at least three quarters of a turn, and if there is an overswing of one half inch or more, you can be reasonably sure that the clock will run at least 400 days.