

FADING MOTION

MAINTENANCE INSTRUCTIONS

GENERAL INFORMATION:

The exhibit "Fading Motion" utilizes a sand filled pendulum and a conveyor belt to plot an exponential decay. The pendulum has an adjustable damping mechanism to change the rate of decay. The belt speed can be varied to change period or the length of the plot.

Please refer to the drawings for the names and locations of the various components described in the following text.

Routine Maintenance:

This exhibit uses sand in the pendulum to draw the plot. The recommended sand is Clementina # 0/30 blasting sand. This grit is just small enough to easily pass through the funnel screen but large enough to reliably fall off of the belt into the sand box. The belt can be cleaned with window or plexi cleaner. It is PVC coated so avoid using strong solvents. The rest of the exhibit is epoxy painted, metal and plastic and can be cleaned with mild soap solutions or plexi cleaner.

Oil Reservoir Care:

The oil used in the damping reservoir is "Extra Heavy Mineral Oil". Lighter oils will not damp the pendulum as effectively. Cleaning the reservoir requires carefully removing four allen screws that hold it to its bracket. Do not over-tighten these screws when replacing since it could crack the plexiglass tank. The tank can be washed out with hot soapy water.

Leveling the Exhibit:

Each leg has a leveler foot built into the bottom. They can be screwed up or down to level the exhibit. The initial set-up of the exhibit should level the belt platen with a carpenter's level. The pendulum should hang near the center of the belt and swing from the starting plate without wobbling in the direction of the belt travel.

Pendulum Alignment:

This will need to be done if the exhibit is moved. Check that the exhibit is level (see 'Leveling the Exhibit') The pendulum is started by pulling it into the starting plate. This plate is intended to swing the pendulum perpendicular to the belt without wobbling. If leveling the exhibit does not correct the wobble, there is additional adjustment for the pendulum at the top where it clamps to the pivot shaft. Loosening the upper cap screw in the clamp will allow the pendulum to be moved on the shaft. Check that the pendulum shaft is parallel to the damping shaft before re-tightening the clamp. (Otherwise the paddle may hit the tank wall.)

Belt Speed Control:

The conveyor belt is moved with a D.C. motor capable of variable speed. The power supply is located in the graphic wedge mounted on the bottom panel. Access is with an exhibit key. The fastest speed is set with the knob on the dimmer control. (The dimmer is the aluminum box located on the electrical chassis.) Located on the side of the dimmer is a small opening to access the slow speed adjustment. A small screwdriver inserted here will adjust the motor when the knob is turned all the way down. It should just come to a stop.

Potentiometer replacement:

This is done from underneath the graphics panel by loosening the two white nylon thumb nuts and pulling on the potentiometer firmly but slowly until it releases. To reassemble, first turn the pot shaft and the knob both completely clockwise. This will avoid a 'spongy' feel at the knob stops. Then align the plate with the threaded studs and push the pot shaft into the rubber coupling.

Motor Clutch Adjustment:

The drive motor is equipped with a clutch to allow the visitor to stall the belt without damaging the mechanism or harming themselves. The clutch is built into the motor pulley. A hex nut is threaded onto the pulley arbor and tightens the assembly for more or less drag. It is locked into place with a small set screw on one of the flats. Care must be taken when adjusting this nut since small children playing under the exhibit must be able to make the clutch slip without getting hurt.

Crank Clutch Adjustment:

The crank is equipped with a torque limiting clutch to prevent the ball screw mechanism from being excessively forced. The clutch is located behind the crank. It is accessed by first removing the crank handle and the plastic cover piece from the frame boss. Next, remove the three screws that hold the bearing and clutch assembly in the exhibit. Loosen the set screw in the universal joint to the right angle drive. (This is accessed under the exhibit.) The unit will now slide out. The torque limiter has a knurled aluminum collar that can be adjusted for the desired torque. (Between 6 and 10 lb-in.) Assembly is the reverse of the disassembly, being certain that the set screw in the universal is on the flat of the right-angle drive shaft. Tighten the three screws holding the assembly into the frame boss before tightening the universal joint to avoid pre-loading the mechanism.

Replacing the V'Belt:

The conveyor belt must be removed to accomplish this. The belt's "drive roller" just sets into the frame and can be lifted out once the motor is loosened.

Funnel Disassembly:

The funnel assembly is held together with a ring of screws under the rim. Removing these screws allows access to the screen, plunger and nozzle for cleaning and servicing. The plunger uses a replaceable roll pin in the end. It can be grabbed in a vice for removal. The bushings can be accessed by loosening the set screw on the handle and sliding the shaft out through the bushing.

Replacing the Pivot Bearings:

The bearings on the pivot shaft are shielded ball bearings. There are a few tricks involved to replace them. The bearings are a slide fit on both the shaft and in the blocks at each end. After the new bearings have been re-assembled, the blocks will have to be tightened in a manner that allows the bearings to precisely align the assembly. One method is to pull the shaft firmly towards the mounting plate while the cap screws are carefully seated. Sometimes tapping the blocks with a small mallet will help the bearings settle into position. Whatever method is used however, the shaft should be checked for free rotation after tightening the blocks down. It may take a few trials before the bearings flop around with no apparent drag.

