A Closer Look at the Catapult

The following terms are used in this manual.

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<td>Rubber band attachment</td>
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Maintenance

ADJUSTMENT OF ARM:

Catapults take a lot of abuse during experiments, and some maintenance is necessary. Also, humidity may cause swelling or shrinking of the wood, creating operational problems. Adjusting the arm in the slot is one of the most helpful maintenance techniques, but is also one of the least known. Adjusting the arm in the slot will "tune" your unit to perform in a consistent manner.

To adjust the slot, loosen the rubber band from the towers' wooden peg so that the arm's rubber band is free. Leave the arm assembled in the unit. Do not remove the arm or the pivot pin.

Turn the unit over so you are looking at the bottom. You will notice six #2 square headed screws hold the sides and tower to the base. As you view the bottom side of the unit, the screws to adjust are the ones on the upper and lower left of the base, which is at the rear of the unit.
While holding rear of the unit, apply pressure on the arm to push against the side of the unit while loosening that side's adjustment screw. The side will move enough to allow the arm to clear the sides and operate smoothly. Often I slide several pieces of paper along each side the arm in the slot. This acts as a spacer.

While in this position, re-tighten the adjustment screw to hold the side in position.

Check the arm for clearance and free operation.

Reattach the rubber band around the pin in the tower and loop the rubber band around the peg at the front of the unit.
Rubber band nicks/cracks –
The team should inspect the rubber band frequently. Small nicks and cracks do influence the shot distance. Long before the rubber band breaks, the damage will change the shot distance. New rubber bands will change shot distances significantly. If a rubber band is changed, the experiment must begin again. Exercise the new rubber band by extending it fully 50 or more times before recording data.

Figure 1 - A crack is forming in the rubber band. This crack is quite advanced and has long since begun to influence the shot distances.

Figure 2 - A crack has formed in an area of the rubber band where a student made a mark with a pen. Also note the crazing of the rubber all along the edge. The shot distances are influenced long before the rubber band fractures.
Impact pad –
When released, the arm impacts a rubber pad. This pad takes a lot of punishment. A
groove will form. A crack will begin to form inside the pad, and propagate to the
surface. The shot distance will drift long before the crack propagates to the front and
becomes visible. The team should carefully monitor the state of the pad. If the pad is
replaced, the shot distances will change significantly, so the experiment must be
repeated. The new pad should be carefully seated. Then pull the arm back and release.
Repeat this action 50 or more times before recording data.

Figure 3 - Note the small crack on the surface of the pad. This signals big problems for catapult operation.

Figure 4 - Different pad materials will have a large influence over shot distance.