

PMT Gluing Procedure

Last Updated 2/5/2013

Making the Glue

1. Assemble the following materials:
 - a. Electronic scale (located in box marked 'Electronic Scale' under shelf 05).
 - b. Cleaning towels, glass fixtures, glass windows, copper rings to secure PMTs, rubber stoppers, test tube organizer (all located in a box in cabinet #4 in the clean room).
 - c. PMTs to be glued (located in two boxes behind cabinet #4 in the clean room).
 - d. Masking tape, syringe, and plastic needle (all located in cabinet #3).
 - e. Large level (located on the top level of the red toolbox next to cabinet #3).
 - f. PMT drying rack (should be already on the table in the center of the room).
 - g. Small plastic cup for mixing epoxy and test tubes (located on the shelf under the centrifuge).
 - h. Epoxy A (white bottle) and epoxy B (dark bottle) (located in cabinet #7 unlocked by key #11 located in the key box in the clean room).
2. Determine the amount of glue to be made (usually about 0.4 - 0.5 grams per PMT). Calculate the amount of epoxy A and B needed to create the desired amount. The ratio of epoxy A to epoxy B is 1 : 0.35. The minimum amount that should be made is about 2.025 grams.
3. Begin by leveling the electronic scale using its built in level. The front two legs can be adjusted up and down using the wheels directly above them. Once the bubble in the level is centered place the plastic cup on the scale and zero it.
4. Put on rubber gloves to protect hands as well as to keep materials clean.

5. Pour epoxy A into the plastic cup until the desired amount is reached.
6. Use the syringe with the plastic needle inserted to add the desired amount of epoxy B. Push the plunger all the way down to remove all of the epoxy.
7. Mix the epoxy for one to two minutes using a stick.
8. Place the mixture in a clean test tube.
9. Seal the test tube and place it in the centrifuge. Place an empty tube across from the tube with the epoxy to balance the centrifuge. Run the centrifuge for 30 minutes to remove bubbles.
10. Once the mixture has been spun for 30 minutes remove the test tubes and pour the mixture back into the syringe by removing the plunger and covering the tip of the needle. Squeeze any air out of the syringe by holding the needle end up and gently pushing in the plunger.
11. Place the syringe in the test tube holder. The glue is now ready to be used. Throw away the test tube and cup (new cups and tubes can be ordered from McMaster).
12. If done making glue return the materials to their proper places and clean up any mess.

Gluing

13. Align the large level to make certain the gluing setup is horizontal by placing notecards and other paper sheets under the rack's legs until the bubbles are centered.
14. Unwrap the bubble wrap protecting the PMTs. Check the PMTs for cracks or any clear deficiencies. Take the PMTs to be glued and carefully wrap masking tape around the PMT about one millimeter below the surface (covering the silver).
15. Install the PMTs in the gluing setup with the cathode facing up. (Secure them using the three copper rings on the bottom of the PMT.)

16. Clean the glass to be glued onto the PMTs and the glass fixture used to align the glass using the cleaning towel and alcohol.
17. Without any glue on the PMT check that the fixture and glass align properly with the PMT.
18. With the syringe carefully add about one drop of glue to the surface of the PMT.
19. Hold the glass by the sides being careful not to smudge the clean surface. Place the glass gently on the glue making certain not to trap any bubbles. Do not allow the glue to touch the gloves.
20. Hold the glass fixture right side up to the top of the PMT. The top of the fixture is the end with a small indent in which the glass can fit tightly. Align the indent in the fixture with the glass on the PMT. With the fixture touching the glass gently center the glass by adjusting the fixture.
21. Once the glass is centered (observe the glass from above to be certain, and adjust lightly using a finger if it is still not well centered) check once more that there are no bubbles. Then keeping the glass centered with the fixture place a rubber stopper on top of the glass (large side down) and secure the glass in place by tightening the screw above the PMT.
22. Check that the glass is still centered.
23. Clean the fixture, glass and PMT to remove any excess glue.
24. Once done gluing return the materials to their proper places and clean up any mess.
25. Allow the glue to dry on the PMT for at least a day.

Cleaning and Cataloguing the PMT

26. Put on rubber gloves to protect hands as well as to keep materials clean.
27. Find the logbook titled 'PMT from BaBar Status'. It should be on a table near the drying rack.
28. Once the glue has dried for at least one day remove the PMTs by loosening the copper rings securing the PMT base.

29. Remove the masking tape and clean the glass using the cleaning towel and alcohol.
30. In the logbook find the last PMT that was completed. Under this entry note the date and initial the page for the new entries. The number used to label the tube is the rightmost number in the columns made up of two numbers. Write the next number in the series and then using the label maker (located on the table near the drying rack) print off a label with this number.
31. Place the label on the bottom (black part) of the PMT with the numbers aligned so that they can be read when the surface of the PMT is upright.
32. Wrap the PMTs back in their bubble wrap securing them with tape.
33. Place the completed PMTs in the box with the number given in the logbook. PMTs should be placed in bags of five with boxes holding sixty PMTs.
34. Once done cleaning and cataloging return the materials to their proper places and clean up any mess.