SERVICING THE McARTHUR MICROSCOPE (OPEN UNIVERSITY MODEL)

Servicing is relatively simple but a special screwdriver will need to be made for most of the models, as the nuts used to hold the parts together are slotted round ones.

First obtain a small screwdriver and file the blade width to 5mm (this is an important dimension) then file a slot in the tip 2mm wide and 2mm deep so that the end fits the slotted nuts.

1. Look through the microscope and if you can see anything note if the field of view is round, if not note this for later. Remove the lamp unit cover and lamp unit.
2. Undo slotted nuts (sometimes they are covered with a white sealant) Note do not remove the other 2 slotted head screws yet. This is the most difficult part of the whole operation and sometimes the long bolts undo with the nuts. Don't worry about this; if it happens just screw it back later.
3. Separate the three parts.
4. The small part with the lower lens of the Huygens eyepiece will be one of 2 types, one will have the lens held in by a black plastic ring and the other type by being secured by heat sealing: Remove the lens and clean thoroughly. This must be very clean, as any dust here will show in the field of view. You probably found that the type with the retaining ring was loose when you separated the sections so after you have cleaned and replaced the ring fix it with a dab of glue. Note that the correct position for the lens is with the flat side to the top.
5. Remove the upper part of the eyepiece and clean thoroughly. Pack both parts away in a clean plastic bag until later.
6. Remove the 2 screws next to the focus wheel on the bottom section and separate the 2 sections being careful not to loose the 1 or sometimes 2 clear plastic strips at the end next to the focus wheel. Clean out the lower section including the mirrors using only clean cotton wool after breathing on them, any scratches will show in the field of view. If the field of view was round (see No. 1) secure the mirrors with a dab of glue but be careful not to get any on the mirrors! If you don't feel competent to do this you will have to leave it and hope that they don't loosen. If the field of view showed a black crescent at the bottom it will mean that the mirror at the opposite end to the focus wheel will need repositioning. Lever off the mirror and clean the back and the mirror mounting carefully. Cut a piece of card (postcard thickness) 15mm x 5mm and cement this to the bottom of the mirror mounting, this will have the effect of tilting up the mirror at the bottom edge. Cement the mirror back in position using Bostik Clear adhesive or something similar. Again if you don't feel competent to do this you will have to live with a non-circular field of view! Put the section away in a plastic bag until later.
7. Turning our attention to the section containing the lenses, pull out the objective plate to the high power position, pull it out again to another position and it will "click" out into this position which held a x40 objective on some models, (sorry none are available now) pull it out again and the carrier will come out. If you are thinking of using the internal battery facility clean the brass spring. I shouldn't even think about it as the modern batteries are bigger and you will have to enlarge the top section: Also they only last a short time. We will deal with lighting and lighting problems later.
8. A common fault is the distortion of the "U" shaped black objective carrier mounting which makes it difficult to adjust the focus. This must be at least level with the white section or slightly proud, if not it will need to be adjusted by the following means. Type 1, the mounting is held by 4 screws which should be removed (take care not to lose the 2 springs) and a piece of card put under the 2 screws nearest the objective end to bring the mounting to the correct position. The position is not critical but it must be at least level with the white section. Type 2, the mounting is retained by 2 screws and the mounting is adjusted by 2 hexagon screws, these are often very tight and you may have to slacken the 2 retaining screws first. If you cannot loosen them, pack them out as for type 1.
9. Turning our attention to the objectives, first push out the objectives complete with their mountings from the objective carrier. There are several sorts of objectives and mountings but they are best removed from their mounts if possible (at least the lower power) to get them really clean. Most of the higher power will be good enough after cleaning without taking them out of their mounts although cleaning and polishing them will obviously be better. Most objective mounts will be loose in the objective carrier (which was one of the most common faults for being out of focus). This can be corrected by scoring the inside of the objective carrier with a knife. When you fit the objectives back into the objective carrier after cleaning, run a little nail varnish between the objective mount and objective carrier to seal them in; this will not make the seal too permanent as

you may want to remove them again for cleaning. To remove the objectives from their mounts, you will have to use a pencil or other wooden item to push them out after removing any retaining rings. Some of the lower power objectives were cemented in their mounts and cannot be removed, these can be identified by the fact that there is no retaining ring (unless it is a "normal" mount with the retaining ring missing). It is important that the lens "doublets" are fitted the correct way up, if you hold the lens at an angle to a light source you will see 2 images reflected in it. On one side you will see the 2 images of equal size and the other size will show the 2 images of unequal size, the "unequal image side" will need to be facing upwards with the microscope in its normal position, this applies to both objectives. The correct position for the objectives in the objective carrier is as follows; the lower power needs to project as far as possible below the carrier; of course if it is too low it will catch the objective carrier mounting and you will be unable to push in the objective carrier. To ensure that you fit the lower power lens mount the correct way in the objective carrier, ensure that the lens retaining ring faces the microscope stage, another way to remember it is to think of the mount as a letter "U" the top of the U must face the stage. When fitting the higher power the smallest lens must face the stage. The higher power objective requires to be just about level with the bottom of the objective carrier. If you are a stickler for parfocality you will need to play about with these dimensions later. Fit the objective carrier complete with objectives into the objective mounting; screw the 2 sections together remembering the 1 or 2 plastic strips between the focus wheel and objective carrier mount. Set aside in a clean plastic bag for later.

10. Note that the larger doublet in the X20 objective is the same as the X8 doublet.
11. Although you can get away with just cleaning the top section containing the condenser, it will repay checking that the condenser has been cemented in correctly as most of them have been cemented in at an angle. Simply undo all of the screws, clean and check the condenser lens and re cement it in. Refit the upper part of the eyepiece.
12. Slide the 3 sections back together and check for dirt in the field of view before screwing the nuts back.
13. We are now ready for setting the microscope up, the lamp units vary but almost all of them will need adjustment to get the bulb in the correct position to give optimum results. This is a bit "fiddly" but it is well worth the effort, I also solder the tip of the bulb to the brass connector when I have adjusted the position. Don't be tempted to remove the paint from the reflector and polish it, this will give a brighter light but also a very poor image. Move the bulb backwards or forwards and turn it round to achieve the optimum position, that is with the spot of light in the centre of the reflector as far as is possible. I also solder 2 leads to the lamp unit cover and bring it out through the slot in the side to connect to an external supply of 3Volts A.C. or D.C. A suitable D.C. source can be made by soldering 2 flashlamp batteries in series, or a suitable 2 battery holder can be purchased from many electronic dealers. By sliding the switch on the battery cover to its centre position, a light source such as a table lamp can be used by shining it through the square aperture in the front. By sliding the switch to the rear position a light source can be shone down through the round aperture in the top. You can use internal batteries but the new metal covered types are larger than when the units were designed and you will need to open up the aperture, note that they only last a very short time, it is better not to bother with these.
14. Insert a slide with the cover slip DOWN this is most important and try out the microscope, if all is well you will have a unit that will give many hours of pleasure, good luck. Any queries to;

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