

*SOME ADVICE
for using
THE CAMERA LUCIDA
constructed in the workshop
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There are three main circumstances from which the best effect of the instrument depend. 1. The exact disposition of the lenses. 2. The correct height of the instrument on the table. 3. The well-proportioned illumination of the paper, and of the object.

The following rules can serve as a guide to those who do not have any experience with the instrument.

1. Having set the foot of the instrument on a solid table on which a sheet of paper has been spread, support F (Fig. I.) is tilted so that the camera lucida is brought over this piece of paper. The glass prism S is turned towards object Q that one wishes to copy, by making it rotate around the axis until the eye, placed over the opening of the thin sheet L sees from high to low through glass V the upright image of this object projected on the paper at P, taking in the greatest extension of it.

Once this is done, if object Q is about the same distance from the camera lucida as this is from the paper, in this case the copy will be approximately of the same dimension as the original object, both of the lenses brought together should be situated obliquely out of use, since their use is not needed in this case.

But if the camera lucida is much more distant from the object than from the paper, in which case the copy is smaller than the original, one must then adjust the lenses on their axes so that the coloured lens C can be obliquely situated, and the non-coloured lens B parallel to paper P, as represented in the figure. And if on the contrary the camera lucida is closer to the object than to the paper (and so the copy will be much larger than the original), the lenses have to be reversed on their axes so that while coloured lens C remains unused, the non-coloured lens may be placed vertically between prism S and object Q.

2. The correct distance of the device over the paper can be found with the following experiment.

Place the point of the pencil on any distinct point of the image of the object that can be seen depicted on the paper, and move the eye over the opening in all directions. If during this movement the point of the pencil always corresponds to the same point of the object, the device is placed correctly. On the contrary, if the pencil changes position, it is better to cause it to remain stationary by lengthening or shortening support F.

3. The object can be too illuminated or too dark compared to the plane on which one wishes to copy. In the first case, the hand that has to draw is lost from sight, or barely visible. In the second case the image of the object cannot be seen, or it remains too dim; therefore only when the brightness is well adjusted can one easily and advantageously use the device. The best way to regulate the light is the following.

If the object is too bright and the pencil cannot be seen (which often happens when copying landscapes seen from a window), the table should be moved nearer to the window until the paper receives enough light so that the pencil can be seen over it without obscuring the image too much. If moving nearer is not enough, one should raise the coloured glass vertically in front of the prism to temper the shine.

However despite this one may not be able to see both the pencil and the object well in all of the points, because the different parts of the same object can be more or less illuminated, or of a different colouring. In this case one must first of all move the table into that position in which the paper equals

the brightest parts of the original in illumination. Once these parts have been traced, without changing anything in the device the user can gradually shade more and more those portions of the paper which correspond to the darker parts of the object simply by using his left hand, and regulate the illumination as he pleases so that the pencil can be seen equally well as the image of the original in all points.

This same stratagem of bringing shadow to the paper when needed should be used whenever one wishes to copy objects inside a room, which must be exposed to the greatest direct light from the window, taking care to work with the device in such a way as to easily take away, as mentioned, or add light to the paper as needed.

One can do without shading the paper if black paper is used in the place of white, tracing over with a white pencil. In this last case the image of the object can be seen more clearly and the beginner often finds it easier to follow the outlines.

Dark periods, so the hours near evening, would not be favourable for drawing objects placed in poorly illuminated rooms.

A moderate contrast of colouring facilitates distinguishing the outlines. So the hair of a person and the coloured clothes of the same, etc. can be better drawn if a white cloth is placed behind them.

If you wish to draw the features of a person, it is better if the eyes of the artist and by consequence the device as well are both at about the same height as the eyes of the person being traced; moreover, this latter should have an appropriate support for his head, because a small movement would take away every resemblance.

Myopic and presbyopic people can use their glasses if they cannot see distinctly with this little device.

The dimension of the copy is to the dimension of the original approximately as the distance of the device from the copy is to the distance of the device from the original. That is, if the instrument is a foot away from the paper and two feet from the object, the copy will be half the size of the original. If it is a foot away from the paper and three from the object, the copy is a third. And if the object is closer to the instrument than is the paper, in this case the copy will be larger. In this latter case, however, the convex lens should be placed against the prism towards the original as was said at the end of art. 1.

If one needs to trace a vast outline, or to make a copy of a drawing so close to the device as to not be entirely included in the field of vision, it can be easily done by forming two similar grids over the original and on the paper or canvas on which the copy is to be made in such a way that each of their squares can be entirely seen by the instrument; with the camera lucida one then traces in each square of the copy that which is contained in the corresponding square of the original. In this way large geographic maps can be copied with great ease and precision.

If one wishes to draw an entire important figure, like a person, a statue, etc., on a paper or canvas, and copy it at a size which cannot be contained in the camera lucida all at once, one should move away from the original figure to the point where the camera lucida takes in the entire image. Once the entire drawing has then been completed on the paper, it will be smaller than desired, and it can be enlarged as preferred by making a grid and copying the squares onto a second piece of paper, as explained before.

But here it is important to warn that the corresponding squares, however similar they may be, may not seem to coincide if the plane of the original did not make a right angle with the plane of the copy, and even more if the ray perpendicular to the plane of the object was not projected perpendicularly by the eye onto the surface of the paper.

This condition is fulfilled, however, when the original is placed with vertical precision, and the copy lies horizontally, and when the axis of the prism is at the same time parallel to the vertical and horizontal planes.

One should keep this consideration in mind when drawing without a grid as well, in order not to alter the resemblance that the copy should have with the object.

When drawing large objects one can do without tracing a grid in some circumstances by using instead the stratagem of greatly lengthening the support in order to distance the camera lucida from the canvas, and then trace the image with a piece of soft charcoal fastened to as long a rod as needed.

Whenever the circumstances allow it is useful to raise the object, lower it or move it right or left until its image is equally distributed around the line which falls perpendicularly from the eye to the paper.

While drawing, be careful not to impede – with a hat or other object - the arrival of rays which have to show the object.

The camera lucida can also be used in the following way, which is more advantageous in all those cases in which one can illuminate the hand to a higher degree than the original. Turn the prism around the axis so that it no longer faces the object, but the paper. By looking horizontally through the opening of the darkened thin sheet, which should now be turned towards the person drawing, he will see the original to be copied through the crystal, and at the same time, by moving the pencil on the paper situated on the table below he will see the point of the pencil which will seem to move onto different parts of the object, as if it were transported. In this way it will be easy to mark the outlines of interest by following the trace of the original with the image ascribed by the pencil.

If one wants the copy to be smaller than the original, with this new arrangement of the instrument it is necessary to invert the lenses so that the convex lens alone is applied to the prism and the other coloured lens remains unused.

The second figure shows the position of the camera lucida for drawing on the table while looking horizontally. Q is the distant object to copy and it is viewed directly by eye O through glass V. The non-coloured lens B is parallel to paper P, and the coloured lens C is unused. The pencil which is drawing in P is seen transported in Q over the various parts of the paper.

Here, too, if the point of the pencil does not always seem to coincide on the same point of the object when the eye is applied in different positions on the opening of the thin sheet, one should approximate or move the camera lucida away from the table as explained at number 2 above.

It is useful to mention here that while using the first method of looking from high to low, the object should be in a more illuminated place than the paper on which the copy is being made so that the loss of light of the object which is seen by means of two reflections takes away the excess brightness. And on the contrary if the second way of looking horizontally and directly at the object is used, this object should be exposed to a lesser light than is the paper, since the paper, now seen with the two reflections from the prism and from the crystal, loses more light than it possesses.

This instrument, useful to people who do not know drawing, can also be of advantage to experts in this field because the person drawing, or the painter after tracing the natural outlines with the camera lucida and then adding those shadows or colours that he believes necessary, can compare his work with the natural image by placing one beside the other and thus judge very easily what is missing in his work to represent reality.

The beginner making simple sketches alone and comparing them closely with those made with the camera lucida can acquire the correctness of sight that is so necessary for the exact distribution of the different parts.

The already experienced artist will save a great deal of time in defining the main outlines of the complicated representation that he wishes to make directly or from a copy done by another.

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