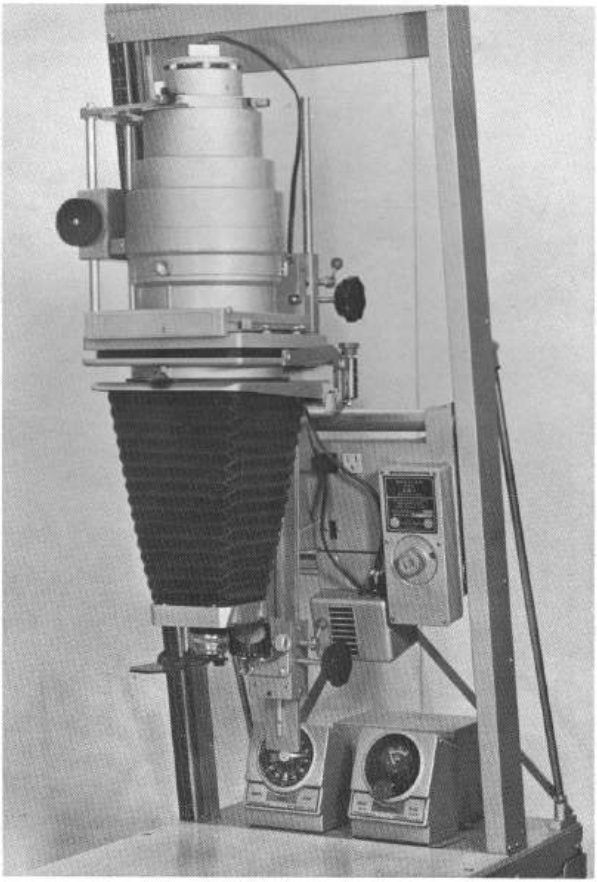
ASSEMBLY AND OPERATING INSTRUCTIONS

FOR THE

POINT SOURCE ILLUMINATING SYSTEM

(CAT. NO. P-112)



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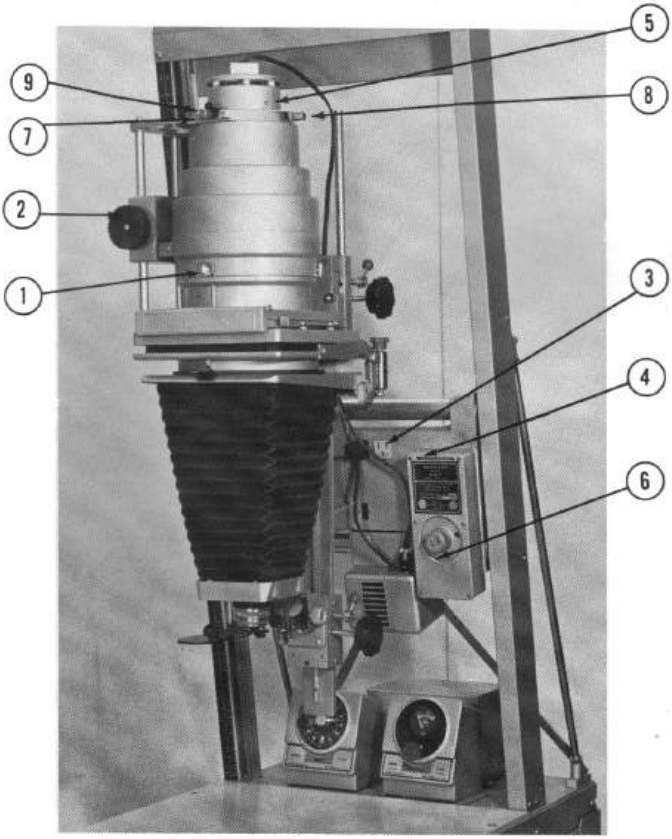

Fig. 1—Point Source Mounted On CB7 Enlarger

I. DESCRIPTION

The point source illuminating system for the CB7 and 45M series enlargers is a special low voltage system designed around an extremely small 150 watt quartz bromine lamp and a specially designed transformer. Each point source is physically interchangeable with the conventional lamp housing normally furnished with each enlarger and the transformer is designed to mount on the carriage so that the transformer power cord is short and neat.

Special provision has been made to permit precise centering of the lamp filament to the optical axis.

The lamp housing incorporated in the point source and means for vertical adjustment of the lamp relative to the condensing system have been designed for compactness with a folded vertical adjusting means which eliminates the need for extremely high ceilings (or cutting holes in the ceiling). This has been accomplished by "folding" the vertical adjusting means (which carries the lamp carrying portion of the lamp housing) back on itself.

Fig. 1 shows the point source mounted on the CB7 enlarger.

Fig. 2 shows the point source mounted on a 45M enlarger.

The point source for the 45M series is identical with that for the CB7 except that in the former case three shim plates have been added inside the mounting ring to reduce the mounting diameter to that required by the condenser housing of the 45M enlarger. In other rsepects the units are identical.

II. MOUNTING THE POINT SOURCE

A. *TRANSFORMER*

In both the 45M and CB7 enlargers the transformer is carried on the lower chrome plated tube of the carriage, as is clearly illustrated in Fig. 3 which shows the transformer mounted on the 45M enlarger. Mounting is accomplished by removing the two screws (-1) which secure the clamping plate (-2).

Push the transformer onto the bar (-3) so that it is positioned as illustrated in Fig. 1 or 2 and secure it by tucking the joggled edge of the clamping plate under the ears (-4). Then replace the two screws. Laterally the transformer should be located close to the control box as illustrated in Figs. 1 and 2.

B. *LAMP HOUSE*

Loosen the three lamp house mounting screws (-1, Fig. 1) and

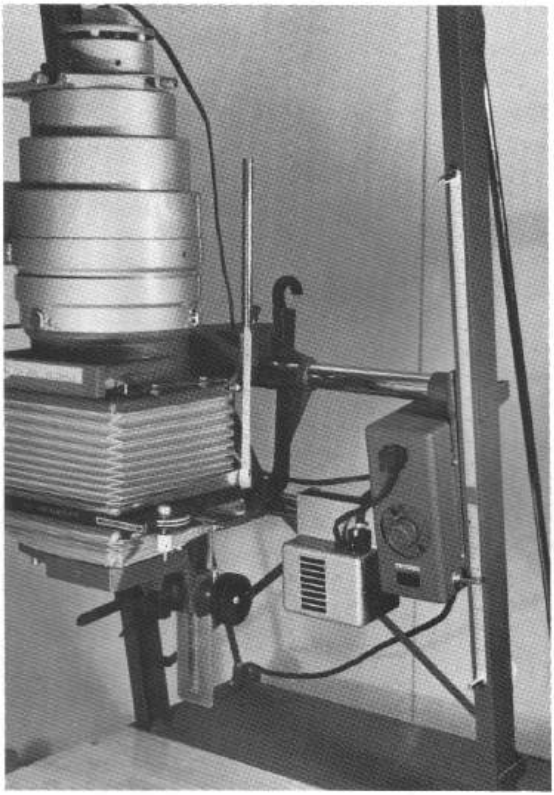

Fig. 2—Point Source Mounted On 45MCRX Enlarger

lift off the standard lamp house. The point source is mounted in the same way as the normal lamp house, and is secured with the same screws, as illustrated in Figs. 1 and 2. Note that the knob (-2) which elevates and lowers the lamp relative to the condensers faces forward.

C. *ELECTRICAL CONNECTIONS*

On the CB7, plug the short cord (-3) of the transformer housing into the black outlet of the carriage as indicated in Fig. 1. On the 45M, plug this cord into the control box as illustrated in Fig. 2.

In each case, plug the lamp cord (-4) from the lamp cap (-5) of the point source lamp housing into the outlet (-6) provided in the top of the transformer, as shown in Figs. 1 and 2.

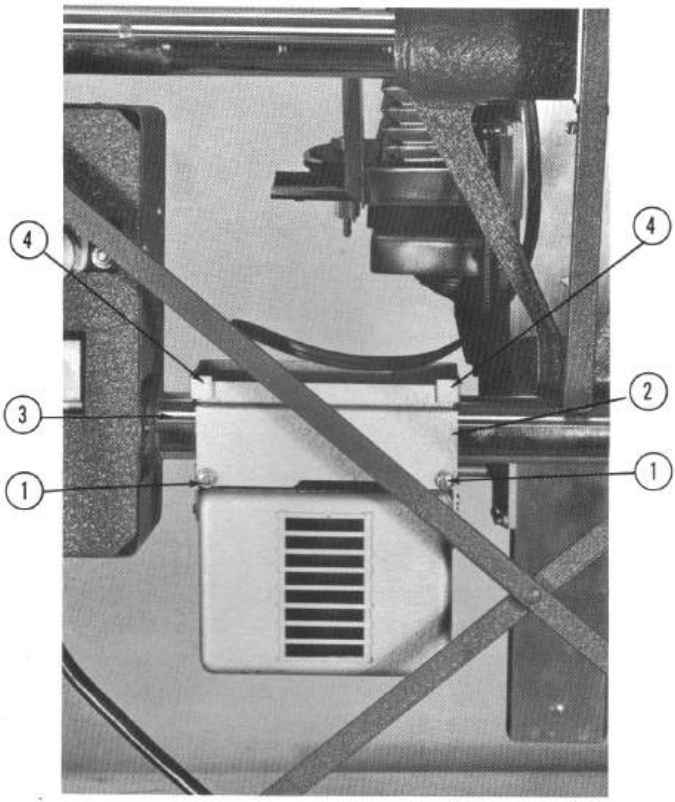

Fig. 3—Mounting The Transformer

III. USING THE POINT SOURCE

A. General Theory

The characteristics of a point light source are quite different from those of a standard enlarging lamp (such as a PH-212, etc.) and it is important that these differences be understood.

We therefore include a brief discussion of this point.

Fig. 4 (A) shows a conventional enlarging lamp and a condensing system and some of the principal rays which are fed to the enlarging lens. Point "a" on the center of the lamp is imaged at a′ on the optical axis, whereas points "b" and "c" from the outer circular portion of the lamp are imaged approximately at points c′ and b′ respectively (neglecting the effect of spherical aberration,

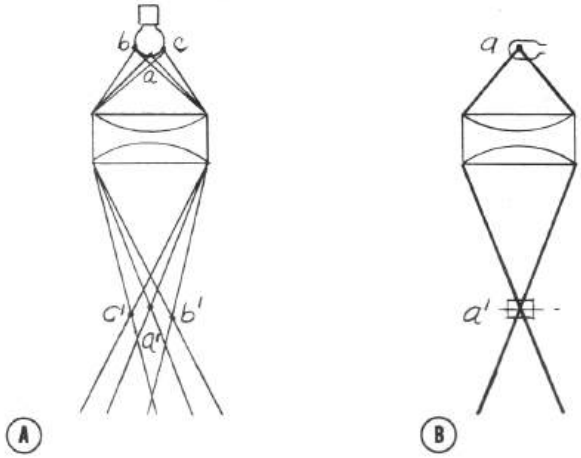

Fig. 4—Cone Of Light Produced By Conventional And Point Sources

which does not affect the discussion here).

The points of convergence of the light from the lamp as a whole constitute a poorly defined area, very large in diameter. A lens placed anywhere in the general area of convergence will pass some light from all portions of the negative, even though the lens is moved through the large variation in distance from the negative which is required for various enlargements.

Fig. 4 (B) shows a similar diagram for light emanating from a small (point) source. In this case the lamp filament is imaged very sharply by the condensing system, and it is necessary that the lens straddle this converging position if all the light is to get through. There are practically no skew rays entering the lens at various angles to help illuminate the edges of the negative if the lens moves from this optimum position.

In other words, getting the light through the lens requires that it be positioned straddling the point of convergence of the light (Condition #1).

On the other hand, the lens must stand at a particular distance from the negative in order to focus the negative sharply on the easel (Condition #2) and this proper position for focusing is a separate condition and has nothing to do with the position which is required in order to pass the light.

Both of these conditions must be met in order to obtain a proper enlargement, and since the lens cannot be moved from the position

required for proper focus, we must provide some means for bringing the point of convergence of the light to the required lens position.

This is accomplished in the Beseler point source by providing a very large movement of the lamp, and this ability is further enhanced by the movement of the negative stage built into the Beseler enlargers.

The above explanation will be made clear if you mount the point source, turn on the light and remove the lens. You will see very dramatically the cone of light and how it comes to a sharp point. Then if you move the lamp up and down, you will see the corresponding movement of the point of convergence of the light.

Because of the sharply defined cone of light as described above, it is usually necessary to work with the lens wide open (f/4.5) and it is also important that the lens design be such that the overall length be as short as possible. Most enlarging lenses conform to this requirement. However, there are some that do not, and these may produce vignetting in certain cases.

B. Procedure

Note: The procedures described below are applicable to both the CB7 and 45M series enlargers. However, in the CB7 the three stages (condenser stage, negative stage and lens stage) can all be moved on the backbone and this results in greater versatility, particularly in the making of reductions. This point is thoroughly discussed in the instruction book furnished with the CB7 enlarger.

1. *Set the negative stage to the setting indicated in Table I.*

   Note: Both the CB7 and the 45M series enlargers have scales which indicate the setting of the negative stage for particular size negatives. These settings are for conventional type enlarging lamps only. THEY DO NOT APPLY WHEN THE POINT SOURCE IS BEING USED. For the point source use settings as indicated in Table I.

2. *Insert the negative.*

3. *Select a suitable lens* (as suggested in Table I).

   Note: For special work such as reductions, etc., the focal length of the lens must be selected to meet the two conditions described in paragraph III, A, "General Theory". By skillful selection of the lens, almost any desired enlargement or reduction can be made.

4. *Adjust the enlarger for desired magnification.*

5. *Focus sharply* (disregarding unevenness of illumination). The purpose of this is to place the lens in its working position for sharp focus to meet Condition #2.

6. *Remove the negative.*

7. *Adjust the point source for maximum uniformity on the easel:*
   (a) Raise or lower the point source lamp.
   (b) If necessary, make small adjustment in the negative stage position.
   (c) Remove blue or brown corners by lateral movement of the point source lamp with adjusting screws (-7 & -8, Fig. 1).

8. *Replace the negative.*

9. *Make exposure using ordinary enlarging techniques.*

Because of the high intensity of light available from the point source and because of the fact that the lens must be used at full aperture, the proper exposure must be obtained either by short exposure times, by the use of neutral density filters or, if available, by use of a voltage regulating device such as the Beseler Voltrol. This, of course, lowers the Kelvin temperature of the lamp. However, for most black and white purposes this is not objectionable.

TABLE I

Negative Stage Settings And Lenses To Be Used With Point Source on CB7 & 45M Series Enlargers

Negative Size	Settings For Negative Stage	Focal Length Of Lenses[1]	
		Minimum	Maximum
Minox	35mm	50mm	135mm
35mm	2¼ x 2¼	75	135
2¼ x 2¼	2¼ x 3¼	90	135
2¼ x 3¼	3¼ x 4¼	100	135
3¼ x 4¼	4 x 5	127	160
4 x 5[2]	4 x 5	127	160

[1]For special purposes, e.g. great reductions, etc., other lenses may be applicable.
[2]Only the central 3¼ x 4¼ portion of a 4 x 5 negative will be covered by the point light source.

C. CONTROLS

When the point source is mounted as described above, all electrical controls used with the normal lamp house system are operative with the light source.

IV. MAINTENANCE

The only maintenance required on the point source of light is changing the lamp.

CAUTION: If the point source has been used, the lamp cap will be very hot. Allow it to cool before attempting to replace the lamp, or handle it with gloves.

This involves:

1. Removing the lamp cap.

To do this, pull the latching bar (9 Fig. 1) away from the lamp cap and carefully lift the lamp cap off of the assembly. The lamp is then accessible for replacement.

2. Replacing the lamp. (Beseler Pt. No. BS3.7-43)

The lamp used in the Beseler point source is a FCS quartz bromine lamp and this is made by several manufacturers. However, we recommend that these lamps be procured from the Charles Beseler Company since designs vary from manufacturer to manuturer and some work better in the point source than do others. The Charles Beseler Company maintains its own special inspection procedure for point light source lamps.

Adjustment of the Socket

The socket has been carefully adjusted at the factory and should not have to be moved. However, because of possible manufacturing variations from lamp to lamp, it may be necessary to readjust the socket to assure that the lamp filament is properly centered over the reflector.

Fig. 5 shows the lamp and the position of its reflected image. The socket should be so positioned that the reflected image appears either exactly beneath the real filament or, if displaced, should be as illustrated in Fig. 5 (A), occupying an area ¼" square. It should not appear as illustrated in Fig. 5 (B), where the image of the fiilament is shown displaced axially relative to the real filament.

Readjustment of the filament position is accomplished by loos-

sening two screws (-1 Fig. 5) and adjusting the socket laterally as required.

If the image of the filament is too small or too large, the socket must be moved toward or away from the reflector by loosening screws -2, Fig. 5.

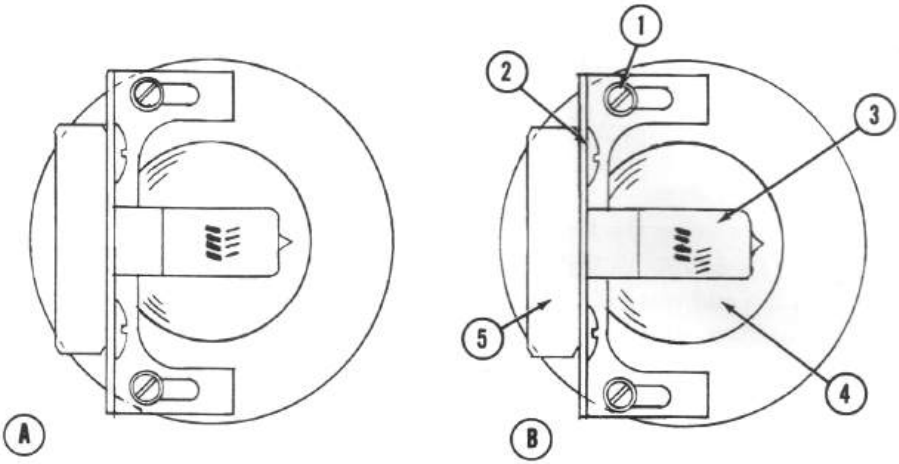

Fig. 5—Adjustment Of Lamp Relative To Reflector

POINT SOURCE—LIST OF PRINCIPAL PARTS

ITEM	NAME	PART NO.	REFERENCE	
			FIG.	CALLOUT
1	Lamp	BS3.7-43	5	3
2	Reflector Assembly	15669	5	4
3	Socket Assembly	15632	5	5
4	Cord Set—Lamp to Transformer	15670	1	4
5	Plug—Lamp Cord to Transformer	BS3.8-28	1	6
6	Knob—Focusing	BS2.11-2	1	2
7	Screw—Lamp Cap Adjusting	BS2.2.1-6	1	7 & 8
8	Transformer	BS3.11-18	—	—
9	Cord Set—Transformer	BS3.1-95	1	3
10	Receptacle (for Item 5)	BS3.8-6	—	—