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1944

TM 11-2368

AR DEPARTMENT TECHNICAL MANUAL

U.S. Dept. of Army

ENLARGERS PH-275 AND PH-275-A

RESTRICTED. DISSEMINATION OF RESTRICTED MATTER.
The information contained in restricted documents and the essential characteristics of restricted material may be given to any person known to be in the service of the United States and to persons of undoubted loyalty and discretion who are cooperating in Government work, but will not be communicated to the public or to the press except by authorized military public relations agencies. (See also par. 28, AR 380-5, 15 Mar. 1944.)

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30 OCTOBER 1944

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**ENLARGERS
PH-275 AND
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WAR DEPARTMENT,
WASHINGTON 25, D. C., 30 October, 1944.

TM 11 2368, Enlargers PH-275 and PH-275-A, is published for the information and guidance of all concerned.
[A.G. 300.7 (8 Aug. 44).]

BY ORDER OF THE SECRETARY OF WAR:

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Chief of Staff.

OFFICIAL:

J. A. ULIO,
*Major General,
The Adjutant General.*

DISTRIBUTION: IC and H 5, 9, 11, 19, 30, (5).
(For explanation of symbols see FM 21-6.)

*Noted
11/1/44
J. A. Ulio*

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DESTRUCTION NOTICE

WHY — To prevent the enemy from using or salvaging this equipment for his benefit.

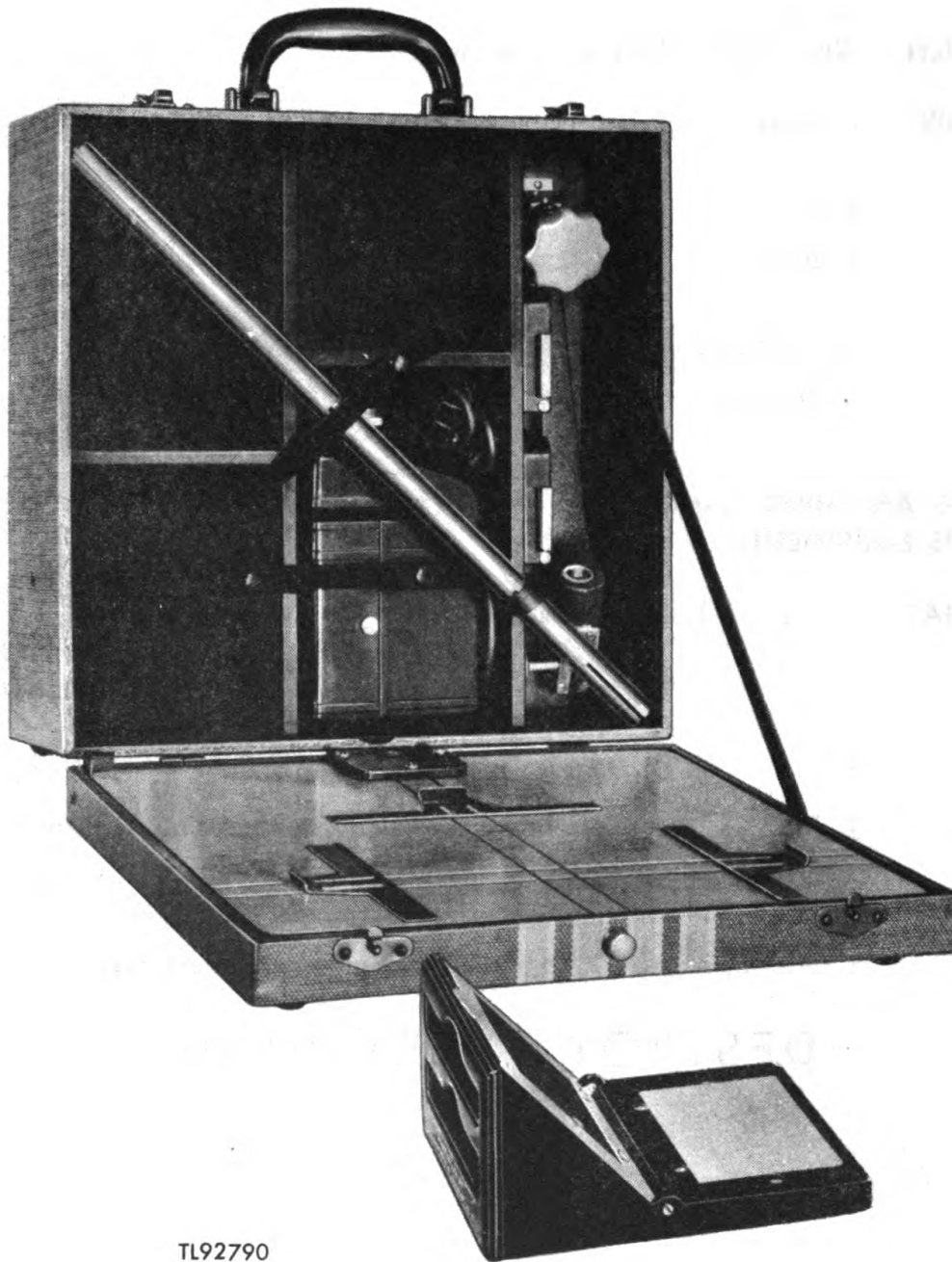
WHEN — When ordered by your commander.

- HOW**
1. Smash — Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.
 2. Cut — Use axes, handaxes, machetes.
 3. Burn — Use gasoline, kerosene, oil, flame throwers, incendiary grenades.
 4. Explosives — Use firearms, grenades, TNT.
 5. Disposal — Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

- WHAT**
1. Smash—Enlarger head, condenser lenses, projection lens, lens barrel, safety filter, enlarger lamp, heat-absorbing glass, switch, paper board (metal), negative holder, elevating arm, knobs, etc.
 2. Cut — Cord, wiring, etc.
 3. Burn — Paper board (wooden), cord, technical manual, etc.
 4. Bend — Baffle, elevating post, paper guides, etc.
 5. Bury or scatter — All of the above pieces after destroying them.

DESTROY EVERYTHING



TL92790

Figure 1. Enlarger PH-275, packed in case.

RESTRICTED

SECTION I

DESCRIPTION

1. GENERAL.

a. The purpose of this manual is to provide full information for the installation, operation, and maintenance of the 35-mm Enlargers PH-275 and PH-275-A.

b. Enlarger PH-275 is packed in a portable, wooden, fabrioid-covered carrying case (fig. 1). The enlarger consists of a plastic enlarger head containing the enlarger lamp, condenser lenses, projection lens, heat-absorbing glass, and baffle. It is mounted on an adjustable elevating arm which can be moved up or down an elevating post secured to the paper board. Sliding metal guides on the paper board locate the sensitized paper and maintain it on a horizontal plane. An additional device included for making enlargements is Board PH-425, a miniature paper board.

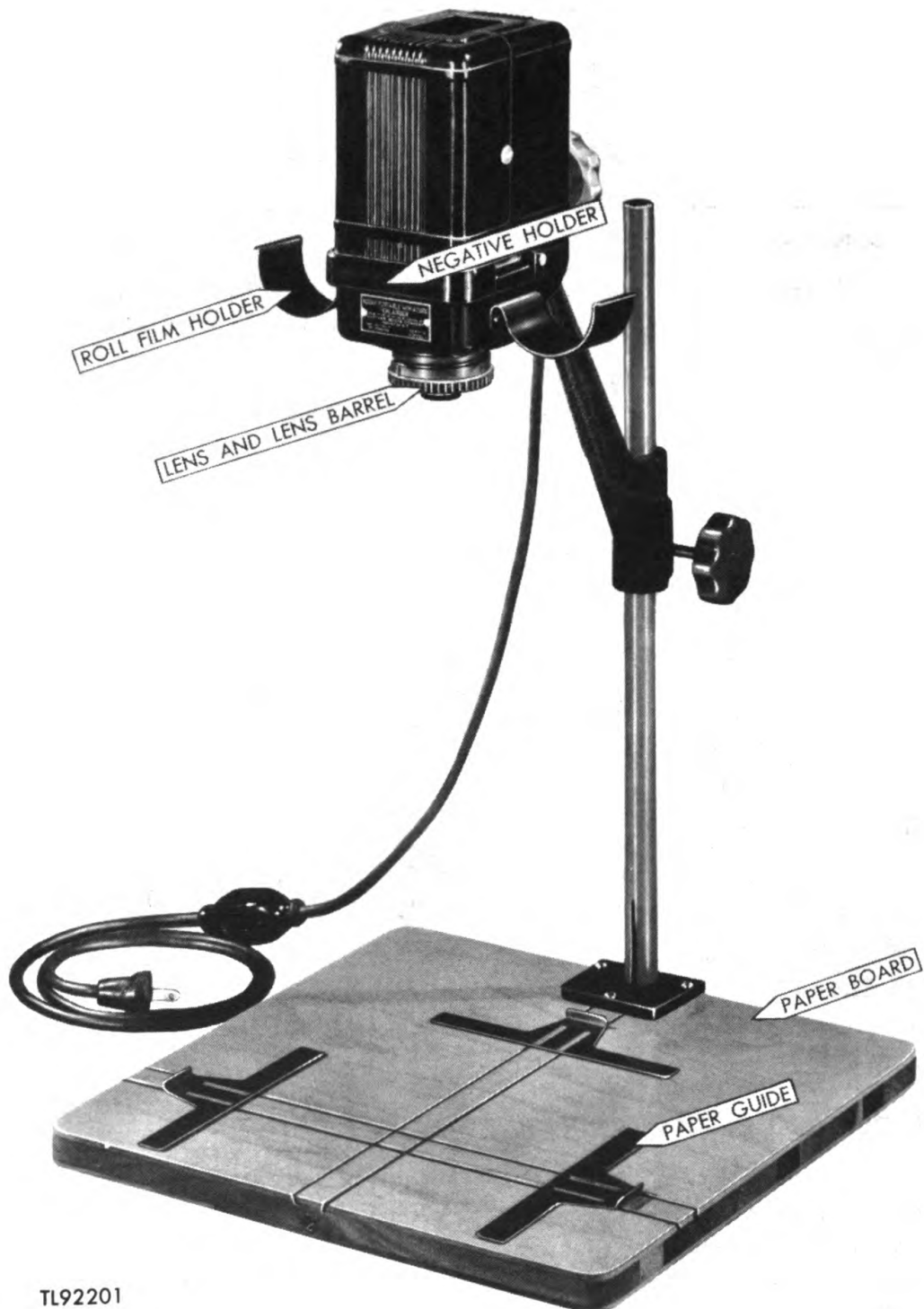
c. When Enlarger PH-275 is a part of Photographic Set PH-261, it is known as Enlarger PH-275-A and differs from Enlarger PH-275 as follows:

- (1) The base of Enlarger PH-275 is part of Case PH-318, the overall case for Photographic Set PH-261.
- (2) Enlarger PH-275-A utilizes an 8- by 10-inch metal paper Board PH-317, in place of the paper guides on the base of Enlarger PH-275. The miniature paper board is not included as part of Enlarger PH-275-A.
- (3) The ON and OFF switch for Enlarger PH-275-A is mounted in the electrical control box of Photographic Set PH-261 and is not a part of the lamp cord as it is with Enlarger PH-275.

2. DETAILED DESCRIPTION (figs. 2 and 3).

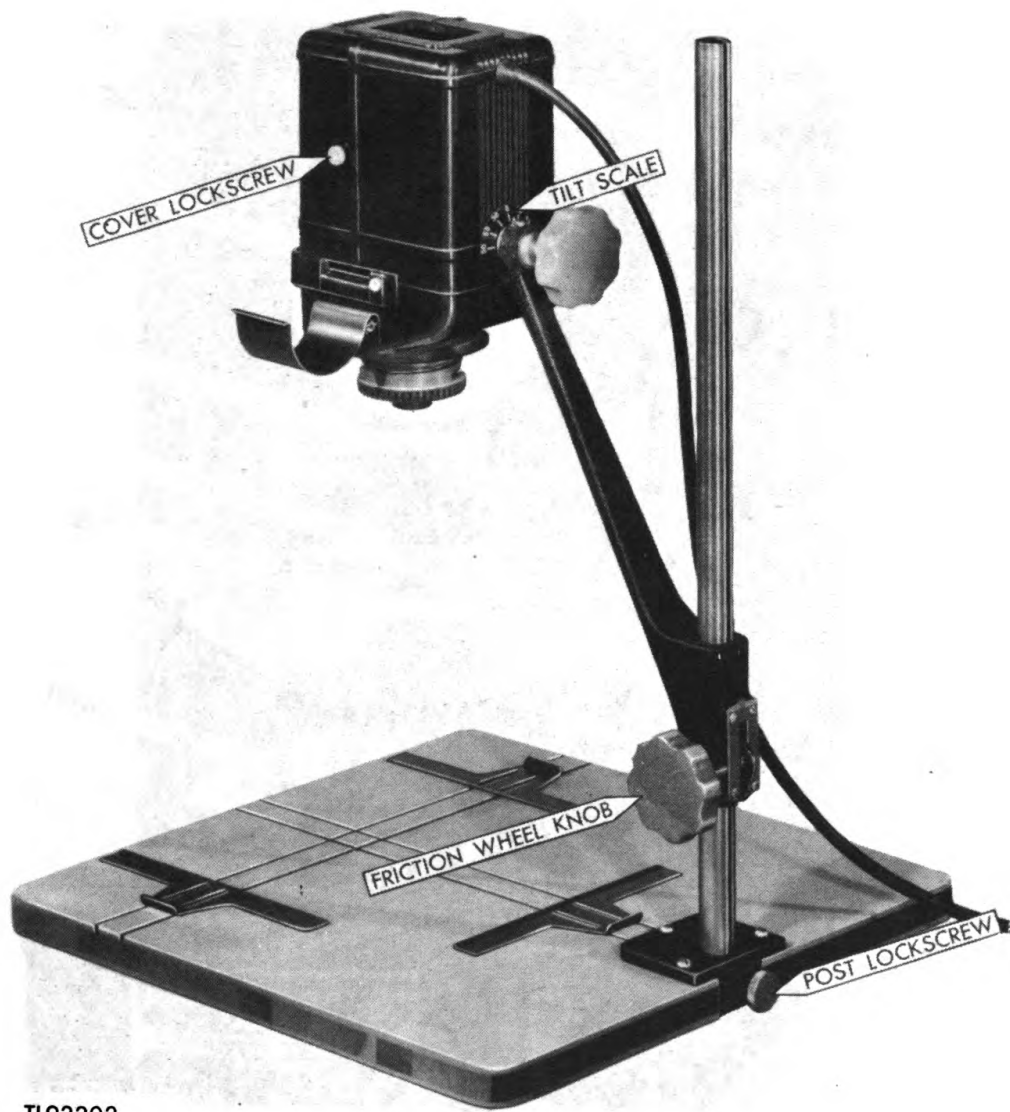
a. Projection Lens. Enlarger PH-275 is equipped with an anastigmat projection lens of 2-inch focal length with a fixed stop setting of $f/6.3$. The lens is mounted in a molded plastic lens barrel which is screwed into the enlarger head. A red safety filter is supplied with the lens. Enlargements of from $2\frac{1}{2}$ to 9 diameters can be made by projection on the paper board.

b. Enlarger Head. The enlarger head (fig. 4) is a molded plastic case consisting of the base, cover, and lamphouse. It houses the optical system, which consists of a No. 113 50-watt, 120-volt Mazda photo enlarger lamp, a three element condenser system, and a heat-absorbing glass to protect the nega-



TL92201

Figure 2. Enlarger PH-275, front view.



TL92202

Figure 3. Enlarger PH-275, rear view.

tives from heat. The enlarger head is mounted on the post bracket and is raised or lowered with a friction screw and knob (fig. 3). A 5-foot cord assembly with an ON and OFF switch is attached to the enlarger lamp socket and is equipped with a plug at the other end for connection to the power source. For making enlargements over 9 diameters, the enlarger head can be turned to a horizontal position to project the image on a wall.

c. Negative Holder. The glassless negative holder (fig. 2) is a plastic and metal holder designed for 35-mm film in single frames or in strips. A small opening in the holder permits viewing the frame numbers on the paper board and facilitates frame location by number. Springs in the base of the enlarger



TL92203

Figure 4. Lamphouse assembly.

head permit the front of the holder to be depressed, allowing the strip of negatives to be moved within the negative holder without danger of scratching the film.

d. Roll Film Holders. Two roll film holders (fig. 2) support the loose ends of the film protruding from the ends of the negative holder. These holders, when in use, are hooked over studs in the lamphouse.

e. Paper Board. The paper board (fig. 2) is constructed of wood and forms the base for the enlarger. Three metal paper guides which slide in grooves on the paper board, locate and hold the sensitized paper in position to receive the exposure. The paper guides will accommodate sensitized paper up to 8 by 10 inches.

f. Board PH-425. This miniature paper board is made of a black composition and is used to make enlargements of $2\frac{1}{4}$ by $3\frac{1}{4}$ inches with $\frac{1}{8}$ -inch margins. Two paper bins in the base of the board hold unexposed and exposed paper, thus making it possible to expose and develop prints in quantity.

SECTION II

INSTALLATION AND OPERATION

3. INSTALLATION (fig. 3).

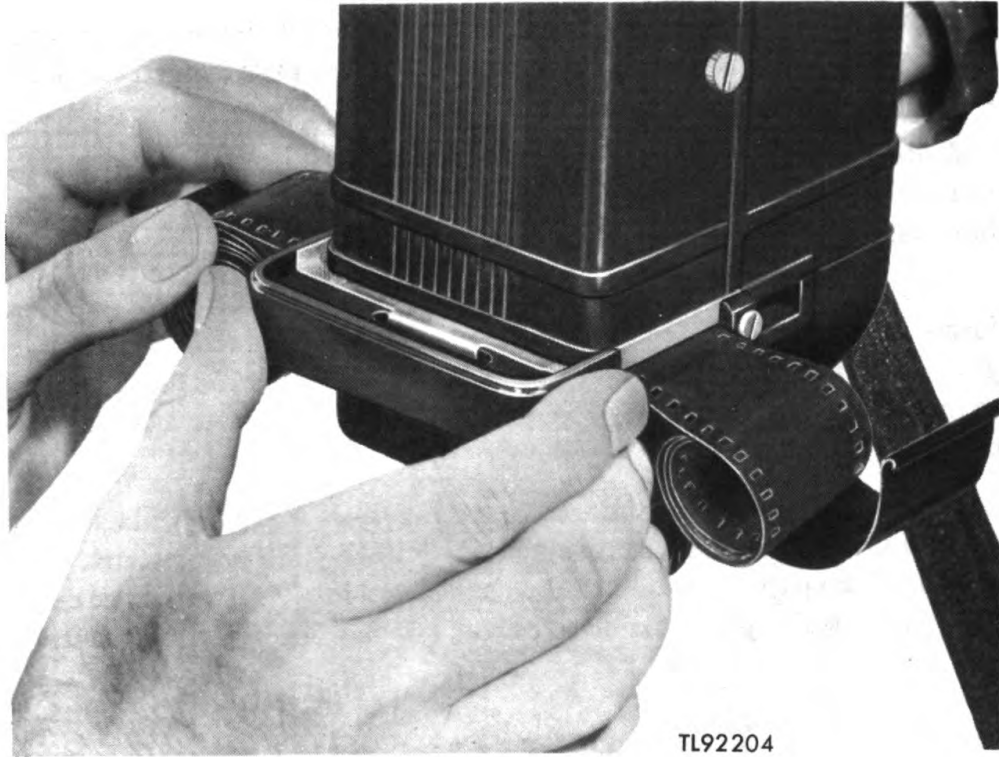
a. The portable carrying case (fig. 1) houses the enlarger equipment. Release the strap supporter, slide the case cover to the right, thus freeing it from the hinges on the lower section of the case. The wooden paper board which forms the base for the enlarger is secured in the lower part of the case by two knurled screws.

b. The enlarger may be set up for operation with the paper board retained in the case cover, or the paper board may be separated from the case by loosening the two screws which hold it in place.

c. Place the base on a flat surface, preferably where the enlarger will be used.

d. Remove the post lockscrew from the post bracket at the rear of the baseboard.

e. Place the split end of the elevating post in the hole of the post bracket. With the full length groove to the rear, force the split end down into the hole as far as it will go. Replace the post lockscrew and tighten it sufficiently to hold the elevating post.



TL92204

Figure 5. Inserting negative holder.



TL92205

Figure 6. Focusing.

f. Slide the bracket assembly onto the elevating post with the friction wheel in the full length groove of the post. Turn the red friction wheel knob until the bottom of the bracket is near the baseboard. If the friction wheel knob turns too hard, reduce the tension on it by loosening the two tension adjusting screws below the knob shaft.

g. Attach the lamphouse to the bracket by means of the swivel screw. Tighten the screw with the pointer set at the zero mark on the lamphouse dial.

b. Unscrew the lens barrel from the enlarger head and clean the lens with lens-cleaning tissue. Then replace the barrel by screwing it into the enlarger head. Keep the red safety filter lens cap in place over the lens.

i. Attach the roll film holders (fig. 2) to each side of the lamphouse by slipping them over the shouldered studs.

j. Place the negative holder into the opening of the enlarger head with the pressure plate uppermost.

k. Connect the cord and switch assembly to a 110- to 120-volt, a-c or d-c electrical outlet.

4. OPERATION.

a. Before starting to operate the enlarger, mix the chemicals and arrange the trays exactly the same as for any other print developing. Place the supply of paper convenient to the enlarger and proceed as described below.

b. Remove the negative holder, raise the pressure plate, and place the negative in position in the holder, with the emulsion (dull) side down. Close the pressure plate and place the negative holder in the enlarger (fig. 5) with the pressure plate up. If a long roll of 35-mm negative is being used, place the extending ends into the roll film holders for support. A small opening in the negative holder permits the desired frame to be located by number. Film may be advanced from frame to frame by exerting a slight pressure downward on the front of the negative holder to release the pressure, and sliding the strip of negatives to the desired frame.

c. Place a sheet of plain white paper on the baseboard and secure it in position with the three sliding paper guides (fig. 2). Darken the room except for a series OA Wratten safelight. Turn on the enlarger by means of the switch and remove the lens cap.

d. Move the enlarger head and bracket up or down on the elevating post, using the friction wheel (fig. 3), until the image projected on the white paper is the approximate size required. To bring the image into sharp focus, screw the lens barrel in or out (fig. 6). Focusing with the lens will change

the image size somewhat, and it may again be necessary to move the bracket up or down to obtain the size desired. A slight readjustment of the lens barrel will then be necessary. Place the paper guides in proper position for the size of paper being used. Turn off the enlarger lamp.

e. Correct exposure depends upon three factors: density of the negative, intensity of light, and degree of enlargement. The nearer the projector is to the paper, the smaller the image and the shorter the exposure; conversely, the farther the projector is from the paper, the larger the image and the longer the exposure. A dense or dark negative will hold back more light and require a longer exposure time than a thin or light negative. Before making the first full-sized picture, make one or more test exposures to determine the correct exposure. Select the grade of paper suitable for the contrast of the negative. Cut a strip from this paper about 2 inches wide and long enough to be held by the paper guides. Put the strip across the center of the baseboard and under the paper guides with the emulsion or sensitive side facing the projector. Cover all but one-fourth of the strip with a piece of cardboard and switch on the enlarger lamp for 32 seconds; uncover another fourth of the strip and give an exposure of 16 seconds; uncover the third quarter and expose for 8 seconds; and finally uncover the last quarter for another 8 seconds. The entire strip has had four different exposures, the first quarter a total exposure of 64 seconds, the second quarter 32 seconds, the third quarter 16 seconds, and the fourth and last quarter 8 seconds. Develop the test strip for the time recommended with the developer being used, rinse, and then fix for 1 or 2 minutes in the hypo tray. Examine the print, preferably under a white light, and select the exposure time indicated by the most satisfactory section of the test strip. If the test exposures are all very much overexposed or underexposed, make another test strip, using the first strip as a guide to the time of exposures. If the image comes up too rapidly and the over-all tone is too dark, it has been overexposed; if the image comes up slowly and the over-all tone is too light, it has been underexposed.

f. After the correct exposure has been determined and all white lights extinguished, place the full-sized sheet of sensitized paper on the baseboard. Slip the red filter over the lens, if it is necessary to readjust the position of the paper guides to get the desired part of the image. Remove the filter and make the exposure for the time indicated by the test.

g. Develop, fix, wash, and dry prints.

b. For making enlargements over 9 diameters, the enlarger head can be turned to a horizontal position by means of the swivel screw (fig. 3) and the image can then be projected on a wall. The pointer should be set at 90 on the tilt scale. An alternate method for making enlargements over 9 diameters consists of removing the elevating post from the paper board and replacing

it with the full-length groove to the front. The enlargements may then be made on the floor. Make certain that the sensitized paper is held flat and is perpendicular to line of projection.

i. When making small enlargements, use Board PH-425. Lift the metal mask hinged to the base, and place the paper, emulsion side down, under the guide pins on the mask. Insert the paper downward and to the left to insure even margins. Close the hinged mask to make the exposure. Care must be taken not to move the miniature paper board during the exposure.

SECTION III MAINTENANCE

NOTE: Failure or unsatisfactory performance of this equipment will be reported on W.D., A. G. O. Form No. 468, which will be forwarded through channels to the Office of the Chief Signal Officer, Washington 25, D. C. If this form is not available, see TM 38-250.

5. PREVENTIVE MAINTENANCE.

Remove and clean frequently the projection lens, condenser lenses, and heat-absorbing glass (fig. 4). Remove the two cover lockscrews and the lamphouse cover. Slide the three condenser lenses (fig. 4) and heat-absorbing glass from their grooves. Clean them with lens-cleaning tissue before replacing them in proper order. Do not touch the glass surfaces with the fingers. Replace the lamphouse cover.

6. TROUBLES, CAUSES, AND REMEDIES.

TROUBLE	CAUSE	REMEDY
Distorted image, or lack of over-all focus.	Enlarger head may be turned on the swivel screw (fig. 2).	Set the pointer at zero on the scale.
	Portions of the paper may be curled away from the paper board.	Flatten the paper on the board.
Spotted prints.	Small particles of dust or dirt on the negative.	Clean the negative carefully before placing it in the negative holder.

7. REPLACEMENT OF LAMP AND CONDENSER LENSES (fig. 3).

a. Remove the negative holder by sliding it from the lamphouse.

- b. Unscrew the two cover lockscrews and remove the lamphouse cover.
- c. Remove the lamphouse baffle by sliding it from the grooves in the top of the lamphouse.
- d. Remove the enlarger lamp by exerting a slight pressure inward and turning it counterclockwise.
- e. Remove the three condenser lenses and heat-absorbing glass by pulling them toward the front against the withholding pressure of the condenser lens clips.
- f. Clean the condenser lenses and heat-absorbing glass with lens-cleaning tissue and replace them in the proper grooves of the lamphouse. Be sure the lenses are seated in the grooves. Do not touch the surfaces with the fingers while replacing the lenses.
- g. Insert the enlarger lamp base into the socket and with a slight inward pressure, turn the lamp clockwise until the base lugs are stopped by the socket.
- h. Replace the lamphouse baffle in its groove in the top of the lamphouse.
- i. Secure the lamphouse cover in position with the two cover lockscrews.
- j. Replace the negative holder in the enlarger head with the pressure plate toward the lamphouse.

8. LUBRICATION.

Enlargers PH-275 and PH-275-A require lubrication of the support column and the friction wheel gear. Lubrication of these parts must be done at the end of every 512 operating hours. To lubricate the support column, wipe with a clean, lint-free cloth which has been lightly dampened with MO (Oil, Lubricating, for aircraft instruments and machine guns; usable in all working temperatures). To lubricate the friction wheel gear, wipe with a clean, dry cloth and coat lightly with GL (Grease, Special Lubricating; usable in all working temperatures). In all lubrication be sure that excess oil is wiped off.

9. MOISTUREPROOFING AND FUNGIPROOFING.

Precautions against moisture and fungus are not required for this equipment.

SECTION IV SUPPLEMENTARY DATA

10. MAINTENANCE PARTS LIST FOR ENLARGER PH-275.

Ret symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
	8A1052	ENLARGER PH-275: Kodak; portable miniature w/Kodak 2" projector, anastigmat <i>f</i> /6.3 in lens tube; 1 glassless negative carrier, Mazda #113 photo enlarger lamp, and 1 carryall case including one 2 1/4" x 3 1/4" Kodak miniature paper board; EKCo or Equal.							
	3E4517	CABLE ASSEMBLY: power; general purpose; rubber jacketed; round 0.2520" diam; 68" lg; two #16 AWG copper cond; ea comprising of forty #34 AWG strands; EKCo #74698; RI; no color coding; Leviton #763 two prong male plug on 1 end; other end bare; switch Gaynor "Interlining" in center.	1		*		**		*
	8A1052/H1	HOLDER: photographic film; 35-mm; phenolic plastic, black; 3 1/2" wd x 2 7/8" h x 0.145" thk; EKCo #7A730; (holds 35-mm film neg in enlg; p/o Sig C Enlarger PH-275).	1		*		**		*
	6Z8336	LAMPHOLDER: candelabra base; molded bakelite; 1 3/8" diam x 0.081" thk, shell 1 1/8" diam; EKCo #68976; (5 amp, 110v; two 3/16" mtg holes on ea end of holder; no sw).	1		**		**		*

*Indicates stock available.

**Parts may be requisitioned as needed from depot stock.

10. MAINTENANCE PARTS LIST FOR ENLARGER PH-275 (Contd.).

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
	8P14-111	LENS: Projection Anastigmat f/6.3; Kodak; 2" focal lg; assembled in barrel; EKCo part U-10264; p/o Photographic Equipment PH-261.	1		**		**		*
	8P14-109	LENS: Front condensing; single; plano convex; 1½" diam; 2¼" f/lg; 1½" diam x ⅛" thk; EKCo #76100; (no holder; p/o Sig C Photographic Equipment PH-261).	1		**		**		*
	8P14-110	LENS: rear condensing; single; bi-convex; 2⅜" diam; 2¼" f/lg; 2⅜" diam x ⅛" thk; EKCo #76102; (no holder; p/o Sig C Photographic Equipment PH-261).	1		**		**		*
	8P20-65	LENS: Condensing; single, bi-convex; 2⅜" diam; 2¼" f/lg; 2⅜" diam x ⅛" thk; EKCo #24376; (no holder; V-mail item; p/o Projector, 8A3125).	1		**		**		*
	6L17504-18.49S	SCREW: thumb; RH, knurled; steel cadmium or zinc, chromate finish; ¼"-20 thd; 1⅛" lg w/½" thd; head ⅜" thk; ⅜" diam; EKCo #74714; (tapering dog at end of screw; p/o Sig C Enlarger PH-275).	1		**		**		*
	6L17106-12.49	SCREW: thumb; RH, knurled; steel, cadmium or zinc plate, chromate finish; #6-32 thd; ⅜" lg w/½" thd; head ⅛" thk x ⅜" diam, EKCo #74723; (p/o Sig C Enlarger PH-275).	1		*		**		*

8A1052/S1	SPRING: retaining brass; black E; holds condensing lens in Mtg; 1 1/2" lg x 1 3/8" h x 0.020" diam; EKCo #74711; (two #40 Mtg holes 1/8" apart on lower lip; 3 prongs 1 1/8 x 3/8"; p/o Sig C Enlarger PH-275).	1	**	**	**	*
8A1052/S2	SPRING: retaining brass; black E; holds condensing lens; 1 3/8" lg x 1/4" wd x 0.020" diam; EKCo #74710; (#40 Mtg hole 1/4" from bottom end; p/o Sig C Enlarger PH-275).	1	**	**	**	*
8A1052/G1	GLASS: window; heat absorbing; round, 2 3/8" diam x 0.067" thk; EKCo #88997; (p/o Sig C Enlarger PH-275).	1	*	**	**	*
8E102	LAMP: enlarging; 50W, 105-120V; #S-11 Bulb, single cont bayonet base; p/o Photographic Set PH-261; (GEO #PH-113, or equal).	1				
6L6440-3	SCREW: machine; #4-40; 1 3/8" FHB; (Fed Spec FF-S-91, type I).	1	*	**	**	*
6L6440-3.49S	SCREW: machine; RHS; #4-40; 1 3/8" lg, PL Robertson; (cadmium-plated).	1	*	**	**	*
6L6632-28.87	SCREW: machine; #6-32; 1 1/4"; RHI; zinc plate; chromate finish.	1	*	**	**	*

*Indicates stock available.

**Parts may be requisitioned as needed from depot stock.

11. MAINTENANCE PARTS LIST FOR ENLARGER PH-275-A.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spares	Orgn stock	3d ech	4th ech	5.h ech	Depot stock
	8A105A	ENLARGER: 35-mm Kodak portable. Same as PH-275 but without case or baseboard, for use in Photographic Set PH-261. Refer to paragraph 10.							

*Indicates stock available.

**Parts may be requisitioned as needed from depot stock.

Order No. 11322—Phila.—44-54; 4178 copies; 30 October 44.

