TM 11-2391B

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

PHOTOGRAPHIC CONTACT PRINTER EN-12(1)

This copy is a reprint which includes current pages from Changes 4 and 5

DEPARTMENT OF THE ARMY • *MAY 1955*

AGO 5402B—May

Changes in force: C 4 and C 5

TM 11-2391B
C 5

CHANGE
NO. 5

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *8 July 1974*

Organizational, DS, GS, and Depot Maintenance Manual

PHOTOGRAPHIC CONTACT PRINTER EN-12(1) AND EN-12(2)

TM 11-2391B, 20 May 1955, is changed as follows:

Page 2, paragraph 1.1: Delete paragraph 1.1 and substitute:

1.1 Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

Paragraph 2. Delete paragraph 2 and substitute:

2. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58/NAVSUP PUB 378/AFR 71-4/MCO P4030.29, and DSAR 4145.8.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33/AFM 75-18/MCO P4610.19A, and DSAR 4500.15.

2.1 Reporting of Equipment Publication Improvements

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forwarded direct to Commander, US Army Electronics Command, ATTN: AMSEL–MA–S, Fort Monmouth, NJ 07703.

Page 3, paragraph 4. Delete paragraph 4 and substitute:

4. Components Comprising the Operable Equipment

Photographic Contact Printers EN–12(1) and EN–12(2) each comprise and operable equipment. Each printer is approximately 21 inches long by 10 inches wide by 13 inches high (with platen down). In open position (with platen up), each unit is 33 inches high. The printers weigh 26 pounds each.

Page 30, appendix B. Delete appendix B.

By Order of the Secretary of the Army:

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11–96	29–136

NG: None

USAR: None

For explanation of abbreviations used, see AR 310–50.

TM 11-2391B
***C 4**

CHANGE
No. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *9 August 1967*

Organizational, DS, GS, and Depot Maintenance Manual PHOTOGRAPHIC CONTACT PRINTER EN-12(1) AND EN-12(2)

TM 11-2391B, 20 May 1955, is changed as indicated so that the manual also applies to the following equipment:

Nomenclature	*Order No.*	*Serial No.*
Photographic Contact Printer EN-12(2).	AF-33(657)14824 ____	1 through 348

The title is changed as shown above.

Note. The parenthetical reference to previous changes (*example* as changed by C 2, 20 Sep 63) indicates that pertinent material was published in that change.

Page 2, chapter 1, below the title. Add:

Note. Photographic Contact Printer EN-12(2) is similar to Photographic Contact Printer EN-12(1). Information in this manual applies to both printers unless otherwise specified.

Change Multimeter, TS-352/U to Multimeter AN/URM-105 in the following places (as changed by C 2, 20 Sep 63):

Page 24, paragraph 34*e*, line 1.

Page 25, paragraph 37, chart, *Item* column, last line.

Paragraph 38*b*, line 2.

Page 26, paragraph 39, chart, *Corrective measures* column, line 12.

Page 2, paragraph 1 (as changed by C 2, 20 Sep 63). Delete subparagraph *c*. Add paragraph 1.1 after paragraph 1:

1.1 Index of Publications

a. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment. DA Pam 310-4 is a current index of technical manuals, technical bulletins, supply manuals

* This change supersedes C 1, 31 October 1960; C 2, 20 September 1963; and C 3, 15 June 1964.

(types 7, 8, and 9), supply bulletins, and lubrication orders, that are available through publications supply channels. The index lists the individual parts (–10, –20, –35P, etc.) and the latest changes to and revisions of each equipment publication.

b. DA Pam 310–7 list all modification work orders.

Delete paragraph 2 (as changed by C 2, 20 Sep 63) and substitute:

2. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions in TM 38–750.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Packing and Handling Deficiencies) as prescribed in AR 700–58 (Army), NAVSUP Publication 378 (Navy), and AFR 71–4 (Air Force).

c. Reporting of Equipment Manual Improvements. Reporting of errors, omissions, and recommendations for improving this manual by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL–MR–NMP–AD, Fort Monmouth, N.J., 07703.

Page 3, paragraph 5*a*. After the last sentence add:
On the EN–12(2), a power indicator lamp is located below the nameplate on the right-hand side.

Subparagraph *b*, heading. Delete and substitute: *b. Printing Head, EN–12(1)* (fig. 1).

Add subparagraph *b*.1 after subparagraph *b*:

b.1 *Printing Head, EN–12(2)* (fig. 1). The printing head, which is mounted on top of the lamp house, consists of an aperture plate, a printing glass, two guide bars, and four masking blades. The printing glass fits into a felt-lined well in the aperture plate. The two horizontal masking blades ride along the right-hand guide bar. The vertical masking blades ride along the front guide bar. All four masking blades may be adjusted to produce the required masking size.

Subparagraph *c*, heading. Delete and substitute: *c. Platen. Assembly, EN–12(1)* (fig. 1).

Add subparagraph *c*.1 after subparagraph *c*:

. *c.*1 *Platen Assembly, EN–12(2)* (fig. 1). The platen assembly is attached to the printing head with pivot pins and consists of the following parts: a sponge rubber-covered platen, a platen arm, two pressure springs, a momentary switch actuating spring (contact spring), a latch, and a safety chain. The platen assembly holds the photographic paper in place over the negative during exposure. The platen assembly is spring-loaded to return to its raised position unless latched closed.

Page 4, figure 1. Add the following notes to figure 1.

NOTES: EN–12(2):

1. JEWEL PILOT LIGHT MOUNTED FLUSH, JUST BELOW CENTER OF ACCESS DOOR.
2. POWER INDICATOR LAMP ADDED BELOW NAMEPLATE ON RIGHT SIDE.
3. PLATEN SPONGE RUBBER CUSHION IS ONE PIECE.
4. GUIDE BARS (2) MOUNTED AT FRONT AND RIGHT SIDE. BOTH HORIZONTAL MASKING BLADES RIDE ON RIGHT-HAND GUIDE BAR; LEFT-HAND GUIDE BAR ELIMINATED.
5. ONE SCREW AT CENTER SECURES THE BOTTOM PLATE.

Page 5. Add paragraph 7.1 after paragraph 7:

7.1 Differences in Models

Photographic Contact Printer EN–12(2) differs from earlier models in the following details:

a. The jewel pilot light is mounted flush.

b. A power indicator lamp is added (para 5*a*).

c. A one-piece platen cushion is used (para 5*c*.1).

d. Two guide bars are used (para *5b*.1) instead of a single wrap-around; horizontal masking blades ride on the right-hand guide bar (para 5*b*.1). Masking blades are interchangeable with those described in paragraph 5*b*.

e. The platen assembly is spring-loaded to the raised position (para 5*c*.1).

f. The printing head is secured to the lamp house; it does not pivot upward (para 5*b*.1).

g. The printing glass may be removed for cleaning or replacement without pivoting or removal of the printing head (para 5*b*.1).

h. The printing glass fits into a well in the aperture plate; no retaining strips are used (para 5*b*.1).

Page 9, figure 4. Add the following notes to figure 4.

NOTES: EN-12(2):

1. TOP ASSEMBLY SECURED TO LAMP HOUSE, MOUNTING SCREWS RELOCATED TO THE SIDES. DOES NOT PIVOT UP TO RAISED POSITION.
2. GUIDE BARS (2) MOUNTED AT FRONT AND RIGHT SIDE. BOTH HORIZONTAL MASKING BLADES RIDE ON RIGHT-HAND GUIDE BAR; LEFT-HAND GUIDE BAR ELIMINATED.
3. PRINTING GLASS RETAINING STRIPS AND SCREWS ELIMINATED. GLASS FITS INTO FELT-LINED WELL FROM TOP OF APERTURE PLATE.
4. DZUS FASTENERS ARE ELIMINATED AT FRONT OF TOP ASSEMBLY.
5. PLATEN SPONGE-RUBBER CUSHION IS ONE PIECE.
6. POWER INDICATOR LAMP ADDED BELOW NAMEPLATE ON RIGHT SIDE.
7. MOMENTARY SWITCH MOUNTED WITH A RING NUT THROUGH TOP OF LAMP HOUSE.

Page 10, paragraph 11*c*. After the last sentence, add: In the EN–12(2), the ruby safe and power indicator lamps should light.

Page 11, paragraph 12*b*, chart, *Function* column, first item. After the last sentence, add: In the EN–12(2), the ruby safe and power indicator lamps should light.

Page 12, paragraph 14*d*. After the last sentence, add: In the EN–12(2), the ruby safe and power indicator lamps should light.

Page 14, paragraph 17*b*. At end of subparagraph, add: In the EN–12(2), the latch must be engaged for the platen to remain in its lowered position.

Page 15. Delete Sections I and II (as changed by C 2, 20 Sep 63) and substitute:

Section I. OPERATOR'S MAINTENANCE

21. Scope of Operator's Maintenance

The maintenance duties assigned to the operator of Photographic Contact Printer EN–12(1) and EN–12(2) are listed below, together with references to the paragraphs covering the specific maintenance functions.

a. Daily preventive maintenance checks and services (para 25).

b. Weekly preventive maintenance checks and services (para 26).

c. Cleaning (para 26.1).

22. Tools and Materials Required

a. *Tools*.

(1) Brush TL–72 (FSN 7920–282–9242).

(2) Hand blower (air syringe) (FSN 5120–254–4162).

b. Materials.

(1) Cleaning compound (FSN 7930–395–9542).

(2) Lubricating oil, general purpose: Preservative (PL Special) (FSN 9150–273–2389).

(3) Textile cloth (FSN 8305–267–3015).

23. Operator's Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to rduce downtime, and to insure that the equipment is serviceable.

a. Systematic Care. The procedures given in paragraphs 25, 26, and 26.1 cover routine systematic care and cleaning essential to proper upkeep of this equipment when it is used separately. When this equipment is used as part of a set, follow the procedures established in the set manual.

b. Preventive Maintenance Checks and Services. Preventive maintenance checks and services charts (paras 25 and 26) outline functions to be performed at specific intervals. The purpose of performing these checks and services is to maintain Army electronic equipment in a combat serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining serviceability, the charts indicate what to check, how to check, and what the normal conditions are. If a defect is discovered by the operator, higher category maintenance is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38–750.

24. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the EN–12(1) and EN–12(2) by the operator are required on a daily and a weekly basis.

a. Paragraph 25 specifies checks and services that must be accomplished daily and under special conditions listed below.

(1) When the equipment is initially installed or reinstalled.

(2) At least once each week if the equipment is maintained in standby (ready for immediate operation) condition.

b. Paragraph 26 specifies additional checks and services that must be performed once each week.

25. Operator's Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	References
		PHYSICAL CHECKS	
1	Exterior surfaces ___	Clean platen assembly (fig. 1), printing head, and lamp house.	Para 26.1*a* and *b*.
2	Printing glass _____	Clean printing glass, and check it for scratches and cracks.	Para 26.1*c*.
3	Masking blades _____	Loosen clamping screws, and move masking blades; masking blades should slide smoothly.	
		OPERATION	
		a. Operate equipment according to Items No. 1 and 2 of equipment performance checklist (para 30).	
		b. Pull platen arm (fig. 1) down, and lock it in position; printing lamps should light.	
		c. Operate equipment according to items Nos. 6 through 9 of equipment performance checklist (para 30).	

26. Operator's Weekly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	References
1	Interior surfaces ____	*a.* On EN–12(1) only, release Dzus fasteners (fig. 4), and raise top assembly.	*a.* None.
		b. Open access door (fig. 1).	*b.* None.
		c. Remove diffusion glass (fig. 4), and clean interior surfaces of printer.	*c.* Para 26.1*a* and *b*.

Sequence No.	Item to be inspected	Procedure	References
2	Diffusion glass ------	Clean diffusion glass, and inspect it for scratches and cracks.	Para 26.1*c*.
3	Lamps ----------	*a*. Clean printing lamps and ruby safe lamp.	*a*. Para 26.1*c*
		b. Replace diffusion glass.	*b*. Para 10*c*
		c. On EN–12(1) only, lower top assembly and tighten Dzus fasteners.	*c*. None.
		d. Close access door ------	*d*. None.
4	Platens ----------	Check surfaces of platens (fig. 1) for dirt and hard areas that might cause uneven pressure on the negative and photographic paper.	Para 26.1*d*.
5	Power cable ---------	Check power cable insulation for cuts and breaks.	

26.1 Cleaning

a. Remove dust and other loose dirt with a clean cloth and an air syringe.

Warning: **Prolonged breathing of cleaning compound is dangerous; make certain that adequate ventilation is provided. Cleaning compound is flammable; do not use near a flame. Avoid contact with the skin; wash off any that spills on your hands.**

b. Remove grease, fungus, and ground-in dirt with a cloth dampened (not wet) with cleaning compound.

c. Clean the printing and diffusion glasses, printing lamps, and ruby safe lamp with a clean cloth. Remove fingerprints with a cloth moistened with a solution of soap and water; then dry the glass with a clean cloth.

d. Clean the rubber surface of the platen with a cloth dampened with water; dry the rubber surface thoroughly before using the printer.

Section II. ORGANIZATIONAL MAINTENANCE

26.2 Scope of Organizational Maintenance

This section contains instructions covering organizational preventive maintenance of Photographic Contact Printers EN–12(1)

and EN–12(2), to be accomplished by the organizational repairman.

Note. Lubrication of the equipment is not required.

26.3 Tools, Material, and Test Equipment

a. Tools. Tool Kit, Photographic Repair TK–77/GF.

b. Material. Cleaning compound (FSN 7930–395–9542).

c. Test Equipment. Multimeter AN/URM–105.

26.4 Organizational Preventive Maintenance

Preventive maintenance is the responsibility of all categories concerned with the equipment. It includes inspections and tests and repair or replacement of parts, subassemblies, or units that these inspections and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance checks and services of Photographic Contact Printers EN–12(1) and EN–12(2) at the organizational maintenance category are made at weekly and monthly intervals, at the same time as the operator's daily (para 25) and weekly (para 26) checks and services, unless otherwise directed by the commanding officer.

26.5 Organizational Weekly Maintenance

Perform the maintenance functions indicated in the organizational weekly preventive maintenance checks and services chart (para 26.6) once each week. A week is defined as approximately 7 calendar days of 8-hour-per-day operation. If the equipment is operated 16 hours a day, the weekly preventive maintenance checks and services should be performed at 3½-day intervals. Adjustment of the maintenance interval must be made to compensate for any unusual operating condition.

26.6 Organizational Weekly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure
1	Printing lamps ------	*a.* Open access dor (fig. 1). *b.* Check printing lamps for discoloration, and replace discolored lamps. *c.* Close access door.
2	Hardware ----------	Tighten loose screws and nuts.

26.7 Organizational Monthly Maintenance

Monthly preventive maintenance checks and services on Photographic Contact Printers EN–12(1) and EN–12(2) are required at organizational maintenance. Periodic weekly services (para 26.6) constitute part of the monthly preventive maintenance checks and services and must be performed concurrently. All deficiencies or shortcomings will be recorded in accordance with the requirements of TM 38–750. Equipment maintained in a standby (ready for immediate operation) condition must have monthly preventive maintenance. Equipment in limited storage (requires service before operation) does not require monthly maintenance.

26.8 Organizational Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	References
1	Completeness	Check to see that equipment is complete	App. B.
2	Installation	Check to see that equipment is properly installed	Para 9.
3	Preservation	*a.* Check all painted surfaces to be sure that they are free from bare spots, rust, and corrosion.	*a.* None.
		b. Remove rust and corrosion by lightly sanding with fine sandpaper. Brush two thin coats of paint on bare metal to protect it from further corrosion.	*b.* TM 9-213, TB SIG 364, and para 41.
4	Publications	Check to see that all publications are complete, serviceable, and current.	DA Pam 310-4.
5	Modifications	Check DA Pam 310-4 to determine whether new MWO's have been published. All URGENT MWO's must be applied immediately. All NORMAL MWO's must be scheduled.	DA Pam 310-7 and TM 38-750.
6	Lampholders	*a.* Remove printer bottom plate	*a.* Para 40*d*.
		b. Check wiring for cut or broken insulation	*b.* None.
		c. Check lampholders for cracked or broken porcelain. Tighten loose terminals.	*c.* Para 40*d*.
7	Switches	*a.* Open access door (fig. 1)	*a.* None.
		b. Check power switch for damage	*b.* Para 40*e*(2).
		c. Close access door. On EN-12(1), release Dzus fasteners and raise top assembly (fig. 4). On EN-12(2), remove top assembly.	*c.* None.
		d. Check momentary switch for damage	*d.* Para 40*f*.

		e. On EN–12(1), lower top assembly and tighten Dzus fasteners. On EN–12(2), replace top assembly.	*e.* None.
8	Spare parts ----------	Check general condition and method of storage of organizational spare parts. There should be no overstockage, and all shortages must be on valid requisitions.	App. B.

Page 18. Delete paragraph 27 (as changed by C 2, 20 Sep 63) and substitute:

27. General

Organizational troubleshooting is performed by the organizational repairman. Repairs beyond the ability of the organizational repairman must be referred to a higher category of maintenance. When trouble occurs, perform a visual inspection (para 28). If the trouble is not discovered during visual inspection, refer to the equipment performance checklist (para 30).

Page 19, paragraph 28*b*. Add after the last sentence: In the EN–12(2), the ruby safe and power indicator lamps should light automatically.

Paragraph 29*d* (as changed by C 2, 20 Sep 63). Delete subparagraph *d*.

Page 20, paragraph 30, chart. Make the following changes:

Normal indication column, Item No. 2. Add: In the EN–12(2), the ruby safe and power indicator lamps light and go out.

Corrective measures column, Item No. 2, second sentence. Delete ruby safe.

Item No. 3. Add after the last sentence: The position of the momentary switch cannot be adjusted in the EN–12(2).

Page 22, paragraph 31*a*. Add after the last sentence: In the EN–12(2), the power indicator lamp is connected in parallel with safe lamp E2. Both lamps light whenever the power switch is moved to ON.

Page 23, figure 6. Add the following note:

NOTE:
A POWER INDICATOR LAMP HAS BEEN ADDED IN PARALLEL WITH SAFE LAMP E2, FOR THE EN–12(2).

Paragraph 33*a*, line 4. After the second sentence, add: In the EN–12(2), a one-piece sponge rubber cushion covers the platens and functions in the same manner.

Line 10, after the period, add: In the EN–12(2), two springs on the pivot bar continuously exert tension to lift the platen assembly to its raised (up) position. The arm must be latched to remain lowered.

Page 24, paragraph 35*a*(1). Before Remove add: In the EN–12(1). Add subparagraph *a*(1).1 after subparagraph (1).

(1).1 In the EN–12(2), the top assembly is fastened to the body with two panhead screws, washers, and hex nuts, located just below the lip of the top assembly on either side of the body (a total of four screws). Open the access door, and hold the hex nuts with a wrench when unscrewing the panhead screws. The top assembly can then be lifted off.

Page 25, paragraph 36*a*, line 2 (as changed by C 2, 20 Sep 63). Change solvent (SD) to: cleaning compound.

Subparagraph *c*. Before To expose add: In the EN–12(1). Add subparagraph *c*.1 after subparagraph *c*.

c.1 In the EN–12(2), to remove the printing glass for cleaning, unlatch the platen assembly and allow it to go to its raised position. Open the access door, and gently push up on the printing glass from the underside. When replacing the printing glass, support it from below to prevent its dropping and possible breakage.

Page 26, paragraph 39, chart. Make the following changes: *Symptom* column, first item, line 2. After "light" add: in EN–12(1).

After the first item in the *Symptom* column, add the following:

Symptom	Probable trouble	Corrective measures
Power indicator lamp fails to light (EN–12(2)).	Power indicator lamp burned out.	Replace.
Ruby safe lamp fails to light EN–12(2)).	Ruby safe lamp burned out.	Replace.
Power indicator and ruby safe lamps fail to light (EN–12(2)).	Power cable broken ------	Replace (para 40*e*).
	Defective switch ---------	Replace (para 40*e*).
	Break in wiring or switch	Check circuit and switch. Repair or replace.

Paragraph 40, subparagraph *a*, line 3. Delete printer body and substitute: top assembly.

Subparagraph *a*(1), line 5. After the last sentence, add: In the EN–12(2), the cotter pins must be removed with the platen arm in its raised position.

Page 27, paragraph 40. Subparagraph *b* heading. Add: EN–12(1). Add subparagraph *b*.1 after subparagraph *b*:

b.1 Entire Top Assembly (fig. 4). To remove the entire top assembly, remove the two panhead screws, washers, and hex nuts, located just below the lip of the top assembly on either side of the body. Hold the hex nuts with a wrench when unscrewing the panhead screws. Access to the nut is through the access door at the front of the body. Remove the printing glass by lifting the platen assembly, and gently push up on the printing glass from the underside. The printing glass is held in a well in the top assembly by gravity. It is not necessary to remove the top to remove the printing glass since this can be done when the top is raised as shown in figure 4. To replace the entire top assembly, reverse the above procedures.

Subparagraph *c*, line 2. Delete casting and substitute: mounting bracket.

Subparagraph *d*, line 6. After the fourth sentence, add: In the EN–12(2), the lamp holder is mounted with a retaining ring on a groove at the bottom of the lampholder after it is pushed through the false bottom. To remove the lampholder, remove the retaining ring.

Subparagraph *f*, line 2. After the last sentence, add: To remove the momentary switch in the EN–12(2), remove the knurled nut on the stem of the switch. Replace the new switch, and secure it with a knurled nut.

Page 28, paragraph 41*b*, line 6 (as changed by C 2, 20 Sep 63). Delete the fourth sentence and substitute: Refer to TB SIG 364.

Paragraph 42, subparagraph *a*, line 2. Delete castings and substitute: mounting bracket.

Paragraph 43 (as changed by C 3, 15 Jun 64). Delete paragraph 43. Add chapter 5.1 after chapter 5.

CHAPTER 5.1

DEPOT OVERHAUL STANDARDS

43. Applicability of Depot Overhaul Standards

The tests outlined in this chapter are designed to measure the performance capability of a repaired equipment. Equipment that is to be returned to stock should meet the standards given in these tests.

43.1 Applicable References

a. Repair Standards. Applicable procedures of Army depots performing these tests and the general standards for repaired electronic equipment given in TB SIG 355–1, TB SIG 355–2, and TB SIG 355–3 form a part of the requirements for testing this equipment.

b. Modification Work Orders. Perform the work specified by modification work orders pertaining to this equipment before making the tests specified. DA Pam 310–7 lists all available MWO's.

43.2 Test Facilities and Conditions Required

The following test facilities and conditions will be used in determining compliance with the requirements of these overhaul standards.

a. Multimeter AN/URM–105 (FSN 6625–242–5023).

b. Power source of 117 volts, 60 cps.

c. Normal room temperature.

43.3 General Check of Printer

a. Visual Check. Visually examine the overall appearance of the printer (figs. 1 and 4). Note any obvious misalignment or damage to the external finishes.

b. Printing Glass (fig. 1). The working surface of the printing (plain) glass must be free of waves and bubbles which could cause distortion or spots in printing.

c. Masks. The masking blades (masks) must not be bent or bured and must not show evidence of rust.

d. Latch. The latch on the platen arm must not be corroded or worn to the extent that it prevents crisp positive action.

e. Platen Lining. The platen lining must be clean and smooth to permit firm contact with the printing glass.

f. Printing Lamps (fig. 4). The printing lamps must be discolored. The ruby safe lamp must not emit any unfiltered (white) light.

g. Pressure Springs. The pressure springs (fig. 1) must cause the platen linings to make firm contact with the printing glass: the platen must make contact and be under compression before the front platen makes contact and the platen arm latches in the locked position.

h. Momentary Switch. The momentary switch must operate mechanically with a free, smooth, and positive action when actuated by the contact on the platen arm.

i. Power Indicator Lamp. The power indicator lamp must light when the printer is connected to a power source and the power switch is set to ON (para 43.4). The power indicator lamp must remain on as long as this condition exists.

j. Ruby Safe Lamp (fig. 4). The ruby safe lamp must light when the printer is connected to the power source and the power switch is set to ON (para 43.4). The ruby safe lamp must remain on as long as this condition exists.

43.4 Operational Test of Printer

a. Connect the power cable (fig. 1) to the power source.

b. Open the access door to permit observation of the ruby safe lamp (fig. 4) and the printing lamps.

c. Place the power switch (fig. 1) to ON; the ruby safe lamp (fig. 4) must light and must not emit any unfiltered (white) light.

d. Pull down the platen arm (fig. 1) until it latches in place; the contact spring must actuate the momentary switch and cause the printing lamps (fig. 4) to light.

e. Release the platen arm latch; the printing lamps must go out before the pressure springs (fig. 1) have released the platens from the surface of the printing glass. The ruby safe lamp (fig. 4) must remain on.

f. Place the power switch to OFF; the ruby safe lamp must go out. On the EN–12(2), the ruby safe and power indicator lamps must go out.

g. Disconnect the power cable from the power source.

Page 29, paragraph 45*a*(5). Delete subparagraph *a*(5) and substitute:

(5) Pull the platen arm to a latched position, and secure it with pressure sensitive tape.

Page 30, appendix I (as changed by C 3, 15 Jun 64). Delete and substitute:

APPENDIX A

REFERENCES

Following is a list of references that should be available to operating and maintenance personnel of Photographic Contact Printers EN–12(1) and EN–12(2):

DA Pam 310–4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders
DA Pam 310–7	Modification Work Orders
TB SIG 355–1	Depot Inspection Standard for Repaired Signal Equipment
TB SIG 355–2	Depot Inspection Standard for Refinishing Repaired Signal Equipment
TB SIG 355–3	Depot Inspection Standard for Moisture and Fungus Resistant Treatment
TB SIG 364	Field Instructions for Painting and Preserving Electronics Command Equipment
TM 9–213	Painting Instructions for Field Use
TM 11–401	Elements of Signal Photography
TM 11–6625–203–12	Operator and Organizational Maintenance: Multimeter AN/URM–105, Including Multimeter ME–77/U
TM 11–6625–366–15	Organizational, DS, GS, and Depot Maintenance Manual: Multimeter TS–352B/U
TM 38–750	Army Equipment Record Procedures

Page 30. Delete appendixes II and III (as changed by C 2, 20 Sep 63) and substitute new appendixes B and C.

APPENDIX B

BASIC ISSUE ITEMS

Section I. INTRODUCTION

B–1. General

This appendix lists items for Printers, Contact, Photographic EN–12(1) and EN–12(2), the component items comprising them, and the items which accompany them, or are required for installation, operation, or operator's maintenance.

B–2. Explanation of Columns

An explanation of the columns in section II is given below.

a. Source, Maintenance, and Recoverability Code, Column 1. Not used.

Note. **When there is no code indicated in the *Recoverability* column, the part will be considered expendable.**

b. Federal Stock Number, Column 2. The Federal stock number for the item is indicated in this column.

c. Description, Column 3. The Federal item name, a five-digit manufacturer's code, part number, and when required, the model designator (*), which indicates different models of the end equipment, are included in this column.

d. Unit of Issue, Column 4. The unit used as a basis of issue (e.g., ea, pr, ft, yd, etc.) is noted in this column.

e. Quantity Incorporated in Unit Pack, Column 5. Not used.

f. Quantity Incorporated in Unit, Column 6. The total quantity of the item used in the equipment is given in this column.

g. Quantity Authorized, Column 7. The total quantity of an item required to be on hand and necessary for the operation and maintenance of the equipment is given in this column.

h. Illustration, Column 8. Not used.

B–3. Federal Supply Codes

This paragraph lists the Federal supply code with the associated manufacturer's name.

Code	*Manufacturer*
04582	Pax Electronics Co.
07055	Besler Charles Co.
24455	General Electric Co.

Section II. BASIC ISSUE ITEMS LIST

(1) Source cd (A)	(1) Maint. cd (B)	(1) Rec. code (C)	(2) Federal stock number	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	(3) Description	(4) Unit of issue	(5) Qty inc in unit pack	(6) Qty inc in unit	(7) Qty auth	(8) Illustrations (A) Figure number	(8) Illustrations (B) Item or symbol number
			6740–243–2980							PRINTER, CONTACT, PHOTOGRAPHIC EN–12(1), EN–12(2): (This item is nonexpendable). *Note.* Model column 1 refers to EN–12(1); column 2 refers to EN–12(2).						
										TECHNICAL MANUAL TM 11–2391B	ea	-----	1	1		
										Requisition through pinpoint account number if assigned; otherwise through nearest Adjutant General facility. *Note.* A quantity of one technical manual is packed with each equipment. Where a valid need exists, additional copies may be requisitioned and kept on hand.						
			6740–902–3933		*					GLASS, PRINTING: 04582; J1217–B009	ea	-----	1	2		
			5620–274–6849	*						GLASS, PRINTING: 07055; B.B.S.1.7–15	ea	-----	1	2		
			6240–174–8854	*	*					LAMP, INCANDESCENT: 24455; GE25	ea	-----	4	6		
										NO ACCESSORIES, TOOLS, OR TEST EQUIPMENT ARE TO BE ISSUED WITH THIS EQUIPMENT						
										NO BASIC ISSUE ITEMS ARE MOUNTED IN OR ON EQUIPMENT						

APPENDIX C

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

C–1. General

This appendix provides a summary of the maintenance operations covered in the equipment literature for Printers, Contact, Photographic EN–12(1) and EN–12(2). It authorizes categories of maintenance for specific functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

C–2. Explanation of Format for Maintenance Allocation Chart

a. Group Number. Not used.

b. Component Assembly Nomenclature. This column lists the item names of component units, assemblies, subassemblies, and modules on which maintenance is authorized.

c. Maintenance Function. This column indicates the maintenance category at which performance of the specific maintenance function is authorized. Authorization to perform a function at any category also includes authorization to perform that function at higher categories. The codes used represent the various maintenance categories as follows:

Code	*Manufacturer*
C	Operator/crew
O	Organizational maintenance
F	Direct support maintenance
H	General support maintenance
D	Depot maintenance

d. Tools and Equipment. The numbers appearing in this column refer to specific tools and equipment which are identified by these numbers in section III.

e. Remarks. Self-explanatory.

C–3. Explanation of Format for Tool and Test Equipment Requirements

The columns in the tool and test equipment requirements chart are as follows:

a. Tools and Equipment. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool for the maintenance function.

b. Maintenance Category. The codes in this column indicate the maintenance category normally allocated the facility.

c. Nomenclature. This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

d. Federal Stock Number. This column lists the Federal stock number.

e. Tool Number. Not used.

Section II. MAINTENANCE ALLOCATION CHART

Group number	Component assembly nomenclature	Maintenance Functions											Tools and equipment	Remarks
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
	PRINTERS, CONTACT, PHOTOGRAPHIC EN-12(1) AND EN-12(2).			C										Preventive maintenance.
		C												Inspect power cable connectors, etc.
			O										1, 2	Test circuit continuity.
												D	1, 3	Plus shop support.

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

Tools and equipment	Maintenance category	Nomenclature	Federal stock number	Tool number
		EN-12(1), EN-12(2) (Continued).		
1	O, F, H, D	MULTIMETER AN/URM-105.	6625-581-2036	
2	O	TOOL KIT, PHOTOGRAPHIC REPAIR TK-77/GF.	5180-752-9068	
3	F, H, D	TOOL KIT, PHOTOGRAPHIC REPAIR TK-109/GF.	5180-856-9653	

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

CNGB (1)
Dir/Trans (1)
CofEngrs (1)
TSG (1)
CofSptS (1)
OCC-E (2)
USAMB (10)
USAARENBD (2)
USCONARC (2)
USAMC (2)
USAMICOM (2)
USAECOM (2)
ARADCOM (2)
ARADCOM Rgn (1)
OS Maj Comd (2)
USACDCEC (10)
USASTRATCOM (2)
USAESC (70)
Armies (1)
Sig FLDMS (1)
USASESS (10)
USASA (2)
USACDCCEA (1)
USACDCCEA
Ft Huachuca (1)
USAPA (5)
Army Depots (1) except
LBAD (14)
SAAD (30)
TOAD (14)
LEAD (7)
NAAD (3)
SVAD (3)
ATAD (10)
Svc Colleges (1)
1st Cav Div (7)
GENDEP (1)
Sig Sec GENDEP (4)
Sig Dep (6)
USACRREL (2)
Fort Huachuca (5)
Fort Carson (7)
WSMR (2)
USAERDAA (2)
USAERDAW (2)
Natl Censorship Sta (5)
Units org under fol
TOE: (2 copies each)
11-57
11-96
11-117
11-127
11-155
11-157
11-158
11-587
11-592
11-597
19-500 (AA-AE)

NG: None.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

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TECHNICAL MANUAL
No. 11-2391B

DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *20 May 1955*

PHOTOGRAPHIC CONTACT PRINTER EN-12(1)

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual contains instructions for the operation, maintenance, and repair of the equipment. The information in this manual applies only to Photographic Contact Printer EN–12(1).

b. Printer is the common name used throughout this manual for Photographic Contact Printer EN–12(1).

c. All comments on this manual will be forwarded direct to—
Commanding Officer
Signal Corps Publications Agency
Fort Monmouth, New Jersey
ATTN: Standards Division

2. Forms and Records

The following forms will be used for reporting unsatisfactory conditions of Army equipment.

a. DD Form 6 (Report of Damaged or Improper Shipment) will be filled out and forwarded as prescribed in SR 745–45–5 (Army); Navy Shipping Guide, Article 1850–4 (Navy); and AFR 71–4 (Air Force).

b. DA Form 468 (Unsatisfactory Equipment Report) will be filled out and forwarded to the Office of the Chief Signal Officer, as prescribed in SR 700–45–5.

c. DD Form 535 (Unsatisfactory Report) will be filled out and forwarded to Commanding General, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio, as prescribed in SR 700–45–5 and AF TO 00–35D–54.

d. Use other forms and records as authorized.

Section II. DESCRIPTION AND DATA

3. General Description

Photographic Contact Printer EN–12(1) is a manually operated, table-model, contact printer that is used in a photographic darkroom to make contact prints from negatives up to 8 by 10

inches in size. The printer can be operated from either a 110-volt, 60-cycle, alternating-current (ac) or a 110-volt direct-current (dc) power source. The printer consists mainly of a lamp house, a printing head, a platen assembly, and the necessary cables and controls for its operation.

4. Dimensions and Weight

The EN–12(1) is a single complete unit and is approximately 21 inches long by 10 inches wide by 13 inches high (with platen down). In open position (with platen up), it is 33 inches high. The printer weighs 26 pounds.

5. Description of Printer (figs. 1 and 4)

a. Lamp House. The lamp house (fig. 1) is a rectangular steel box with a hinged front panel that serves as an access door. A momentary contact switch is mounted on the front of the lamp house above the access door, and the power switch and 10-foot power cable are located on the right-hand side. A jewel pilot light is mounted in the access door (fig. 1). Inside the lamp house, the ruby safe lamp and printing lamps (fig. 4) are located in a false bottom that covers the wiring chamber. A diffusion glass and channels for holding the glass at any one of three levels are also provided.

b. Printing Head (fig. 1). The printing head is mounted on the top of the lamp house by a hinged bar located at the rear of the housing. The printing head consists of a steel aperture plate, a printing glass, a guide bar, and four masking blades.

c. Platen Assembly (fig. 1). The platen assembly is attached to the printing head with pivot pins and consists of the following parts: two sponge rubber-covered platens (front and rear), two pieces of channel iron, two pressure springs, a momentary switch actuating spring (contact spring), a latch, and a safety chain. The platen assembly holds the photographic paper in place over the negative during exposure.

d. Spare Parts. Two printing lamps (white frosted) and one ruby lamp are supplied as spare parts.

6. Technical Characteristics

Lamps:	
4 printing lamps	25 watts.
1 ruby safe lamp	25 watts.
Power source	110–120 v, 60 cycle ac or 110–120 v dc.
Print size	8 x 10 in. (max).
Type	Contact

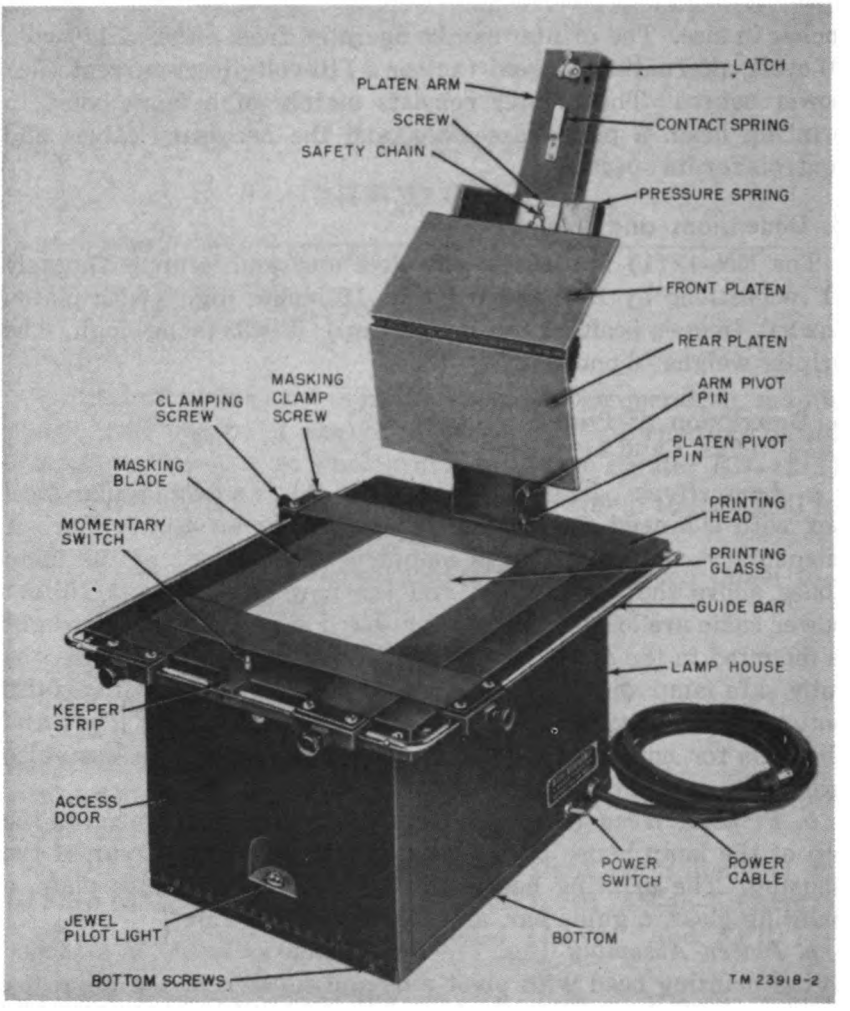


Figure 1. Photographic Contact Printer EN–12(1), front view.

7. Packaging and Packing Data

The equipment is packed and shipped as a complete unit. It is packaged individually as follows:

a. Domestic Shipment (fig. 2). All electric lamps are wrapped in separate cartons and placed inside the lamp house. The diffusion glass is wrapped and inserted in the channels in the lamp house. Cushioning material is added to prevent the parts from moving during shipment. The entire printer is placed in a carton (inner) with corrugated fillers around it to prevent the printer from moving. Bags of silica gel are placed near the printer. The carton is sealed and placed in a moisture-vaporproof barrier that is also sealed. The unit then is placed in a second (or outer) carton and

sealed. Packed for domestic shipment, the unit weighs 32 pounds.

b. Export Shipment (fig. 3). The printer, packed in the inner corrugated carton as described in *a* above, is placed in an outer corrugated carton without the moisture-vaporproof barrier. The printer, thus packaged, is placed in a wooden shipping box which is lined with a waterproof case liner. The case liner is sealed. The cover of the shipping box is nailed securely and then further secured with steel straps. Packed for export shipment, the printer weighs 50 pounds.

CHAPTER 2
INSTALLATION

8. Uncrating, Unpacking, and Checking New Equipment

a. Unpacking Equipment, Export Shipment (fig. 3).

(1) Open the wooden shipping box by breaking the metal straps and by removing the nails.

(2) Slit the vaporproof case liner so that the outer corrugated carton containing the equipment may be removed from the wooden shipping box.

(3) Remove the outer corrugated carton from the wooden shipping box.

(4) Place the outer corrugated carton in a horizontal position with the words "THIS SIDE UP" on top.

(5) Slit the top and lift the inner corrugated carton out of the outer corrugated carton.

(6) Slit the top of the inner corrugated carton and remove the bags of silica gel and the equipment.

(7) Open the access door of the equipment and remove the cushioning material, lamps, and diffusion glass from the interior.

(8) Remove the protecting material from the lamps and the diffusion glass.

(9) Save the wooden shipping box, the corrugated cartons, and the corrugated fillers for possible repacking of the printer.

b. Unpacking Equipment, Domestic Shipment (fig. 2).

(1) Slit the top of the outer corrugated carton and the top of the moisture-vaporproof barrier.

(2) Lift out the inner corrugated carton containing the equipment.

(3) Slit the top of the inner corrugated carton and remove the equipment and the corrugated fillers.

(4) Open the access door of the printer and remove the cushioning material, lamps, and diffusion glass.

(5) Remove the protecting material from the lamps and diffusion glass.

Checking Equipment. Check the equipment as follows:

(1) Check for breakage of glass parts or damage to metal parts.

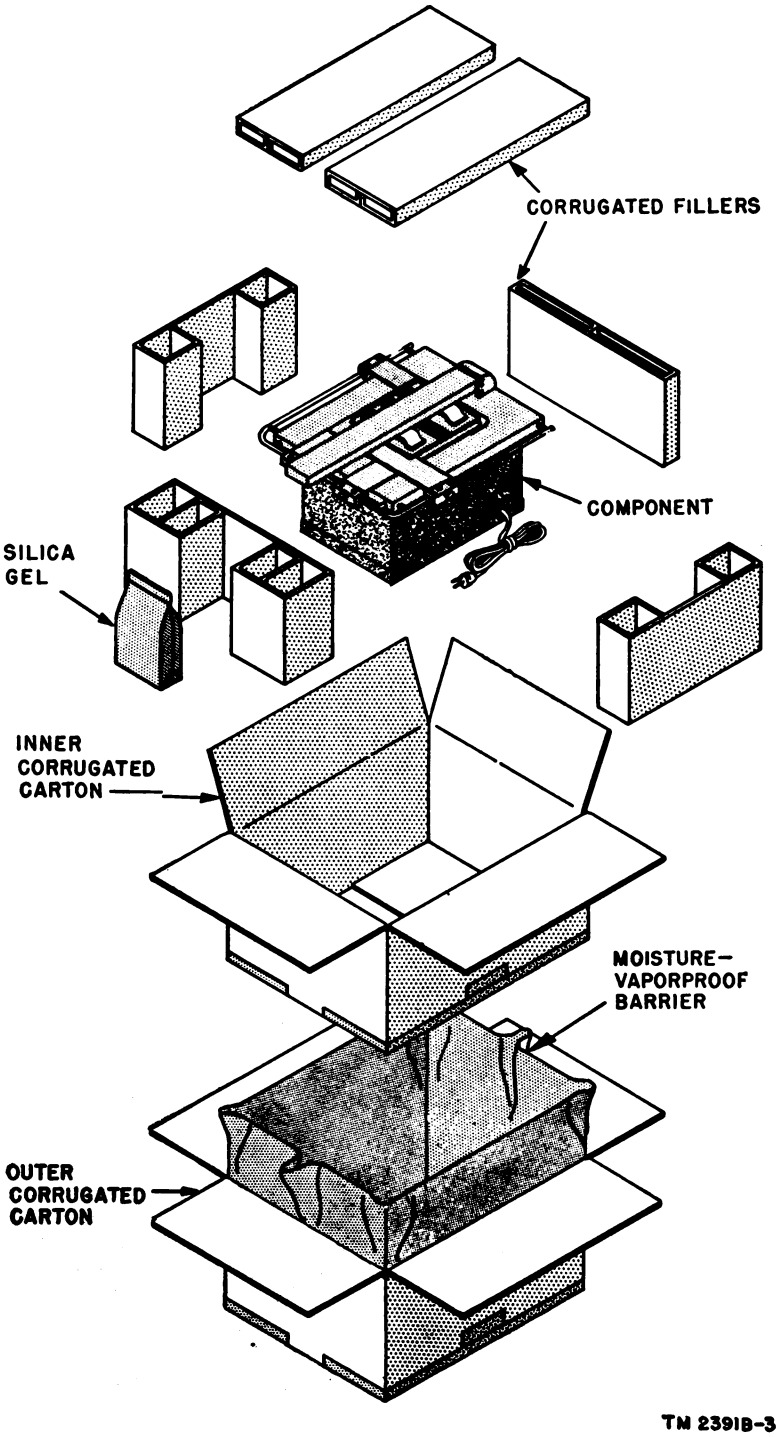


Figure 2. Packaging diagram, domestic shipment.

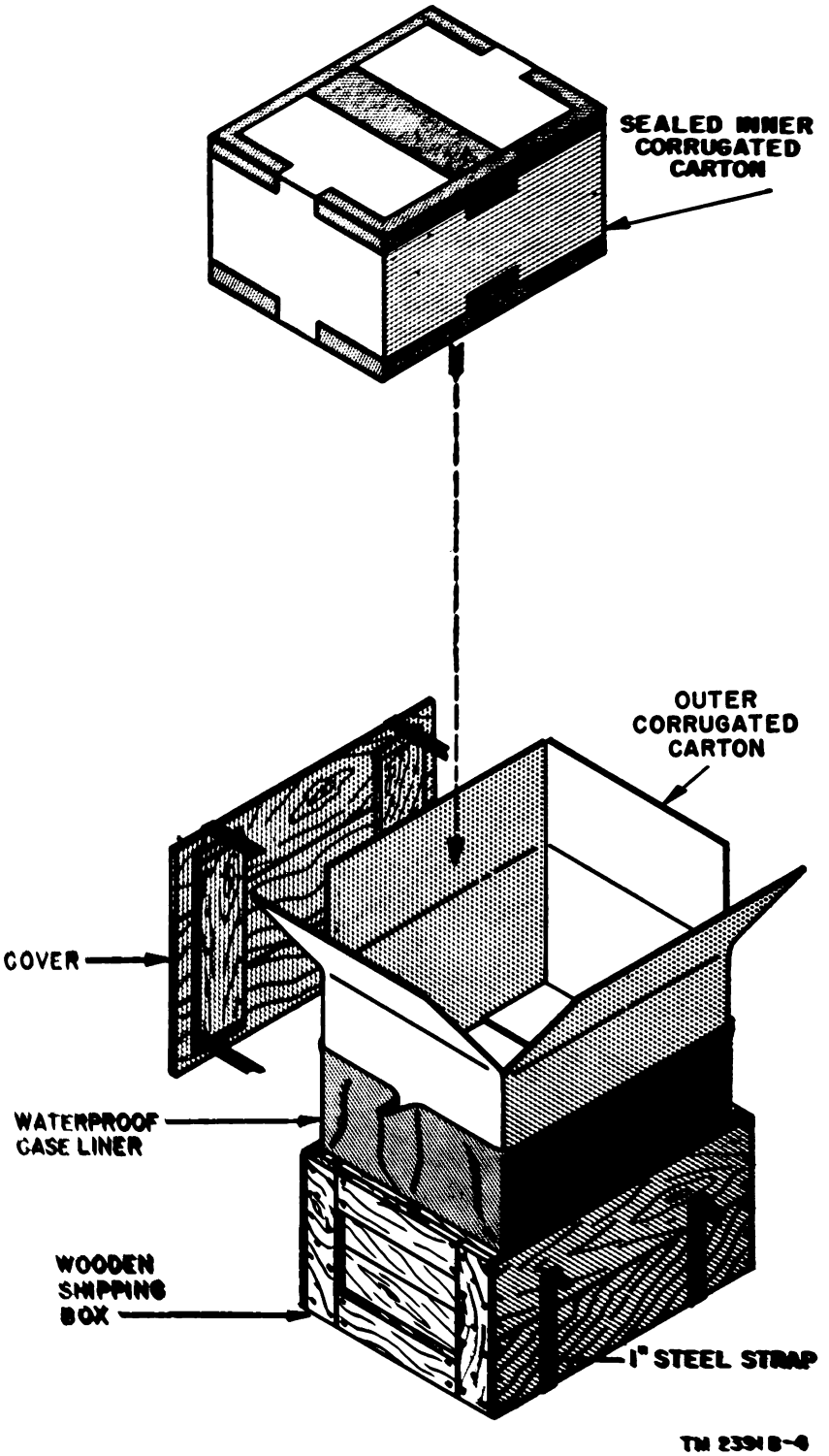


Figure 3. Packing diagram, export shipment.

(2) Check with the shipping documents for possible missing mponents.

9. Locating Printer

Install the printer in a photographic darkroom illuminated by a safe lamp. Be sure the safe lamp is the proper one for the type of contact paper being used with the printer. See TM 11–401 for information on processing procedure. Place the printer on a sturdy table or bench near a 110- to 120-volt ac or dc power source outlet, and near the trays of solutions used in processing the prints. Be sure that the printer power cable can reach the power source outlet.

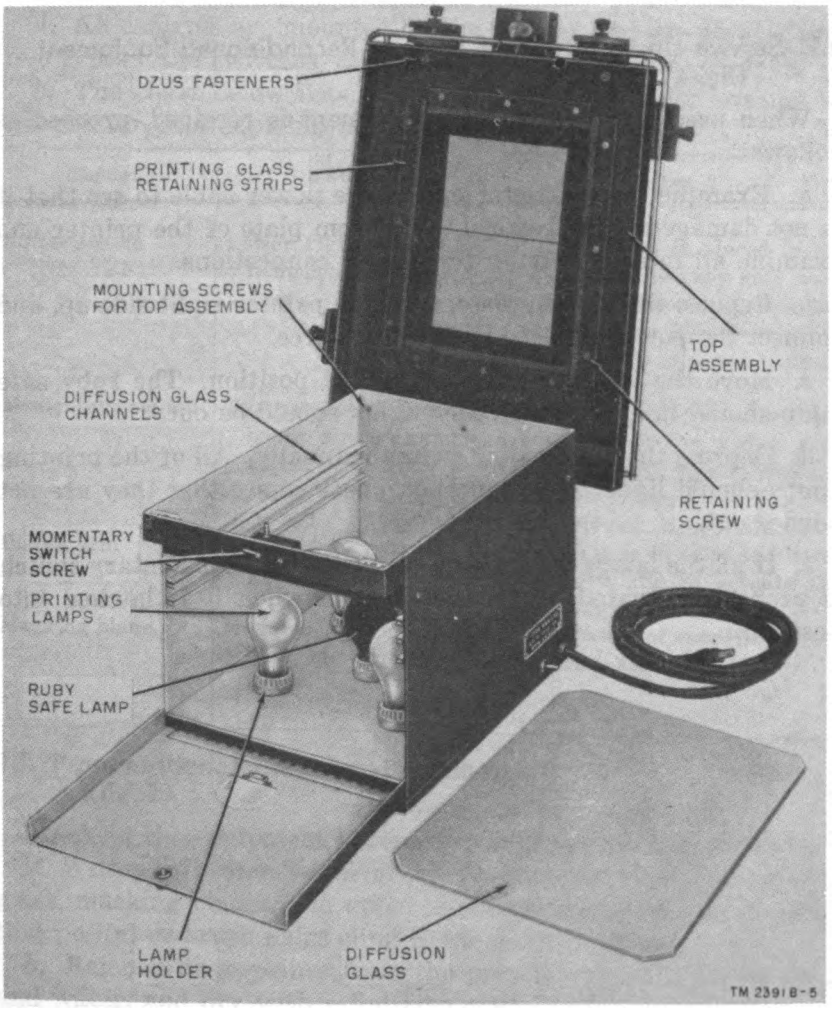


Figure 4. Photographic Contact Printer EN–12(1), printing head raised, access door open, and diffusion glass removed.

10. Preparing Printer for Use (fig. 4)

a. Open the access door.

b. Screw the ruby safe lamp into its socket (fig. 4) and screw the four printing lamps into the other sockets.

c. Insert the diffusion glass in one set of channels (slots) inside the lamp house. Be sure that the diffusion and printing glasses are clean.

d. Close the access door (fig. 1).

e. Plug the power cable into the 110- to 120-volt ac or dc outlet.

11. Service Upon Receipt of Used or Reconditioned Equipment (fig. 4)

When used or reconditioned equipment is received, proceed as follows:

a. Examine the connector end of the power cable to see that it is not damaged; then remove the bottom plate of the printer and examine all internal wiring for proper connections.

b. Replace the bottom plate, turn the printer right side up, and connect the power cable to the power source.

c. Move the power switch to the ON position. The ruby safe lamp should light, but the other lights should be out.

d. Depress the momentary switch manually. All of the printing lamps should light; if they do not, check to see that they are not burned out.

e. If all the lamps light, check to see that the momentary switch is properly actuated by the platen arm when it is latched into position.

CHAPTER 3
OPERATION

Section I. CONTROLS AND OPERATION UNDER USUAL CONDITIONS

12. Controls and Their Uses (fig. 1)

a. All controls are mounted on the printer and are divided into two types: the switches (electrical) and the manual controls.

b. The chart below lists these controls, gives their location on the printer, and explains their function.

Control	Location	Function
Power switch (ON-OFF).	Lower right side of lamp house, toward rear.	When this switch is placed in the ON position, the ruby safe lamp will light and power is supplied to the printer. The four white printing lamps will not light at this time.
Momentary switch	Top center of lamp house, above front panel.	This switch is actuated by the contact spring on the platen arm. When the platen arm is lowered, the switch is closed and the four white printing lamps will light.
Platen arm	Attached to rear of printing head.	This arm is used to raise and lower the platens and to actuate the momentary switch.
Masking blade	Mounted on guide bars on printing head.	Permits setting of margins to desired print size.

13. Preoperational Cleaning Procedure (fig. 1)

To clean the equipment before operation, proceed as follows:

a. With a soft camel's-hair brush, remove dust from the printing glass, masking blades, and upper surfaces of the printer. Be sure that no lint or brush hairs cling to the printing glass.

b. Remove fingerprints from the printing glass by using soap and water, and dry with a lint-free cloth.

c. Remove dust or dirt from the diffusion glass. If necessary, remove the printing and diffusion glasses (fig. 4) and wash them

with soap and water. After washing, dry them carefully and replace them in their original positions.

14. Preliminary Starting Procedure (fig. 1)

Before operating the equipment, check the equipment as follows:

a. Be sure that the power switch is in the OFF position and that each socket contains the proper lamp (fig. 4).

b. See that the masking blades (fig. 1) are clean and square and that they ride freely on the guide bar.

c. Be sure that the platen arm moves freely from the up position to the lower clamping position and that the latch is held in place by the keeper strip.

d. Be sure that the power cable connector is plugged into the power source. Move the power switch to the ON position. The ruby safe lamp should light.

Caution: See that no unexposed photographic paper is present when the printing lamps are lighted. The lights from the printing lamps will fog the photographic paper.

e. With the access door open (fig. 4), pull the platen arm down to the closed position, allowing the latch on the platen arm to engage the keeper strip. If all the lamps light, release the latch and allow the platen arm to return to the vertical position. Close the access door.

f. Be sure that the ground side of the diffusion glass faces the printing lamps.

15. Operating Procedure (fig. 1)

To operate the printer, proceed as follows:

a. Loosen the clamping screws on the masking blades and lift the masking blades to a vertical position.

b. Place the negative to be used, emulsion side up, on the printing glass.

c. Lower the masking blades. Adjust the masking blades to the desired print size by loosening the clamping screws. Be sure that the edges of the negative are covered. Tighten the clamping screws to hold the masking blades in the desired position.

d. Place the photographic paper, with the emulsion side down, over the negative and center the image on the paper. Use the ruled lines on the masking blades as a guide.

e. The hinged platen arrangement makes it possible to place and hold the paper properly over the negative before lowering the platen arm all the way. Pull down the platen arm, and hold the paper during the first portion of travel so that the rear platen does not push the paper away from the desired position. When the platen arm (fig. 1) is partly lowered, the rear platen will hold the paper in place. Continue lowering the platen arm until it is latched. As the platen arm is latched, the contact spring under the platen arm automatically depresses the momentary switch, lighting the printing lamps (fig. 4). The jewel light glows when the printing lamps are on.

f. Expose the photographic paper by allowing the platen arm to remain locked for the correct exposure time. After the proper exposure, release the latch, raise the platen arm, and remove the paper. The paper now is exposed and ready for development.

g. Process the paper. See TM 11–401.

16. Dodging

Sometimes it is necessary to print negatives (in certain areas) that are either imperfect or unequal in exposure. Some parts may be considerably denser or lighter than the rest of the negative. The process of balancing the lighting to all of these areas is called *dodging.* If a test print from a negative indicates that a portion of the print is overexposed, it is necessary to dodge. Dodge only those portions of the negative that show overexposure.

a. Leave the negative on the printing glass and open the access door.

b. Slide the diffusion glass forward and place small pieces of torn tissue or similar paper on the diffusion glass so that their shadows are cast on the thinner or overexposed portions of the negative. Be sure that no unexposed paper is open in the darkroom.

c. Press the momentary switch to turn on the printing lamps and observe the shadows of the dodging paper. Adjust the position of the dodging paper to fit portions of the negatives as required.

d. To control the diffusion of the shadow, raise or lower the diffusion glass as necessary. The diffusion glass rests on one of three sets of channels. When the glass is on the top set of channels, it gives minimum diffusion of light.

e. After completing the dodging, close the access door and continue printing from the negative as if it were properly exposed. *Dodging requires experience. Exposure time also requires experience. Make test prints to acquire this experience before printing important negatives.*

17. Stopping Procedure

After making the necessary number of prints, return the negatives to their proper storage file.

a. Move the power switch to the OFF position.

b. Lower the platen arm to its lower position, but do not engage the latch.

c. If a cover is available, keep the printer covered to prevent dust from settling on it.

d. If the printer is not to be used for a long period of time, disconnect the power cable from the power source.

Section II. OPERATION UNDER UNUSUAL CONDITIONS

18. Operation in Arctic Areas

Keep the printer under cover as much as possible. To use the printer, slowly expose it to existing temperatures. Keep the ruby safe lamp burning to warm up the unit. Be care that moisture does not accumulate on the printing glass and lamps. Snow and ice must be kept off the printer.

19. Operation in Desert Areas

Sand and dust must be kept out of the printer. Use a camel's-hair or other soft brush to keep sand off the platens and the printing head. Keep the entire printer covered when not in use to avoid accumulation of sand and dirt.

20. Operation in Tropical Areas

Use the same precautions as for arctic and desert climates (pars. 18 and 19, respectively), except for keeping the ruby safe lamp burning. If excessive moisture appears on or inside the printer, turn on the printing lamps for a few minutes before operation. The heat from the lamps will dry the moisture. Disconnect the printer from the power supply, and cover the printer when not in use.

CHAPTER 4
ORGANIZATIONAL MAINTENANCE

Section I. PREVENTIVE MAINTENANCE SERVICES

21. Definition of Preventive Maintenance

Preventive maintenance means making systematic checks and adjustments at regular intervals to keep the equipment operating at top efficiency. It is not the same as troubleshooting or repair. The purpose of troubleshooting and repair is to *correct existing defects*. Preventive maintenance is designed to *prevent* the development of defects. The importance of preventive maintenance cannot be overemphasized. Failure or inefficient operation of one piece of equipment may cause the failure of the entire photographic system. It is vitally important, therefore, that operators and repairmen maintain their equipment properly.

22. Tools and Materials Used with Equipment

No special tools are necessary for operation of the printer. For organizational maintenance, the following common tools and materials are needed:

Item	Use
Screw driver (¼" blade).	For slotted screws.
Pliers.	For nylon cable grommet and switch retaining nuts.
Stiff bristle brush.	Clean dirt and other debris from equipment.
Camel's-hair brush.	Brush off dust and lint.
Bleached cheesecloth, 36" wide.	Wash printing and diffusion glass with soap and water.
Lint-free cloth.	Clean dust from lamp house and printing and diffusion glass.
Sandpaper No. 000	Sand rust spots before painting.
Dry cleaning solvent (SD)	Remove dirt and grease from equipment.
Orange stick.	Clean dirt from hard-to-reach places.

23. Detailed Instructions

Certain maintenance instructions should be followed for the printer. Cleanliness of the printer is absolutely essential.

a. Clean and dust all parts of the printer after it has been unpacked and before it is put into use.

b. Be sure that no scratches are on the printing glass.

c. Wipe fingerprints from the printing glass with a lint-free cloth. If they do not come off completely, remove the glass and wash with soapy water. Use a clean lint-free cloth. Dry with a clean towel and brush off any lint with a camel's-hair brush.

d. Examine the rubber platen surfaces to be sure that no foreign particles are embedded in them. Remove any foreign particles carefully without cutting the rubber.

e. Inspect all outside surfaces for cracks, chipped paint, broken or cracked glass, bent or dented metal parts, rust, mildew, fungi, loose or missing screws, and accumulations of moisture.

f. Tighten all loose screws and mountings.

g. Inspect all lamps and determine whether replacement is necessary.

h. Inspect all switches and controls for free movement, positive action, and freedom from binding.

Note. No lubrication of the equipment is required.

24. Preventive Maintenance Check List

The following chart shows preventive maintenance procedures for the printer. The list contains information on what to check, when to check, how to check, and precautions to be taken before, during, and after checking.

Item No.	What to check	When to check	How to check	Precautions
1	Power cable (fig. 1).	Weekly	Examine for abrasion, cuts, or breaks. See that connections are tight.	Examine before plugging in to power source. Tighten screws snugly, keep cable clean.
2	Printing and ruby lamps (fig. 4).	Daily before use	See that they are tight in their sockets and that they are all operating. Check all wiring.	If they do not light, replace with new lamps as required.
3	Momentary switch (fig. 1).	Daily before use	Pull down platen arm until it catches. See whether printing lamps light and go out when arm is released.	Be sure that no sensitized material is open in the darkroom. If lamps do not light, switch may be defective.
4	Printing glass (fig. 1).	Daily before use	Examine visually for scratches or debris.	If debris cannot be brushed off, try to soak it off. Scratched glass must be replaced.
5	Masking blades (fig. 1).	Daily before use	Examine for rust, bends, or nicks.	Straighten, remove rust. If badly damaged, replacement is necessary.
6	Rubber platens (fig. 1).	Daily before use	Examine for foreign particles.	Clean with a moist cloth, but be sure to dry before use.
7	Diffusion glass (fig. 4).	Daily before use	Examine for left-over dodging material.	Remove old dodging material and clean glass.
8	Power switch (fig. 1).	Weekly	Inspect for free movement, dirt, positive action.	Be sure all leads are in good order and properly connected.
9	Lamp house (fig. 4).	Monthly	Inspect for dirt, cracks, loose or missing screws, loose mounting, defective cable.	Remove dirt. Tighten loose screws; replace missing ones.

Section II. WEATHERPROOFING

25. Weatherproofing Procedures

a. General. Signal Corps equipment, when operated under severe climatic conditions such as prevail in tropical, arctic, and desert areas, requires special treatment and maintenance. Fungus growth, insects, dust, corrosion, salt spray, excessive moisture, and extreme temperatures are harmful to most materials.

b. Tropical Maintenance. A special moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection. This treatment is explained in TB SIG 13 and TB SIG 72.

c. Arctic Maintenance. Special precautions necessary to prevent poor performance or total operational failure of equipment in extremely low temperatures are explained in TB SIG 66.

d. Desert Maintenance. Special precautions necessary to prevent equipment failure in areas subject to extremely high temperatures, low humidity, and excessive sand and dust are explained in TB SIG 75.

26. Rustproofing and Painting

Photographic Contact Printer EN–12(1) is fungiproofed and rustproofed during manufacture. The lamp house is rustproofed and painted. All other parts are plated or anodized for corrosion resistance. Touch up minor scratches in paint by first sanding with No. 000 sandpaper and then applying enamel of the proper color. Use dull black for exterior surfaces and dull white for interior surfaces. Finish touch-up jobs by applying the proper moistureproofing and fungiproofing lacquer.

Caution: If an abrasive must be used to remove rust or corrosion, *do not use steel wool.* Minute particles frequently enter the equipment and cause short circuiting or grounding of the circuits.

Section III. TROUBLESHOOTING AT ORGANIZATIONAL MAINTENANCE LEVEL

27. General

Organizational troubleshooting is performed by the operator or unit repairman. Familiarity with the equipment will help in the locating of some troubles and in making minor repairs. Any abnormal performance must be checked, its cause discovered, and repairs made. Repairs beyond the ability of the operator or unit repairman must be referred to higher repair authority. When

trouble occurs, refer to the equipment performance check list (par. 30), and to the general procedures as outlined in paragraph 28.

28. Visual Inspection
(figs. 1, 4, and 5)

Most defects that may occur in the printer may be detected by visual inspection.

a. Examine the power cable to see that the connecting plug and conductors have not been damaged.

b. Connect the equipment to a power source and move the power switch to the ON position; the ruby safe lamp should light automatically.

c. Light the printing lamps by manually pressing down on the momentary switch. If any of the printing lamps fail to light, try a replacement lamp.

d. Examine the masking blades, platen (front and rear), and platen springs to see that they are not physically damaged.

e. Examine the lamp house and the printing head for obvious physical damage.

29. Troubleshooting

a. General. The equipment performance check list (par. 30) will help to locate trouble in the equipment. The list gives the items to be checked, the normal indication and tolerances of correct operation, and the corrective measures that can be taken by the operator. When using this list, follow the items in numerical sequence.

b. Action or Condition. For some items, the information given in the *action or condition* column consists of various switch and control settings at which the item is to be checked. For other items, it represents an action that must be taken to check the normal indication given in the *normal indication* column.

c. Normal Indication. The normal indications listed include the visible and audible signs that the operator should detect when he checks the items. If the indications are not normal, the operator should apply the recommended corrective measures.

d. Corrective Measures. The corrective measures listed are those that the operator can make. If the set is completely inoperative and if the recommended corrective measures do not yield results, troubleshooting is necessary. However, if the tactical situation requires that operation be maintained, and if the printer is not completely inoperative, the operator must keep the printer in operation as long as possible.

30. Equipment Performance Check List

	Item No.	Item	Action or condition	Normal indication	Corrective measures
PREPARATORY	1	Power cable (fig. 1).	Plug into power supply (par. 10*e*).		
	2	Power switch (fig. 1).	Snap to ON and OFF (fig. 1).	Ruby safe lamp lights and goes out.	Check the power source and the power cable. Install a new ruby safe lamp. Turn in equipment for repair.
START	3	Momentary switch (fig. 1).	Push plunger down (fig. 1).	Printing lamps go on.	Replace any defective printing lamps. If no printing lamps light, it may be necessary to adjust position of momentary switch. Move the switch out by loosening the inside nut and tightening the outside nut.
EQUIPMENT PERFORMANCE	4	Platen arm (fig. 1).	Pull platen arm down and lock in position (fig. 1).	Presses printing paper in absolute contact with negative.	Check printer top platen hinge, platen face, and platen spring.
				Actuates momentary switch and turns printing lamps on.	Check contact spring and latch.
	5	Printing lamps (fig. 1).	Proper lamps selected and mounted in sockets.	Lamps should light when platen is lowered and latched.	Check contacts on lamp bases. Check lamps.
	6	Masking blades (fig. 1).	Frames print to the desired size.	Masking blades should lock, holding even margin.	Check frame and clamps. Clean. Turn in equipment for repair. If fuzzy print results, examine for defective platen springs. Turn in equipment for repair.

	Item No.	Item	Action or condition	Normal indication	Corrective measures
STOP	7	Platen arm (fig. 1).	Platen arm raised.	Releases plunger on momentary switch and turns off printing lamps.	Check momentary switch for defect if printing lamps do not go off. Check action of momentary switch actuating lever. Turn in equipment for repair.
	8	Power switch (fig. 1).	Moved to OFF position.	Ruby safe lamp goes out.	If ruby safe lamp still lights, it indicates a defective power switch. Turn in equipment for repair.
	9	Power cable (fig. 1).	Remove from power source.		

CHAPTER 5

THEORY AND FIELD MAINTENANCE

Note. This chapter contains information for field maintenance. The amount of repair that can be performed by units having field maintenance responsibility is limited only by the tools and test equipment available and by the skill of the repairman.

Section I. THEORY

31. Electrical System (fig. 6)

a. Safe lamp E2 is connected in series with power switch S1 and operates independently of the printing lamps. The safe lamp always lights when the power switch is moved to the ON position.

b. Four printing lamps E3 are wired in parallel. The parallel arrangement of the four printing lamps is connected in series with

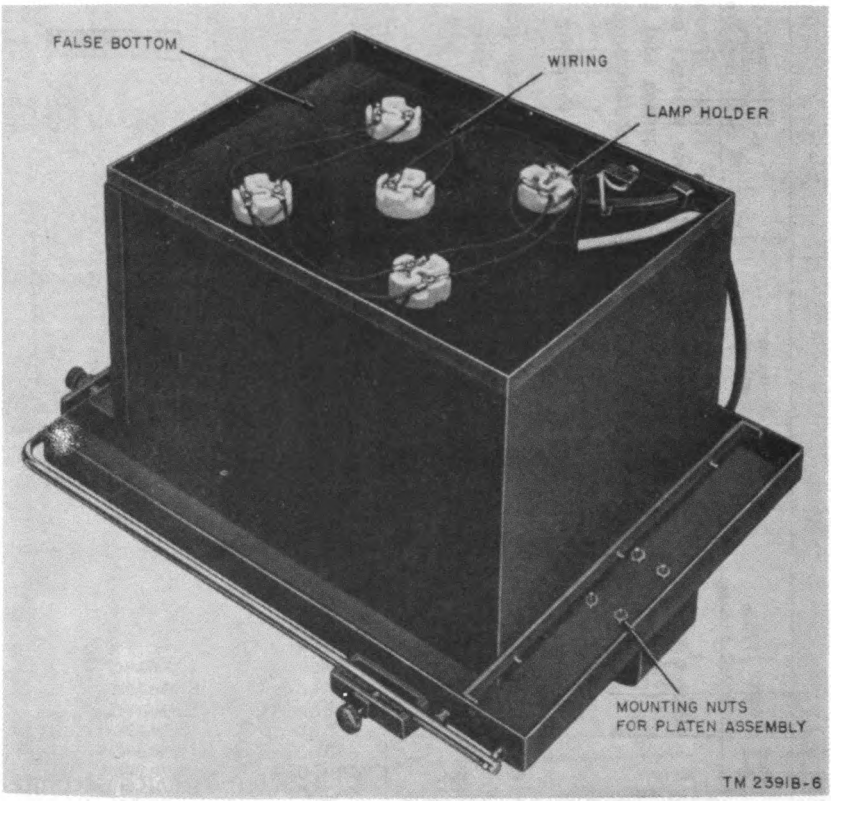
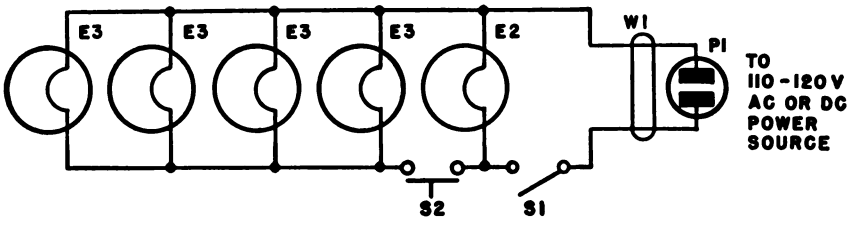


Figure 5. Photographic Contact Printer EN–12(1), bottom plate removed.



E2. RUBY SAFE LAMP, 25 WATTS.
E3. PRINTING LAMP, 25 WATTS.
P1. CONNECTOR PLUG
S1. POWER SWITCH
S2. MOMENTARY SWITCH

TM 2391B-9

Figure 6. Photographic Contact Printer EN–12(1), schematic diagram.

momentary switch S2. Thus, all printing lamps will light when switch S2 is operated, if power switch S1 is in the ON position.

32. Printing Lamps
(figs. 4 and 6)

The four printing lamps light when the platen arm is lowered to the printing position and go out when the platen arm is raised. A contact spring on the bottom of the platen arm contacts the plunger of the momentary switch and pushes it down when the platen arm is latched. The latch is located beneath the platen arm at the forward end and engages a keeper strip attached to the top of the printing head.

33. Platen Assembly and Masks
(fig. 1)

a. The platen assembly consists of front and rear platens and a hinge strip, all assembled permanently. The underside of the platens is covered with sponge rubber which gives positive pressure over the entire surface of the print. Two springs which exert pressure on the pressure plates are attached to the under surface of the platen arm assembly. At the forward end of the platen arm assembly, fastened to the lower surface, is the latch and the momentary switch actuating spring. The entire platen arm assembly hinges about a pivot at the rear of the printing head. A separate pivot bar is provided for the platen assembly. The platen assembly connects to the platen arm assembly toward the front by means of a safety chain. A heavy steel keeper strip is located at the forward edge of the printing head. The latch engages this keeper strip. Simultaneously, the momentary switch actuating spring depresses the momentary switch to initiate the printing exposure.

b. The masking blades frame the print to the desired size. They adjust along the guide bar by means of clamping screws and also hinge around the guide bar in a vertical plane.

Section II. INSPECTING, STRIPPING, AND CLEANING

34. Inspecting
(figs. 1, 4, and 5)

To inspect the equipment at field maintenance level, proceed as follows:

a. Inspect the printer for holes, dents, bends, loose seams, and loose screws.

b. Inspect the platen assembly for broken springs, loose pins, and loose or defective rubber pads.

c. Inspect the printer body for defective or missing glass, screws, masking blades, and masking blade guides.

d. Inspect the power cable for physical defects.

e. Test the electrical system with Multimeter TS–352/U to determine whether the equipment is functioning properly.

35. Stripping and Adjusting
(fig. 1)

a. If the printer lamp house is only slightly dented or bent, repair it by straightening it as needed. If the body is bent badly enough to cause serious light leaks or misalignment of parts, discard it and replace it with a new body subassembly.

(1) Remove the platen arm and platen assembly from the top by removing the four nuts (fig. 5).

(2) The entire top assembly is hinged at the rear (fig. 4) and is fastened at the front by two Dzus fasteners. Turn these fasteners one-half turn counterclockwise to release them. Remove the top assembly by removing the three mounting screws at the rear.

(3) The lamp house of the printer contains a false bottom (fig. 5) in which the lamp sockets are mounted. Remove the real bottom by removing the screws which fasten it to the printer lamp house. The wiring is then exposed.

b. Replace subassemblies or parts of the printer that cannot be repaired.

c. Salvage all parts that are not welded together.

36. Cleaning

To clean the printer, proceed as follows:

a. Dry the printer completely if it is cleaned with a water spray or solvent (SD). It is not necessary to disassemble the equipment.

b. If mud, grease, or other heavy dirt is to be removed, disassemble the printer. Before installation, wash glass parts with soap and water (use clean lint-free cloth); then rinse and dry thoroughly. The interior surface of the printer should be kept white to reflect light from the printing lamps.

c. To expose the under surface of the printing glass for cleaning, raise the entire top of the printing glass as shown in figure 4.

Section III. TROUBLESHOOTING AT FIELD MAINTENANCE LEVEL

37. Tools and Test Equipment Required for Troubleshooting

For troubleshooting, it is necessary to have the following tools and equipment. The tools listed below are part of Tool Equipment TK–24/GF.

Item	Used to
Pliers.	Remove cable grommet and switch retaining nuts.
Screw driver (¼-inch blade).	Remove slotted screws.
Soldering iron, flux and solder.	Solder electrical connections.
Test light, 110-volt.	Test lamps.
Multimeter TS–352/U.	Test electrical circuit.

38. Troubleshooting Procedures (figs. 1, 4, 5, and 6)

a. Mechanical troubles can be determined by visual inspection.

b. Electrical troubles may be localized by use of the troubleshooting chart (par. 39), Multimeter TS–352/U, and a test light. Before plugging the power cable into the power source, move the power switch to the OFF position.

39. Troubleshooting Chart

The schematic diagram (fig. 6) shows the proper electrical arrangement of the printer. All electrical parts are marked for 110- to 120-volt ac or dc operation. The following chart shows the usual symptoms, probable cause, and corrective measures when troubleshooting this equipment.

Symptom	Probable trouble	Corrective measures
Ruby safe lamp fails to light.	Safe lamp burned out.	Replace.
	Power cable broken.	Replace (par. 40*e*).
	Defective switch.	Replace (par. 40*e*).
	Break in wiring or switch.	Check circuit and switch. Repair or replace.
Printing lamps fail to light.	Printing lamp burned out.	Replace.
		Replace (par. 40*f*).
	Momentary switch defective.	Check circuit and switch. Repair or replace (par. 40*d* and *e*).
	Break in wiring or switch.	
Excessive exposure time.	Low line voltage.	Check with Multimeter TS–352/U.
Scratch marks on prints, not on negative.	Scratched printing glass.	Replace (par. 40*b*).
Loss of detail in prints from sharp negative.	Defective platen spring.	Replace (par. 40*a*).
	Foreign matter embedded in rubber platen.	Remove foreign matter.
Margin of print not parallel.	Masks are not held securely in place.	Adjust masking blades. Replace clamps, if defective (par 40*c*).

Section IV. REPAIRS

40. Disassembly and Reassembly (figs. 1, 4, and 5)

Parts are held together by screws, nuts, or cotter pins. Screws require a screwdriver with a ¼-inch blade. Hexagonal nuts may be started by hand and tightened or loosened with pliers or wrenches.

a. Entire Arm and Platen Assembly (fig. 1). To remove the entire arm and platen assembly, remove the four nuts (fig. 5) which attach the yoke to the printer body.

(1) Remove the arm assembly first by removing the screw which attaches the chain to the arm and then by removing the cotter pins and withdrawing the arm pivot pin (fig. 1). To remove the arm assembly, it is not necessary to remove the entire platen arm and platen assembly.

(2) Remove the platen assembly by removing the cotter pins and by withdrawing the platen pivot pin. To remove the platen assembly, it is not necessary to remove the entire platen arm and platen assembly.

(3) Reassemble the arm and platen assembly by reversing the procedure in (1) and (2) above.

b. Entire Top Assembly (fig. 4). To remove the entire top assembly, unfasten the Dzus fasteners and then remove the three mounting screws. Remove the printing glass by removing the retaining strip screws and the retaining strips which hold it in place. It is not necessary to remove the top to remove the printing glass since this can be done when the top is opened as shown in figure 4. To replace the entire top assembly, reverse the above procedures.

c. Mask Assembly (fig. 1). Each mask assembly consists of a masking blade, masking blade casting, a mounting strip, and a clamping screw. The entire assembly rides on the guide bar from which it can be easily removed by loosening the clamping screw. To remove the masking blade, remove the screws which attach it to the casting. The loosening of these screws also permits the blade to be adjusted so that it is parallel to the edge of the aperture. To reassemble the mask assembly, reverse the procedure above.

d. Printer Bottom (fig. 5). To remove the bottom plate, remove the screws (fig. 1). When the bottom plate is removed, the lamp holders and wiring (fig. 4 and 5) may be reached easily. The lamp holder is mounted by a porcelain ring which screws onto the bottom portion of the lamp holder after it is pushed through the false bottom. To move the lamp holder, unscrew the porcelain ring. Replace the lamp holder and the printer bottom plate by reversing the procedure above.

e. Power Switch and Power Cable.

(1) To remove the power cable, unsolder the wires (fig. 5) and pull out the power cable. To replace the power cable, insert the new power cable through the hole in the lamphouse and solder the wires.

(2) To replace the power switch, remove the retaining nut (fig. 1) and unsolder the wires (fig. 5). Insert a new power switch, screw on the retaining nut, and solder the wires.

f. To remove the momentary switch, unscrew the two screws (fig. 4). Replace the new switch and secure with the two screws.

41. Refinishing

Check all surfaces for appearance and condition of the finish. The finish should not show decided wear and should not be chipped or otherwise damaged. When the finish has been completely removed or has worn thin, clean and sand the affected surfaces; then apply enamel as follows:

a. Refinish all exterior parts with dull black enamel.

b. Refinish all interior parts with dull white enamel. Photographic Contact Printer EN–12(1) has been moisturproofed and fungiproofed during manufacture. When operated under tropical conditions, the equipment will require moistureproofing and fungiproofing only after repairs that may have broken the coating of protective varnish. Moistureproofing and fungiproofing are performed according to instructions given in TB SIG 13. The units should be treated under a heat lamp for 2 or 3 hours at 140° F., after which they should be cooled and sprayed with two or three coats of moistureproofing and fungiproofing lacquer. Lacquer all wiring; be careful not to get lacquer on moving parts. This can cause serious damage.

Section V. FINAL ADJUSTMENTS AND TESTING

42. Final Adjustments

After reassembly, adjust the equipment so that it functions properly. Three parts require adjustment: the masking blades must be squared with the aperture opening (par. 40*c*), the platen assembly must be adjusted so that it is centered over the printing glass, and the latch must be adjusted to engage the keeper strip properly (fig. 1).

a. To set the masking blades parallel to their corresponding edges, loosen the screws which attach them to the castings, and adjust them until they are parallel with the aperture opening; then tighten the screws.

b. To center the platen assembly over the printing glass, loosen the four nuts (fig. 5) which attach the yoke to the printer body, and move the platen to the desired position. Retighten the nuts.

c. To adjust the latch (fig. 1), loosen the screws which attach it to the arm and move it backward or forward, as required, so that it engages the keeper strip properly (fig. 1).

43. Tests

Final test procedures should include a visual examination of the printer and an examination in accordance with the troubleshooting procedures outlined in paragraphs 40 through 42. As a final test, make several prints from negatives with minute detail and examine the prints critically for reproduction quality.

CHAPTER 6

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

44. Disassembly for Shipment or Limited Storage

Disconnect the printer from the power source by disconnecting the power cable. Remove all lamps and insert them in corrugated paper jackets or equivalent packing.

45. Repacking for Shipment or Limited Storage

a. Domestic Shipment (fig. 2). Package the equipment as follows for domestic shipment:

(1) Stow the lamps with adequate cushioning in the bottom of the printer.

(2) Sandwich the diffusion glass between two sheets of corrugated paper and seal the edges.

(3) Stow this package in the channels of the printer.

(4) Add cushioning inside the lamphouse to prevent movement of loose pieces.

(5) Pull the platen arm to a low position (do not lock) and secure it with pressure sensitive tape.

(6) Roll up the power cable and secure it to the front of the printer with pressure sensitive tape.

(7) Place the entire printer in a corrugated carton (inner) and cushion it with corrugated fillers. Seal the carton with gummed tape.

(8) Place this carton in a second (outer) corrugated carton which is lined with a moisture-vaporproof barrier. Seal the moisture-vaporproof barrier. Seal the carton with gummed tape.

b. Oversea Shipment (fig. 3). For oversea shipment, proceed as follows:

(1) Place the sealed inner corrugated carton (*a*(7) above) in an outer corrugated carton. Seal the carton with gummed tape.

(2) Place this sealed carton in a wooden shipping box which is lined with a waterproof case liner. Nail on the cover.

(3) Further secure the box by nailing on two 1-inch steel straps about 6 inches from each end.

Section II. DEMOLITION TO PREVENT ENEMY USE

46. Destruction of Components

The demolition procedures outlined in paragraph 47 will be used to prevent the enemy from using or salvaging the equipment. Demolition of the equipment will be accomplished only upon order of the commanding officer.

47. Methods of Destruction

a. Smash. Smash all glass, internal parts, external parts; use sledges, axes, pickaxes, hammers, crowbars, or other heavy tools.

b. Cut. Cut the power cable, wire, rubber platens; use axes, handaxes, or machetes.

c. Burn. Burn publications; use gasoline, kerosene, oil, flame throwers, or incendiary grenades.

d. Explosives. If explosives are necessary, use firearms, grenades, or TNT.

e. Disposal. Bury or scatter the destroyed parts in slit trenches, fox holes, or throw them into streams.

f. Destroy. Destroy everything.

INDEX

[AG 413.52 (27 Apr 55)]

BY ORDER OF THE SECRETARY OF THE ARMY:

M. B. RIDGWAY,
General, United States Army,
Chief of Staff.

OFFICIAL:

JOHN A. KLEIN,
Major General, United States Army,
The Adjutant General.

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Gen & Br Svc Sch (5)
SigC Sch (25)
Gen Depots (2)
SigC Sec, Gen Depots (10)
SigC Depots (20)
POE (2)
OS Sup Agencies (2)
SigC Fld Maint Shops (3)
SigC Lab (5)
Mil Dist (1)
Units organized under following TOE:
11–7, Sig Co Inf Div (2)
11–16A, Hq&Hq Co, Sig Bn, Corps or Abn Corps (2)
11–57, Armd Sig Co (2)
11–95, Sig Bn-Opr (2)
11–96, Hq&Hq Co, Sig Bn-Opr (2)
11–127, Sig Rep Co (2)
11–128, Sig Depot Co (2)
11–500A (AA–AE), Sig Svc Org (2)
11–557A, Abn Sig Co (2)
11–587A, Sig Base Maint Co (2)
11–592A, Hq&Hq Co, Sig Base Depot (2)
11–597A, Sig Base Depot Co (2)

NG: State AG (6); Units— same as Active Army except allowance is one copy to each unit.

USAR: None.

For explanation of abbreviations used, see SR 320–50–1.

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