TM 11-2390A

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

CAMERA
PH-430-B

This copy is a reprint which includes current pages from Changes 1, 4 through 7.

DEPARTMENT OF THE ARMY • *FEBRUARY 1952*

AGO 2305B-Jan

TM 11-2390A
C 8

CHANGE
No. 8

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 1 January 1989

CAMERA PH-430-B AND CAMERA SETS, MOTION PICTURE KS-10(1), KS-10(2), AND KS-10(3)

TM 11-2390A, 7 February 1952, is changed as follows:

Page 2, paragraph 4.1 is Superseded as follows:

NSN	*(QTY*	*Nomenclature, part No., and mfr code*	*Usable on code*
		NOTE The part number is followed by the applicable 5-digit Federal supply code for manufacturers (FSCM) identified in SB 708-42 and used to identify manufacturer, distributor, or Government agency, etc. **NOTE** In usable on code column, number 1 refers to Camera PH-430-B; number 2 refers to Camera Set, Motion Picture KS-10(1); number 3 refers to Camera Set, Motion Picture KS-10(2); number 4 refers to Camera Set, Motion Picture KS-10(3).	
6760-00-408-5745	1	Board, Sign: Slate Ph-384B (Not Installed) (Not mounted)	1,2,3,4
6710-00-240-4792	1	Camera, Motion Picture: incl 1-inch lens and matching viewfinder lens; PH430A; 80063 (Not installed) (Not mounted)	1
6710-00-292-2281	1	Camera, Motion Picture KF-3(1): incl l-inch lens and matching viewfinder lens; 70 KM; 06650 (Not installed) (Not mounted)	2
6710-00-823-9769	1	Camera, Motion Picture KF-3(2): incl 1-inch lens and matching viewfinder lens; and 70-KRM (modified with filter slot) (Not installed) (Not mounted)	3

NSN	QTY	Nomenclature, part No., and mfr code	Usable on code
6710-00-889-3401	1	Camera, Motion Picture, KF-3(3): incl 1-inch lens and matching viewfinder lens; 70-KRM; 06650 (without filter slot) (Not installed) (Not mounted)	4
	3	Filter, Light, Photographic Lens: light yellow; 22211; 06650 (Not installed) (Not mounted)	1,2,4
6760-00-356-6293	3	Filter, Light, Photographic Lens: dark yellow; 22212; 06650 (Not installed) (Not mounted)	1,2,4
	3	Filter, Light, Photographic Lens: wratten 23 E-red; 22213; 06650 (Not installed) (Not mounted)	1,2,4
	3	Filter, Light, Photographic Lens: wratten 5N5; 22216; 06650 (Not installed) (Not mounted)	1,2,4
6760-00-839-0663	1	Filter, Light, Photographic Lens: No. 96, 0.3 neutral density, 3 in. x 3 in.; 291301; 06650 (Not installed) (Not mounted)	3
676U-00-839-0664	1	Filter, Light, Photographic Lens: No. 96, 0.6 neutral density; 3 in. x 3 in.; 291300; 06650 (Not installed) (Not mounted)	3
6760-00-839-0665	1	Filter, Light, Photographic Lens: No. 11 wratten; 3 in. x 3 in.; 291296; 06650 (Not installed) (Not mounted)	3
6760-00-550-8672	1	Filter, Light, Photographic Lens: No. 8 wratten; 3 in. x 3 in.; 291295; 06650 (Not installed) (Not mounted)	3
6760-00-839-0667	1	Filter, Light, Photographic Lens: No. 85, type A; 3 in. x 3 in.; 291299; 06650 (Not installed) (Not mounted)	3
6760-00-550-8666	1	Filter, Light, Photographic Lens: No. 15; deep yellow; 3 in. x 3 in.; 291297; 06650 (Not installed) (Not mounted)	3
6760-00-550-8671	1	Filter, Light, Photographic Lens: No. 25; red; 3 in. x 3 in.; 291298; 06650 (Not installed) (Not mounted)	3
	1	Lens, Camera Motion Picture: 0.7 in. nom f/lg, f/2.5 apert range; SC-A-46090; 80063 (Not installed) (Not mounted)	1
6760-00-597-1548	1	Lens, Camera, Motion Picture: 2 in. nom f/lg, f/3.5 apert range; SG-A-46091; 80063 (Not installed) (Not mounted)	1

NSN	*QTY*	*Nomenclature, part No., and mfr code*	*Usable on code*
6760-00-286-7600	1	Lens, Camera, Motion Picture: 4 in. nom f/lg, f/4.5 apert range; SC-A-46092; 80063 (Not installed) (Not mounted)	1
6760-00-242-3758	1	Lens, Camera, Motion Picture: 0.7 in. or 17.8-mm f/lg, f/2.5 to f/22 apert range; 06712; 06650 (Not installed) (Not mounted)	2,3
6760-00-081-2040	1	Lens, Camera, Motion Picture: 15mm f/lg, f/1.3 apert range, 200440; 06650 (Not installed) (Not mounted)	4
6760-00-237-8366	1	Lens, Camera, Motion Picture: 2 in. or 50.8-mm f/3.5 to f/22 apert range; 06713; 06650 (Not installed) (Not mounted)	2
6760-00-268-3989	1	Lens, Camera, Motion Picture: 4 in. or 100.8-mm f/lg, f/4.5 to f/32 apert range; 06714; 06650 (Not installed) (Not mounted)	2
6760-00-664-2010	1	Lens, Camera, Motion Picture: 3 in. lens f/2.5 r apert range; 27657; 06650 (Not installed) (Not mounted)	3,4
	1	Lens, Viewfinder, Photographic: u/w 0.7 or 17.8-mm f/lg lens; 05046; 06650 (Not installed) (Not mounted)	1
	1	Lens, Viewfinder, Photographic: u/w 15-mm f/lg lens; 200441; 06660 (Not installed) (Not mounted)	4
6760-00-240-8352	1	Lens, Viewfinder, Photographic: u/w 2 in. or 50.8-mm f/lg lens; 04538; 06650 (Not installed) (Not mounted)	1
	1	Lens, Viewfinder, Photographic: u/w 4 in. or 101.6-mm f/lg lens; 04501; 06650 (Not installed) (Not mounted)	1
	1	Lens, Viewfinder, Photographic: u/w 0.7 in. or 17.8-mm f/lg lens; 06718; 06650 (Not installed) (Not mounted)	2,3
6760-00-223-7691	1	Lens, Viewfinder, Photographic: u/w 2 in. or 50-mm f/lg lens; 06717; 06650 (Not installed) (Not mounted)	2
6760-00-240-6912	1	Lens, Viewfinder, Photographic: u/w 4 in. or 100.8-mm f/lg; 06716; 06650 (Not installed) (Not mounted)	2
6760-00-531-6495	1	Lens, Viewfinder, Photographic: u/w 3 in. lens; 020028; 06660 (Not installed) (Not mounted	

NSN	*QTY*	*Nomenclature, part No., and mfr code*	*Usable on code*
6760-00-715-7800	1	Retainer, Filter: holds filters in position; 306539; 06650 (Not installed) (Not mounted) CAMERA, MOTION PICTURE NSN 6710-00-240-4792; CAMERA, MOTION PICTURE KF-3(1); CAMERA, MOTION PICTURE KF-3(2); CAMERA, MOTION PICTURE KF-3(3). NOTE In usable on code column, number 1 refers to Camera, Motion Picture (NSN 6710-00-240-4792); number 2 refers to Camera, Motion Picture KF–3(1); number 3 refers to Camera, Motion Picture KF–3(2); number 4 refers to Camera, Motion Picture KF-3(3),	3
6710-00-394-1026		Crank, Hand: 0295; 94973 (Not installed) (Not mounted)	1,2,3,4
6710-00-340-4992	1	Key, Winding: 07072; 06650 (Not installed) (Not mounted)	1,2,3,4
6760-00-200-4361	1	Lens, Camera, Motion Picture: 1 in. or 25.4-mm f/lg, f/1.9 to f/22 relative apert range; 07088; 06650 (Not installed) (Not mounted)	2,3,4
	1	Lens, Camera, Motion Picture: 1 in. f/lg, f/1.9 relative apert range; SGA-46073-B; 80063 (Not installed) (Not mounted)	1
	1	Lens, Viewfinder, Photographic: u/w 1 in. or 25.4-mm f/lg lens; 64458; 06650 (Not installed) (Not mounted)	1
6760-00-223-7692	1	Lens, Viewfinder, Photographic: u/w 1 in. or 25.4-mm f/lg lens; 06715; 06650 (Not installed) (Not mounted)	2,3,4
6760-00-242-3758	1	Lens, Camera Motion Picture: 0.7 in. or 17.8 mm 22 apert. range; Bell & Howell Part Drawing No. 06712.	2

Page 2, paragraph 4.2. Items 1, 5, and 6 are superseded, and item 7 is added as follows:

Item	*Description*	*Ref No. and FSCM*	*FSC*
1	Chalk: 3 in. stick (Not installed) (Not mounted) National Stock Number (NSN) 7510-00-223-6706		7510
5	Orangestick: (Not installed) (Not mounted) NSN 5120-01-018-5908	97403	5120
6	Paper, Lens: (Not installed) (Not mounted) NSN 6640-00-597-6745		6640
7	Brush, Artist's: NSN 8020-00-240-6361		8020

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

WILLIAM J. MEEHAN II
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-36 Operator, Unit, and DS/GS requirements for PH-430-B.

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TM 11-2390A
C 7

CHANGE
No. 7

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *8 October 1973*

CAMERA PH-430-B AND CAMERA SETS, MOTION PICTURE KS-10(1), KS-10(2), AND KS-10(3)

TM 11-2390A, 7 February 1952, is changed as follows:

Page 1, 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 (Army)/NAVSUP PUB 378 (Navy)/AFR 71-4 (Air Force)/and MCO P4030.29 (Marine Corps).

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 (Army)/NAVSUP PUB 459 (Navy)/AFM 75-34 (Air Force)/and MCO P4610.19 (Marine Corps).

2.1. Recommendations for 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 forwarded direct to Commander, US Army Electronics Command, ATTN: AMSEL-MA-S, Fort Monmouth, NJ 07703.

Page 2, paragraph 4. Change title to, "Table of Components and Dimensions."

After paragraph 4 add:

4.1. Items Comprising an Operable Equipment

FSN	*QTY*	*Nomenclature, part No., and mfr code*	*Usable on code*
		NOTE The part number is followed by the applicable 5-digit Federal supply code for manufacturers (FSCM) identified in SB 708-42 and used to identify manufacturer, distributor, or Government agency, etc. **NOTE** In usable on code column, number 1 refers to Camera PH-430-B; number 2 refers to Camera Set, Motion Picture KS-10(1); number 3 refers to Camera Set, Motion Picture KS-10(2); number 4 refers to Camera Set, Motion Picture KS-10(3).	
6760-408-5745	1	Board, Sign: Slate Ph-384, (Not Installed) (Not mounted)	1,2,3,4
6710-240-796	1	Camera, Motion Picture: incl l-inch lens and matching viewfinder lens; 05854; 06650 (Not installed) (Not mounted)	1
6710-720-5334	1	Camera, Motion Picture KF-3(1): incl l-inch lens and matching viewfinder lens; 70KM; 06650 (Not installed) (Not mounted)	2
6710-823-9768	1	Camera, Motion Picture KF-3 (2): incl l-inch lens and matching viewfinder lens; and 70-KRM (modified with filter slot) (Not installed) (Not mounted)	3

FSN	*QTY*	*Nomenclature, part No., and mfr code*	*Usable on code*
6710-889-3402	1	Camera, Motion Picture, KF-3(3): incl l-inch lens and matching viewfinder lens; 70-KRM; 06650 (without filter slot) (Not installed) (Not mounted)	4
6710-356-6292	3	Filter, Light, Photographic Lens: light yellow; 22211; 06650 (Not installed) (Not mounted)	1,2,4
6710-356-6293	3	Filter, Light, Photographic Lens: dark yellow; 22212; 06650 (Not installed) (Not mounted)	1,2,4
6710-356-6294	3	Filter, Light Photographic Lens: wratten 23 E-red; 22213; 06650 (Not installed) (Not mounted)	1,2,4
6710-366-6297	3	Filter, Light, Photographic Lens: wratten 5N5; 22216; 06650 (Not installed) (Not mounted)	1,2,4
6760-839-0663	1	Filter, Light, Photographic Lens: No. 96, 0.3 neutral density, 3 in. x 3 in.; 291301; 06650 (Not installed) (Not mounted)	3
6760-839-0664	1	Filter, Light, Photographic Lens: No. 96, 0.6 neutral density; 3 in. x 3 in.; 291300; 06650 (Not installed) (Not mounted)	3
6760-839-0666	1	Filter, Light, Photographic Lens: No. 11 wratten; 3 in. x 3 in.; 291296; 06650 (Not installed) (Not mounted)	3
6760-839-0666	1	Filter, Light, Photographic Lens: No. 8 wratten; 3 in. x 3 in.; 291295; 06650 (Not installed) (Not mounted)	3
6760-839-0667	1	Filter, Light, Photographic Lens: No. 85, type A; 3 in. x 3 in.; 291299; 0666,0 (Not installed) (Not mounted)	3
6760-550-8666	1	Filter, Light, Photographic Lens: No. 16; deep yellow; 3 in. x 3 in.; 291297; 06660 (Not installed) (Not mounted)	3
6760-550-8671	1	Filter, Light, Photographic Lens: No. 25; red; 3 in. x 3 in.; 291298; 06650 (Not installed) (Not mounted)	3
6760-223-3436	1	Lens, Camera Motion Picture: 0.7 in. nom f/lg, f/2.5 apert range; SC-A-46090; 80063 (Not installed) (Not mounted)	1
6760-597-1548	1	Lens, Camera, Motion Picture: 2 in. nom f/lg, f/3.5 apert range; SC-A-46091; 80063 (Not installed) (Not mounted)	1

FSN	*QTY*	*Nomenclature, part No., and mfr code*	*Usable on code*
6760-286-7600	1	Lena, Camera, Motion Picture: 4 in. nom f/lg, f/4.6 apert range; SGA-46092; 80063 (Not installed) (Not mounted)	1
6760-242-3758	1	Lens, Camera, Motion Picture: 0.7 in. or 17.8-mm f/lg, f/2.5 to f/22 apert range; 06712; 06660 (Not installed) (Not mounted)	2,3
6760-081-2040	1	Lens, Camera, Motion Picture: 15mm f/lg, f/1.3 apert range, 200440; 06650 (Not installed) (Not mounted)	4
6760-287-8366	1	Lens, Camera, Motion Picture: 2 in. or 50.8-mm f/3.5 to f/22 apert range; 06713; 06650 (Not installed) (Not mounted)	2
6760-268-3989	1	Lens, Camera, Motion Picture: 4 in. or 100.8-mm f/lg, f/4.5 to f/32 apert range; 06714; 06650 (Not installed) (Not mounted)	2
6760-664-2010	1	Lens, Camera, Motion Picture: 3 in. lens f/2.5 r apert range; 27657; 06650 (Not installed) (Not mounted)	3,4
6760-240-8351	1	Lens, Viewfinder, Photographic: u/w 0.7 or 17.8-mm f/lg lens; 05046; 06650 (Not installed) (Not mounted)	1
6760-061-4160	1	Lena, Viewfinder, Photographic: u/w 15-mm f/lg lens; 200441; 06660 (Not installed) (Not mounted)	4
6760-240-8352	1	Lens, Viewfinder, Photographic: u/w 2 in. or 50.8-mm f/lg lens; 04538; 06660 (Not installed) (Not mounted)	1
6760-223-7694	1	Lens, Viewfinder, Photographic: u/w 4 in. or 101.6-mm f/lg lens; 04601; 06650 (Not installed) (Not mounted)	1
6760-223-7690	1	Lens, Viewfinder, Photographic: u/w 0.7 in. or 17.8-mm f/lg lens; 06718; 06660 (Not installed) (Not mounted)	2,3
6760-223-7691	1	Lens, Viewfinder, Photographic: u/w 2 in. or 50-mm f/lg lens; 06717; 06650 (Not installed) (Not mounted)	2
6760-240-6912	1	Lena, Viewfinder, Photographic: u/w 4 in. or 100.8-mm f/lg; 06716; 06660 (Not installed) (Not mounted)	2
6760-631-6496	1	Lens, Viewfinder, Photographic: u/w 3 in. lens; 020028; 06650 (Not installed) (Not mounted)	

FSN	*QTY*	*Nomenclature, part No., and mfr code*	*Usable on code*
6710-715-7800	1	Retainer, Filter: holds filters in position; 306539; 06660 (Not installed) (Not mounted) CAMERA, MOTION PICTURE FSN 6710-240-4796; CAMERA, MOTION PICTURE KF-3(1); CAMERA, MOTION PICTURE KF-3(2); CAMERA, MOTION PICTURE KF-3(3). **NOTE** In usable on code column, number 1 refers to Camera, Motion Picture (FSN 6710-240-4796); number 2 refers to Camera, Motion Picture KF-3(1); number 3 refers to Camera, Motion Picture KF-3(2); number 4 refers to Camera, Motion Picture KF-3(3).	3
6710499-601!	1	Crank, Hand: 07071; 06660 (Not installed) (Not mounted)	1,2,3,4
6710-340-4992	1	Key, Winding: 07072; 06650 (Not installed) (Not mounted)	1,2,3,4
6760-200-4961	1	Lena, Camera, Motion Picture: 1 in. or 25.4-mm f/lg, f/1.9 to f/22 relative apert range; 07066; 06660 (Not installed) (Not mounted)	2,3,4
6760-260-6044	1	Lens, Camera, Motion Picture: 1 in. f/lg, f/1.9 relative apert range; SC-A-46073-B; 60062 (Not installed) (Not mounted)	1
6760-240-8350	1	Lens, Viewfinder, Photographic: u/w 1 in. or 25.4-mm f/lg lens; 04466; 06660 (Not installed) (Not mounted)	1
6760-223-7692	1	Lens, Viewfinder, Photographic: u/w 1 in. or 26.4-mm f/lg lens; 06715; -6650 (Not installed) (Not mounted)	2,3,4
6760-597-1457	1	Spool, Photographic Film: 06272; 06660 (Not installed) (Not mounted)	1,2,3,4

4.2. Expendable Consumable Items

A list of expendable consumable items required for operation appears in table 1-1.

Table 1-1. Expendable Consumablr Supplies and Materials

The supplies and material listed in this table are required for operation of this equipment and are authorized to be requisitioned by SB 700-50. The

FSN for the applicable unit of issue required can be found in appropriate supply catalogs. The FSCM is used as an element in item identification to designate manufacturer or Government agency, etc., and is identified in SB 70842.

Item	*Description*	*Ref No. and FSCM*	*FSC*
1	Chalk: 3 in. stick (Not installed) (Not mounted)		7510
2	Cleaner, Lens: 1 1½-oz bottle (Not installed) (Not mounted)	314060; 06650	6860
3	Cleaner, Lens: 2 oz bottles (Not installed) (Not mounted)	04217; 06660	6750
4	Oil, Lubricating: 2-oz glass bottle (Not installed) (Not mounted)		9160
5	Orangestick: (Not installed) (Not mounted)	313048; 06650	6710
6	Paper, Lens: (Not installed) (Not mounted)		6640

Page 142, appendix V. Delete appendix V and substitutes:

APPENDIX V

BASIC ISSUE ITEMS LIST (BIIL) AND ITEMS TROOP INSTALLED OR AUTHORIZED LIST (ITIAL)

Section I. INTRODUCTION

1. Scope

This appendix lists basic issue items and items troop installed or authorized required by the crew/operator for installation, operation, and maintenance of Camera PH-430-B and Camera Sets, Motion Picture KS-10(1), KS-10(2), and KS-10(3).

2. General

This Basic Issue Items and Items Troop Installed or Authorized List is divided into the following sections:

a. Basic Issue Item List—Section II. A list, in alphabetical sequence, of items which are furnished with, and which must be turned in with the end item.

b. Items Troop Installed or Authorized List—Section III. A list in alphabetical sequence, of items which, at the discretion of

the unit commander, may accompany the end item, but are not subject to be turned in with the end item.

3. Explanation of Columns

The following provides an explanation of columns found in the tabular listings:

a. Illustration. Not applicable.

b. Federal Stock Number. Indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. Part Number. Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements, to identify an item or range of items.

d. Federal Supply Code for Manufacturer (FSCM). The FSCM is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., and is identified in SB 708-42.

e. Description. Indicates the Federal item name and a minimum description required to identify the item.

f. Unit of Measure (U/M). Indicates the standard of basic quantity of the listed item as used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr, etc.). When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.

g. Quantity Furnished with Equipment (Basic Issue Items Only). Indicates the quantity of the basic issue item furnished with the equipment.

h. Quantity Authorized (Items Troop Installed or Authorized Only). Indicates the quantity of the item authorized to be used with the equipment.

4. Special Information

Usable on codes are included in description column. Uncoded

items are applicable to all models. Identification of the usable on codes are as follows:

Code	*Used on*
1	PH-480-B
2	KS-10(1)
3	KS-10(2)
4	KS-10(3)
5	(FSN 6710-240-4796)
6	KF-3(1)
7	KF-3(2)
8	KF-3(8)

Section II. BASIC ISSUE ITEMS LIST

(1) Illustration (A) Fig. no.	(1) Illustration (B) Item no.	(2) Federal stock number	(3) Part number	(4) FSCM	(5) Description	Usable on code	(6) Unit of meas	(7) Qty furn with equip
		6760–238–3008	20720	06650	CAP, LENS: (Not installed) (Not mounted)	1,2,3,4	EA	3
		6760–238–3008	20720	06650	CAP, LENS: (Not installed) (Not mounted)	5,6,7,8	EA	1
		6760–242–9205	05960	06650	CARRYING CASE, PHOTOGRAPHIC EQUIPMENT: (Not installed) (Not mounted)	1	EA	1
		6760–537–9237	08511	06650	CARRYING CASE, PHOTOGRAPHIC EQUIPMENT: (Not installed) (Not mounted)	2	EA	1
		6760–715–7790	031466	06650	CARRYING CASE, PHOTOGRAPHIC EQUIPMENT: (Not installed) (Not mounted)	3,4	EA	1
		6760–356–6285	05885	06650	CASE: accom 6 lens filters (Not installed) (Not mounted)	1,2	EA	3
		6760–356–6333	05859	06650	STRAP ASSEMBLY: Camera carry (Not installed) (Not mounted)	5,6,7,8	EA	1
		6710–356–6334	3551	25472	SYRINGE: for dispersing dust (Not installed) (Not mounted)	5,6,7,8	EA	1

Section III. ITEMS TROOP INSTALLED OR AUTHORIZED LIST

(1) Federal stock number	(2) Part number	(3) FSCM	(4) Description	Usable on code	(5) Unit of meas	(6) Qty auth
8020–262–9100	22199	06650	BRUSH, ARTIST'S: (Not installed) (Not mounted)	5,6,7,8	EA	1
6710–356–6184	5385	06650	BRUSH, CLEANING: (Not installed) (Not mounted)	5,6,7	EA	1
6710–086–7700	313049	06650	BRUSH, RETRACTABLE: retractable container (lipstick type) (Not installed) (Not mounted)	5,6,7,8	EA	1
4930–277–1044	6670		OILER, HAND: Dill, press-to-oiler. (Not installed) (Not mounted)	5,6,7,8	EA	1

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

Official:

VERNE L. BOWERS
Major General, United States Army
The Adjutant General

Distribution:

Active Army:

USASA (2)
CNGB (1)
ACSC (2)
Dir of Trans (1)
COE (1)
TSG (1)
USAARENBD (1)
USAMB (10)
AMC (1)
FORSCOM (5)
ARADCOM (2)
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LOGCOMDS (3)
MICOM (2)
TECOM (2)
USASTRATCOM (4)
MDW (1)
Armies (2)
corps (2)
HISA (ECOM) (18)
Svc Colleges (1)
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USAADS (2)
USAFAS (2)
USAARMS (2)
USAIS (2)
USAES (2)
USAINTS (3)
WRAMC (1)
ATS (1)
Instl (2) except
Ft Gordon (10)
Ft Huachuca (10)
WSMR (1)
Ft Carson (10)
Ft Richardson (ECOM Ofc) (2)
Army Dep (2) except
LBAD (14)
SAAD (30)
TOAD (14)
LEAD (7)
ATAD (10)
Gen Dep (2)
Sig Sec Gen Dep (5)
Sig Dep (5)
Sig FLDMS (2)
USAERDAA (1)
USAERDAW (1)
MAAG (1)
USARMIS (1)
Units org under fol TOE:
(1 cy each)
11–95
11-96
11-117
11-127
11-158
11-500 (AA-AC)
29-134
29-136

NG & USAR: None.

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

TM 11-2390A
C 6

CAMERA PH430-B AND CAMERA SETS.
MOTION PICTURE KS-10(I), KS-10(2), AND KS-10(3)

CHANGE
No. 6

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *4 November 1969*

TM 11-2390A, 7 February 1952, is change a as follows:

Note. The parenthetical reference to a previous change (example: "page 1 of C 4") indicates that pertinent material was published in that change.

Change "solvent (SD)" to "cleaning compound" in the following places:

Page 20, paragraph 17g, line 3.
Page 60, paragraph 69b, line 1.
Page 61, paragraph 70b, line 2.
Page 68, paragraph 71b, line 2.
Page 84, paragraph 73c, line 2.
Page 94, paragraph 74c(1), line 2.
Page 100, paragraph 75c (1), line
Page 102, paragraph 76b, line 2.
Page 106, paragraph 77b (1), line 1.
Page 1, paragraph la. Delete the last sentence.

Add paragraph 1.1 after paragraph 1.

1.1. Index of Publications

Refer to the latest issue of DA Pam 310-6 to determine whether there are new editions, changes, or additional publications pertaining to the equipment. DA Pam 310-4 is an index of current technical manuals, technical bulletins, supply manuals (types 4, 6, 7, 8, and 9), supply bulletins, lubrication orders, and modification work 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.

Delete paragraph 2 (page 2 of C 5) 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 Damaged or Improper Shipment) as prescribed in AR 700-58 (Army), NAVSANDA Publication 378 (Navy), and AFR 71-4 (Air Force)

c. Reporting of Equipment Manual Improvemnts. The direct reporting by the individual user of errors, omissions, and recommendations for improving this rnanusl is authorized and encouraged. DA Form 2028 (Recommended changes to DA technical manual parts lists or supply manual 7, 8, or 9) will be used for reporting these improvement recommendations. This form will be completed in triplicate using pencil, pen, or typewriter The original and one copy will be forwarded direct to Commanding Officer, U. S. Army Electronics Material Support Agency, ATTN: SELMS-MP, Fort Monmouth, NJ. 07703. One information copy will be furnished to the individual's immediate supervisor (officer, noncommissioned officer, supervisor, etc.).

Page 19, paragraph 17. make the following changes:

Subparagraph *b*. Add the following warning after subparagraph *b*.

Warning: **Cleaning compound is flammable, and its fumes are toxic. Provide adequate ventilation.** ***Do not use*** **near a flame.**

Subparagraph *c,* next-to-last line. Change "solvent dry-cleaning (SD)" to: cleaning compound.

Page 20, paragraph 17g, last line. Change "42" to: 49.

Page 37, paragraph 33, "Checks and corrective measures" column, last line. Delete the last sentence.

Page 41. Delete chapter 3 and substitute:

CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section I. OPERATOR'S MAINTENANCE

39. Scope of Operator's Maintenance

The maintenance duties assigned to the operator of Camera PH-490-B and Camera Set, Motion Picture KS-10(*) are listed in paragraph 43. The duties assigned do not require tools or test equipment other than those issued with the equipment. The materials required are listed in paragraph 40.

40. Materials Required

a. Cleaning brush (FSN 6710-356-6184).

b. Cleaning compound (FSN 7930-395-9542).

c. Hand blower (air syringe) (FSN 6710-356-6334).

d. Lens cleaner (FSN 6750-392-9751).

e. Lens tissue (FSN 6640-393-2090).

f. Orangewood stick (FSN 6710-086-7701).

g. Retractable brush (FSN 6710-086-7700).

h. Textile cloth (FSN 8305-267-3015).

41. Operator's Preventive Maintenance

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

a. Systematic Care. The procedures given in paragraph 43 cover routine systematic care and cleaning essential to proper upkeep and operation of the equipment.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and services chart (par. 43) outlines functions to be performed at a specific interval. These checks and services are to maintain electronic equipment in a serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining serviceability, the chart indicates what to check, how to check, and the normal conditions. The references column lists the paragraphs that contain supplementary information. If the defect cannot be corrected by the operator, higher echelon 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.

42. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of Camera PH-430-B and Camera Set, Motion Picture KS-10 (*) are required daily. Paragraph 43 specifies the items to be checked and serviced daily or under the conditions listed below.

a. When the equipment is initially installed or reinstalled.

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

43. Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
		Physical checks	
1	Exterior surfaces	Inspect exterior surfaces of camera (figs. 2–3.1) and tripod (fig. 5) for dirt, dust, grease, and corrosion. Remove dust and dirt with a clean cloth; remove grease and corrosion with a clean cloth dampened with cleaning compound.	
2	Lenses and filters	Inspect lenses (fig. 7) and filters for dust and fingerprints	Par. 17*e* and *f*.
3	Camera door	Remove camera door (par. 17*a*), and inspect it for bends and dents.	
4	Aperture plate, pressure plate, and sprockets.	Remove pressure plate (par. 17*b*), and clean aperture and pressure plates (fig. 15), feed sprocket and guard, and takeup sprocket and guard (fig. 16).	Par. 17*c*.
5	Film chamber	Inspect film chamber (fig. 12) for dirt and grease	Par. 17*g*.
		Operation	
6	Controls and indicators	During normal operation, check governor speed dial (figs. 3 and 3.1), footage dial (on PH–430–B only), film counter (on KF–3(*) only), starting button and lock, and winding key for binding, sticking, and looseness.	
7	Lens and viewfinder turrets	During normal operation, check lens turret (figs. 2. 2.1, and 2.2), viewfinder turret, and idler gear (on KF–3(2) and KF–3(3) only) for binding, sticking, and looseness.	

Section II. SECOND ECHELON MAINTENANCE

44. Scope of Second Echelon Maintenance

a. This section contains instructions covering second echelon maintenance of Camera PH-430-B and Camera Set, Motion Picture KS-10 (*). It includes instructions for performing preventive and periodic maintenance services that are to be accomplished by the second echelon repairman.

b. Second echelon maintenance of Camera PH-430-B and Camera Set, Motion Picture KS–10(*) includes-

(1) Monthly preventive maintenance checks and services (par. 48).

(2) Lubrication (par. 49).

45. Tools and Materials Required

A list of parts authorized for second echelon maintenance appears in TM 11-6710-202-20P. The tools and materials required are listed below.

a. Tools. Tool Kit, Photographic Repairman TK-77/GF.

b. Materials.

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

(2) Grease, Aircraft and Instrument (GL) (FSN 9150-576-4262) .

(3) Lens cleaner (FSN 6750-392-9761).

(4) Lens tissue (FSN 6640-393-2090).

(5) Lubricating oil, General Purpose (LO) (FSN 9150-252-6173) .

(6) Stopwatch (FSN 6645-719-8670).

(7) Textile cloth (FSN 8305-267-3015).

46. Second Echelon Preventive Maintenance

a. Preventive maintenance is the responsibility of all echelons 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 the equipment at the second echelon level are made at monthly intervals at the same time that the daily (par. 43) checks and services are made, unless otherwise directed by the commanding officer. Lubrication (par. 49) is also required quarterly and semiannually.

b. Maintenance forms and records to be used and maintained on this equipment are specified in TM 38-750.

47. Monthly Maintenance

Perform the maintenance functions indicated in the monthly preventive maintenance checks and services chart (par. 48) once each month. A month is defined as approximately 30 calendar days of 6-hour-per-day operation. If the equipment is operated 16 hours a day, the monthly preventive maintenance checks and services should be performed at 15-day intervals. Adjustment of the maintenance interval must be made to compensate for any unusual operating conditions. Equipment maintained in a stand-by (ready for immediate operation) condition must have monthly preventive maintenance checks and services. Equipment in limited storage (requires service before operation) does not require monthly preventive maintenance

48. Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Completeness	See that equipment is complete (app. V).	
2	Publications	See that all publications are complete, serviceable, and current (DA Pam 310–4).	
3	Modifications	Check DA Pam 310–4 to determine whether applicable MWO's have been published. All URGENT MWO's must be applied immediately. All NORMAL MWO's must be scheduled.	
4	Spare parts	Check all spare parts (operator (app. V) and organizational) (TM 11–6710–202–20P) for general condition and method of storage. There should be no overstockage, and all shortages must be on valid requisitions.	
5	Preservation	*a.* Inspect all painted surfaces for bare spots, rust, and corrosion. *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.	*a.* None. *b.* TM 9–213.
6	Carrying strap	Inspect carrying strap (figs. 2.2, 3, and 3.1) for cuts and wear.	
7	Viewfinder	Inspect viewfinder eyepiece and objectives (fig. 4) for scratches and cracks.	
8	Diaphragm	Adjust each lens diaphragm (par. 22), and check for binding and sticking.	
9	Sprocket teeth	Remove camera door (par. 17*a*), and inspect feed (fig. 12) and takeup sprockets for undercut teeth.	
10	Lubrication	Lubricate equipment	Par. 49.
11	Speed check	Check camera speed	Par. 62.
12	Lens footage scale	Check accuracy of lens footage scale	Par. 63.
13	Operation	Operate equipment according to equipment performance checklist.	Par. 33.

49. Lubrication

Lubrication of the equipment is required monthly (or after running 2,500 feet of film), quarterly, and semiannually.

***Caution: Do* not lubricate the camera lock knob (5, fig. 45) on the tripod, the tapped studs (12), the leg studs (23), or the tripod shoes (39).**

a. Monthly.

(1) Unscrew the lenses from the lens turret, and remove the camera door (par. 17a).

(2) Pull out the oil retaining pin (2, figs. 23 and 23.1) from the center locknut (3) in the center of the lens turret (4). Lubricate the shutter mechanism by applying 1 drop of oil (LO) to the oil retaining pin (2) hole; replace the oil retaining pin (2).

(3) Lubricate the governor by applying 1 drop of oil (LO) to each of the four oilholes marked OIL (fig. 46) in the film chamber.

***Caution:* Do not remove the sprockets (6 and 7, fig. 31) from the gear and sleeve assemblies (11) during lubrication.**

(4) Remove the fillister head screws (4), sprocket guards (3), and shims (5) from the ends of the gear and sleeve assemblies (11). Lubricate each gear and sleeve assembly (11) by applying 1 drop of oil (LO) between it and its sprocket (6 and 7). Replace the shims (6), sprocket guards (3), and fillister head screws (4).

(5) Clean the threads of the lens bores in the lens turret (4 figs. 23 and 23.1), with a clean cloth moistened with cleaning compound; grease the threads lightly with grease (GL).

b. Quarterly.

(1) Apply 1 drop of oil (LO) to the carrying case (fig. 10) locking device. Do not lubricate the carrying case latch.

(2) Tighten the pan lock handle (11, fig. 45) of the tripod to secure the tripod head. Unscrew the special wingnut (32), and lift the tripod head (29) from the tripod base (34). Clean the bearing surfaces of the tripod head (29), tripod base (34), and the threaded shaft of the tripod head with a clean cloth moistened with cleaning compound. Grease the bearing surfaces and the threaded shaft lightly with grease (GL). Replace the tripod head (29) on the tripod base (34), and remove excessive lubricant.

c. Semiannually. Unscrew the tripod handle (1) from the tilting head (17). Apply grease (GL) to the threaded opening to a depth of one-quarter inch, and screw the tripod handle (1) into the threaded opening. Remove excessive lubricant.

Page 53, paragraph 60e, next to last line. Delete "TM 11-2324 and TM 11-2325" and substitute: TM 11-401.

Page 71, paragraph 71d(1), last line. Change "42" to: 49.

Page 95, paragraph 74c (2), last line. Change "42b" to: 49.

Page 115, paragraph 79, "Remedy" column, lines 2 and 11. Change "paragraphs 41 through 45" to: paragraph 49.

Page 120, appendix I. Delete appendix I and substitute:

APPENDIX I

REFERENCES

Following is a list of applicable publications that are available to the operating and maintenance personnel of Camera PH-430-B and Camera Set, Motion Picture KS-10(*).

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 4, 6, 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders.
TA. 11-17	Signal Field Maintenance Shops.
TA 11-100(11-17)	Allowances of Signal Corps Expendable Supplies for Signal Field Maintenance Shop, Continental United States.
TB SIG 149	Tropicalization of Photographic Equipment.
TB SIG 189	Cold Weather Photography.
TM 9-213	Painting Instructions for Field Use.
TM 11-401	Elements of Signal Photography.
TM 11-2340A	Identification Set AN/TFG-lB.
TM 11-6710-202-20P	Organizational Maintenance Repair Parts and Special Tool Lists: Camera Sets, Motion Picture KS-10(1) and KS-10 (2) and Camera PH-430-B.
TM 11-6710-202-35P	Field and Depot Maintenance Repair Parts and Special Tool Lists: Camera Sets, Motion Picture KS-10(1) and KS-10(2) ; and Camera PH-430-B.

TM 11-6730-201-10 Operator's Manual: Projection Set, Motion Picture. Sound AS-2(1) ; and Projector. Motion Picture Sound AQ-2A (1), AQ-2A(2), and AQ-2A(3).

TM 11-6760-206-12 Operator and Organizational Maintenance Manual: Meter, Photographic Exposure LM-46A.

TM 36-750 The Army Equipment Record System and Procedures.

By Order of the Secretary of the Army:

EARLE G. WHEELER,
General, United States Army.
Chief of Staff.

Official:

J. C. LAMBERT,
Major General. United States Army,
The Adjutant General.

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USAOCDA (1)
USAQMCDA (1)
USATCDA (1)
USAADCDA (1)
USAARMCDA (2)
USAAVNCDA (1)
USAARTYCDA (1)
USASWCDA (1)
USCONARC (5)
USAMC (5)
USASMCOM (1)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Comd (3)
OS Base Cored (2)
LOGCOMD (2)
USAECOM (7)
USAMICOM (4)
USASCC (4)
MDW (1)
Armies (2)
Corps (2)
USATC AD (2)
USATC Armor (3)
USATC Engr (2)
USATC Inf (3)
USASTC (3)
USAINTCA (5)
Installations (2) except
Ft Monnmouth (63)
Ft Hancock (14)
Svc College (2)
Br Svc Sch (2)
GENDEP (OS) (2)
Sig Dep (OS) (12)
Sig Sec, GENDEP (5)
Army Dep (2) except
Lexington (12)
Sacramento (28)
Tobyhanna (12)
Ft Worth (8)
USA Trans Tml Comd (1)
Army Tml (1)
POE (1)
Yuma PG (2)

WSMR (5)	11-15
WRAMC (1)	11-16
BAMC (5)	11-35
AMS (1)	11-36
AFIP (1)	11-55
USA Corps (3)	11-56
USAPA (5)	11-37
USA Elct Mat Agcy (12)	11-95
Army Pic Cen (2)	11-90
USA Mbl Spt Cen (1)	11-117
Chicago Proc Dist (1)	11-155
USA Elct RD Actv,	11-157
Ft Huachuca (2)	13-215
USA Elct RD Actv,	11-216
White Sands (12)	11-500 (AA-AE) (4)
Sig Fld Main Shops (3)	11-557
Units org under fol TOE:	11-587
UNOINDC):	11-592
(2 copies each	11-597
7	17
8-500 (AA-AH)	29-56
11-5	30-14
11-6	37
11-7	57

NG: None.

USAR: None.

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

TECHNICAL MANUAL

CAMERA PH-430-B AND CAMERA SETS, MOTION PICTURE KS-10(1), KS-10(2), AND KS-10(3)

TM 11-2390A
CHANGES No. 5

HEADQUARTERS, DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *27 November 1962*

TM 11–2390A, 7 February 1952, is changed as indicated so that the manual also applies to the following equipment:

Nomenclature	*Order No.*
Camera Set, Motion Picture KS-10 (3).	AF33(657)-8254

The title of the manual is changed as shown above.

Note. The parenthetical reference to, previous Changes (example: "page 1 of Cl") indicates that pertinent material was published in that Changes.

Change "KF-3(1)" to KF-3(*) in the following places:

Page 1, paragraph lb (page 1 of Cl), line 3.
Page 3, paragraph 5a (page 2 of Cl), line 4.
Page 4, figure 3.1 (page 3 of C1), caption.
Page 5, paragraph 5e, note (page 3 of Cl), line 1.
Page 6, paragraph 5j, note (page 4 of Cl), line 1.
Page 10, paragraph 9a (page 4 of C1), line 3.
Page 28, paragraph 19.1 (page 4 of Cl), heading.
Page 36, paragraph 33 (page 5 of Cl), chart, "Item No." column, Items 4.1 and 10.1.
Page 56, paragraph 67b.1 (page 5 of Cl), lines 1 and 2.
Page 56, paragraph 67c.1 (page 5 of Cl), lines 1 and 2.
Page 79, paragraph 72g (2) (page 9 of Cl), line 8.
Page 84, paragraph 73b (7) (page 9 of Cl), line 1.
Page 85, figure 33.1 (page 10 of Cl), caption.
Page 88, paragraph 73e (1) note, (page 9 of Cl), line 1.
Page 94, figure 40, legend (page 12 of Cl), item 10.
Page 95, paragraph 74d (1) (page 11 of C1), line 5.
Page 99, figure 42.1 (page 13 of C1), caption.
Page 101, paragraph 75.1 (page 12 of Cl), heading.
Page 113, figure 48.1 (page 16 of C1), caption.
Page 1, section I, (page 1 of C1).

*These Changes supersede C3, 26 December 1961 which in turn, superseded C2, 27 July 1960.

Note. (Superseded) Cameras, Motion Picture KF-3(1), KF-3(2), and KF-3(3) are major components of Camera Sets, Motion Picture KS-10(1), KS-10(2), and KS-10(3), respectively. Camera, Motion Picture KF-3(*) is similar to the camera component of Camera PH-30–B. All information in this manual applies equally to Camera Set, Motion Picture KS-10(*) unless otherwise specified.

Paragraph 1 (page 1 of C1).

c. (Added) Official nomenclature followed by (*) is used to indicate all models of the equipment item covered in this manual. Thus, Camera Set, Motion Picture KS-10(*) represents Camera Sets, Motion Picture KS-10(1), KS-10(2), and KS-10(3). Camera, Motion Picture KF-3(*) represents Cameras, Motion Picture KF-3(1), KF-3(2), and KF-3(3).

Paragraph 2 (page 1 of C4).

2. Forms and Records

(Superseded)

a. Reports of Unsatisfactory Equipment. Fill out DA Form 2407 (Maintenance Request) in accordance with instructions in TM 38-750 and forward it to: Commanding Officer, U.S. Army Electronics Materiel Support Agency, ATTN: SELMS-PIE, Fort Monmouth, N.J. The form should be filled out and forwarded to report:

(1) Receipt of defective equipment (use DD Form 6 *(b* below) if defect is due to damaged or improper shipment).

(2) Equipment deficiencies (deadlined equipments).

(3) Equipment shortcomings (operable but at less than rated capability or efficiency).

(4) Equipment improvement suggestions and recommendations.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army), NAVSANDA Publications 378, and AFR 71-4 (Air Force).

c. Index to Equipment Publications. Refer to DA Pam 310-4 to determine what changes to or revisions of this publication are current.

d. Comments on Manual. Forward all other comments on this publication direct to: Commanding Officer, U.S. Army Electronic Materiel Support Agency, ATTN: SELMS-MP, Fort Monmouth, N.J. DA Form 1598 (Record of Comments on Publications), DA Form 2028 (Recommended Changes to Technical Manual Parts Lists or Supply Manual 7, 8, or 9), DD Form 96 (Disposition Form), or letter maybe used.

Page 2, paragraph 4, note (page 1 of C1). Delete the last sentence and substitute:

A 0.6-inch (15 mm) f/lg, f/1.3 to f/22 aperture range wide angle lens is furnished with the KS–10(3) in place of the 0.7-inch (17.8 mm) f/lg, f/2.5 to f/22 aperture range lens furnished with the PH-430-B, KS–10(1), and the KS-10(2).

Page 3, figure 2.1 (page 2 of C1).

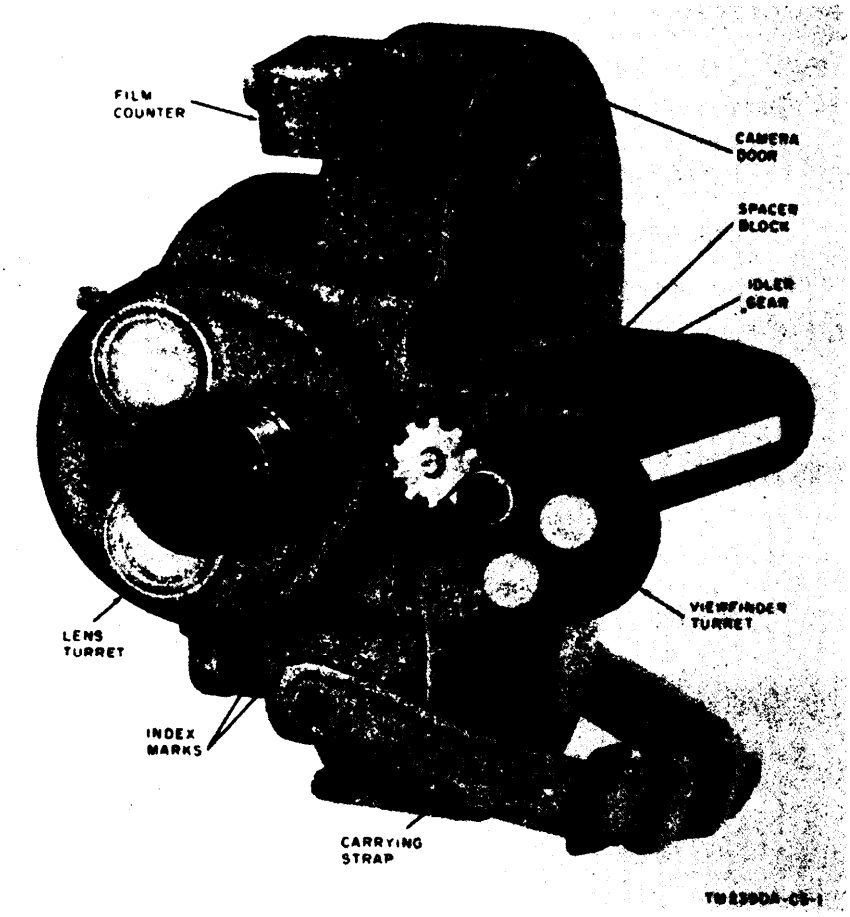

Figure 2.2. (Added) *Cameras, Motion Picture KF-3(2) and KF-3(3), front view.*

Paragraph 5 (page 2 of C1). Make the following changes:

Subparagraph *a,* heading. Change " (figs. 2 and 2.1)" to: (figs. 2, 2.1, and 2.2).

Subparagraph *b,* heading. change "(figs. **2** and 2.1)" to: (figs. 2, 2.1, and 2.2).

Last sentence. After the last sentence add:

In addition, the rotatable lens turrets of the KF–3(2) and the KF-3 (3) have spur gear teeth milled on their outer edge.

Add the following note after subparagraph *b:*

Note. Cameras, Motion Picture KF-3(2) and KF-3(3) have the lens and viewfinder turrets coupled for simultaneous rotation. As the lens turret is rotated to position the desired lens, the matching viewfinder objective automatically rotates into position for viewing of the scene to be photographed.

Page 5, paragraph 5 (page 3 of Cl), subparagraph *h,* heading. Change "(figs. 2 and 2.1)" to: figs. 2, 2.1, and 2.2).

Last sentence. After the last sentence add:

In addition, the rotatable viewfinder turret of the KF-3(2) and the KF–3 (3) has spur gear teeth milled on its outer edge.

Page 16, paragraph 10.

10.1 Differences in Models

(Added)

The following chart indicates the general differences between the major component of the KS–10(3) and the major component of the earlier models.

Item	PH-430-B (camera equipment)	KF-3 (1)	KF-3 (2)	KF-3 (3)
Type of *film used* indicator.	Circular footage dial 0–100.	Mechanical film counter 0–999.	Mechanical film counter 0–999.	Mechanical film counter 0–999.
Lens and viewfinder turrets.	Individually positioned.	Individually positioned.	Gear train coupled for simultaneous positioning.	Gear train coupled for simultaneous positioning.
Adapted for mounting of 200- or 400-foot film magazine.	No	Yes	Yes	Yes
Viewfinder housing detachable from camera door.	No	Yes	Yes	Yes
Built-in filter slot.	No	No	Yes	No
Wide angle lens supplied with the PH-430-B and the KS-10(*) for use with each camera.	0.7-inch (17.8 mm) f/lg, f/2.5 to f/22 aperture range.	0.7-inch (17.8 mm) f/lg, f/2.5 to f/22 aperture range.	0.7-inch (17.8 mm) f/lg, f/2.5 to f/22 aperture range.	0.6-inch (15 mm) f/lg, f/1.3 to f/22 aperture range.

Page 25 , paragraph 18m, note. Change the word "Note" to Notes. Number the existing note "1" and add the following:

2. Before reinstalling the camera door (fig. 2.2) on the KF-3(2) or the KF-3 (3), align the index marks on both the lens and the viewfinder turret heads to insure the correct matching of the camera lenses with corresponding viewing objectives. Make certain that the teeth of the idler gear mesh properly with the teeth on the lens turret head.

Page 29, paragraph 21b, line 1. Change "Mount" to: On the KF-3(1), and the camera component of the PH–430–B mount.

Add subparagraph *c* after subparagraph *b:*

c. The viewfinder turret of the KF–3(2) and the KF-3(3) is gear-coupled to the lens turret; therefore, the sequence of mounting the objectives must be reversed. For example, if the lenses on the camera turret are 1-INCH, 2-INCH, and 4-INCH, reading clockwise, the objectives on the viewfinder turret, therefore must be 1-INCH, 2-INCH, and 4-INCH, reading *counterclockwise*.

Page 30, paragraph 25. Add the following note after paragraph 25:

Note. The viewfinder turret of the KF-3(2) and the KF-3(3) is coupled to the lens turret. The matching viewfinder objective will move automatically into the viewing position as the desired camera lens is rotated into its operating position.

Page *56,* paragraph 67b.1 (page 5 of Cl). After the last sentence add: The viewfinder turret on the KF-3(2) and the KF-3(3) (figs. 2.2 and 22.2) has spur gear teeth (milled on its outer periphery) that mesh with the teeth of the idler gear mounted on the spacer block. When assembling the viewfinder turret to the camera door, make certain that the gear teeth of the viewfinder turret and the idler gear are properly meshed.

Page 64, paragraph 70.1 (page 7 of C1).

70.2. Camera Door Repair (KF-3(2) and KF-3(3))

(Added)

(fig. 22.2)

a. Disassembly and Cleaning.

(1) Perform the procedures given in paragraph 70.1 (1) through (6).

(2) To repair or replace the idler gear assembly or any of its components, unscrew the pivot screw (21), remove the idler gear (20), and the idler spacer (22).

(3) Perform the cleaning procedures given in paragraph *70b*.

b. Reassembly.

(1) Perform the procedures given in paragraph 70.lc(1) through (6).

(2) Press the viewfinder eyepiece (4) into the housing and screw it into the viewfinder tube.

(3) Assemble the idler gear (20), the idler spacer (22), and the pivot screw (21) and screw the entire assembly' into the front of the spacer block (19). Check to be sure that the idler spacer (22) fits properly into the pilot counterbore on the face of the spacer block (19) and that the teeth of the idler gear (20) and the viewfinder turret assembly (8) mesh properly.

(4) Fasten the spacer block (19) and the viewfinder housing (18) to the camera door with the four fillister-head screws (3).

(5) Adjust the camera door (par. 70d).

Page 62, figure 22.1 (page 6 of Cl).

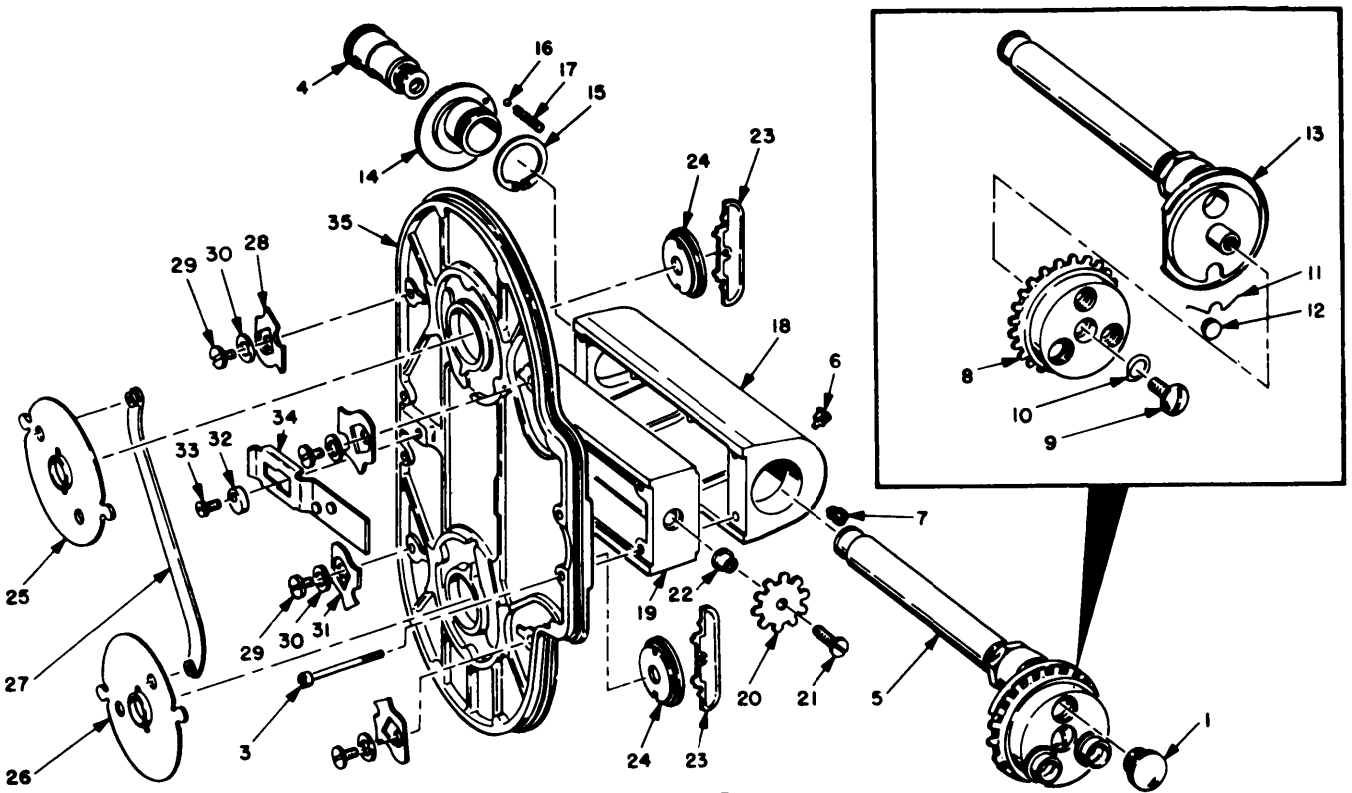

Figure 22.2. (Added) *Camera door for Cameras, Motion Picture KF–3(2) and KF–3(3), exploded view.*

1 Lens mount cover (MP 161)
2 Viewfinder housing assembly (items 4 through 18)
3 Fillister-head screw (four) (H28)
4 Viewfinder eyepiece (MP25)
5 Viewfinder assembly (MP 163)
6 Pilot screw, upper (H36)
7 Pilot screw, lower (H37)
8 Turret assembly (MP131)
9 Truss-head screw (H61)
10 Spring washer (H56)
11 Indexing spring (MP107)
12 Indexing roller (MP88)
13 Turret and mount assembly (MP164)
14 Parallax correction cam (MP165)
15 Retaining ring (MP86)
16 Indexing ball (MP3)
17 Indexing spring (MP106)
18 Viewfinder housing (MP166)
19 Spacer block (MP167)
20 Idler (spur) gear (MP133)
21 Pivot screw (H61)
22 Idler spacer (MP134)
23 Latch cam key (two) (MP45)
24 Latch cam hub (two) (MP168)
25 Upper latch earn (NIP169)
26 Lower latch cam (MP170)
27 Latch cam link (MP51)
28 Upper door latch (two) (MP46)
29 Shoulder screw (four) (H39)
30 Spring washer (four) (H54)
31 Lower door latch (two (MP45)
32 Eccentric washer (MP24)
33 Fillister-head screw (H6)
34 Push bar assembly (MP137)
35 Camera door (MP19)

Figure 22.2—Continued.

Page 66, figure 23, caption. Change *"components"* to: *PH–430-B, and KF-3(1), exploded view.*

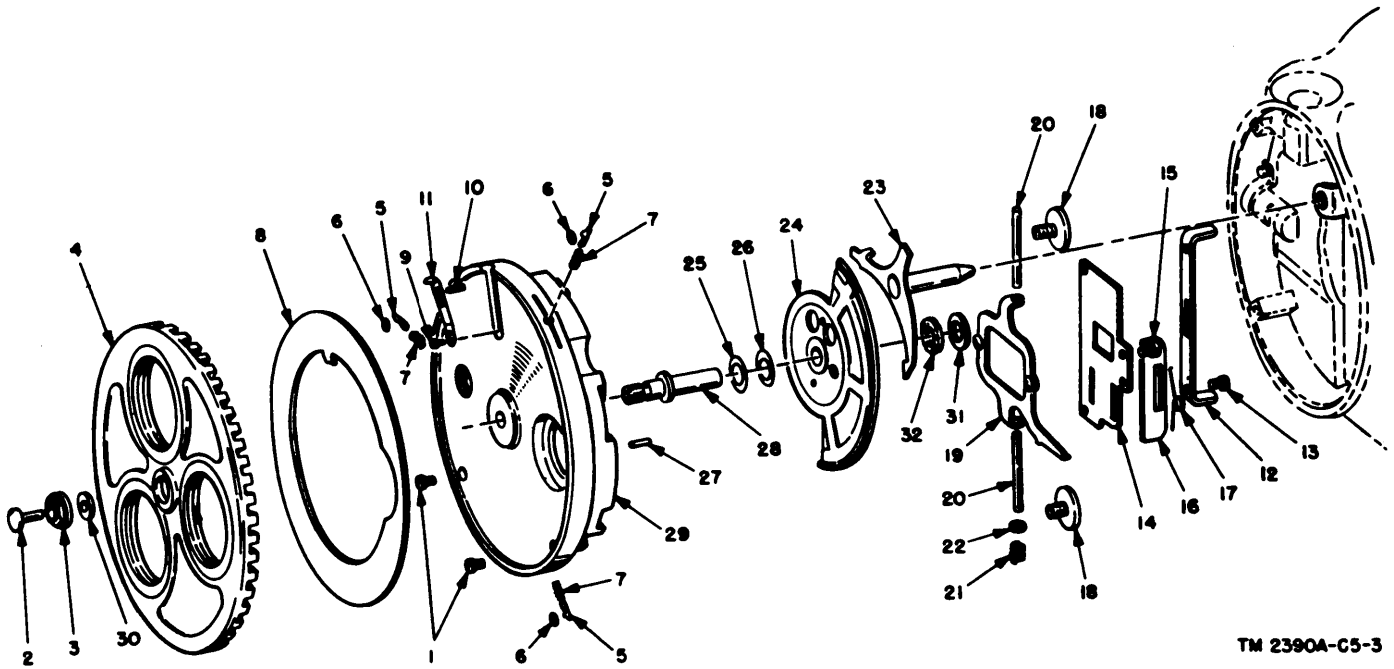

Figure 23.1. (Added) *Camera head for Cameras, Motion Picture KF–3(2) and KF–3(3), exploded view.*

1 Fillister-head screw (H10)
2 Oil retaining pin (MP77)
3 Center locknut (H2)
4 Lens turret (MP131)
5 Index roller stud (MP130)
6 Index roller (MP88)
7 Index spring (MP113)
8 Bearing plate (MP67)
9 Fillister-head screw (H4)
10 Plunger swing (MP106)
11 Plunger (MP78)
12 Film guide rail (MP82)
13 Film headscrew (H11)
14 Aperture plate (MP66)
15 Fillister-head screw (H12)
16 Film tension rail (MP81)
17 Tension spring (MP120)
18 Shuttle pin screw (H13)
19 Shuttle (MP98)
20 Shuttle pin (MP63)
21 Shuttle spring (MPll7)
22 Washer (H49)
23 Stop pawl assembly (MP55)
24 Shutter and cam (MP171)
25 Shim (H63)
26 Shim (H62)
27 Dowel pin (MP62)
28 Shuttle cam spindle (MP90)
29 Head casting (MP69)
30 Washer (H45)
31 Steel flat washer (H59)
32 Felt washer (H60)

Figure 23.l—Continued.

Page 122, appendix II (As deleted by C3, 26 December 1961). Delete.

Page 142, appendix IV (page 1 of C3).

APPENDIX IV

MAINTENANCE ALLOCATION

(Superseded)

Section I. INTRODUCTION

1. General

a. This appendix assigns maintenance functions to be performed on components, assemblies, and subassemblies by the lowest appropriate maintenance echelon.

b. Columns in the maintenance allocation chart are as follows:

(1) *Part or component.* This column shows only the nomenclature or standard item name. Additional descriptive data are included only where clarification is necessary to identify the component. Components, assemblies, and subassemblies are listed in top-down order. That is, the assemblies which are part of a component are listed immediately below that component, and the subassemblies which are part of an assembly are listed immediately below that assembly. Each generation breakdown (components, or subassemblies) is listed in disassembly order or alphabetical order.

(2) *Maintenance function.* This column indicates the various maintenance functions allocated to the echelons.

(a) Service. To clean, to preserve, and to replenish lubricants.

(b) *Adjust.* To regulate periodically to prevent malfunction.

(c) *Inspect.* To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.

(d) *Test.* To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.

(e) *Replace.* To substitute serviceable components, assemblies, or subassemblies, for unserviceable components, assemblies, or subassemblies.

(f) *Repair.* To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but, is not limited to welding, grinding, riveting, straightening. and replacement of parts other than the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

(g) To adjust two or more components of an electrical system so that their functions are properly synchronized.

(h) *Calibrate.* To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.

(i) *Overhaul.* To restore an item to *completely serviceable* condition as prescribed by serviceability standards developed and published by heads of technical services. This is accomplished through employment of the technique of "Inspect and Repair Only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.

(j) *Rebuild.* To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements using original manufacturing tolerances and/or specifications and subsequent reassembly of the item.

(3) *1st, 2d, 3d, 4th, and 5th echelon.* The symbol X indicates the echelon responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Echelons higher than the echelon marked by X are authorized to perform the indicated operation.

(4) *Tools required.* This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment referenced. The grouping of codes in this column of the maintenance allocation chart indicates the tool, test, and maintenance equipment required to perform the maintenance function.

(5) *Remarks*. Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding columns.

c. Columns in the allocation of tools for maintenance functions are as follows:

(1) *Tools required for maintenance functions.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

(2) *1st, 2d, 3d, 4th, and 5th echelon.* The dagger (†) symbol indicates the echelons normally allocated the facility.

(3) *Tool code*. This column lists the tool code assigned.

2. Maintenance by Using Organizations

When this equipment is used by signal service organizations organic to theater headquarters or communication zones to provide theater communications, those maintenance functions allocated up to and including fourth echelon are authorized to the organization operating this equipment.

Section II. MAINTENANCE ALLOCATION CHART

(1) Part or component	(2) Maintenance function	(3) 1st ech.	(4) 2d ech.	(5) 3d ech.	(6) 4th ech.	(7) 5th ech.	(8) Tools required	Remarks
CAMERA SET, MOTION PICTURE KS-10(1); KS-10(2), KS-10(3) CAMERA PH-430-B.								
	service	X						
	inspect	X						
	test		X					Speed test, feed spindle backlash test. Light tight and shooting tests.
	repair		X				1	
	rebuild				X		1, 2, 3	

Section III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

(1) Tools required for maintenance functions	(2) 1st ech.	(3) 2d ech.	(4) 3d ech.	(5) 4th ech.	(6) 5th ech.	(7) Tool code	(8) Remarks
TOOL KIT TK-77/GF		†	†	†	†	1	
TOOL EQUIPMENT TK-109/GF			†	†	†	2	
TOOL EQUIPMENT TK-25/GF			†	†	†	3	

Page 142, appendix V (page 50 of C3).

APPENDIX V

BASIC ISSUE ITEMS LIST FOR CAMERA PH430-B AND CAMERA SETS, MOTION PICTURE KS-10(I), KS-10(2), AND KS-10(3)

(Superseded)

Section I. INTRODUCTION

1. General

This appendix lists items supplied for initial operation. The list includes tools, parts, and materials issued as *part of* the major end item. The list includes all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

2. Columns

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

b. Federal Stock No. This column lists the n-digit Federal stock No.

c. Designation by Model. The dagger (†) indicates model or equipment in which the parts are used.

d. Description. Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

e. Unit of Issue. The unit of issue is each unless otherwise indicated and is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

f. Expendability. Nonexpendable items are indicated by NX. Expendable items are not annotated.

g. Quantity Authorized. Under "Items Comprising an Operable Equipment", the column lists the quantity of items supplied for the initial operation of the equipment. Under "Running Spare Items" the quantities listed are those issued initially with the equipment as spare parts. The quantities are authorized to be kept on hand by the operator for maintenance of the equipment.

Section II. FUNCTIONAL PARTS LIST

(1) Source, maintenance and recoverability code	(2) Federal stock No.	(3) Designation by model				(4) Description	(5) Unit of issue	(6) Expendability	(7) Quantity authorized
		1	2	3	4				
	6710-292-2281					CAMERA SET, MOTION PICTURE KS-10(1); silent portable, spring motor, 16-mm camera; 0.7-inch lens, 2-inch lens, 4-inch lens, all with matching viewfinder lens; Bell and Howell part/ dwg No. 08480.		NX	
	6710-823-9769					CAMERA SET, MOTION PICTURE KS-10(2); silent, portable, spring motor, 16-mm camera; 15-mm lens, 1-inch lens, 3-inch lens, all with matching viewfinder lens; Bell and Howell Model 70-KRM (modified with filter slot).		NX	
	6710-889-3401					CAMERA SET, MOTION PICTURE KS-10(3); silent, portable spring motor, 16-mm camera; 15-mm lens, 1-inch lens, 3-inch lens, all with matching viewfinder lens; Bell and Howell Model 70-KRM (without filter slot).		NX	
	6710-240-4792					CAMERA PH-430-B: silent, portable, spring motor, 16-mm camera; 0.7-inch lens; 2-inch lens, 4-inch lens, all with matching viewfinder lens; Bell and Howell part/dwg No. 05900. *Note.* Model Col 1 refers to PH-430-B; Col 2 refers to KS-10(1); Col. 3 refers to KS-10(2); Col. 4 refers to KS-10(3);		NX	

(1) Source, maintenance and recoverability code	(2) Federal stock No.	(3) Designation by model 1	2	3	4	(4) Description	(5) Unit of issue	(6) bility Expenda-	(7) Quantity authorized
						ITEMS COMPRISING AN OPERABLE EQUIPMENT			
	Ord thru AGC	†	†	†	†	TM 11-2390A. (Not installed.) (Not mounted.)			2
	6710-240-4796	†	----	----	----	CAMERA, MOTION PICTURE: incl 1-inch lens and matching viewfinder lens; B and H p/d No. 05854. (Not installed.) (Not mounted.)		NX	1
	6710-720-5334	----	†	----	----	CAMERA, MOTION PICTURE KF-3(1): incl 1-inch lens and matching viewfinder lens; B and H Model 70KM. (Not installed.) (Not mounted.)		NX	1
	6710-823-9768	----	----	†	----	CAMERA, MOTION PICTURE KF-3(2): incl 1-inch lens and matching viewfinder lens; and Model 70-KRM (modified with filter slot). (Not installed.) (Not mounted.)		NX	1
	6710-889-3402	----	----	----	†	CAMERA, MOTION PICTURE, KF-3(3): incl 1-inch lens and matching viewfinder lens. B and H Model 70-KRM (without filter slot). (Not installed.) (Not mounted.)		NX	1
	6760-408-5745	†	†	†	†	BOARD, SIGN: Slate PH-384. (Not installed.) (Not mounted.)			1
	6760-238-3008	†	†	†	†	CAP, LENS: B and H p/d No. 20720 (Not installed.) (Mounted in equipment.)			3
	6760-242-9205	†	----	----	----	CARRYING CASE, PHOTOGRAPHIC EQUIPMENT: B and H p/d No. 05960. (Not installed.) (Not mounted.)		NX	1
	6760-537-9237	----	†	----	----	CARRYING CASE, PHOTOGRAPHIC EQUIPMENT: B and H p/d No. 08511. (Not installed.) (Not mounted.)		NX	1

					6760-715-7790	----	----	†	†	CARRYING CASE, PHOTOGRAPHIC EQUIPMENT: B and H p/d No. 031466. (Not installed.) (Not mounted.)		NX	1
					6760-356-6285	†	†	----	----	CASE: accom 6 lens filters; B and H p/d No. 05885. (Not installed.) (Not mounted.)			3
					6710-356-6292	†	†	----	†	FILTER, LIGHT, PHOTOGRAPHIC LENS; light yellow; B and H p/d No. 22211. (Not installed.) (Not mounted.)			3
					6710-356-6293	†	†	----	†	FILTER, LIGHT, PHOTOGRAPHIC LENS: dark yellow; B and H p/d No. 22212. (Not installed.) (Not mounted.)			3
					6710-356-6294	†	†	----	†	FILTER, LIGHT, PHOTOGRAPHIC LENS: wratten 23 E-red; B and H p/d No. 22213. (Not installed.) (Not mounted.)			3
					6710-356-6297	†	†	----	†	FILTER, LIGHT PHOTOGRAPHIC LENS: wratten 5N5; B and H p/d No. 22216. (Not installed.) (Not mounted.)			3
					6760-839-0663	----	----	†	----	FILTER, LIGHT, PHOTOGRAPHIC LENS: No. 96, 0.3 neutral density, 3 in x 3 in; B and H p/d No. 291301. (Not installed.) (Not mounted.)			1
					6760-839-0664	----	----	†	----	FILTER, LIGHT, PHOTOGRAPHIC LENS: No. 96, 0.6 neutral density; 3 in x 3 in; B and H p/d No. 291300. (Not installed.) (Not mounted.)			1
					6760-839-0665	----	----	†	----	FILTER, LIGHT, PHOTOGRAPHIC LENS: No. 11 wratten; 3 in x 3 in; B and H p/d No. 291296. (Not installed.) (Not mounted.)			1
					6760-839-0666	----	----	†	----	FILTER, LIGHT, PHOTOGRAPHIC LENS: No. 8 wratten; 3 in x 3 in; B and H p/d No. 291295. (Not installed.) (Not mounted.)			1

(1) Source, maintenance and recoverability code	(2) Federal stock No.	(3) Designation by model				(4) Description	(5) Unit of issue	(6) Expendability	(7) Quantity authorized
		1	2	3	4				
	6760–839–0667	----	----	†	----	FILTER, LIGHT, PHOTOGRAPHIC LENS: No. 85, type A; 3 in x 3 in; B and H p/d No. 291299. (Not installed.) (Not mounted.)			1
	6760–550–8666	----	----	†	----	FILTER, LIGHT, PHOTOGRAPHIC LENS: No. 15; deep yellow; 3 in x 3 in; B and H p/d No. 291297. (Not installed.) (Not mounted.)			1
	6760–550–8671	----	----	†	----	FILTER, LIGHT, PHOTOGRAPHIC LENS: No. 25; red; 3 in x 3 in; B and H No. 291298. (Not installed.) (Not mounted.)			1
	5210–356–4458	†	†	†	†	GAUGE, FILM SPOOL: B and H p/d No. 6338. (Not installed.) (Not mounted.)			1
	6760–223–3436	†	----	----	----	LENS, CAMERA, MOTION PICTURE: 0.7 in nom f/lg, f/2.5 apert range; SigC dwg. No. SC–A–46090. (Not installed.) (Not mounted.)		NX	1
	6760–597–1548	†	----	----	----	LENS, CAMERA, MOTION PICTURE 2 in nom f/lg, f/3.5 apert range; SigC dwg No. SC–A–46091. (Not installed.) (Not mounted.)		NX	1
	6760–286–7600	†	----	----	----	LENS, CAMERA, MOTION PICTURE 4 in nom f/lg, f/4.5 apert range; SigC dwg No. SC–A–46092. (Not installed.) (Not mounted.)		NX	1
	6760–242–3758	----	†	†	----	LENS, CAMERA, MOTION PICTURE: 0.7 in or 17.8-mm f/lg, f/2.5 to f/22 apert range; B and H p/d No. 06712. (Not installed.) (Not mounted.)		NX	1
	6760–081–2040	----	----	----	†	LENS, CAMERA, MOTION PICTURE: 15 mm f/lg, f/1.3 apert range. B and H p/d No. 200440. (Not installed.) (Not mounted.)		NX	1

				6760-237-8366	----	†	----	----	LENS, CAMERA, MOTION PICTURE: 2 in or 50.8-mm f/lg, f/3.5 to f/22 apert range; B and H p/d No. 06713. (Not installed.) (Not mounted.)	NX	1
				6760-268-3989	----	†	----	----	LENS, CAMERA, MOTION PICTURE: 4 in or 100.8-mm f/lg, f/4.5 to f/32 apert range; B and H p/d No. 06714. (Not installed.) (Not mounted.)	NX	1
				6760-664-2010	----	----	†	†	LENS, CAMERA, MOTION PICTURE: 3 in lens f/2.5 r apert range; B and H p/d No. 27657. (Not installed.) (Not mounted.)	NX	1
				6760-240-8351	†	----	----	----	LENS, VIEWFINDER, PHOTOGRAPHIC: u/w 0.7 or 17.8-mm f/lg lens; B and H p/d No. 05046. (Not installed.) (Not mounted.)		1
				6760-061-4150	----	----	----	†	LENS, VIEWFINDER, PHOTOGRAPHIC: u/w 15-mm f/lg lens; B and H p/d No. 200441. (Not installed.) (Not mounted.)		1
				6760-240-8352	†	----	----	----	LENS, VIEWFINDER, PHOTOGRAPHIC: u/w 2 in or 50.8-mm f/lg lens; B and H p/d No. 04538. (Not installed.) (Not mounted.)		1
				6760-223-7694	†	----	----	----	LENS, VIEWFINDER, PHOTOGRAPHIC: u/w 4 in or 101.6-mm f/lg lens; B and H p/d No. 04501. (Not installed.) (Not mounted.)		1
				6760-223-7690	----	†	†	----	LENS, VIEWFINDER, PHOTOGRAPHIC: u/w 0.7 in or 17.8-mm f/lg lens; B and H p/d No. 06718. (Not installed.) (Not mounted.)		1
				6760-223-7691	----	†	----	----	LENS, VIEWFINDER, PHOTOGRAPHIC: u/w 2 in or 50-mm f/lg lens; B and H p/d No. 06717. (Not installed.) (Not mounted.)		1

(1) Source, maintenance and recoverability code	(2) Federal stock No.	(3) Designation by model				(4) Description	(5) Unit of issue	(6) Expendability	(7) Quantity authorized
		1	2	3	4				
	6760–240–6912	----	†	----	----	LENS, VIEWFINDER, PHOTOGRAPHIC: u/w 4 in or 100.8-mm f/lg; B and H p/d No. 06716. (Not installed.) (Not mounted.)			1
	6760–531–6495	----	----	†	†	LENS, VIEWFINDER, PHOTOGRAPHIC: u/w 3 in lens; B and H p/d No. 020028. (Not installed.) (Not mounted.)			1
	6710–715–7800	----	----	†	----	RETAINER, FILTER: holds filters in position; B and H p/d No. 306539. (Not installed.) (Not mounted.)			1
						CAMERA, MOTION PICTURE FSN 6710–240–4796; CAMERA, MOTION PICTURE KF–3(1); CAMERA, MOTION PICTURE KF–3(2); CAMERA, MOTION PICTURE KF–3(3). *Note.* Model Col. 1 refers to Camera, Motion Picture (FSN 6710–240–4796); Col. 2 refers to Camera, Motion Picture KF–3(1); Col. 3 refers to Camera, Motion Picture KF–3(2); Col. 4 refers to Camera, Motion Picture KF–3(3).			
	8020–262–9100	†	†	†	†	BRUSH, ARTIST'S: B and H p/d No. 22199. (Not installed.) (Not mounted.)			1
	6710–356–6184	†	†	†	----	BRUSH, CLEANING: B and H p/d No. 5385. (Not installed.) (Not mounted.)			1
	6710–086–7700	†	†	†	†	BRUSH, RETRACTABLE: retractable container (lipstick type) B and H p/d No. 313049. (Not installed.) (Not mounted.)			1
	6760–238–3008	†	†	†	†	CAP, LENS: B and H p/d No. 20720. (Not installed.) (Not mounted.)			1
	7510–164–8893	†	†	†	†	CHALK: 3-in. sticks.			1

				7510–222–1255	†	†	†	†	CHALK: 3-in. stick. (Not installed.) (Not mounted.)			1
				6850–061–2296	----	----	----	†	CLEANER, LENS: 1½-oz bottle B and H p/d No. 314060. (Not installed.) (Not mounted.)			1
				6750–392–9751	†	†	†	----	CLEANER, LENS: 2 oz bottles; B and H p/d No. 04217. (Not installed.) (Not mounted.)			1
				6710–399–8017	†	†	†	†	CRANK, HAND: B and H p/d No. 07071. (Not installed.) (Not mounted.)			1
				6710–340–4992	†	†	†	†	KEY, WINDING: B and H p/d No. 07072. (Not installed.) (Not mounted.)			1
				6760–200–4361	----	†	†	†	LENS, CAMERA, MOTION PICTURE: 1 in or 25.4-mm f/lg, f/1.9 to f/22 relative apert range; B and H p/d No. 07088. (Not installed.) (Not mounted.)		NX	1
				6760–250–8044	†	----	----	----	LENS, CAMERA, MOTION PICTURE: 1 in f/lg, f/1.9 relative apert range; SigC dwg No. SC–A–46073–B. (Not installed.) (Not mounted.)		NX	1
				6760–240–8350	†	----	----	----	LENS, VIEWFINDER, PHOTOGRAPHIC: u/w 1 in or 25.4-mm f/lg lens; B and H p/d No. 04458. (Not installed.) (Not mounted.)			1
				6760–223–7692	----	†	†	†	LENS, VIEWFINDER, PHOTOGRAPHIC: u/w 1 in or 25.4-mm f/lg lens; B and H p/d No. 06715. (Not installed.) Not mounted.)			1
				9150–252–6173	†	†	†	†	OIL, LUBRICATING: 2-oz glass bottle. (Not installed.) (Not mounted.)			1
				4930–277–1044	†	†	†	†	OILER, HAND: ½-oz; Dill No. 6670 press-to-oiler. (Not installed.) (Not mounted.)			1
				6710–086–7701	†	†	†	†	ORANGESTICK: B and H p/d 313048. (Not installed.) (Not mounted.)			1

(1) Source, maintenance and recoverability code	(2) Federal stock No.	(3) Designation by model				(4) Description	(5) Unit of issue	(6) Expendability	(7) Quantity authorized
		1	2	3	4				
	6640–393–2090	†	†	†	†	PAPER, LENS. (Not installed.) (Not mounted.)			1
	6760–597–1457	†	†	†	†	SPOOL, PHOTOGRAPHIC FILM: B and H p/d No. 08272. (Not installed.) (Not mounted.)			1
	6760–356–6333	†	†	†	†	STRAP ASSEMBLY: Camera carrying; B and H p/d No. 05859. (Not installed.) (Not mounted.)			1
	6710–356–6334	†	†	†	†	SYRINGE: for dispersing dust; BF Goodrich p/d No. 3551. (Not installed.) (Not mounted.)			1
						RUNNING SPARE ITEMS			
	6760–238–3008	†	†	†	†	CAP, LENS: B and H p/d No. 2072. (Not installed.) (Mounted in equipment.)			1
	7510–222–1255	†	†	†	†	CHALK: 3-in. stick. (Not installed.) (Not mounted.)			1
	6710–086–7701	†	†	†	†	ORANGESTICK: B and H p/d No. 313048. (Not installed.) (Not mounted.)			2
	6640–393–2090	†	†	†	†	PAPER, LENS. (Not installed.) (Not mounted.)			3

By Order of the Secretary of the Army:

EARLE G. WHEELER,
General, United States Army,
Chief of Staff.

Official:

J. C. LAMBERT,
Major General, United States Army,
The Adjutant General,

Distribution:

Active Army:

DASA (5)
USASA (2)
CNGB (1)
CofEngrs (1)
CofT (1)
TSG (1)
CSigO (5)
USA Engr CD Agcy (1)
USA CBR CD Agcy (1)
USA Comm Elct CD Agcy (1)
USA Med Svc CD Agcy (1)
USA Ord CD Agcy (1)
USA QM CD Agcy (1)
USA Trans CD Agcy (1)
USCONARC (5)
USA AD CD Agcy (2)
USA Armor CD Agcy (2)
USA Arty CD Agcy (1)
USA Avn CD Agcy (1)
USA Inf CD Agcy (1)
USA SPWAR CD Agcy (1)
USAATBD (1)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Cored (3)
OS Base Cored (2)
LOGCOMD (2)
MDW (1)
Armies (2)
corps (2)
Instls (2) except
Fort Monmouth (63)
USATC AD (2)
USATC Engr (2)
USATC Inf (2)
USATC Armor (2)
USAOMC (4)
Svc Colleges (2)
Br Svc Sch (2)
GENDEP (OS) (2)
Sig See, GENDEP (OS) (5)
Sig Dep (OS) (12)
Dep (OS) (2)
Army Dep (2) except
Atlanta Army Dep (None)
Sacramento Army Dep (17)
WRAMC (1)
Trans Tml Cored (1)
Army Tml (1)
POE (1)
OSA (1)
Yuma Test Sta (2)
AFIP. (1)
AMS (1)
Army Pictorial Cen (2)
EMC (1)
USA Strat Comm Cored (4)
USA Elct Mat Agcy (25)
USA Elct Mat Agcy, Midwest Rgn Ofc (1)
USARCARIB Sig Agcy (1)
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11-5
11-6
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11-15
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11-36
11-55
11-56
11-57
11-96
11-97

11-98
11-117
11-165
11-157
11-500 (AA-AE) (4)
11-557
11-587
11-592
11-597
17
29-56
30-14
30-500 (AA-AE)
37
57

NG & USAR: None.

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

813-394-2

TECHNICAL MANUAL

CAMERA PH-430-B AND MOTION PICTURE CAMERA SETS KS-10(1) AND KS-10(2)

TM 11-2390A
CHANGES NO. 4

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 26, D.C., *20 November 1962*

TM 11-2390A, 7 February 1952, is changed as follows:

Note. The parenthetical reference to previous Changes (example: "page 1 of C 3") indicates that pertinent material was published in that Changes.

Page 1, paragraph 2 (page 1 of C 3). Delete paragraph 2 and substitute:

2. Forms and Records

a. Report of Unsatisfactory Equipments. Fill out DA Form *2407* (Maintenance Request) in accordance with instructions in TM 38-750 and forward it to: Commanding Officer, U.S. Army Electronics Materiel Support Agency, ATTN: SELMS-PIE, Fort Monmouth, N.J. The form should be filled out and forwarded to report:

(1) Receipt of defective equipment (use DD Form 6 *(b* below) if defect is due to damaged or improper shipment).

(2) Equipment deficiencies (deadlined equipments).

(3) Equipment shortcomings (operable, but at less than rated capability or efficiency).

(4) Equipment improvement suggestions and recommendations.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army), NAVSANDA publications 378, and AFR 71-4 (Air Force),

c. Report of Comments on Basic Issue Items List (app. V). Fill out and forward DA Form 2028 (Recommended Changes to DA Technical Manual Parts Lists or Supply Manual 7, 8, or 9) direct to: Commanding Officer, U.S. Army Electronics Materiel Support Agency, ATTN: SELMS-ML, Fort Monmouth, N.J.

d. Index to Equipment Publications. Refer to DA Pam 310-4 to determine what changes to or revisions of this publication are current.

e. Comments on Manual. Forward all other comments on this publication direct to: Commanding Officer, U.S. Army Electronics Materiel Support Agency, ATTN: SELMS-MPP-4 Fort Monmouth, N.J. (DA Form 1508 (Record of Comments on Publications), DA Form 2028 (c above), DD Form 96 (Disposition Form), or other suitable form, or letter may be used.)

Page 116, section V (page 18 of C 1). Delete section V and substitute:

Section V. FOURTH ECHELON TESTING PROCEDURES FOR CAMERA SETS, MOTION PICTURE KS-10(1) AND KS-10(2)

81. General

a. Taking procedures are prepared for we by Signal field maintenance shops and Signal service organizations responsible for fourth echelon maintenance to determine the acceptability of repaired signal equipment. These procedures set forth specific requirements which must be met by repaired signal equipment before it is returned to the using organisation. The testing prooedures may also be used as a guide for testing equipment repaired at third echelon, if the proper tools and test equipment are available. A summary of the performance standards is given in paragraph 85.1.

b. Each test depends on the preceding one for certain operating procedures. Follow the instructions preceding the body of each chart before proceeding to the chart. Perform each test in sequence. Do not vary the sequence. For each step, perform all the actions required in the *Test equipment and Equipment under test* columns; then perform each specific test procedure and compare the results with the performance standard.

82. Equipment, Tools, and Materials Required

All equipment, tools, and materials required to perform the testing procedures given in this section are listed in the following charts and are authorized under TA 11-17, Signal Field Maintenance Shops, and TA 11-100(11-17), AUowancea of Signal Corps Expendable Supplies for Signal Field Maintenance Shop, Continental United States.

a. Equipment.

Equipment	*Federal Stock No.*	*Reference*
Developing Equipment PH-253-C	6740-240-7400	TM 11-2340A
Lamp Equipment PH-218	6760-223-510707	None
Meter, Photographic Exposure LM-46A	6760-810-8385	TM 11-6760-206-12
Projector, Motion Picture, Sound AQ-2A(1).[a]	6730-285-4428	TM 11-6730-201-10
Screen, Projection BM-1(1)	6730-224-9819	None
Splicer, Photographic Film FM-3(1)	6740-291-5840	TM 11-2331A
Tripod, Photographic LM-41	6710-222-2507	None
Watch, stop, type B[b]	6645-719-8670	None

a Or equal.
b Part of Tool Kit, Photographic Repair TK-100/GF.

b. Tools. Performance of the tests requires measuring tape (FSN 5210-227-1688), part of Tool Kit, Photographic Repair TK-109/GF, or equal.

c. Materials

Material	Federal stock No.
Film, photographic, 16-mm[a]	6750-664-0518
Film, photographic, processed: 16mm; 100-foot test reel	6770-248-9262

[a] Any 16-mm black-and-white film loaded on a 100-foot reel is suitable for these tests.

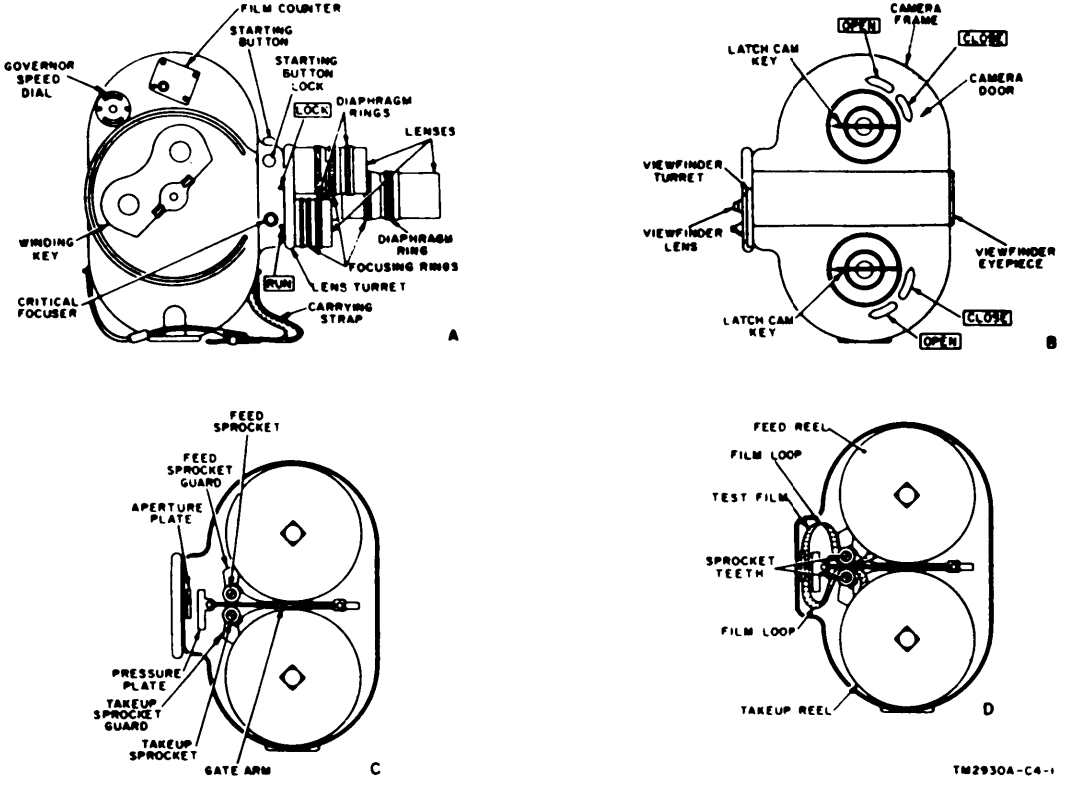

Figure 49 (Added). *Physical tests and inspection.*

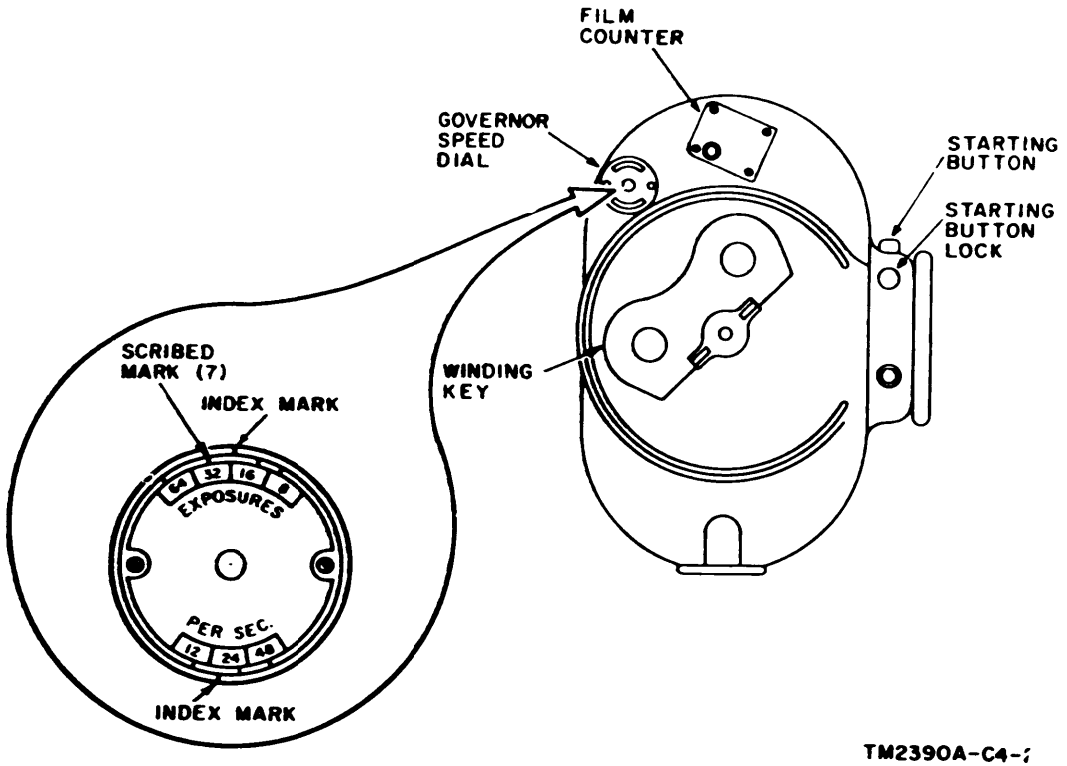

Figure 50 (Added). *Camera speed tests.*

(3) Watch, stop, type D (stopwatch).

b. Test Connections and Conditions The camera is loaded with test film and mounted securely on the tripod.

c. Procedure. The following test procedures are applicable to both the KS–10(1) and the KS–10(2).

Step No.	Control settings		Test procedure	Performance standard
	Test equipment	Equipment under test		
1	Stopwatch: set at 0.	Film counter: 000 Governor speed dial: 8. *Note.* When setting governor speed dial, be sure that one of index marks on outer knurled ring lines up with scribed mark for speed selected.	*a.* Wind camera motor spring fully. *b.* Press and hold starting button and, at same time, start stopwatch. *c.* Press in starting button lock. *d.* When film counter reads 010, pull out starting button lock to stop camera. At same time, stop stopwatch. *e.* Note elapsed time indicated on stopwatch.	*a.* None. *b.* None. *c.* None. *d.* None. *e.* Stopwatch indicates elapsed time of 45.0 to 55.0 seconds.
2	Stopwatch: set at 0.	Film counter: 000 Governor speed dial: 12.	Same as step No. 1.	Stopwatch indicates elapsed time of 30.0 to 36.7 seconds
3	Stopwatch: set at 0.	Film counter: 000 Governor speed dial: 16.	Same as step No. 1.	Stopwatch indicates elapsed time of 23.7 to 26.3 seconds.
4	Stopwatch: set at 0.	Filmcounter: 000 Governor speed dial: 24.	Same as step No. 1.	Stopwatch indicates elapsed time of 15.8 to 17.5 seconds.
5	Stopwatch: set at 0.	Film counter: 000 Governor speed dial: 32.	Same as step No. 1.	Stopwatch indicates elapsed time of 11.2 to 13.8 seconds.
6	Stopwatch: set at 0.	Film counter: 000 Governor speed dial: 48.	Same as step No. 1.	Stopwatch indicates an elapsed time of 7.5 to 9.2 seconds.
7	Stopwatch: set at 0.	Film counter: 000 Governor speed dial: 64.	Same as step No. 1.	Stopwatch indicates elapsed time of 5.6 to 6.9 seconds.
8	None.	None.	*a.* Press and hold starting button and allow remaining film to run through. *b.* Unload test film and remove camera from tripod.	*a.* None. *b.* None.

85.1 Test Data Summary

1. PHYSICAL TESTS AND INSPECTION (par. 83).

Function	Performance standard
a. Physical condition of camera.	*a.* Satisfactory.
b. Operation of camera controls.	*b.* Satisfactory.
c. Operation of camera mechanism.	*c.* Satisfactory.
d. Length of film run for one winding of camera motor spring.	*d.* Between 21 and 23 feet.

2. CAMERA SPEED TESTS (par. 84).

Function	Performance standard
Film run of 10 feet with governor speed dial set at:	Elapsed time:
a. 8 frames per second.	*a.* 45.0 to 55.0 seconds.
b. 12 frames per second.	*b.* 30.0 to 36.7 seconds.
c. 16 frames per second.	*c.* 23.7 to 26.3 seconds.
d. 24 frames per second.	*d.* 15.8 to 17.5 seconds.
e. 32 frames per second.	*e.* 11.2 to 13.8 seconds.
f. 48 frames per second.	*f.* 7.5 to 9.2 seconds.
g. 64 frames per second.	*g.* 5.6 to 6.9 seconds.

3. OPERATION TESTS (par. 85).

Function		Performance standard	
a. KS–10(1)		*a.* KS–10(1)	
Lens (in.)	Distance (ft)	Focusing scale reading (ft)	Picture quality
0.7	2.5	2.5	Satisfactory
1	4	4	Satisfactory
2	12	12	Satisfactory
4	12	.....	Satisfactory
4	30	30	Satisfactory
2	30	.....	Satisfactory
1	30	.....	Satisfactory
0.7	30	.....	Satisfactory
KS–10(2)		KS–10(2)	
Lens (in.)	Distance (ft)	Focusing scale reading (ft)	Picture quality
0.7	2.5	2.5	Satisfactory
1	4	4	Satisfactory
3	12	.....	Satisfactory
3	30	30	Satisfactory
1	30	.....	Satisfactory
0.7	30	.....	Satisfactory
b. Overall picture quality.		*b.* Pictures steady, properly framed, and free from scratches.	
c. Camera light leakage.		*c.* Pictures free from light streaks or evidence of fogging.	

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Svc College (2)
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USASESCS (100)
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Sig Sec GENDEP (OS) (5)
Army Dep (2) except
Sacramento (17)
Atlanta (None)
Sig Dep (OS) (12)
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11-587
11-592
11-597

NG: None.

USAR: None.

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

TECHNICAL MANUAL

CAMERA PH-430-B AND MOTION PICTURE CAMERA SET KS-10(1)

CHANGES
NO. 1

DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *4 January 1966*

TM 11-2390A, 7 February 1952, is changed as follows:

The title of the manual is changed to read—

CAMERA PH-430-B AND MOTION PICTURE CAMERA SET KS-10(1)

Section I. GENERAL

Note. (Added) Motion Picture Camera KF-3(1) is a component of Motion Picture Camera Set KS-10(1). Motion Picture Camera KF-3(1) is similar in appearance and operation to the camera component of Camera PH-43PB. Both are designed for 16-millimeter (mm) silent motion picture operation, and both are equipped with a rotatable three-lens turret. Major differences between these two cameras are as follows: Motion Picture Camera KF-3(1) is adapted for mounting a 200-foot or 400-foot film magazine. The camera component of the PH-430-B uses the 100-foot reel only. The viewfinder housing for the KF-3(1) is detachable and is separated from the camera door by a spacer block. The amount of film used during operation of the camera component of Camera PH-430-B is registered by a small footage dial at the upper right-hand side of the camera housing. Motion Picture Camera KF-3(1) is equipped with a mechanical film counter. All information in TM 11-2390A applies equally to Motion Picture Camera Set KS-10(1) except as otherwise specified in this change.

1. Scope

* * * * * * *

b. (Superseded) The Appendix contains depth of field charts for the lens components supplied with Camera PH-430-B and Motion Picture Camera KF-3(1).

In figures 2, 3, 4, 8, 10, 22, 33, 42, and 48, the following is added at the end of the caption: PH-430-B.

4. Table of Components

(figs. 5 and 9)

Note. (Added) The accessories furnished with the KS-10(1) differ from those furnished with Camera PH-4310-B as follows: One 2-ounce bottle of lens cleaner and five packages of lens cleaning tissues are supplied with the KS-10(1); the brush furnished with the KS-10(1) is one half of an inch wide by 8 inches long. Otherwise the following table is equally applicable to both Camera PH-430-B and Motion Picture Camera Set KS-10(1).

* * * * * * *

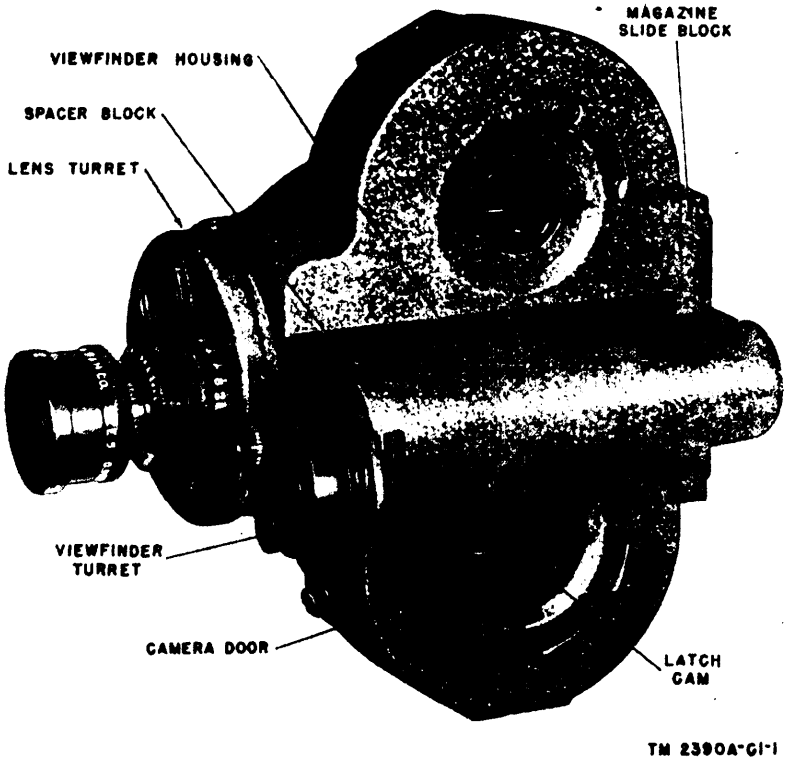


Figure 2.1 (Added). *Motion Picture Camera KF–3(1), front left view.*

5. Component Parts of Camera Unit

The camera unit * * * if so desired.

a. Camera Frame **(figs. 2 and 2.1).** The main frame * * * the camera door. The positive viewfinder housing is an integral part of the camera door on the **PH-430-B only. The viewfinder housing for the KF-3(1) is detachable and is separated from the camera door by a spacer block to permit easier viewing when a film magazine is installed on the rear of the camera.**

b. Lens Turret **(figs. 2 and 2.1).** The rotatable lens * * * of the turret.

c. *Critical Focuser* **(figs. 3 and 3.1).** The built-in critical * * * at this position.

d. Governor Speed Dial **(figs. 3 and 3.1).** The governor speed * * * proper running speed.

e. Footage Dial (fig. 3). The footage dial **on the PH-430-B,** marked O to 100, is located above and to the right of the governor speed dial. The footage dial * * * of the film.

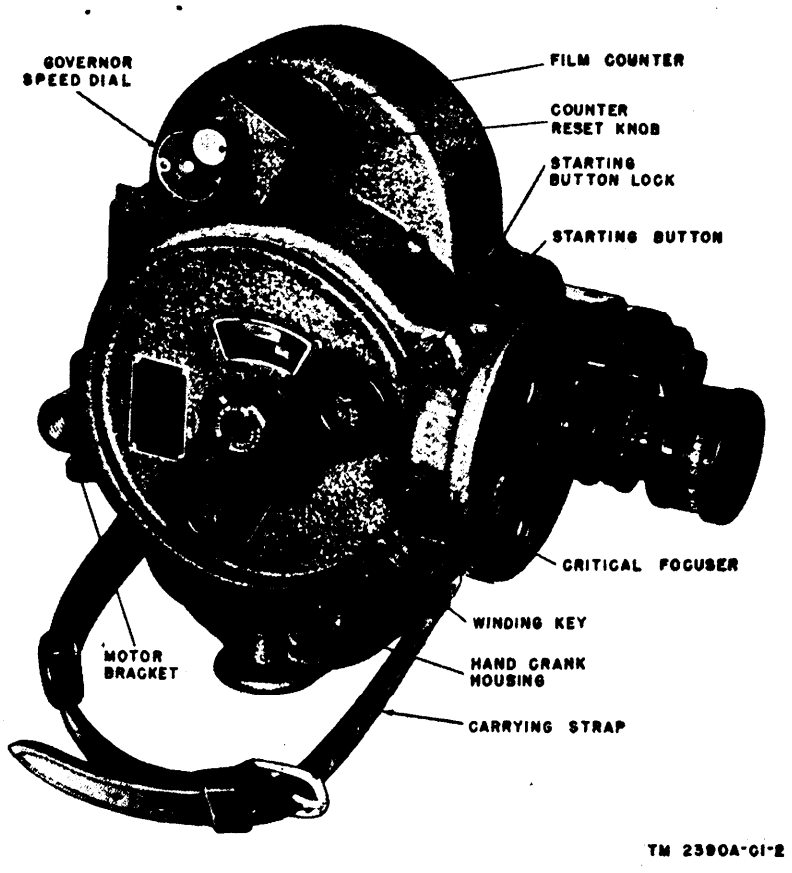


Figure 3.1 (Added). *Motion Picture Camera KF-3(1), front right view.*

Note. (Added) Motion Picture Camera KF–3(1) is equipped with a mechanical film counter for indicating the footage of film that has been exposed. The counter can be set manually at the start of each run by turning the counter reset knob counterclockwise until three zeros appear in the window. The film counter operates in the forward direction only.

f. Motor Drive and Winding Key **(figs. 3 and 3.1).** A hand-wound, spring-driven * * * to the camera frame.

g. Starting Button **(figs. 3 and 3.1).** The starting button * * * the starting button.

h. Positive Viewfinder **(figs. 2 and 2.1).** The positive viewfinder * * * lens is used.

* * * * * * *

j. Aperture Plate (fig. 23). The stainless steel * * * past the aperture for exposure.

Note. (Added) In addition to the above, Motion Picture Camera KF-3(1) includes provisions (figs. 2.1 and 42.1) for mounting 200-foot or 400-foot magazines. Exposed film footage is calculated by a mechanical film counter at the upper right-hand side of the side of the camera housing (fig. 3.1).

9. Camera Carrying Case and Accessories

a. Carrying Case (fig. 8). The camera carrying * * * camera lens turret. **In the carrying case for Motion Picture Camera KF-3(1), the 4-inch lens is supported in a V-block and held securely with a snapdown strap.**

b. Accessories, **Camera PH-430-B** (fig. 9). The following accessories are included in the components supplied with the equipment.

* * * * * * *

14. Starting Button and Starting Button Lock
(figs. 3 and 3.1)

* * * * * * *

19.1 Setting Footage Dial on Camera PH-430-B

* * * * * * *

19.1 Setting the Film Counter on Motion Picture Camera KF-3(1)
(Added)

With the camera threaded and the camera door installed, set the film counter at zero and run 4 feet of film through the camera. These 4 feet of film and the 2 feet used for leader and testing will be cut from the roll when the film is developed. Reset the film counter at zero. During operation, determine the length of all individual shots and scenes by before- and after-take checks of the footage recorded on the counter. If film breakage occurs, follow the procedure outlined in paragraph 19c.

20. Setting Governor Speed Dial
(figs. *3* and 3.1)

* * * * * * *

26. Handholding Camera

Always use the camera holding strap when shooting without the tripod. Fasten the strap handle to the two screws provided on the camera frame (figs. 3 and 3.1). Adjust the strap * * * shoot the scene.

30. Camera Operation

* * * * * * *

b. Using Hand Crank. The hand crank * * * dial is set. To use the hand crank, insert it in its socket (figs. 3 and 3.1) and lock the starting button in the running position with the starting button lock. Crank with an even, steady pressure.

* * * * * * *

g. Rewinding Back-Wound Film, ***Camera PH430-B.*** Before using the * * * rewound on the feed reel.

33. Equipment Pewrformance Checlist

Item No.	Item	Action or condition	Normal indication	Checks and corrective measures
*	*	* *	*	* *
4	Footage dial___	0 * * * dial.	----------	Turn * * * (par. 19*a*)
4.1	Film counter (KF–3(1) only).	Counter set at zero. Run 4 feet of film through camera and reset at zero.	----------	Turn reset knob counterclockwise to zero.
*	*	* *	*	* *
10	Footage dial___	Note * * * (par. 19).	Enough * * * take.	Reload camera (par. 18).
10.1	Film counter (KF–3(1) only).	Note footage exposed and calculate footage remaining.	Enough unexposed film remains for proposed scene.	Reload camera (par. 18).
*	*	* *	*	* *

67. Component Repair and Replacement

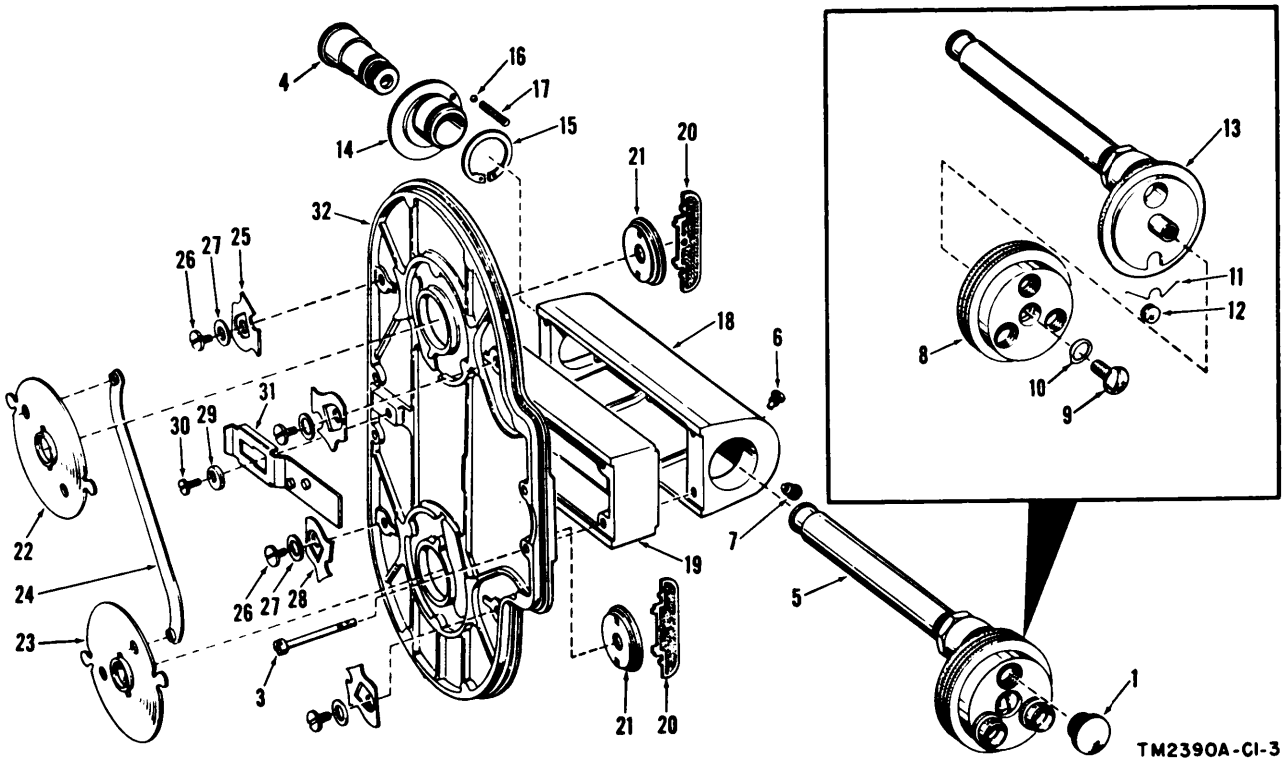
* * * * * * *

b.1. (Added) *Viewfinder Turret for KF-3 (1) (figs.* 2.1 and 22.1). The KF–3 (1) viewfinder turret can be disassembled from the camera door by removing the single truss-head screw and spring washer from the center of the turret. Be careful not to lose the indexing spring and roller when pulling the turret from the turret mount. Possible turret repair will consist mainly of indexing spring and roller replacement.

* * * * * * *

c.1. (Added) *Viewfinder Tube for KF-3(1)* (fig. 22.1). When repairing the KF–3(1), the removal of the viewfinder tube is accomplished by unscrewing the eyepiece (4) and the two pilot screws (6 and 7) from the viewfinder housing (18). The viewfinder tube (13) must be replaced as an assembly.

* * * * * * *



NOTE: Items 4 through 18 comprise item 2, viewfinder housing assembly.

Figure 22.1 (Added). *Camera door for Motion Picture Camera KF–3(1), exploded view.*

1 Lens mount cover
2 Viewfinder housing assembly (items 4 through 18)
3 Fillister-head screw (four)
4 Viewfinder eyepiece
5 Viewfinder assembly
6 Pilot screw, upper
7 Pilot screw, lower
8 Turret assembly
9 Truss-head screw
10 Spring washer
11 Indexing spring
12 Indexing roller
13 Turret and mount assembly
14 Parallax correction cam
15 Retaining ring
16 Indexing ball
17 Indexing spring
18 Viewfinder housing
19 Spacer block
20 Latch cam key (two)
21 Latch cam hub (two)
22 Upper latch cam
23 Lower latch cam
24 Latch cam link
25 Upper door latch (two)
26 Shoulder screw (four)
27 Spring washer (four)
28 Lower door latch (two)
29 Eccentric washer
30 Fillister-head screw
31 Push bar assembly
32 Camera door

Figure 22.1—Continued.

70. Camera Door Repair (PH–430-B) (fig. *22)*

* * * * * * *

70.1. Camera Door Repair (KF–3(1))

(fig. 22.1)
(Added)

a. Disassembly.

(1) Remove the camera door (par. 70a (1)).

(2) Remove the four screws (3) and disassemble the view finder housing (18) and spacer block (19) from the camera door.

(3) If the viewfinder parts require repair or replacement, remove the turret (par. 67b.1) and disassemble the viewfinder tube from the housing (par. 67c.1). Then remove the retaining ring (15) and lift the cam (14), indexing ball (16), and spring (17) from the housing (18).

(4) The latch cam keys (20), cam hubs (21), and cams (22 and 23) are staked together during assembly and must not be removed unless they are obviously in need of replacement.

(5) To replace any one of the four door latches (25 or 28), remove the shoulder screw (26) and spring washer (27) which attach the latch.

(6) The eccentric washer (29) adjusts the gate arm backlash. If this washer is removed, the gate arm backlash

must be readjusted (par. 70d). The push bar (31) can be lifted from the camera door (32).

b. Cleaning. Refer to paragraph 70b.

c. Reassembly.

(1) Secure the camera door latches (25 and 28) to the camera door with the shoulder screws (26) and spring washers (27). Figure 48.1 illustrates the proper reassembly of these parts.

(2) Position the latch cam link (24) on the inside surface of the camera door. Place the latch cams (22 and 23) in position with the extrusion at each end of the link engaging the proper hole in each cam.

(3) Assemble the latch cam hubs (21) to the door and install the latch cam keys (20) so that the key prongs protrude through the hubs and the cams. Stake over the key prongs. Leave no noticeable play, but allow the latch key to turn freely.

(4) Insert the spring (17) and steel ball (16) into the small hole in the end of the viewfinder housing (18) and hold them in place with a steel ruler or a nail file while assembling the parallax correction cam (14) into the housing. Secure the cam with the retaining ring (15).

(5) Position the indexing spring (11) and roller (12) on the turret mount portion of the viewfinder tube (13). Press the roller inward with a steel ruler or piece of shim stock while installing the turret. Fasten the turret in place with the truss-head screw (9) and spring washer (10).

(6) Insert the assembled viewfinder tube and turret (5) into the housing (18), aline the pilot screw holes in the housing and tube collar, and install the two pilot screws (6 and 7).

(7) Press the viewfinder eyepiece (4) into the housing and screw it into the viewfinder tube. Then fasten the spacer block (19) and housing (18) to the camera door with the four screws (3).

d. Adjustments. Adjust the camera door as instructed in paragraph 70d.

72. Driving Mechanism and Spring (fig. 27)

* * * * * * *

e. Footage Presetting Adjustment.

* * * * * * *

(5) (Superseded) After resetting the gears, recheck the amount of footage recorded and the number of turns made. Wind the spring motor to its full capacity, and reset the footage dial or film counter at 0. Press the starting button and allow the camera to run until it stops.

* * * * * * *

g. Installing Spring and Driving Mechanism.

* * * * * * *

(2) (Superseded) Grasp the gate arm between the thumb and forefinger, and insert the driving mechanism carefully into the camera frame. Spread the two pawls (on the PH-430-B only) until they straddle the film meter ratchet, and press down firmly on the driving mechanism until it is seated solidly in the frame. Check the locking pawl to make certain that it operates the footage dial freely. The KF-3(1) is equipped with a film counter driven by an idler gear near the top of the driving mechanism. This idler gear must be engaged carefully with the film counter when the mechanism is installed.

* * * * * * *

73. Front Mechanism Plate Repair

* * * * * * *

b. Disassembly (fig. 31).

* * * * * * *

(7) Slide the stud * * * except for replacement. **The KF-3(1) is equipped with an idler gear (27, fig. 33.1) which drives the mechanical film counter. Remove the four screws (26) and disassemble the gear retainer (25) and idler gear (27) from the mechanism plate. The rest of the disassembly of the front mechanism plate follows the procedure outlined in paragraph 73 except that for figure 33.1, item 25 is changed to item 28.**

* * * * * * *

e. Reassembly. The reassembly instructions outlined in (1) through (3) below refer to the parts illustrated on figure 33. The remaining steps of the reassembly procedure are keyed to figure 31.

(1) If any of * * * of the plate.

Note. (Added) When reassembling the KF-3(1), install the idler gear (27, fig. 33.1) on the rear retainer (25) and fasten the retainer to the mechanism plate with the four flat-head screws (26).

* * * * * * *

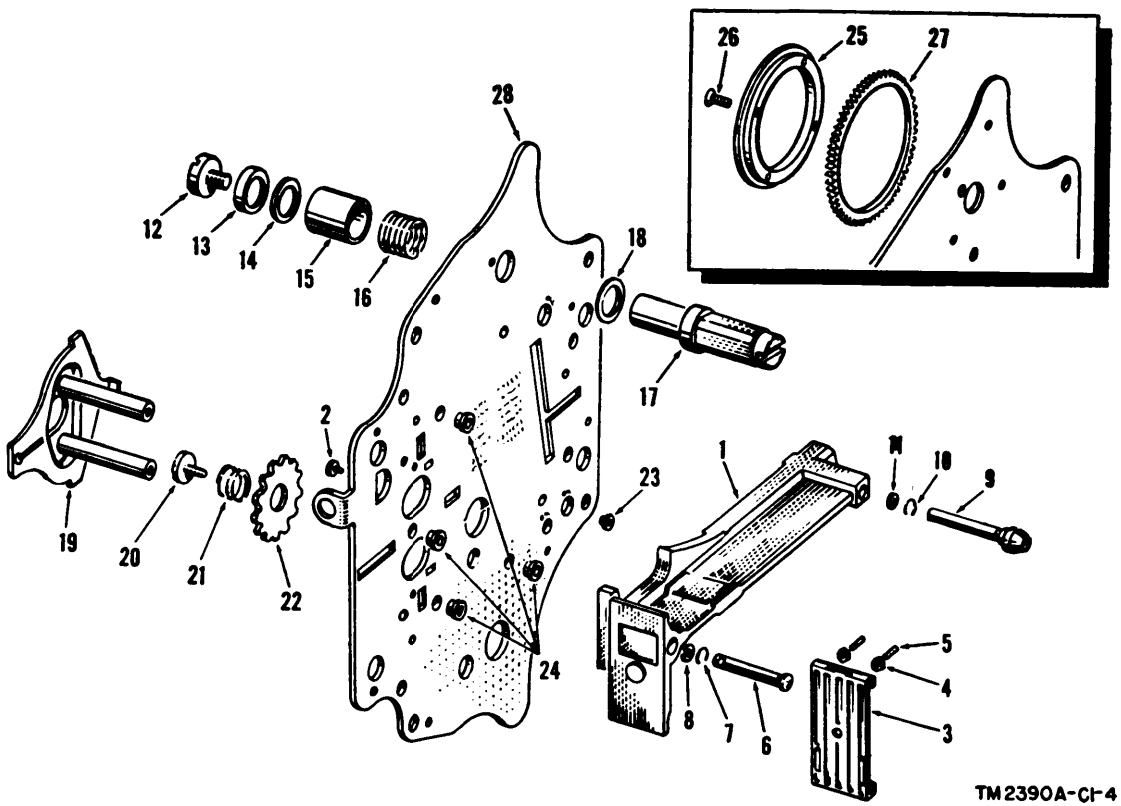


Figure 33.1 (Added). *Front mechanism plate (KF–3(1)), exploded view.*

1	Gate arm assembly	15	Return spring housing
2	Fillister-head screw	16	Return spring
3	Pressure plate	17	Feed spindle
4	Hexagonal nut	18	Friction washer
6	Set screw	19	Stud carrier
6	Front retaining stud	20	Fillister-head screw
7	Spring	21	Stop gear spring
8	Washer	22	Idler stop gear
9	Rear retaining stud	23	Governor bushing
10	Spring	24	Drive gear bushing
11	Washer	25	Idler gear retainer
12	Shoulder screw	26	Flat-head screw (four)
13	Friction collar	27	Idler gear
14	Spring washer	28	Front plate

Figure 33.1—Continued.

74. Back Mechanism Plate Repair

* * * * * * *

b. Disassembly (fig. 39).

* * * * * * *

(2) Lift the pull * * * idler gear (11).

Note. (Added) In the KF–3(1), the pawls and springs are not used, and the eccentric shaft gear has been replaced by a counter feed gear which drives the counter idler gear.

* * * * * * *

d. Repair and Reassembly (fig. 39).

(1) In order that * * * and worm gear. The eccentric shaft gear (10) **(PH-430-B only)** is driven directly by the main driving gear (1) and, through the action of an eccentric, operates the footage indicator pawls. **In the KF-3(1), the counter feed gear (10) also is driven directly by the main driving gear (1) and, in turn, drives the counter idler gear at the top of the front mechanism plate.** The drive shaft * * * back mechanism plate.

* * * * * * *

(4) Prepare a back * * * the back plate. Install the eccentric shaft gear assembly (4) **(or the counter feed gear),** and press the drive shaft stop gear (5) down on the hub of the drive shaft.

(5) (Superseded) On the PH-430-B only, install the tension spring (3), locking pawl (2), and pu1l pawl (1) on the shaft of the eccentric shaft gear assembly (4). Place the assembled back mechanism plate assembly in a clean

spot for reassembly of the major components of the camera.

* * * * * * *

In the legend of figure 39, items 1, 2, and 3 apply to Camera PH-430-B only.

In the legend of figure 40, the following is added after item 10: (PH-430-B) or counterfeed gear (KF-3(1)).

75.1 Camera Frame Repair (KF–3(1))

(Added)

a. Removing Component Assemblies From Frame. Refer to paragraph 75a.

b. Disassembly (fig. 42.1).

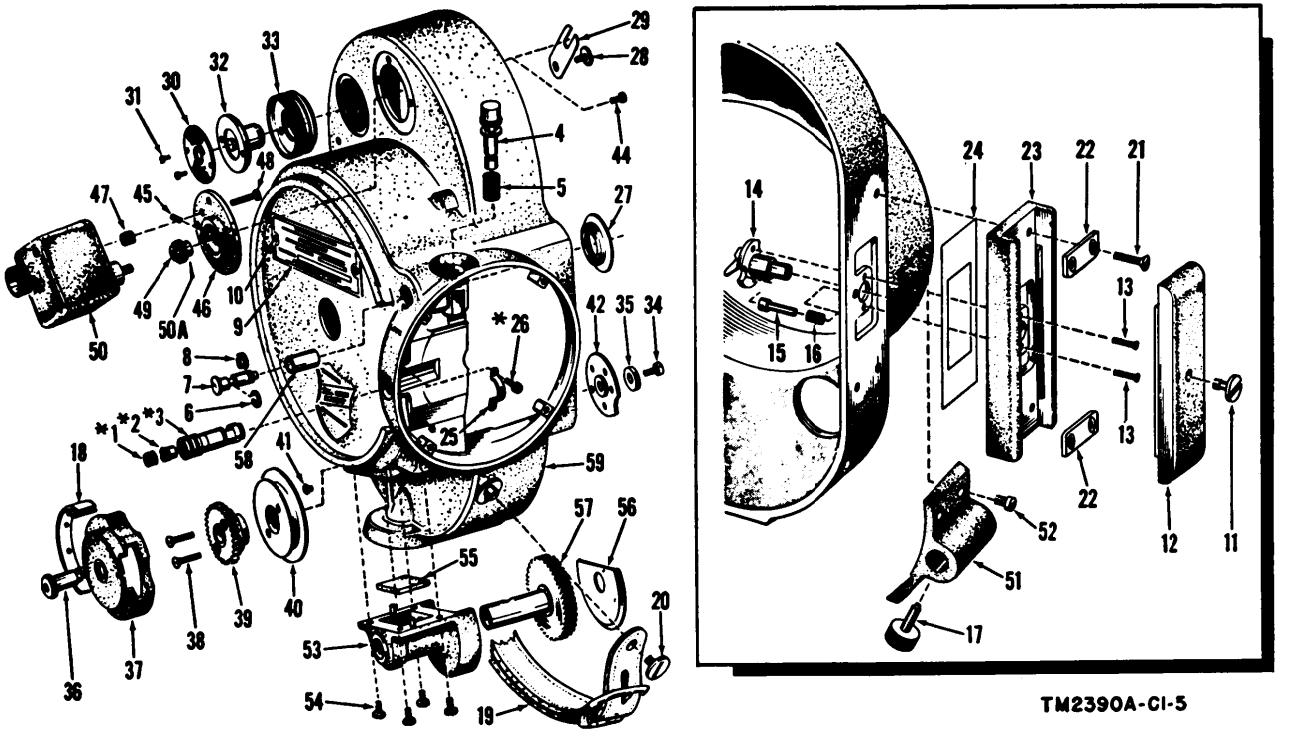
(1) The focuser eyepiece (1), focuser carrier (2), and critical focuser (3) are held in place with the focuser clamp (25) and clamp screws (26). These parts are shown exploded in figure 42.1 for illustrating purposes only. The alinement of the focuser parts is very critical and requires the use of special factory equipment. Do not remove them from the camera frame.

(2) Lift out the starting button (4) and spring (5). Remove the retaining spring (6) from the stop plunger (7) and lift out the plunger and friction spring (8).

(3) Loosen the special screw (11) and lift the cover plate (12) from the rear of the camera. Remove the two flat-head screws (13) and disassemble the push pin crank (14), push pin (15), and spring (16) from the camera. Unscrew the four flat-head screws (21) and lift off the retaining plates (22), magazine slide block (23), and slide block gasket (24).

(4) Carefully pry the light trap cover (18) from the spring belt housing (37). Remove the fillister-head screw (34) and washer (35) and disassemble the gear stud (36), belt housing (37), and pulley (40) from the camera frame. The pulley drive gear (39) is fastened to the pulley with two screws (38). The bearing plate (42) can be separated from the camera frame by removing five flat-head screws (41).

(5) Remove the fillister-head screw (28) and retaining spring (29), and press the governor dial parts (30 through 33) from the camera frame. The dial (30) can be separated from the holder (32) by removing two oval head screws (31).



NOTE: Items 45 through 50A comprise item 43, film counter assembly.
Asterisked (*) items exploded for illustrative purposes only.

Figure 42.1 (Added). *Stripping camera frame, Motion Picture Camera KF–3 (1).*

(6) Unscrew three fillister-head screws (45) from inside the camera, frame and lift the complete film counter (43) from the frame. Loosen the setscrews (45) in the eccentric collar (46). The collar is held rigidly in position with a spacer bushing (47) and fillister-head screw (48). Remove the screw (48) and lift off the collar and spacer bushing. Drive out the taper pin (50A) and press the drive gear (49) from the film counter (50).

(7) Remove four fillister-head screws (52) and the motor bracket (51). If necessary, unscrew the knurled screw (17) from the bracket.

(8) Remove four fillister-head screws (54) and carefully pry the hand-crank housing (53) from the camera frame. Disassemble the lubricating pad (55), housing cover (56), and cranking gear (57) from the housing.

(9) Inspect the stop plunger bushing (58) and main drive shaft bearing (27) for abnormal wear, *out-of-round* or similar damage. If necessary, press these items from the camera frame.

(l0) Remove the identification plate (9) by first removing 2 oval-head screws (10).

c. Cleaning and Lubrication. Refer to paragraph 75c.

d. Reassembly (fig. 42.1).

(1) If the stop plunger bushing (58) and main drive shaft bearing (27) were removed for replacement, press the new parts into the camera frame.

(2) Fasten the motor bracket (51) to the camera frame with the four fillister-head screws (52).

(3) Secure the drive gear (49) to the shaft of the film counter (50) with the taper pin (50A). Install the eccentric collar (46) over the drive gear (49) with the hub of the collar facing the counter. Slip the spacer bushing (47) between the eccentric collar (46) and film counter (50), and install the fillister-head screw (48). Tighten the set screws (45) to lock the eccentric collar (46) rigidly in place. Insert the drive gear end of the assembly through the camera frame and install the three fillister-head screws (44).

(4) Fasten the bearing plate (42) to the camera frame with five flat-head screws (41). Assemble the drive gear (39) to the belt pulley (40) with two flat-head screws (38). The belt pulley parts (34 through 40) must not be assembled to the camera frame until the driving mechanism has been installed (par.72g).

(5) Fasten the governor dial (30) to the dial holder (32) with the two oval-head screws (31). Assemble the dial holder (32) to the speed control knob (33) and insert this group through the opening in the camera frame. Slip the arms of the retaining spring (29) around the groove in the end of the dial holder, and fasten the spring to the camera frame with the screw (28).

(6) Fasten the magazine slide block (23) and gasket (24) to the camera frame with the two retaining plates (22) and four flat-head screws (21). Install the spring (16) to the push pin (15) and insert the push pin through the hole in the camera frame and slide block. Install the pushpin crank (14) so that the crank actuating arm engages the slot in the head of the push pin, and secure the crank with the two screws (13). Attach the cover plate (12) with the special screw (11).

(7) Assemble the friction ring (8) and retaining ring (6) to the stop plunger (7); be sure that both rings are compressed seas to avoid scoring the stop plunger bushing (58). Insert the plunger into the bushing, and drop the spring (5) and starting button (4) down into place. Hold the starting buttondown and tap the stop plunger until the plunger engages the keyway or slot at the end of the push button.

(8) Assemble the cranking gear (57), housing cover (56), and lubricating pad (55) into the hand-crank housing (53), and lubricate the pad with Oil, Lubricating, Light (LO). The hand-crank housing (53) must not be assembled to the camera frame until after the driving mechanism has been installed (par. 72g).

e. Assembling Camera Components.

(1) Install the driving mechanism (par. 72g). Assemble the belt housing (37, fig. 42.1) and pulley (40) to the gear stud (36) and assemble this group carefully to the camera frame (59). The locating pin, inside the belt housing (37) opening in the camera frame, must fit into the slot in the belt housing. Secure the gear stud with the screw (34) and washer (35).

(2) Install the camera head (par. 71d) and the camera door (par. 70d), and press the winding key into the winding key socket. Adjust the camera (par. 78).

78. Final Camera Adjustments

* * * * * * *

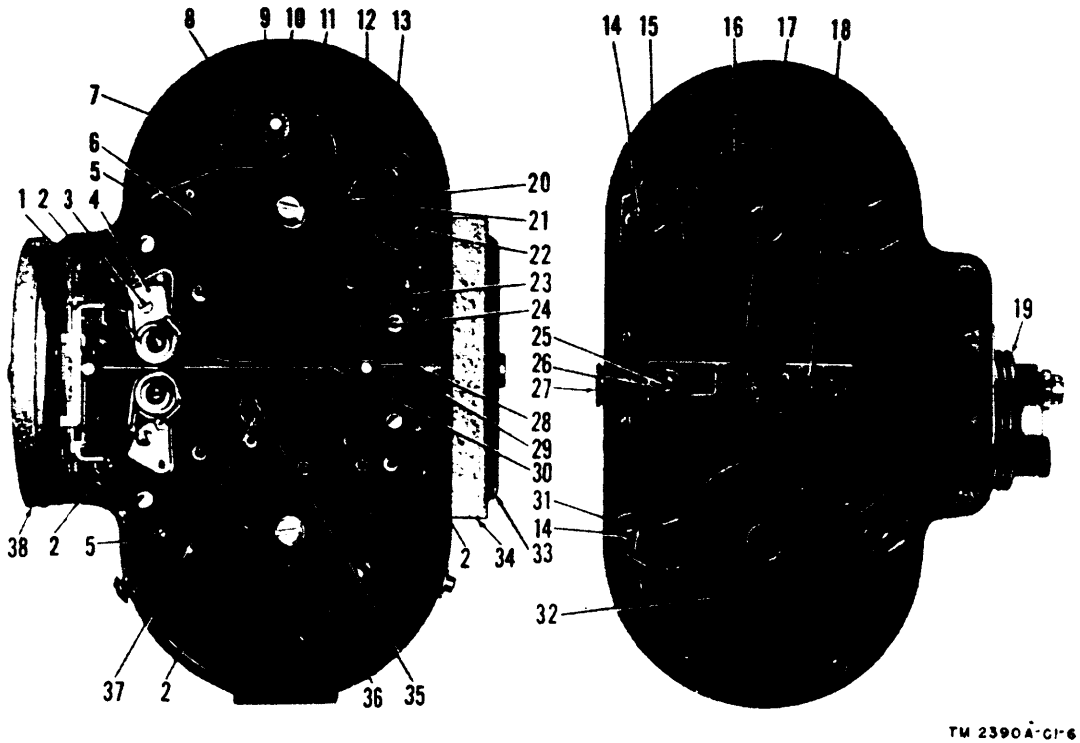


Figure 48.1 (Added). *Location of parts in film chamber and on door for Motion Picture Camera KF–3 (1).*

1 Sprocket guard (two)
2 Front plate attaching screw (six)
3 Guard shoe retaining screw (two)
4 Sprocket guard shoe (two)
5 Drive mechanism attaching screw (four)
6 Front mechanism plate
7 Film counter idler gear
8 Eccentric collar attaching screw (three)
9 Feed tension regulating screw
10 Film counter drive gear
11 Feed reel spindle
12 Connecting link screw (long)
13 Governor dial holder
14 Door latch attaching screw (four)
15 Door latch (upper) (two)
16 Latch cam (upper)
17 Latch cam link
18 Push bar
19 Viewfinder turret
20 Governor connecting link
21 Dial holder retaining spring
22 Retaining spring screw
23 Connecting link screw (short)
24 Film guard (four)
25 Eccentric washer attaching screw
26 Eccentric washer
27 Viewfinder eyepiece
28 Push pin
29 Push pin crank
30 Film gate arm
31 Door latch (lower) (two)
32 Latch cam (lower)
33 Slide block cover plate
34 Magazine slide block
35 Main drive shaft stop gear
36 Take-up spindle
37 Mechanism idler gear
38 Lens turret

Figure 48.1—Continued.

---

e. Gate Arm Eccentric Adjustment **(figs. 48 and 48.1).**

* * * * * * *

f. Camera Footage Adjustment.

* * * * * * *

(2) (Superseded) Wind the spring to capacity and set the footage indicator dial at zero. Press the camera starting button and allow the camera to run until it stops. Then check the footage dial or film counter to see how many feet the camera has run.

(a) As an example, suppose the footage dial or film counter registers a camera run of 19 feet. Since each tooth * * * re-engage the gears.

(b) (Superseded) If, for example, the footage dial or film counter should register a camera run of 30 feet on one complete winding, disengage the idler gear with a screwdriver and turn the winding key slowly until three drive gear teeth (representing 9 feet) have passed by the idler gear in a counterclockwise direction. Then re-engage the gears.

* * * * * * *

82. General Mechanical Test Procedure

* * * * * * *

d. (Superseded) Rewind the spring motor to full capacity and set the footage dial or film counter at zero. Press the starting button and allow the camera to run down. The camera footage dial or film counter must show a run of not less than 21 and not more than 23 feet. If necessary, adjust as instructed in paragraph 78f.

* * * * * * *

APPENDIX II
IDENTIFICATION TABLE OF PARTS
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SigC Lab (5)
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11-127, Sig Rep Co (2)
11-128A, Sig Depot Co (2)
11-500A (AA through AE), Sig Admin Teams (2)
11-587A, Sig Base Maint Co (2)
11–592A, Hq & Hq Co, Sig Base Depot (2)
11-597A, Sig Base Depot Co (2)
19–500A (AA through AD), MP Svc Org (2)
30-500A (2)

NG: None.

USAR: None

Unless otherwise noted, distribution applies to CONUS and overseas.
For explanation of abbreviations used, see SR 320-50-1.

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TM 11-2390A

CAMERA
PH-430-B

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DEPARTMENT OF THE ARMY

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For explanation of distribution formula, see SR 310-90-1.

CONTENTS

Figure 1. Camera PH-430-B, mounted on tripod.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. These instructions are published for the information and guidance of the personnel to whom this equipment is issued. They include complete information on the operation and the organizational and field maintenance of the equipment as well as a discussion of the theory of camera operation. They apply only to Camera PH-430-B.

b. Appendix I contains a list of current references including supply catalogs, technical manuals, and other available publications applicable to the equipment. Appendix II contains an identification table of parts for Camera PH-430-B. Appendix III contains depth of field charts for lens components supplied with Camera PH-430-B.

2. Forms and Records

The following forms will be used for reporting unsatisfactory conditions of Army equipment and in performing preventive maintenance:

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

b. DA AGO 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. AF Form 54, 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 AFR 65-26.

d. DA AGO Forms 11–258 and 11–259, Preventive Maintenance Checklist for Signal Corps Equipment, will be prepared in accordance with instructions on the back of the form.

e. Use other forms and records as authorized.

Section II. DESCRIPTION AND DATA

3. Application

Camera PH-430-B is a 16-mm (millimeter), silent motion picture camera which includes a tripod and all necessary accessories (par. 4). The camera unit has a rotatable lens turret which will accommodate three lenses of different focal lengths. The camera is calibrated to operate at speeds of 8, 12, 16, 24, 32, 48, and 64 fps (frames per second). A built-in, high-speed governor mechanism assures accurate and constant speed control. Included as components are a tripod assembly, tripod case, four lenses of different focal lengths, filters, a camera carrying case, and other components necessary for proper operation and maintenance.

4. Table of Components

(figs. 5 and 9)

Quantity	Component	Dimensions (in.)		
		Height	Width	Length
1	Camera, 16-mm motion picture	8	5½	6
1	Case, camera carrying	11½	9½	15¼
1	Lens, 0.7-INCH, F/2.5 (w/lens shade)			1⅞
1	Lens, 1-INCH, F/1.9 (w/lens shade)			2⅛
1	Lens, 2-INCH, F/3.5 (w/lens shade)			3½
1	Lens, 4-INCH, F/4.5 (w/lens shade)			4⅝
18	Filter, glass (refer to paragraph 7 for types).			
3	Case, filter			
3	Cover, lens mount			
1	Reel, 100 ft, 16-mm film			
1	Strap, camera carrying			
1	Tripod assembly	44½ (folded) 73 (legs extended).		
1	Tripod carrying case			46¾
1	Oil (LO) (2-oz. bottle)			
2	Cleaner, lens, liquid (2-oz. bottle)			
1	Oiler, hand, single drop		½	5
2	Tissue, lens (package)			
1	Brush, aperture		¼	4
1	Slate, camera scene		9	13¼
1	Chalk, white (box)			
1	Syringe, air, rubber			

Note. This list is for general information only. See appropriate publications for information pertaining to requisition of spare parts.

5. Component Ports of Camera Unit

The camera unit supplied with Camera PH-430-B consists of a metal frame housing which contains a film-movement mechanism, a compact lens turret, a critical focuser, a governor speed dial, a film footage dial, a spring motor and winding key, a start, ing button control, a positive viewfinder, a shutter, and an aperture plate. A motor bracket has been added so that an electric motor may be attached if so desired.

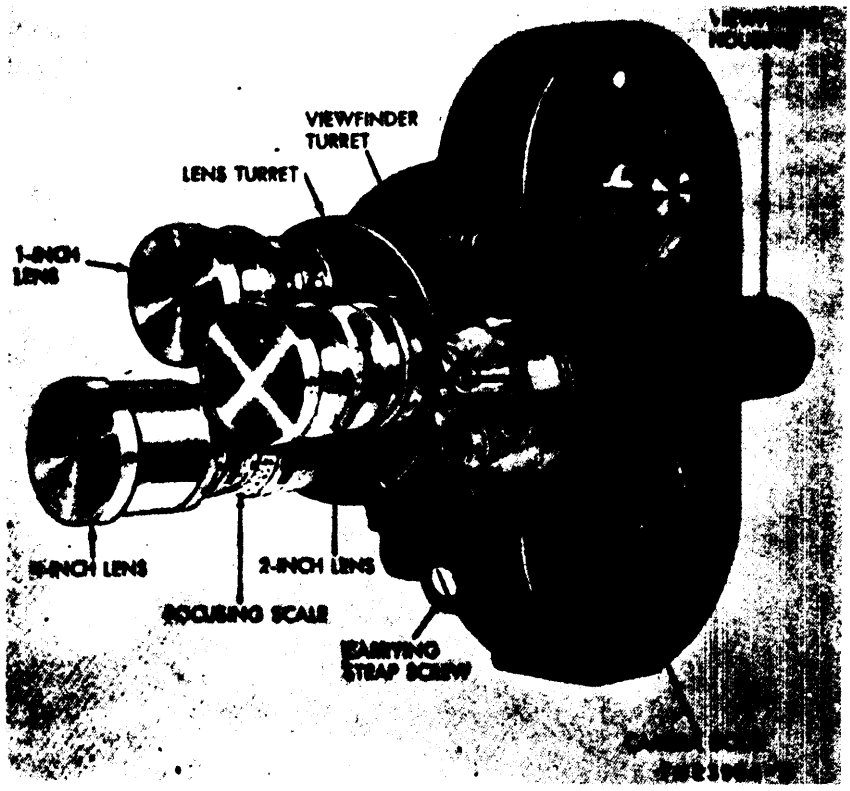


Figure 2. Camera, lenses in place, front left view.

a. CAMERA FRAME (fig. 2). The main frame of the camera is die-cast aluminum alloy with an olive-drab crackle finish. This casting holds the optical system and all of the moving parts of the camera in alinement. The camera door is detachable as a unit and is locked to the frame by the upper and lower door levers which are operated by a cam latch link and two outer cam latches. Markings for both the CLOSED and OPEN positions of the cam latches are embossed on the outer surface of the camera door. The positive viewfinder housing is an integral part of the camera door.

b. LENS TURRET (fig. 2). The rotatable lens turret mounts three lenses of different focal lengths to facilitate rapid changing from one lens to another. The desired lens can be moved into position either for photographing or critical focusing by rotating the turret head in either direction. A detent (locking) mechanism provides positive positioning of the lens; an audible click and a sudden arresting of the rotating motion will indicate that the lens is seated properly. As an added safety feature, the starting button *(g* below) is locked automatically when the lens is in any position other than photographing position. To bring any one of the lenses mounted on the camera turret into correct photographing position, rotate the lens turret until the detent mechanism *closest to* the positive viewfinder arrests the movement of the turret.

c. CRITICAL FOCUSER (fig. 3). The built-in critical focuser provides an inverted and greatly magnified image of the central portion of the subject being photographed. The lens which is being used is moved to the focusing position by rotating that lens

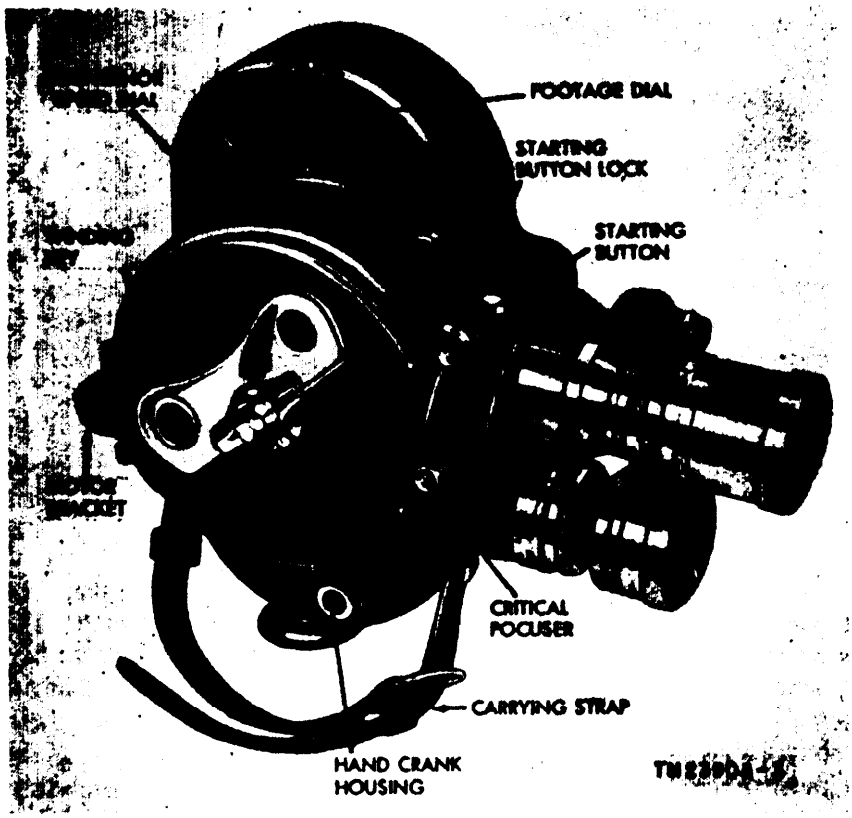


Figure 3. Camera carrying strap attached, front right view.

until the dot on the edge of the turret head is opposite the word LOCK embossed on the camera frame casting (fig. 3). The detent mechanism accurately positions the lens at this position.

d. GOVERNOR SPEED DIAL (fig. 3). The governor speed dial is located near the top of the camera frame on the right, or winding key side, and is marked EXPOSURES PER SEC. The outer knurled ring has a scribed mark to coincide with any one of seven speeds (8, 12, 16, 24, 32, 48, and 64 fps) that may be selected. The outer knurled ring 'revolves in both directions about the disk upon which these seven speeds are indicated. This ring must be turned to set the camera for the proper running speed.

e. FOOTAGE DIAL (fig. 3). The footage dial, marked 0 to 100, is located above and to the right of the governor speed dial. The footage dial is actuated by the camera mechanism and registers the amount of film used, in feet, from the instant that the starting button is pressed to the instant that the button is released. The dial can be hand-turned in a counterclockwise direction only. The large center dot above the dial indicates the footage of film which has been exposed; the two smaller dots indicate the leader footage at the end and beginning of the film.

f. MOTOR DRIVE AND WINDING KEY (fig. 3). A hand-wound, spring-driven motor with a built-in governor provides accurate control throughout the range of 8 to 64 fps. One complete winding of the spring motor drives approximately 22 feet of film through the camera. The spring motor mechanism is designed to stop automatically y before reaching the deceleration point at the end of the winding. Winding is accomplished by means of the motor winding key on the right side of the camera frame. When the winding key is turned clockwise, the shaft of the key engages the spring motor and is ratchet-driven by the handle of the key only when the handle is unfolded perpendicular to the camera frame.

g. STARTING BUTTON (fig. 3). The starting button is located on the front of the camera frame, directly above the turret head. This button must be depressed to start the motor and released to stop the motor. The camera can be locked in the running position by the use of the starting button lock which is located just to the right of the starting button.

h. POSITIVE VIEWFINDER (fig. 4). The positive viewfinder turret mounts three objectives which match the lenses being used on the camera and revolve in the same manner as the turret. The objectives, when positioned according to the lens being used, show an image of the actual area being photographed by the camera lens. This makes masks unnecessary when the telephoto lens is used.

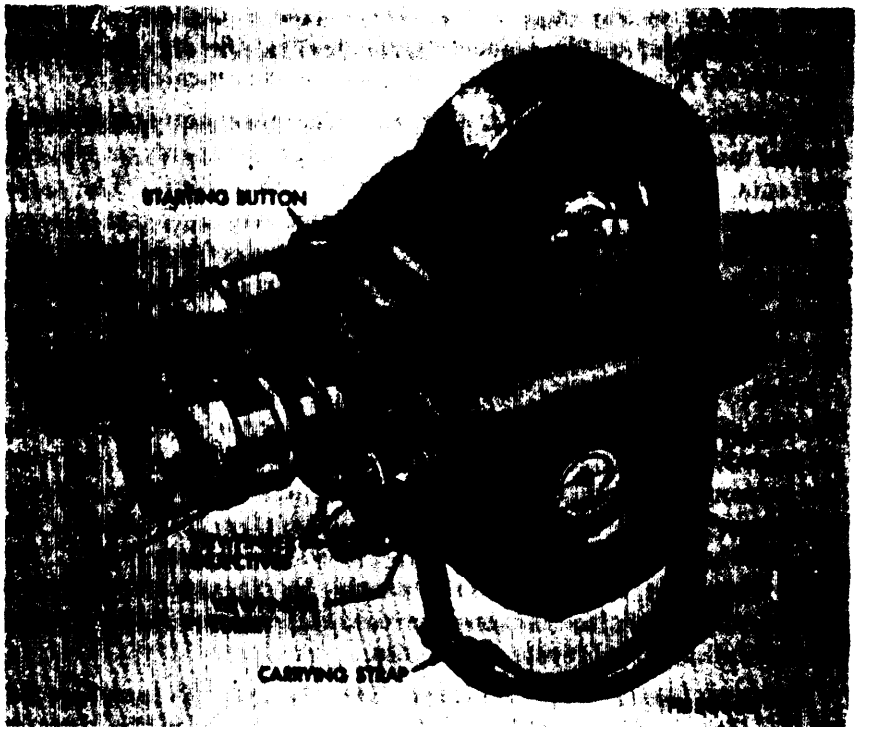


Figure 4. Camera, left side view.

i. SHUTTER (fig. 23). The rotary, metal, disk-type shutter has a fixed open segment of 204°. It is geared directly to the film movement mechanism and cannot get out of synchronization. The 204° opening gives an exposure time of 1/27 second at a speed of 16 fps. At 8 fps, the exposure time is 1/13 second; at 12 fps, 1/20 second; at 24 fps, 1/40 second; at 32 fps, 1/53 second; at 48 fps, 1/80 second; and at 64 fps, 1/107 second. The shutter mechanism is designed so that the shutter is always in the closed position over the exposure aperture when the camera stops.

j. APERTURE PLATE (fig. 23). The stainless steel aperture plate and the adjacent pressure plate guide the film as it passes over the aperture for exposure. Two horizontal shuttle teeth of the intermittent movement, which is geared to the camera motor, extend through a slot in the aperture plate. These teeth engage the sprocket holes in the film and draw each frame down past the aperture for exposure.

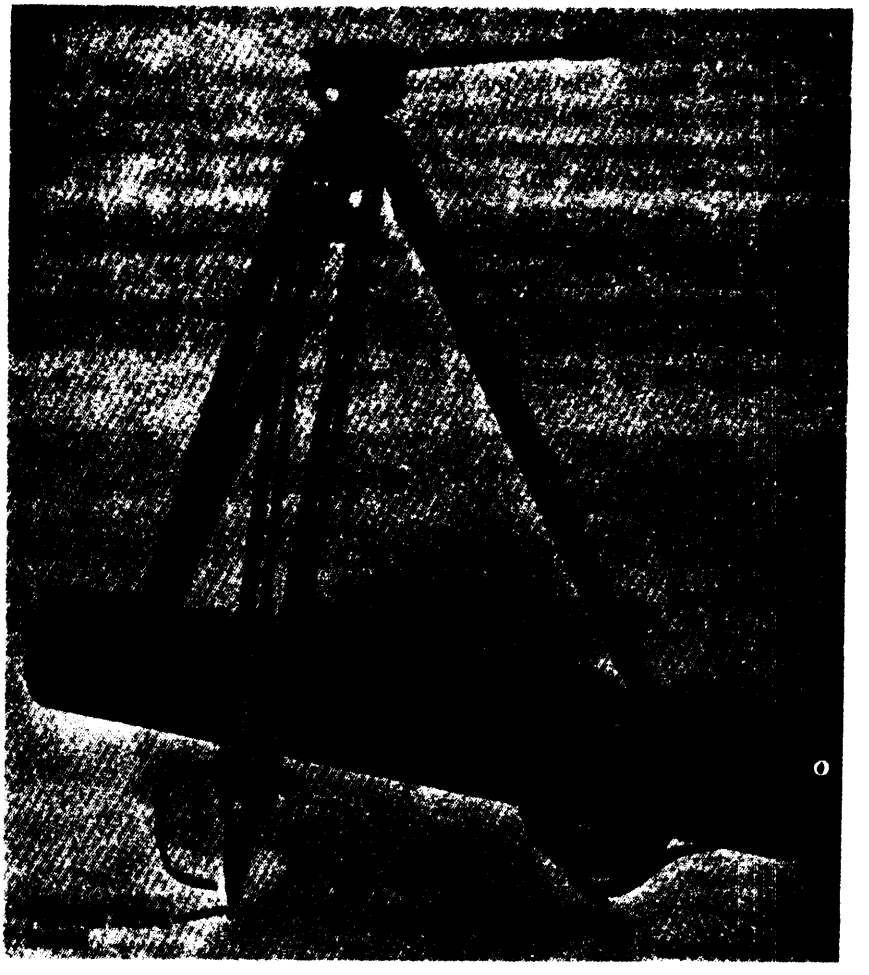


Figure 5. Tripod and carrying case.

6. Component Parts of Tripod Assembly
(fig. 5)

Tripod PH-520A/U consists of a base unit with legs attached, ahead, and a carrying case.

a. TRIPOD BASE UNIT (fig. 6). The tripod base is made of a one-piece aluminum casting with cast leg bosses. An L-shaped spirit level is mounted permanently on the tripod head. Each of the three tripod legs is constructed in two sections to permit adjustment of the length from 44½ inches to 73 inches. The legs are fastened to the tripod base with studs, locking nuts, and washers. A clamping mechanism, consisting of a clamp and

knurled screw, can be locked to hold each leg at the desired length. Each leg is equipped with pointed steel shoes.

b. TRIPOD HEAD. The tripod head is constructed to permit movement in two planes simultaneously. It consists of a tilting top for moving the camera in a vertical plane and a *panning* (panoramic) mechanism for moving the camera in a horizontal plane. The head is made of cast aluminum with the bearing supports for the tilt top cast as an integral part of the head. TWO lock handles (fig. 6) make it possible to lock the camera position in any tilt or panning point. Friction control of the tilt can be adjusted to any degree of traction by turning the tension knob (fig. 6). The tripod handle can be removed by unscrewing it from the tilt.

Figure 6. *Tripod base and head construction.*

c. TRIPOD CARRYING CASE (fig. 5). The carrying case is of rigid, tubular construction and is designed to hold the folded tripod. The tripod handle must be unscrewed from the tilt and screwed into the adjusting ring beneath the tripod base unit before inserting the tripod into the case. The cover is secured with a strap, and a leather handle facilitates carrying.

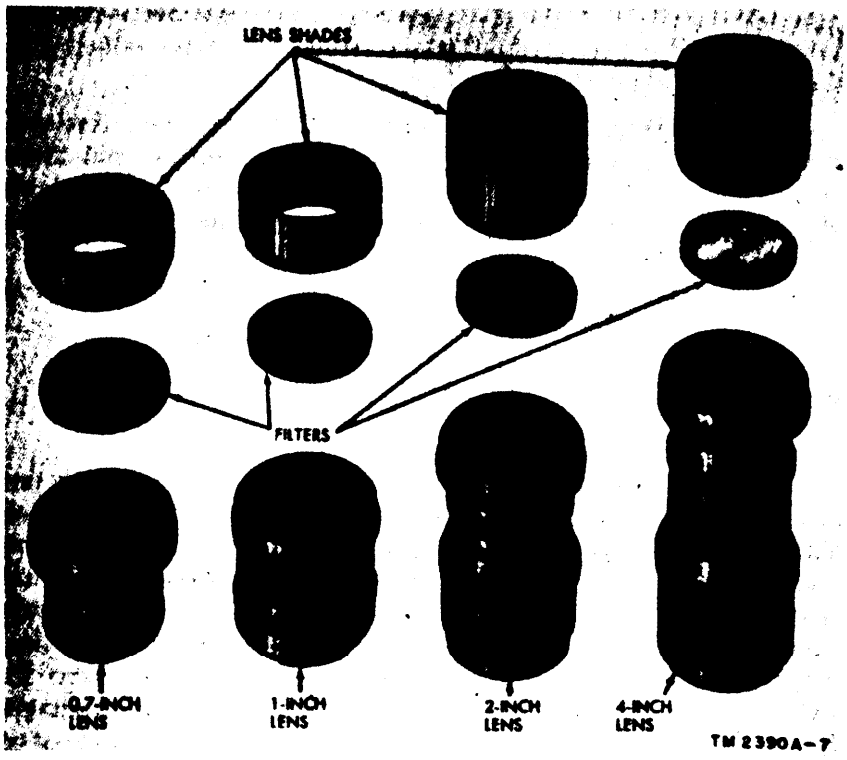


Figure 7. Lenses, lens shades, and filters.

7. Lenses

(fig. 7)

Each of the four lenses supplied with Camera PH-430-B is a high-quality anastigmatic lens mounted in a barrel. All lenses are provided with detachable lens shades. The lenses supplied with the equipment are coated with a fluoride or similar coating in accordance with Army specification 75-150-C.

a. LENS, 0.7-INCH F/2.5 (WIDE ANGLE). This lens has a focusing range from 2 feet to infinity and is designed for use in filming, from a given position, a larger area than is possible with any other lens used on the camera. This lens is to be used where it is

necessary to obtain a wide angle of view and a large depth of field. Use of this lens should be limited to relatively short distances, with applicable exceptions, because of the small image size produced.

b. LENS, 1-INCH F/1.9 (STANDARD ANGLE). This lens has a focusing range from 1 foot to infinity and is used for general photographic work.

c. LENS, 2-INCH F/3.5 (TELEPHOTO). This lens has a focusing range from 2½ feet to infinity and provides a closer effect than the standard-angle lens.

d. LENS, 4-INCH F/4.5 (TELEPHOTO). This lens has a focusing range from 4½ feet to infinity and gives an image four times larger than the l-inch lens. This lens is used where a short depth of field is desired such as when photographing small objects against confusing foregrounds and backgrounds.

Note. All movable scales or collars on the lenses have raised, milled serrations on their outer periphery, to facilitate resetting position.

8. Filters

(fig. 7)

Three identical sets of filters, each containing six filters, are provided with Camera PH-430-B. These filters are all interchangeable and can be accommodated by any of the lens components provided in the equipment. Three leather cases are supplied, each of which will hold six filters. The list of filters supplied and their colors are as follows: Wratten 15 (G), deep yellow; Wratten 1.00 (neutral density) ; Wratten 5, (aero 2), yellow; Wratten .5 (neutral density) ; Wrath 23 (A), orange-red; Wratten 5N5, yellow-green. All the filter components supplied with Camera PH430-B are of the type II.

9. Camera Carrying Case and Accessories

a. CARRYING CASE *(fig.* 8). The camera carrying case is of wooden construction with metal corner braces. The support block and braces for the camera are lined with foam rubber to prevent scratching and act as a shock absorber for the camera. Separate compartments are provided for the filter cases, 4-inch lens, lubricating oil, lens cleaning fluid, lens tissues, chalk, and camera slate. A strap in one corner of the lid holds the camera hand crank in place. A handle and an adjustable shoulder strap, both made of webbing, are provided for carrying the case. No provision is made in the camera carrying case for any of the lens components other than the 4-inch lens. This lens has its own compartment in the

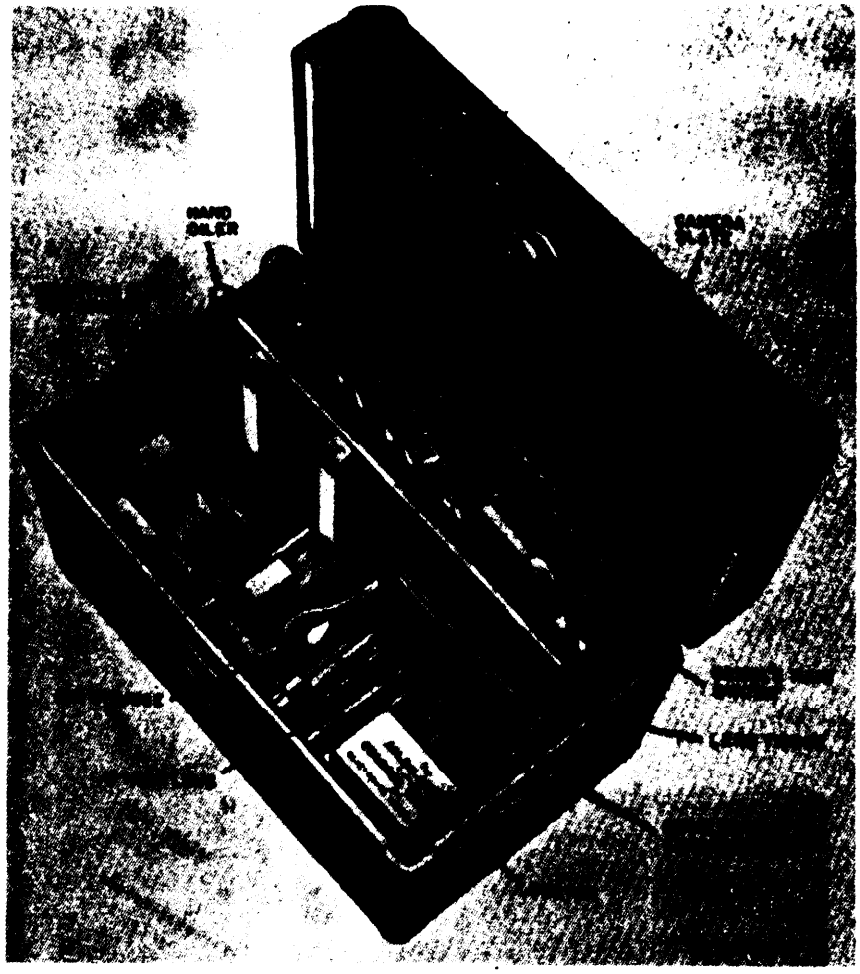


Figure 8. Camera carrying case, camera removed.

carrying case. Fasten the remaining lens components securely in the camera lens turret.

b. ACCESSORIES (fig. 9). The following accessories are included in the components supplied with the equipment:

(1) A camera slate, 9 by 13¼ inches, constructed of black vulcanized fiber, used for identifying scenes taken with the camera. Ring-bound numbers and letters at the top of the slate make possible a rapid change in scene identification. A supply of chalk is also provided.

(2) A soft, camel's-hair aperture brush for dusting the aperture plate, pressure plate, lenses, filters, and film chamber.

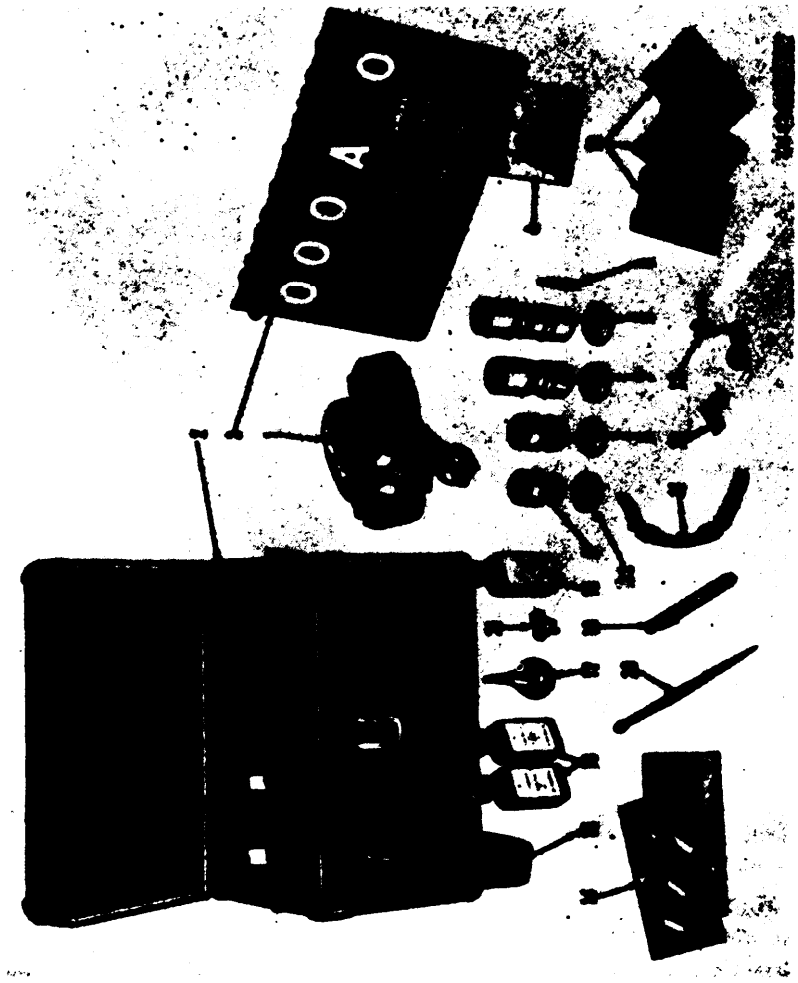


Figure 9. Components of camera PH–430–B, less tripod and case.

1. Camera.
2. Case, carrying.
3. Slate, camera scene.
4. Chalk, white (box).
5. Lens, 0.7-INCH, F/2.5 (w/lens shade).
6. Lens, 1-INCH, F/1.9 (w/lens shade).
7. Lens, 2-INCH, F/3.5 (w/lens shade).
8. Lens, 4-INCH, F/4.5 (w/lens shade).
9. Objective, positive viewfinder.
10. Cases, filter.
11. Strap, camera carrying.
12. Gage, film reel.
13. Crank, camera (hand).
14. Tissue, lens (package).
15. Strap, case, camera carrying.
16. Cleaner, lens, liquid (2-oz. bottle).
17. Syringe, air, rubber.
18. Oil, lubricating, light (LO) (2-oz. bottle).
19. Oiler, hand, single drop.
20. Brush, camel's-hair.
21. Keys, camera case.
22. Cap, lens.

Figure 9—Continued.

(3) A 2-ounce bottle of oil, lubricating, light (LO), for lubricating the moving parts of the camera.

(4) A hand oiler with a clip for pocket carrying. This syringe-like oiler is designed so that pressure on the needle spout will cause 1 drop of oil to be ejected. The spout cap and needle applicator can be unscrewed from the glass container.

Figure 10. Camera carrying case, camera in place.

(5) A rubber, bulb-type air syringe for blowing dust and dirt from the camera mechanism and lens surfaces.

(6) Two 2-ounce bottles of liquid lens cleaner.

(7) A hand crank which makes it possible to run a full, 100-foot reel of film through the camera without winding.

(8) A leather carrying strap for hand-carrying the camera and providing a more rigid wrist support during picture-taking operation.

(9) Two packages of 4- by 6-inch lens tissue for cleaning lenses and filters.

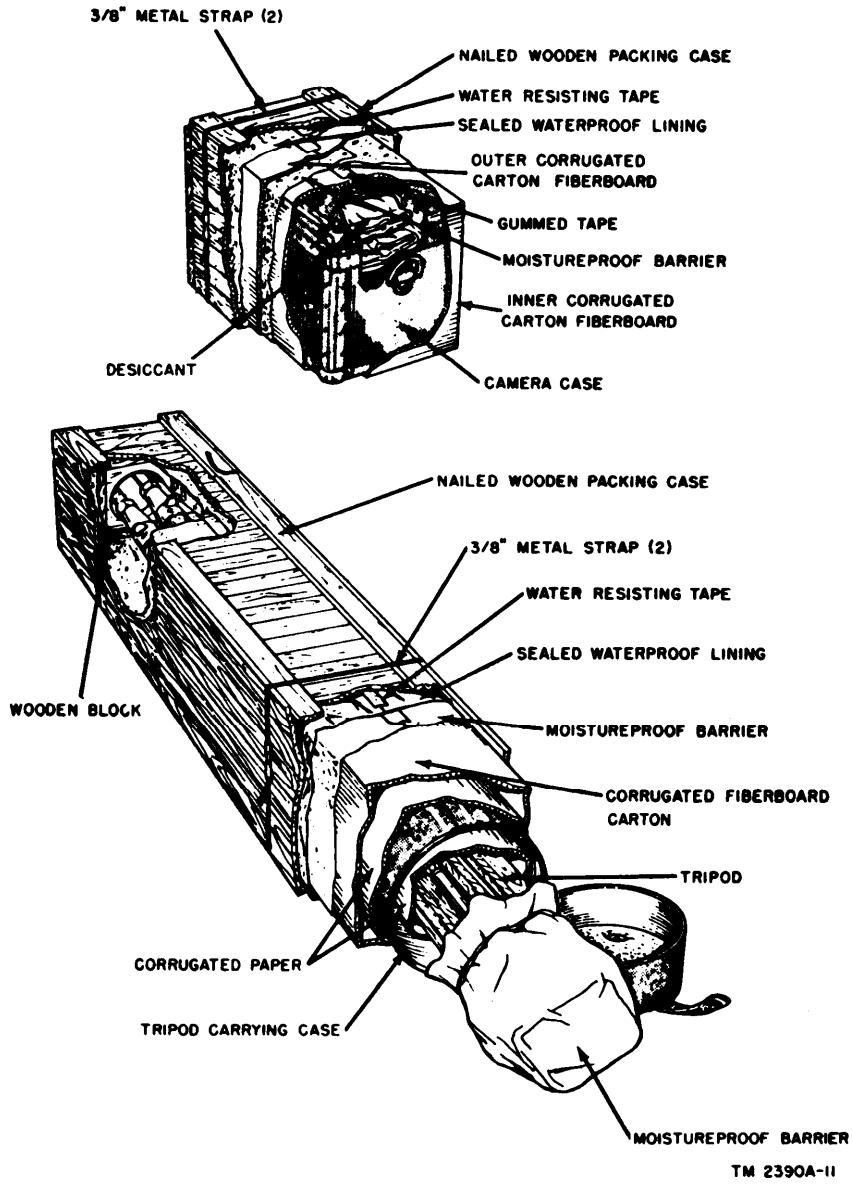


Figure 11. Packaging and packing camera and tripod.

10. Packaging Data

(fig. 11)

a. The camera component and its accessories (less tripod) are placed within their designated compartments in the carrying case (fig. 10), and the voids within the case are thoroughly packed with neutral cellulose wadding to prevent movement of the parts. The carrying case then is wrapped with corrugated fiberboard paper and is placed within a close-fitting corrugated fiberboard box and sealed with waterproof tape. After sealing, the boxed carrying case is wrapped in a moisture-vaporproof barrier and heat-sealed. This box then is placed within a second close-fitting, corrugated fiberboard box which, in turn, is sealed with water-resistant tape. This second box is placed within a water-greaseproof lined wooden box. The lining is folded over and all open spots are sealed with waterproof tape. The box then is nailed shut.

b. The head of the tripod assembly is wrapped in water-greaseproof paper. A 3½-inch diameter hole is cut part way through a 3-inch thick, 5-inch square block, and the tripod shoe points are inserted in this hole. The entire tripod is then wrapped in corrugated fiberboard paper and inserted into the tripod carrying case. The carrying case is wrapped in corrugated fiberboard paper and placed in a fiberboard box which is sealed with waterproof tape. The boxed tripod and case then are wrapped in waterproof barrier material and completely waterproof-sealed. This, in turn, is placed within a water-greaseproof lined wooden box. The lining is sealed with waterproof tape and the wooden box nailed shut.

c. When Camera PH-430-B is crated for oversea shipment, each of the two wooden crates is bound with two ¾-inch metal straps.

CHAPTER 2
OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

11. Service Upon Receipt of New Equipment

u. Be very careful when uncrating and unpacking the equipment. Avoid thrusting tools into the interior of the shipping container. Do not damage the packaging materials any more than is absolutely necessary to remove the equipment; these materials may be required for future packaging. Stow the interior packaging material within the wooden shipping container. When uncrating and unpacking the equipment follow the procedure outlined below:

(1) Unpack the equipment in a location where it will not be exposed to dust, dirt, or excessive moisture.

(2) Cut the metal straps with a suitable cutting tool, or twist them with pliers until the straps crystallize and break.

(3) Remove nails from top of shipping container with a nail puller.

(4) Cut the tape and seals of the case liner so that the waterproof paper will be damaged as little as possible.

(5) Lift the packaged equipment from the wooden crate.

(6) Cut the tape, which seals the top flaps of the outer cartons, in such a manner as to leave the cartons undamaged.

(7) Carefully cut the moisture-vaporproof barrier and remove the inner cartons. Remove the camera case and tripod case from the cartons and return shipping cartons and packaging material to wooden case for possible future reuse. Open the tripod case and remove waterproof paper from tripod head.

b. Open the camera carrying case and thoroughly check all equipment against the shipping documents. Carefully inspect all components for possible damage during shipment. Pay particular attention to the condition of the lenses, positive viewfinder objectives, and external control points.

12. Service Upon Receipt of Used or Reconditioned Equipment

The uncrating, unpacking, and checking procedure for used or reconditioned equipment will be the same as that followed for new equipment (par. 11). It is very important to check used equipment for a possible shortage of components. The components of used equipment also should be checked for damage so that any damaged parts can be replaced immediately.

Section II. CONTROLS

Note. This section describes, locates, illustrates, and furnishes the operator with all information pertaining to the various controls provided for proper operation of the equipment. Do not attempt the operation of this equipment until the use of all operating controls is understood fully.

13. Winding Key

The winding key is located on the right side of the camera frame. When the wing handle of the key is flat against the camera, the key is disengaged. Lift the handle until it is perpendicular to the side of the camera. This engages the key with the ratchet. Wind the spring motor by turning the winding key counterclockwise. If the key is grasped in the right hand while the left hand holds the camera, the camera itself may be turned one way while the key is turned the other. The ratchet design makes it possible to use the same backward and forward winding motion that is used when winding a watch. A definite resistance to turning will indicate that the spring is wound fully. After winding, fold the key flat against the side of the camera. If left erect, it will rotate as the camera runs.

14. Starting Button and Starting Button Lock (fig. 3)

a. The starting button is located on the front of the camera frame, directly above the turret head. The spring motor starts when the button is depressed, and it stops automatically when the button is released.

b. The starting button lock is located to the right of the starting button and is used to lock the camera in the running position. This is particularly useful when the camera is tripod-mounted, because it permits the operator to step into the scene. Hold the starting button down and press in the lock. To stop the camera mechanism, withdraw the lock to release the starting button.

15. Starting Button Safety Locking Device

A safety device incorporated into the camera prevents accidental starting of the camera. Revolve the turret so that any one of the three index dots on the edge of the turret head falls opposite the word LOCK on the camera frame. To release the starting button, rotate the turret until the desired lens is at the aperture and the corresponding index dot is opposite the word RUN.

Section III. OPERATION UNDER USUAL CONDITIONS

16. General

The procedures forgetting up, loading, and operating Camera PH-430-B are described in paragraphs 17 through 34. The operator should familiarize himself thoroughly with these procedures until the operation of the camera, including that portion involving special effects, becomes more or less automatic.

17. Preloading Instructians

a. Remove the camera door by turning both door latches simultaneously to the OPEN position and by lifting the door from the frame.

b. Carefully press in the gate arm tension pin and slide the gate (pressure) plate from the gate arm.

c. Remove dust from the gate plate, aperture plate, and the aperture itself with a soft camel's-hair brush. Be sure that no lint or brush hairs cling to the edge of the aperture opening. If emulsion or dirt accumulation remains after brushing and cannot be removed by wiping with a clean, dry cloth, use an orange stick or toothpick moistened with solvent, dry-cleaning (SD) to scrape off such dirt.

Note. Do not use a knife or any othcr metal to clean the parts mentioned in c above. Avoid scratching or otherwise marring the highly polished surfaces of the aperture plate and the gate plate.

d. Clean the film guides in the same manner as the aperture plate and gate plate. The shuttle teeth slots in the gate plate must lineup with the shuttle teeth slots in the aperture plate. Gently press the gate plate all the way in until it clicks into position on the gate arm.

e. Very gently remove the dust particles from the surface of the lens; use a camel's-hair brush or an air syringe. All dust particles contain abrasive material that is as hard, or harder, than

the fluoride coating on the lens surface. The above procedure must be adhered to before attempting any further removal of foreign matter from the lens. Slightly dampen a wad of lens cleaning tissue with liquid lens cleaner and apply to the lens with a gentle circular motion from the edge to the center of the glass. Dry the lens in the same manner, using a fresh piece of lens tissue. Discard lens tissue after it has been used once.

Caution: Do not use any lens cleaning tissue containing a silicon. A slight deposit is left on the lens coating which may affect the performance of the lens.

f. Clean the filters as carefully as the lens. Hold the filter by its mount to avoid fingerprints. Remove dust from the surface of the filter with a soft camel's-hair brush. Moisten a piece of lens cleaning tissue with liquid lens cleaner and clean each filter thoroughly. Use a circular motion, and work from the edge to the center of the glass. Do not use excess pressure when applying the cleaning procedures outlined above.

g. Blow the dust from the film chamber with the air syringe. Excess oil can be removed from the interior by wiping it with a cloth moistened in solvent (SD). Oil the camera as directed in paragraph 42. The camera is now ready for loading.

18. Loading Film in Camera

Note. The camera may be loaded in daylight when daylight loading reels are used. However, be sure to find a shaded spot. Avoid direct sunlight during the loading and threading process. Even the shadow cast by the body will protect the film from exposure. Film which has been spooled for darkroom loading has no light protection of any kind and must he loaded and unloaded in a darkroom.

a. Fully wind the spring motor (par. 13). This will bring the shuttle teeth into their lower (engaged) positions at the film gate.

b. Place the camera on its right (winding key) side with the lenses pointing to the left of the operator. Turn the camera door latches simultaneously to the OPEN position and remove the door.

c. Remove the empty reel from the feed spindle by lifting the reel upward. Be *careful not be bend the reel flange.* With the camera in the position described in *b* above, the take-up spindle is at the bottom; the feed spindle is at the top (fig. 12). Both spindles now are empty.

d. Open the film gate by pushing the gate arm toward the back of the camera as far as it will go (fig. 12). An intermediate stopping point can be felt when the gate is partially open, but the gate

Figure 12. Opening the camera film gate.

arm should be pushed back until the upper and lower sprockets are forced away from their guards (fig. 12) by the flanges on the gate arm.

e. Remove the spool of film from its metal container, and unreel about 18 inches of the film leader. On film where a paper leader is not provided, the first 6 feet of the film itself will serve for threading. Seat the feed reel on the feed spindle (fig. 13) by turning ing the reel counterclockwise. Note that the film unwinds clockwise.

Note. During this and all succeeding operations, keep the film wound tightly. If it is permitted to loosen, light may fog the film on its edges.

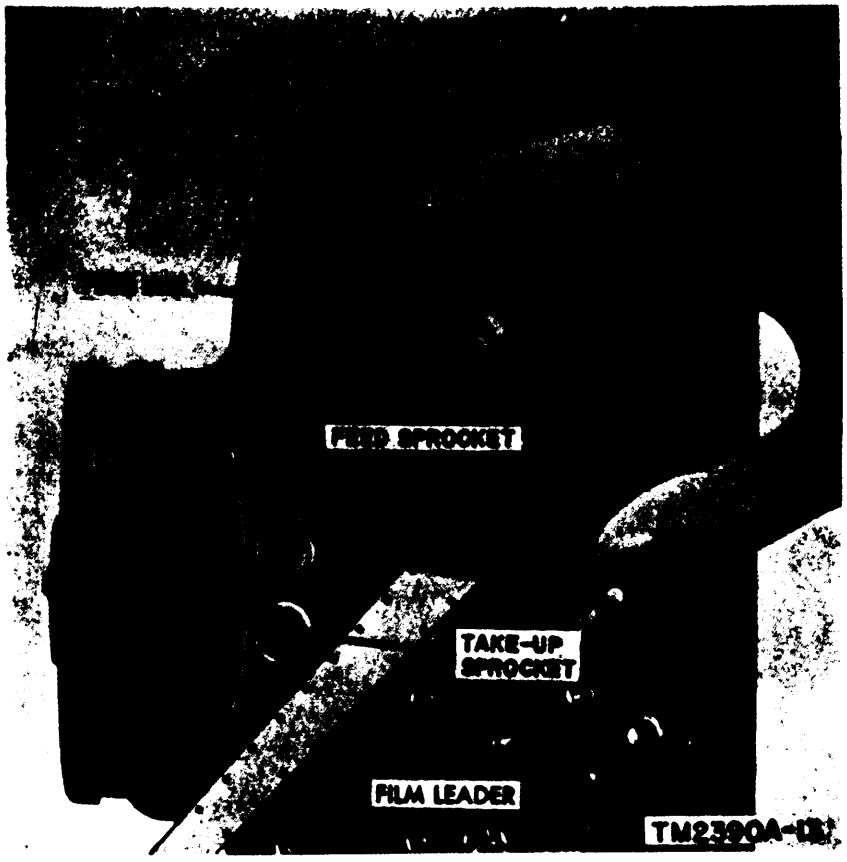


Figure 13. Placing feed reel on feed spindle.

f. Insert the film leader between the feed sprocket and feed sprocket guard (fig. 14). Place the film into the channel between the pressure plate and the aperture plate (fig. 15). The film must be inserted so that the emulsion side is facing the lens. Leader perforations must be engaged with the sprocket teeth.

g. Adjust the film loops so that they are about one-fourth inch from the camera frame, and insert the film between the take-up sprocket and its guard (fig. 16). Correctly adjusted loops should have seven perforations showing in the top loop when the gate is closed and six perforations showing in the bottom loop (fig. 18). Make certain that the sprocket teeth of the take-up sprocket are engaged with the perforations in the leader.

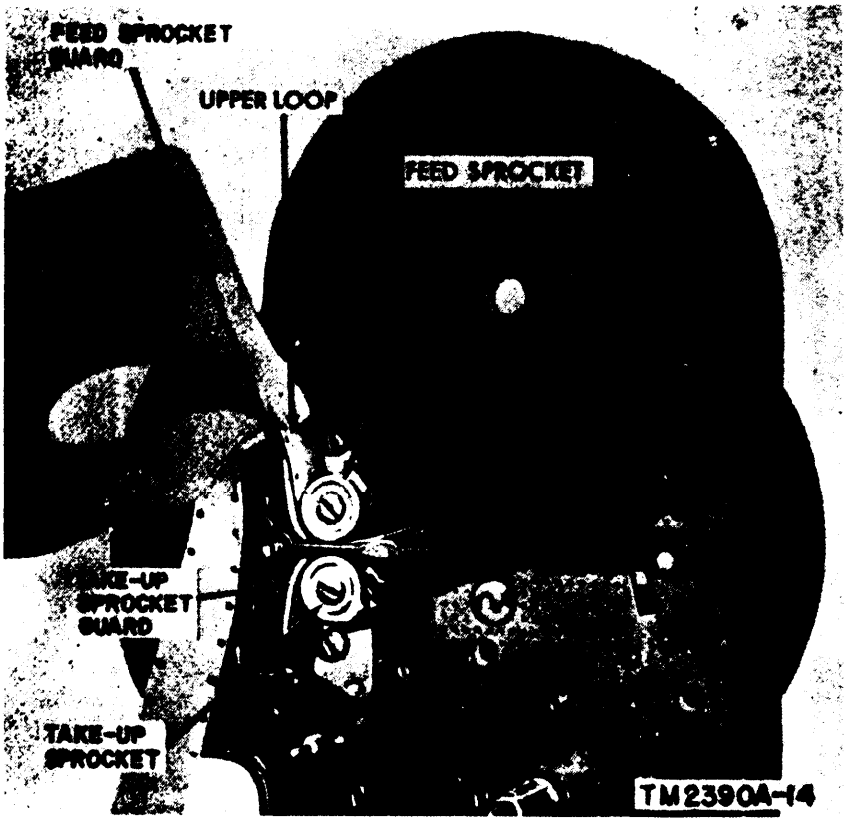


Figure 14. Threading film leader around feed sprocket.

h. Engage the film with the shuttle teeth by inserting the index and second fingers of the left hand in the loops. Spread the fingers and move the film slightly until the shuttle teeth are seated firmly in the film perforations (fig. 17).

i. See that the upper and lower loops are still the proper size; then close the film gate by pushing the film gate arm toward the front of the camera as far as it will go (fig. 18).

Note. When closing the gate, be careful not to stop at the intermediate stopping point. The gate should be pushed up firmly against the film. The camera cover cannot be installed unless the film gate is completely closed.

j. Check the shape of the take-up reel. See that the flanges of the reel are not bent or battered; a damaged flange causes buckling and film jam.

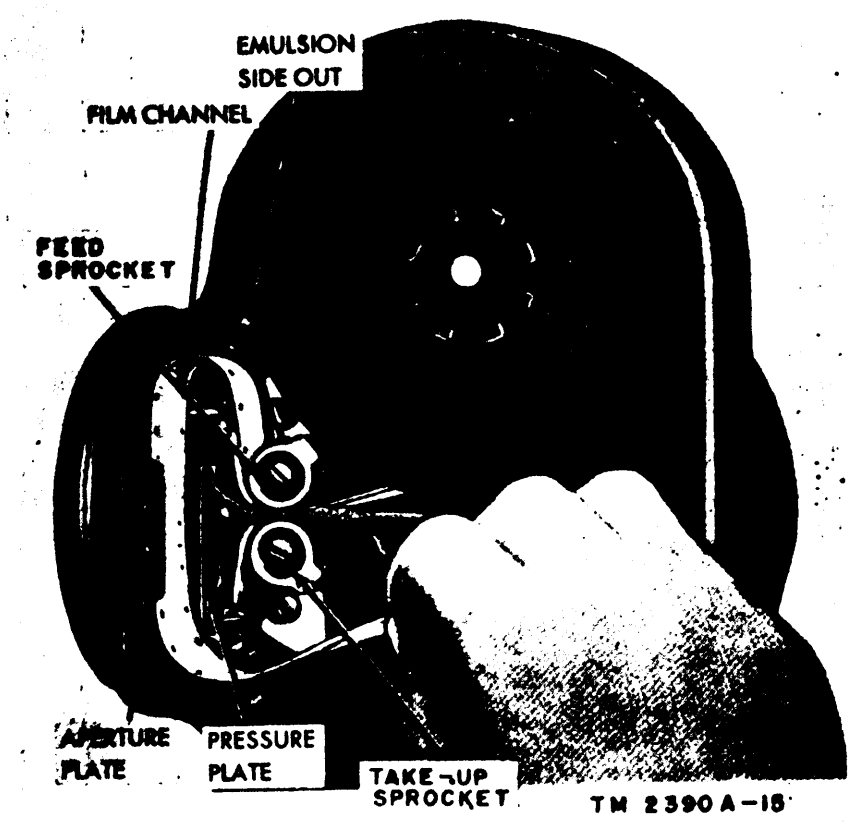


Figure 15. Threading film leader through film gate:

k. Insert the end of the film leader into the slot on the hub of the take-up reel. Turn the reel clockwise until most of the slack M has been wound on. Then place the reel on the take-rip spindle (fig. 19) .

l. If the loops are too near or too far from the camera frame *(g* above), reopen the film gate and readjust the loops through the lower sprocket only. Always push the film through the open sprocket; do not pull the film. After readjusting the loops, close the film gate as instructed in *i* above.

m. With the camera door still open, momentarily depress the starting button while keeping a finger pressed lightly on the feed reel to prevent backlash and fogging of the unexposed film. If the

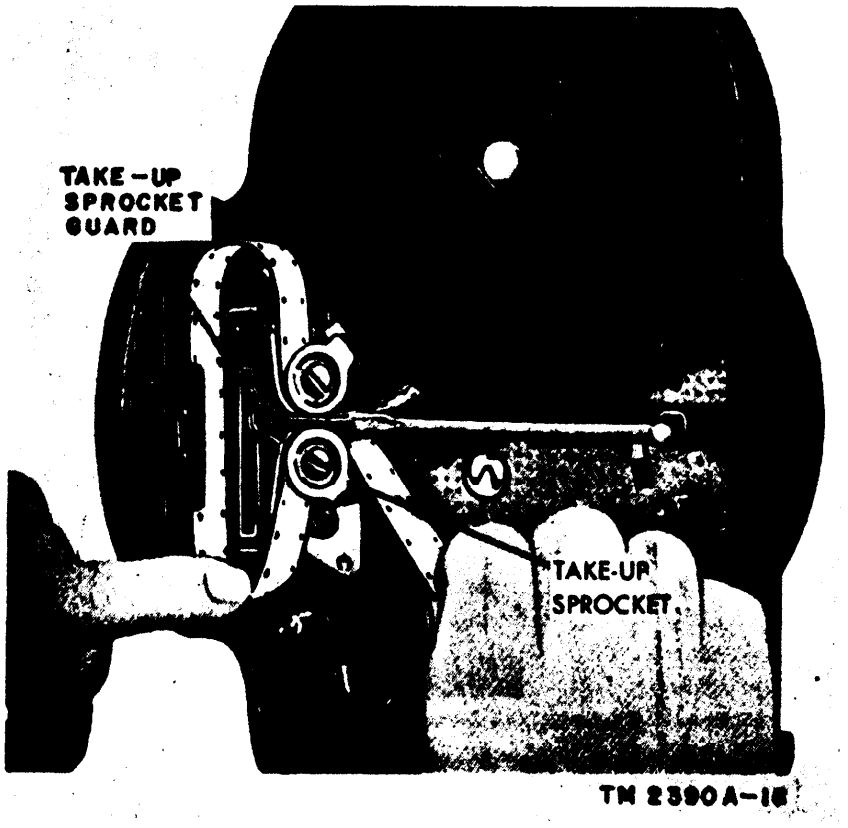


Figure 16. Threading film leader around take-up sprocket.

loops do not buckle or alter their shape during this test run, the camera is threaded properly.

Note. Avoid running off more than 6 inches of film during the test. These 6 inches, together with the 18 inches used in threading and the 4 feet to be run off with the camera cover in place, comprise the 6 feet which is cut off the roll (as a leader) when the film is developed.

n. Reinstall the camera door and turn the door latches to the CLOSED position. Failure of the camera door to fit easily in place on the camera housing indicates that the film gate arm is not fully closed *(i* above). The camera must not be opened again, except in a darkroom, until the entire reel has been exposed.

19. Setting Footage Dial

a. BEFORE EXPOSURE. When the camera has been threaded properly (par. 18) and the camera door installed and locked in

Figure 17. Engaging film leader perforations with shuttle teeth.

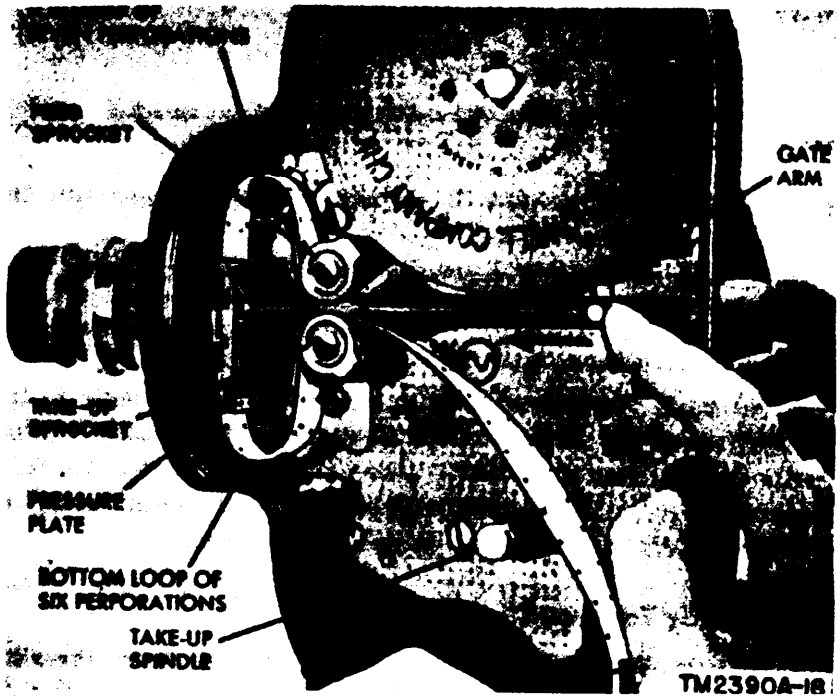


Figure 18. Closing camera film gate.

Figure 19. Placing reel on take-up spindle.

place, set the footage dial with the zero at the small right-hand dot by turning the exposure footage dial counterclockwise. When using the standard daylight reel, depress the starting button until the zero mark of the footage dial is at the large center dot, thereby insuring that all the leader has passed the aperture. The camera now is ready for a useful take of 100 feet.

b. DURING EXPOSURE. The length of all individual scenes or shots may be determined by before- and after-take checks of the position of the footage dial with reference to the large center dot.

c. AFTER FILM BREAKAGE. If the film breaks, proceed as follows: Open the camera in a changing bag (or darkroom if changing bag is not available). Pull enough film from the feed reel to rethread the camera and to wind at least two wraps around the take-up reel. Rewind both the exposed and unexposed portions of film on the take-up reel, thus binding the loose end of the film on the reel. Run the camera and check the reels by touch. If the camera is operating properly, reinstall the camera door and re-

move the camera from the changing bag. Estimate the number of feet taken from the feed reel, and set the film footage dial accordingly.

d. AFTER EXPOSURE. At the end of a 100-foot useful take, indicated when the footage dial zero mark has made a complete revolution and is back at the large center reference dot, depress the starting button until the zero mark moves to the small left-hand reference dot. This insures that a protective trailer (at least 5 feet) is wound around the exposed film so that the roll can be removed from the camera in daylight.

20. Setting Governor Speed Dial

(fig. 3)

a. Adjust the governor speed dial to the desired number of exposures per second by rotating the knurled ring until one of the two index marks (located 180° apart on the ring) is alined with the index mark of the appropriate speed indication on the stationary center dial. The ring can be rotated in either direction.

b. The standard speed for running silent film is 16 fps. Use this speed for general photography. If the films are intended for theatrical exhibition or if any accompanying sound track is to be used, a camera speed of 24 fps is necessary at all times.

c. The slower speeds, 8 and 12 fps, are useful for speeding up sluggish action and for gaining greater exposure through the slower shutter speeds when the light will not permit full exposure at the fastest lens opening at normal speed.

d. The faster speeds have many uses. A setting of 64 fps gives a slow-motion effect and is useful for analyzing and demonstrating machine operations. A speed of 48 fps is used to advantage for scenes taken from fast moving trains or automobiles. The 24- and 32-fps setting are recommended for panoramic shots, since operation at these speeds minimizes irregular motion of the camera.

e. If the running speed of the camera is to be changed while the equipment is operating, first turn the speed control dial to the next higher operating speed than that desired; then turn it back to the desired operating speed.

21. Mounting Lenses and Objectives

a. Mount the lenses in the three threaded holes in the lens turret by carefully screwing the threaded end of the lens all the way into the hole. Do not remove the lens cap until the camera is to be used and then be sure the combination of lenses is correct Certain combinations of lenses cannot be used together because of interference with the field of the wider angle lens. The following

chart lists those lenses which may be used together without interference:

Shortest lens in use	These lenses may be used in combination with the shorter lenses listed in the left-hand column, but must be focused on infinity to reduce their length.		
0.7-inch	1-inch		
1-inch	0.7-inch	2-inch	4-inch*
2-inch	0.7-inch	1-inch	4-inch
4-inch	0.7-inch	1-inch	2-inch

* Interferes slightly, even with lens shade removed.

b. Mount each objective by turning it clockwise on the viewfinder turret in a position corresponding to that of the lens it matches. For example, reading clockwise, the lenses on the camera turret are l-INCH, 2-INCH, and 4-INCH; therefore, the objectives, reading clockwise, should be l-INCH, 2-INCH, and 4-INCH.

22. Setting Lens Diaphragm

The amount of light passing through the lens is regulated by the opening of the lens iris diaphragm, which is controlled by a knurled collar, usually the first knurled ring from the objective end of the lens. An exposure meter should be used, and its reading applied to other factors present, to determine the correct aperture. These factors include—amount of light present on the subject, film emulsion speed, depth of field required, fps desired, and filter factor, if used. When the proper f/stop has been determined, turn the diaphragm collar until the proper f/stop designation inscribed on the collar is opposite the index mark on the stationary barrel of the lens. Once the proper diaphragm setting has been chosen, the lens opening must be corrected whenever the speed of the camera is changed; for example, slow speed, smaller diaphragm opening; fast speed, larger diaphragm opening. Although not supplied with Camera PH-430-B, the Exposure Computer PH-504/PF can be used to determine the correct f/stop for each speed.

23. Focusing Camera

a. SETTING FOCUSING COLLAR. The lens is focused by means of a knurled collar, usually the middle one of the three knurled rings on the lens. The focusing collar is calibrated for distances in feet and is adjustable for objects from a few feet to infinity. First, if possible, measure the distance from the approximate film plane in the camera to the object being photographed. Where distance permits, use a tape measure to measure the distance from the

focal plane to the subject being photographed. Then turn the focusing collar until the proper designation inscribed on the collar is opposite the index mark on the stationary barrel of the lens. The movable scales and collars on the lens components are equipped with a series of milled serrations on their periphery to permit a positive grasp when handling. If the distance cannot be measured, use the critical focuser as instructed in *b* below.

b. OPERATING CRITICAL FOCUSER. When critical focusing is required, set the lens focusing collar (to approximate value) as instructed in *a* above, and then rotate the lens turret to the click-stop position where the selected lens is on the same side of the camera head as the critical focuser (LOCK position on turret frame.) When the lens is in this position, the camera mechanism is locked automatically against operation. Open the lens diaphragm to its widest opening and look through the small eyepiece of the critical focuser, which is at right angles to the lens objective. The focuser lens provides a greatly magnified image of the central portion of the scene or object. Manipulate the lens focusing collar *(a* above) until the object is seen in sharp focus through the critical focuser eyepiece. Then rotate the turret back 180° to the click-stop position where the focused lens is exactly in front of the film aperture.

24. Installing Filters

The filters are universally adaptable to all of the lens components and are mounted to each of the various lenses in the same manner. Remove the detachable lens shade from the lens by unscrewing it in a counterclockwise direction. Place the filter in the recess of the lens barrel just above the lens and reinstall the lens shade.

25. Setting Viewfinder

To position the objective before the viewfinder aperture, rotate the turret until the objective matching the focal length of the lens in use is before the aperture. The turret clicks into each of the three positions to position the objective correctly in direct relationship to the lens being used.

26. Handholding Camera

Always use the camera holding strap when shooting without the tripod. Fasten the strap handle to the two screws provided on the camera frame (fig. 3). Adjust the strap to fit comfortably but firmly when the left hand is inserted between the strap and the camera and the fingers grasp the barrel of the viewfinder. *Be*

careful not to cover the viewfinder lens with the little finger. Hold the camera firmly in position against the forehead so that the object to rephotographed can be seen positioned appropriately in the field when looking through the eyepiece of the viewfinder. Have the right hand in position on the right side of the camera so that one of the fingers can readily depress the starting button to shoot the scene.

27. Setting Up Tripod

a. Remove the tripod from the tripod case. Separate the tripod legs so that the tripod can be set solidly on the ground.

Caution: The tripod shoes are constructed of steel and, therefore, the location on which the steel points rest must be carefully chosen.

b. Unscrew the tripod handle from the adjusting ring below the tripod base and screw it into the tilting mechanism of the tripod head. Position the tripod so that one of the legs faces toward the subject; this permits the operator to stand between the other two legs.

c. The lock knob screw at the top of the tripod head fits the threaded hole in the base of the camera. With one hand, hold the camera in position over the screw. With the fingers of the other hand, grasp the knurled screwhead and turn it clockwise until the camera is fastened securely. The camera lenses should face the direction opposite to that in which the tripod handle (figs. 1, 5, and 6) is extended.

d. To increase the height of the tripod, extend each leg to the desired height by loosening the leg adjusting knobs and by drawing the intersection of the leg out the necessary distance. Tighten the adjusting knobs securely. The tripod is equipped with an L-shaped spirit level. Always refer to this when setting or resetting the tripod legs.

28. Using Tripod Handle

The tripod handle is used for moving the camera in vertical and horizontal planes. This is called *tilting* and *panning* (panoramming), respectively. Both operations are discussed below:

a. TILTING. The tripod handle serves as a lever for tilting the camera up or down. The camera may be locked at any intermediate angle by turning the tilt lock handle (fig. 6) until it is tight. The desired amount of friction for tilting can be regulated by turning the friction knob at the side of the tripod head. One complete turn of the knob from the tightly clamped position is sufficient to remove the friction entirely.

b. PANNING (PANORAMMING). The tripod handle also serves as a lever to turn the camera horizontally for taking panoramic scenes. This should be done slowly and with a steady motion to avoid blurring or intermittent jerking of the picture. The tripod L-shaped level, screwed to the tripod head, should be used to set the tripod level to the ground. The knurled friction adjusting ring just below the tripod base (fig. 6) can be regulated to increase or decrease the friction of the panning movement. The tripod level should be referred to before attempting any panning procedures. This is extremely important when subjects that include horizon are to be photographed. If the tripod is not level, the horizon line on the picture will not be straight and even; during projection of the film the horizon will tend to rise and fall from one end of the screen to the other.

29. Preoperational Procedure

Before beginning to shoot pictures, check the following list to make certain that Camera PH-430-B is ready for operation:

a. Be sure that the film has been properly loaded and threaded in the camera (par. 18).

b. Make certain that the proper lens is in place (par. 21) and that the proper viewfinder objective is in position (par. 25). If a filter is to be used, see that the proper filter is in place (par. 24).

c. Check the footage dial to see that sufficient footage is available for the shot to be taken.

d. If a tripod is used, make certain that the camera is mounted solidly and that the tripod is firm and level to the ground. Also check the panning or tilt locks (fig. 6) to make certain that they are either set or released, as required.

e. Check the lens diaphragm opening, and make a final inspection of the lens focusing (par. 23). If focus changes are anticipated during the shooting, these changes should be rehearsed.

30. Camera Operation

a. STARTING CAMERA. If the check outlined in paragraph 29 is satisfactory, the camera is ready for operation. With the subject framed in the viewfinder, press the starting button to begin taking pictures. As soon as the button is pressed, the hum of the motor will indicate that the camera is running. Hold the starting button down until the scene is concluded; then release the button. On extended runs of film, the starting button can be locked in the running position by pressing the starting button and then the starting button lock. The camera then will continue to run until the starting button lock is pulled outward. The capacity of a full

winding of the spring is approximately 21 feet of film. The operator must keep this in mind on extended runs of film.

Note. If desired, the starting button may be locked to prevent accidental starting *of* the camera while it is not in use. This is accomplished by revolving the turret head until any one of the three index dots on the edge of the head is opposite the word LOCK. To release, turn the turret until the desired *lens* is in front of the aperture when one of the index dots is opposite the word RUN.

b. USING HAND CRANK. The hand crank should be used for shooting purposes only when the camera is rigidly and securely mounted on the tripod. When the spring motor is fully run down, the full 100-foot roll of film can be exposed manually without a stop by turning the hand crank in a forward direction. The speed dial controls the camera running speed even when the hand crank is used, and it is not possible to crank the camera faster than the speed for which the dial is set. To use the hand crank, insert it in its socket (fig. 3) and lock the starting button in the running position with the starting button lock. Crank with an even, steady pressure.

c. BACKWINDING FILM. The hand crank may be used to wind the film backwards in order to make lap dissolve and other trick effects. Before beginning to backwind with the hand crank, place the lens cap or other suitable cover over the lens. This is necessary to avoid exposing the film while the camera is being reversed. Press the starting button, meanwhile maintaining pressure against the hand crank counterclockwise to backwind the film. Before depressing starting button, hold the hand crank firmly in position to prevent forward movement of the film. Be sure to release or unlock the starting button before releasing the hand crank at the end of each backwind. Each complete counterclockwise revolution of the hand crank backwinds 20 frames of film (½ foot). This is indicated by the calibrated crank dial which can be revolved independently of the hand crank, thus making it possible to set the dial at zero regardless of the position of the crank. Backwinding should be limited to 1½ feet of film. The spring motor must run down at least 2 feet before backwinding is possible.

Note. The camera footage dial is directly coupled to the camera mechanism, and it moves forward even when the hand crank is winding the film in reverse. After backwinding, therefore, the footage dial must be set back twice the amount of film which was rewound.

d. MAKING DOUBLE EXPOSURE. To make a simple double exposure (in which the same length of film is exposed twice), complete the first exposure by pressing the starting button. Then place the lens cap on the lens, and backwind the film as instructed in *c* above. After the film has been backwound, remove the lens

cap, and again press the starting button, thus superimposing the two pictures.

e. FADE-INS AND FADE-OUTS. As the name implies, a fade-in starts at the beginning of a scene with solid black and gradually becomes lighter until a picture of normal density is reached. A fade-out comes at the end of the scene and means that the picture becomes increasingly darker until it is totally blacked out. Fading can be accomplished by closing or opening the lens diaphragm. When worked with the smaller diaphragm stops on brightly lighted scenes, a fader attachment is desirable because it is impossible (with most lenses) to stop the lens diaphragm down sufficiently to get a complete fade-out. Neutral density filters can be used to permit shooting the picture at a larger lens diaphragm opening, thus obtaining a larger range of diaphragm for making the fade. The neutral density filter will not affect the color of films, nor does it have any effect on black and white rendering. To make a fade-in with the lens diaphragm, first set the lens diaphragm to its smallest opening, place a finger over the end of the lens shade, and allow the camera to run for a few frames. With the camera running steadily, remove the finger and slowly revolve the diaphragm ring to the proper aperture for the scene being photographed. To fade out, slowly turn the diaphragm ring to its smallest opening while the camera is steadily running and place a finger in front of the lens shade. Camera starting button is then released.

f. CREATING LAP DISSOLVE. A lap dissolve is that transition from one scene to another wherein the first scene fades gradually and almost imperceptibly into the second with no abrupt breaks. This is accomplished by superimposing a fade-in over a fade-out. Fading-out can be accomplished by closing or opening the lens diaphragm gradually or by using a fader device. When creating a lap dissolve, note carefully the exact amount of footage consumed in fading in, the length of normal exposure used, and the footage consumed in fading out. To complete the lap dissolve, reverse the procedure and apply individually the amount of film used in each step. This is necessary for a smooth dissolve.

g. REWINDING BACK-WOUND FILM. Before using the camera again for double exposure after back-winding with the hand crank *(c* and *d* above), the film should be taken upon the feed reel. The knob on the upper cam latch (fig. 4 and fig. 22(3)) connects directly to the feed spindle on the inside of the camera. When film has been back-wound by means of the hand crank, as explained in *c* above, it is not rewound on the feed reel, because the hand crank has no connection with the speed spindle mechanism. This back-

wound film, up to 1½ feet in length *(c* above), fills the space near the feed reel (fig. 15). In order to rewind this l½ feet of film on the feed reel, it is necessary to depress the knob on the upper cam latch (fig. 4) which causes the shaft (fig. 22(5)) to engage the slot on top of the feed spindle. By turning the knob counterclockwise the back-wound film is rewound on the feed reel.

31. Unloading Camara

After the footage dial indicates that a roll of film has been corn. pletely exposed and that approximately 5 feet of trailer film have been run through the camera, the camera door may be removed. Take the spool of exposed film out of the camera; hold it firmly to present any unwinding or loosening. Place the spool immediately in the safety metal container in which it was received.

Note. The camera should be unloaded in a dark or shaded spot. In any event, do not expose the roll of film to the direct rays of the sun. Film designated for darkroom loading and unloading must not be exposed to light Hold the roll firmly so that it does not unwind during the unloading process, because this may fog the edges of the film. Then place the exposed roll of film directly into the film can.

32. Purpose and Use of Checklist

The equipment performance checklist (par. 33) is used to determine whether Camera PH-430-B is functioning properly. The checklist gives the item to be checked, the action or condition under which the item is to be checked, the normal indication of correct operation, and the corrective measures that the operator can take. Items 1 through 8 are checked before starting, items 9 and 10 when darting, and item 11 when stopping.

a. ACTION OR CONDITION. The information given under the *Action* ***or*** *condition* column represents, in the case of some items, the control settings at which the item is to be checked. In other item it represents action that must be taken to check the normal indication given in the column bearing the title *Normal indication.*

b. NORMAL INDICATION. The normal indications listed include the visible and audible signs that the operator will perceive when he checks the items. If the indications in the equipment operation are not normal, the operator should apply the recommended corrective measures.

c. CORRECTIVE MEASURES. The corrective measures listed are those that the operator can make without turning the equipment in for repairs. If the equipment will not operate or if the recommended corrective measures do not yield the desired results, turn the equipment in for repair by technical service personnel.

33. Equipment Performance Checklist

Item No.	Item	Action or condition	Normal indication	Checks and corrective measures
1	Spring motor drive	Fully wound	Definite resistance to turning the winding key.	Wind (par. 13).
2	Film chamber	Loaded and threaded	*a.* Top loop of film shows seven perforations; bottom loop shows six perforations (fig. 18).	*a.* Open film gate and adjust film accordingly (par. 18*g*).
			b. Teeth of shuttle and feed and take-up sprockets engage perforations (fig. 14).	*b.* Open film gate and adjust film accordingly (par. 18*g*).
			c. Film feeds through film chamber onto take-up reel without buckling when starting button is pressed.	*c.* Check threading pattern (par. 18*m*).
3	Camera door	Replaced and locked	Latches in CLOSED position (fig. 4).	Turn latches counterclockwise to CLOSED position (par. 18*n*).
4	Footage dial	0 mark set at right-hand dot. Press starting button until 0 mark is at center dot on footage dial.		Turn footage dial counterclockwise until 0 mark is at right-hand dot (par. 19*a*).
5	Governor speed dial	Set at desired operating speed.	Index mark on knurled ring is alined with index mark of desired speed.	Rotate knurled ring on governor speed dial until index mark of desired speed (par. 20).
6	Lens	*a.* Mounted on lens turret. Set at required f/stop.	*a.* Screwed firmly in bore. Indication for desired f/stop is alined with index mark on stationary lens barrel.	*a.* Turn diaphragm collar until index mark for desired f/stop is alined with index mark on lens barrel (par. 22).

		b. Focused for shooting	*b.* Focusing collar at required calibration for distance.	*b.* Rotate focusing collar until index mark for required distance is alined with index mark on lens barrel (par. 23*a*).
		c. Set in operating position.	*c.* Lens is locked in position next to viewfinder; dot on lens turret is alined with RUN (figs. 3 and 4).	*c.* Rotate lens turret until desired lens is locked in place by detent mechanism. Check multiple lens mount for possible interference (par. 21).
7	Support: camera strap.	Fastened to camera	Camera can be handheld securely and comfortably.	Adjust strap (par. 26).
	Tripod	*a.* Firmly set up	*a.* Camera supported by tripod at desired height.	*a.* Adjust tripod legs accordingly (par. 27).
		b. Adjusted for tilting and panoramming.	*b.* Camera can be moved freely in vertical and horizontal planes.	*b.* Adjust locking devices (par. 28).
8	Positive viewfinder	Adjusted for viewing	Correct matte designation in position.	Rotate viewfinder turret until proper objective is in position (par. 25).
9	Starting button	*a.* Depress to start camera mechanism.	*a.* Characteristic sound of film driving mechanism.	*a.* Wind motor (par. 13). Open camera door (par. 17*a*).
		b. Lock starting button for continuous run.	*b.* Camera continues to operate when finger is removed from starting button.	*b.* Push starting button in all the way, and press lock pin (par. 30*a*).
10	Footage dial	Note footage exposed and amount remaining (par. 19).	Enough unexposed film for proposed take.	Reload camera (par. 18).
11	Starting button	Release or unlock to stop mechanism.	Film mechanism silent	Starting button jammed. Allow motor to run down. Disassemble and clean.

34. Operating Faults Disclosed by Defects in Developed Film

Defect	Probable cause	Corrective measures
Picture in faulty focus	*a.* Shooting lens not properly seated in lens mount (par. 21).	*a.* Remove lens and check lens bore for dirt.
	b. Lens improperly focused	*b.* Use critical focuser (par. 23*b*).
Picture obstructed	*a.* Dirt in aperture opening	*a.* Clean aperture opening.
	b. Wrong lens complement	*b.* Remove interfering lens from turret.
Light-struck	*a.* Film loaded or unloaded in bright light	*a.* Load in subdued light (par. 18).
	b. Camera door not securely latched	*b.* Check latches.
	c. Camera door sprung	*c.* Aline with rubber mallet.
Film scratched	*a.* Aperture plate dirty	*a.* Check door edges for dirt. Clean aperture plate (par. 16*c*).
	b. Aperture plate or pressure plate nicked or damaged	*b.* Repair, polish, or replace.
	c. Overlong loop in threading	*c.* See threading instruction (par. 18).
Pictures blurred or fuzzy	*a.* Camera not held steady	*a.* Hold camera steady.
	b. Tripod jarred	*b.* Hold tripod steady. Check all locking devices (par. 27*c*).
	c. Incorrect panning technique	*c.* Pan slowly as instructed (par. 28*b*).
	d. Lens or filter element dirty	*d.* Clean as directed (par. 37*b*).
	e. Dirt on lens	*e.* Clean lens (par. 37*b*).

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

35. Unusual Conditions

Camera PH-430-B is intended for operation in temperature ranging from arctic to tropical and in areas where snow and dust are characteristic. Therefore, special operating precautions must be taken to protect the equipment in these unusual conditions.

36. Operation in Arctic Climates

Cold-weather operational procedures and general precautions, as indicated in TB SIG 189, should be followed when operating Camera PH-430-B at temperatures below 32° F. When the equipment has been stored outdoors or has been kept at low temperatures for an extended period of time, the following procedure is recommended before transferring the equipment to warmer air:

a. Gradually transfer the equipment from the cold to the warmer temperature by intermediate temperature steps. Allow 6 hours or more for this gradual transfer so that the equipment will have attained the ambient temperature of the warmer room.

b. Do not open the carrying cases before the equipment has reached the room temperature; water may condense on the equip ment and cause permanent damage. Whenever possible, inclose the carrying case in water-repellent material while transferring from cold to normal room temperatures. This precaution will eliminate the possibility of condensation on the equipment.

c. After the equipment has reached the warmer temperature, open the camera door and use a lint-free cloth to remove any water that has condensed on the inside surfaces of the camera; be particularly careful to clean the aperture plate, pressure plate, and sprockets. Clean the various lenses (par. 17e). Moisture can be blotted from the lenses with lens cleansing tissues.

37. Operation in Desert Climates

Dustproofing of Camera PH-430-B equipment is necessary only under adverse ‘conditions of operation, as follows:

a. When the equipment is operated outdoors where wind and dust or sand are present, be careful to keep the camera door closed at all times, except when threading or adjusting the camera. If it becomes necessary to open the camera door when the above conditions prevail, use any protective shelter that may be at hand.

b. Before using the equipment, use a camel's-hair brush to clean off any sand or other foreign matter accumulated on the surface of the camera and tripod head. Use a camel's-hair brush to clean the pressure plate, aperture plate, sprockets, and lenses of the camera. *Do not use lens tissue to clean lenses unless they have been dusted first with a camel's-hair brush or an improvised brush made of lens tissue.* Cleaning the lens with lens tissue before it has been dusted, as above, will scratch the lens. Do this cleaning indoors or under cover to insure that no dust remains on the equipment when stored.

c. Avoid storing the camera outdoors. When it is necessary to store the equipment outdoors, cover it with shelter cloth or other improvised material to protect it from dust.

38. Operation in Tropical Climates

In climates of high humidity, such as the tropics, special care should be given to the aperture and pressure plates to prevent corrosion of the polished surfaces. If necessary, lubricate the plates with a light film of oil (LO). When applying oil (LO) to the plates, it is extremely important to avoid any oil on the polished surfaces that come in contact with the film. If any oil comes in contact with the film it will be rendered unfit for use. The camera should be inspected for traces of fungus, mold, mites, and metallic corrosion. All indications of fouling should be removed immediately. When the camera is not in use, the equipment should be stored in a reasonably dry, cool place, since excessive moisture will damage the moving parts, and exposure to direct sunlight will impair the accuracy and positioning of cemented lens elements. For information on dehydration, see TB SIG 149. If the camera must be kept standing in the sunlight, it should be covered with a white cloth until ready for shooting. Only short lengths of film should be used in the camera whenever possible. The film should be promptly dehydrated and shipped in sealed containers after shooting.

CHAPTER 3
MAINTENANCE INSTRUCTIONS

Section I. SPECIAL ORGANIZATIONAL TOOLS AND EQUIPMENT

39. Materials Supplied

The following materials must be on hand before preventive maintenance is performed:

Item	*Signal Corps stock No.*
Brush, camel's-hair	8P10-96
Cleaner, aperture	8A817-540
Cleaner, lens, liquid	8A819.2
Cloth, lint-free	6Z1896
Solvent, dry-cleaning (SD)	51-S-4385-1 (QMC)
Syringe, air	628590
Tissue, lens	8A2559
Toothpicks, orange sticks, or similar softwood sticks.	

Note. Gasoline will not be used as a cleaning fluid for any purpose.

40. Special Service Tools

All the standard repair tools required for service, inspection, and repair of Camera PH430-B are included in Tool Equipments TK-24/GF and TK-26/GF.

a. Tool Equipment TK-24/GF includes the hand tools used for general maintenance and repair of Camera PH-430-B.

b. Tool Equipment TK-25/GF includes the tools used in field maintenance and repair of Camera PH-430-B.

Section II. LUBRICANTS AND PRESERVATIVES

41. General Lubrication Instructions

Camera PHA-430-B requires specific lubrication of parts indicated in this text, at regular intervals. These parts, their points of wear, and the time intervals involved, are discussed at length in paragraphs 42, 43, and 44.

42. Organizational Lubrication of Camera PH-430-B

a. TABLE OF LUBRICANTS.

Lubricants used	Stock No.
Oil, lubricating, light (LO)	QMC-14-O-1338-60
Grease, lubricating, special (GL)	ORD-14-G-1196-400
Graphite, lubricating (GFS	ORD-14-G-539-990

b. CAMERA. At least once a month or after running 2,500 feet of film, whichever occurs first, remove the lenses by unscrewing them from the lens turret, and remove the camera door. Lubricate the following points:

(1) *Shutter spindle, cam, and camshaft.* Remove the oilhole pin by pulling it straight out from the locking nut in the center of the lens turret. Put 1 drop of oil (LO) in the hole. Reinstall the oilhole pin.

(2) *Lens bores.* Clean the threads of the lens bores with solvent (SD) and coat them lightly with grease (GL).

(3) *Sprocket shafts.* Remove the screws and cover guards from the ends of the feed and take-up shafts. Put 1 drop of oil (LO) between each shaft and its sprockets. Reinstall the guards and the screws. *Be sure the cover guards are seated properly when reinstalled.*

(4) *Governor worm shaft bearings.* Place 1 drop of oil (LO) in each of the two bearing oilholes.

(5) *Governor spring control washer.* Put 1 drop of oil (LO) in the oilhole.

(6) *Governor worm gear and ratchet.* Place 1 drop of oil (LO) in the governor worm gear oilhole.

c. CAMERA CARRYING CASE. At least every 3 months, place 1 drop of oil (LO) on the locking device of the carrying case. DO not lubricate the camera carrying case latches.

d. TRIPOD. Lubrication of the tripod assembly is as follows:

(1) *Quarterly.*

(a) Tighten the pan lock handle in the locking position. Remove the tripod wingnut below the base of the tripod, and lift. the tripod head from the tripod base. Clean the bearing surfaces of the tripod head and base, and coat them lightly with grease (GL).

(b) Reassemble the tripod head onto the tripod base. Remove excess lubricant with a clean cloth.

Caution: Be very careful not to bend or damage the friction washer.

(2) *Semiannually.* Remove the handle from the tripod head and fill the opening with grease (GL) to a depth of —

approximately one-fourth inch. Insert the handle into the tripod head and force the lubricant into the head tilt by screwing the handle into the threaded opening. Remove the excess lubricant with a clean cloth.

(3) *Items not to be relubricated.*

(a) Camera lockscrew.

(b) Tilt and pan lockscrews.

(c) Leg hinge pins.

(d) Tripod shoe tips.

43. Lubrication by Field Maintenance Personnel

The following chart shows the parts of Camera PH-430-B which are to be lubricated only by field maintenance personnel at time of disassembly of the equipment and gives the specific paragraph reference to this manual where the lubrication information is contained.

Part to be lubricated	*Paragraph reference*
Main drive spring	72
Front mechanism plate assembly	73
Back mechanism plate assembly	74

44. Lubrication Precautions

a. When the equipment is subjected to extremes of heat, cold, dust, storm, and other unfavorable conditions, the intervals of lubrication must be reduced to the extent necessary to provide adequate lubrication under such conditions. The change in interval to meet these abnormal conditions is usually one-third to one-half of normal. Experience in the field under unfavorable conditions will give a more accurate check on the change of interval.

b. The effects of extreme cold and heat on materials and lubricants are explained in TB SIG 69. Observe all precautions outlined in TB SIG 69.

45. Weatherproofing

a. GENERAL. Signal Corps equipment, when operated under severe climatic conditions such as prevail in tropical, arctic, and desert regions, 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 fully explained in TB SIG 13 and TB SIG 72.

Note. Do not use saddle soap or similar cleaning preparations to clean leather after treatment. Soap will remove the moisture- and fungus-resistant

leather-treating compound from the leather. Where necessary, use a wet cloth to clean trcated leather which has accumulated dirt or mud.

c. WINTER MAINTENANCE. Special precautions necessary to prevent poor performance or total operational failure of equipment in extreme] y low temperatures are explained fully in TB SIG 66 and TB SIG 219.

d. DESERT MAINTENANCE. Special precautions necessary to prevent equipment failure in areas subject to extreme high temperatures, low humidity, and excessive sand and dust are explained fully in TB SIG 75.

Section III. PREVENTIVE MAINTENANCE SERVICES

46. Meaning and Importance

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

Note. Thc operations in sections III and IV of this chapter are to be performed by organizational personnel.

47. Preventive Maintenance Procedures

a. Most of the parts of Camera PH-430-B require routine preventive maintenance of one kind or another. Because maintenance techniques cannot be applied indiscriminately, definite and specific instructions are needed. This section of the manual contains specific instructions and serves as a guide for organizational maintenance personnel. Field use without continuous inspection, cleaning, and adjustment will probably result in the equipment becoming operationally erratic, undependable, and subject to breakdown.

b. This section of the manual does not deal with individual parts of the equipment, but it gives instructions for maintenance of the equipment as a whole. Chapter V deals with the individual parts requiring maintenance.

48. General Inspection

To insure efficient and trouble-free performance of all operating

parts, inspect, lubricate, and check Camera PH-430-B for cleanliness at regular intervals. Avoid the use of unauthorized cleaning substitutes; use improved implements of inspection and correction at all times.

49. Frequency of Inspection

The preventive maintenance checklist (par. 51) is a summary of the basic maintenance operation necessary and the intervals at which they should occur. Routine preoperational and after-operational inspection of all camera equipment should become habitual with the operator. A check for condition and for all irregularities of the spring and film-driving action should be made while the camera is in operation. Standard precautions on the handling of lens and filter elements are discussed at length in TM 11–2324, and TM 11–2325, and they apply equally to the optical units of motion picture cameras.

Note. Disassembly of optical parts in questionable operating condition is not a function of routine preventive maintenance and should be undertaken only by authorized personnel. Under no circumstances should permanent lens units be disassembled by the operator for check-up or routine cleaning.

50. Detailed Instructions

Cleanliness of the camera is absolutely essential. Clean and dust all parts of the camera after it has been unpacked and before it is put in use. Before the camera is used at any time and before loading film into the camera film chamber, clean as follows:

a. Dust all lenses and filters with the camel's-hair brush issued with the camera, or use improvised brush made by rolling a sheet of lens cleaning tissue into a tube and tearing off one end. Use the ragged end as a brush. After all dust and dirt have been removed, clean the lens with lens cleaning fluid. Refer to paragraph 17e.

b. Wipe off the film chamber with a clean, lint-free cloth to remove all dust, dirt, and excess lubricant. Brush out any dirt or dust from around the film feed, take-up sprockets, aperture plate, and pressure plate. Use a toothpick or orange stick moistened with solvent (SD) to remove dirt or film emulsion remaining on the aperture plate and pressure plate and between the sprocket teeth of the film feed and take-up sprockets.

Note. Do not use a knife or any other metal tool to clean the above named parts. Avoid scratching or otherwise marring the highly polished surface of the aperture plate and the pressure plate.

c. Before using film reels, inspect the reels carefully to make sure the flanges have not become bent. Straighten or discard any reels that are damaged.

d. Remove dust from the camera case with a damp cloth or a brush.

51. Preventive Maintenance Checklist

Item No.	What to check	When to check	How to check	Precautions
1	Camera	Before using	Remove camera from case and inspect camera and components for dust, dirt, sand, or moisture. Carefully check the areas around or under the controls.	Do not use tools or any other sharp instrument when cleaning film gate and aperture plate.
			Use a jet of clean air, or dry an air syringe and blow out the camera magazine chamber, film gate, and aperture plate.	
			Oil as directed in paragraph 42. Do not lubricate excessively. Carefully wipe excess oil from points lubriated.	Do not oil to excess since the residual qualties of oil will cause foreign matter to adhere and accumulate on the surfaces.
			Use a camel's-hair brush to remove any dust and sand particles from the tripod receptacle.	
			Determine the tightness of all screws by testing each screw individually with a proper fitting screw driver. Screws should be handtight and free of burrs.	Do not use force. Turn screws gently until they are handtight.
2	Camera door	Before loading	Remove and replace camera door; check flanges for bent or damaged edges.	
3	Turret	Before use	Rotate turret to insure free movement and proper operation of detent click stops.	
4	Lenses	Before use	Clean as instructed in paragraph 17*e*. Check operation of aperture diaphragm and focusing control ring to determine satisfactory functioning.	Do not attempt disassembly of the lens. Return it to repair shop for cleaning of its inner elements.

5	Filters	Before use	Clean as instructed in paragraph 17*f*.	
6	Viewfinder and critical focuser.	Before use	Inspect for dust and dirt on objectives and eyepieces. Remove with camel's-hair brush or lens tissue.	
7	Aperture and pressure plates.	Before use	Clean as directed in paragraph 17*c*.	
8	Sprocket, guards, and film channel.	Before loading	Examine guards for proper clearance from sprockets. Remove accumulation of dirt and emulsion with toothpick moistened in solvent (SD).	
9	Take-up spool	Before loading	Inspect for rust, bent flanges, or other damage.	Discard spool if damage cannot be repaired.
10	Spring motor drive	As indicated	If camera is not to be used for prolonged period of time, remove film in a darkroom or changing bag, and depress starting button until spring motor runs down.	
11	Tripod	Before use	Inspect tripod legs for warps or cracks. Remove dust and dirt with a cloth dampened in a solvent (SD).	
12	Tripod head	Before use	Check all controls and locks. Lubricate as instructed in paragraph 42*d*. Inspect L-shaped level for proper performance.	Make certain tension and control knobs are locked when mounting camera.

52. General Trouble Shooting

The equipment performance checklist (par. 33) and the preventive maintenance checklist (par. 51) list the various visual and operational indications of normal performance while Camera PH–430–B is in use. The corrective measures recommended in the equipment performance checklist relate only to minor failures of equipment which can be remedied by a simple adjustment of parts which are otherwise unimpaired. The trouble-shooting chart in chapter V provides a table of specific equipment defects, probable causes, and recommended remedies.

CHAPTER 4

EQUIPMENT USED IN CONJUNCTION WITH CAMERA PH-43-B

53. General

Camera PH-430-B is a complete portable motion picture equipment. Additional aids to motion picture photography exist, however, and may be used when available to facilitate the handling of the camera and to increase its utility. Items described in paragraphs 54, 55 and 56 are not essential to the operation of Camera PH-430-B, but augment camera functions already provided for in the basic camera issue.

54. Meauring Tape

A reel of cloth or steel measuring tape, used to determine the exact measurement of distance, is desirable in shooting close-ups. The 25-foot reel of steel tape, Signal Corps stock No. 6R36028-25, is satisfactory for this purpose.

55. Changing Bag PH-105

A changing bag is an expedient for field use when darkroom facilities are not immediately available or practicable. The bag also may be used as a chamber for correcting film jam under emergency situations. Bag PH-105 is lightproof, water-resistant, and large enough to accommodate the camera complement of Camera PH-430-B. It is made of cotton-twill, olive-drab cloth on the outside and black rubber sheeting on the inside, has two long sleeves secured at the wrists by lightproof elastic wristlets, and is fastened by a full-length zipper. To use Bag PH-105, proceed as follows:

a. Place the camera into the bag and zip the bag completely.

b. Insert both arms into the elastic wristlets, working the sleeves high up on the arms.

c. Open the camera door inside the bag and load or thread as directed.

d. Check the sprockets, film loop, and channel, by touch, and reinstall the camera door.

e. When the camera door has been locked fast, withdraw the hands from the sleeves, open the bag, and remove the camera equipment.

Note. Follow the same procedure correcting jammed or buckled film with a partially exposed film load.

56. Exposure Meter PH-260-A

This meter may be used in conjunction with Camera PH-430-B. It supplies the necessary information for precise exposure calculation for all light conditions. The light values obtained when using this meter, coupled with film speed and depth of field needed, are used to determine the correct aperture stop. Refer to TM 11-2356.

CHAPTER 5
FIELD MAINTENANCE INSTRUCTIONS

Section I. GENERAL

57. Scope and Application

The repair instructions which follow are intended for field maintenance and are applicable for all purposes of repair through and including rebuilding. The amount of repair to be performed by any particular unit having field maintenance responsibility will be limited only by the tools and test equipment available and by the skill of the assigned personnel.

58. Disassembly Units

Camera PH-430-B is an equipment for moving light-sensitized film and exposing successive frames during intervals when the film is at rest behind a lens. The process as a whole involves three basic operations: the feeding of the film to the exposure aperture, the intermittent exposure of the film at the aperture, and the rewinding of the exposed film after leaving the aperture. The camera is made up of four distinct disassembly units: the head assembly, the mechanism plate assembly (including the train of gears), the spring motor, and the camera frame assembly.

a. The head assembly consists of the intermittent shutter and shuttle-movement, the compact lens turret (less lenses), and the aperture plate.

b. The mechanism plate assembly consists of the film sprockets, the feed and take-up spindles, and the film gate. The front plate is held securely to the back mechanism plate with six screws and studs, and it is held to the camera frame as a whole by four retaining screws. The trains of gears on the back mechanism plate is separated from the film chamber by the front mechanism plate.

c. The spring motor, which supplies the film driving power, is separated from the gears by two plates: a thin, brass plate, known as the spring-motor graphite retaining plate, and the back mechanism plate complete with bearings and studs.

d. The camera frame assembly is, in effect, the housing for the

complete camera mechanism. On it are mounted the dials, the critical focuser (which must not be removed), the motor mounting bracket, and the hand-crank housing.

Section II. CONDENSED THEORY OF OPERATION

59. General

Camera PH-430-B is essentially an equipment for moving light-sensitized film and exposing successive frames during intervals when the film is at rest behind the lens. Three basic operations are involved: the feeding of the film to the exposure aperture, the intermittent exposure of the film at the aperture, and the rewinding of the exposed film after leaving the aperture. These operations are accomplished inside the camera complement by a mechanism which feeds, carries, positions, takes up the film during the operation, and regulates the intervals of motion and rest. The camera equipment also includes lenses which form the image, filters which control the absorption and transmission of colors in the subject, a diaphragm which controls the amount of light at the exposure aperture, a governor control which regulates the period of exposure, viewing devices which aid in determining the framing and composition of the picture, and a tripod which sup ports the camera.

60. Theory of Operation

a. A powerful spring motor, controlled by a high-speed governor, supplies the driving power for the film-moving mechanism. This governor can be adjusted to operate at any one of the seven speeds–8, 12, 16, 24, 32, 48, or 64 fps.

b. The governor shaft is mounted in bearings with two ball-thrusts at each end. The springs and weights are mounted on the shaft and are accurately adjusted. The governor housing is linked to the speed control dial, and movement of the dial slides the housing back and forth to change the flexing length of the springs on which the governor weights are mounted. The rapid rotation of the governor worm shaft throws the weights outward until they touch the inside of the governor housing. Actually, the control of the speed is obtained by regulating the length of the springs to which the weights are attached, or by changing the inside diameter of the governor housing.

c. The pressure plate holds the film stationary in the aperture for the moment of exposure, at which time the open segment of

the rotating shutter passes directly in front of it at a designated speed and exposes the film to the light. The closed portion of the rotating shutter then interrupts the light, and the shuttle teeth re-engage the perforations of the next frame and pull it down into position for the next exposure. This cycle is repeated for as long a time as the starting button is depressed.

d. During the time when the unexposed film is being drawn into position by the shuttle teeth, the opaque segment of the shutter is completing the rotation before the aperture, excluding light from the film. Both the shuttle action and the rotary action of the shutter are synchronized by a single gear; this permits light to enter the camera only when the film is stationary, and interrupting the light when the film is in motion. The shutter revolves once for each complete cycle so the shutter teeth, while the operating speed (or the number of frames exposed per second) is regulated by a friction-controlled governor mechanism which is adjustable (b above). After exposure, the film is drawn down into the lower film chamber by the take-up sprocket. It then is rewound on the take-up reel by the take-up spindle.

e. An analysis of the standard optical theory embodied in the optical components of this camera is not within the scope of this manual; refer to TM 11–2324, and TM 11-2325 for such information.

Section III. PREREPAIR PROCEDURES

61. General Inspection

Load the camera with a spool of test film (par. 18). With the camera door removed, wind the spring motor to capacity and lock the starting button in place. Check the course of a piece of test film to make certain that the sprocket teeth are releasing the film smoothly and that the film is winding tight on the take-up spool. Listen for unusual noises that may indicate a need for lubrication. Check the footage indicator to make certain that the dial does not stick at any point. Watch the action of the footage dial ratchet pawls, inside the camera frame, to make sure that the footage dial does not jump.

62. Camera Speed Check

a. Unfold the winding key so that it is perpendicular to the side of the camera frame, and mark one end of the key by fastening a piece of string or tape to it.

b. Wind the spring motor to capacity, leaving the marked end of the key adjacent to the critical focuser.

c. Set the speed dial outer ring for the speed to be checked.

d. Note in the following chart the number of turns of the winding key and the time necessary for the key to make the turns as required for the speed setting:

Speed (fps)	No. of turns (winding key)	No. of seconds	Allowed variation (percent)
8	5	75	10
12	6	60	10
16	6	45	5
24	6	30	5
32	7	26	10
48	6	15	10
64	7	13	10

e. Press the starting button, and note the *exact* starting time.

f. Count the number of turns of the winding key, using the location of the critical focuser eyepiece as a reference point. *Note the exact time the required number of turns is completed.*

g. Compare the elapsed time with the time given in the chart *(d* above).

(1) If the time is within the allowed variation of the number of seconds for the counted number of turns, the speed of the camera may be considered satisfactory.

(2) If the time is not within the allowed variation of the number of seconds for the counted number of turns, proteed as follows in accordance with the extent of the discrepancy:

(a) If the discrepancy is in the neighborhood of only plus or minus 5 percent, replace the speed dial by removing the dial retaining screws and lifting out the old dial. With the new speed dial in position, set the index line of the outer ring approximately midway over the fps to be checked. Check the speed with the chart. If the speed is fast, move the outer ring in a clockwise direction from its location; if the speed is slow, turn the outer ring in a counterclockwise direction. After the correct position of the index line on the outer speed control ring has been determined, use a sharp instrument and mark the stationary speed dial exactly opposite the index line. Make this same check for each of the seven speeds.

(b) If the discrepancy is over plus or minus 20 percent, apply disassembly procedures for checking and cleaning.

(c) An alternative and better method of checking the running speed is to count the shutter revolutions per minute, using a Strobatac. The chart is as follows:

Speed	Rpm	Tolerances (percent) ±
8	480	10
12	720	10
16	960	5
24	1440	5
32	1920	10
48	2880	10
64	3480	10

63. Lens Test

Mount the camera on the tripod. At measured distances, place targets upon which to focus the lenses. Turn the lens turret so that the lens to be tested is in line with the critical focuser. *Check all distances of the lens with the diaphragm wide open.* Place the footage scale on the lens barrel opposite the footage-index line being checked and, by sighting through the critical focuser, check the accuracy of the lens on the target located at the distance set on the footage scale. If the image of the target is not sharp, turn the focusing ring on the lens until the image is sharp and note the position of the footage indicator with reference to the index. If the footage indicator is not opposite the index mark, the focusing ring has slipped. Only qualified personnel are authorized to disassemble the lens and make any corrections; therefore, the lens must be replaced by a new one.

64. Photo Test

Make a photo test with approximately 3 or 4 feet of film. Examine this test film for sharpness to check the lens focus. Join the ends of the film to make a loop and run it through a projector to check the steadiness and proper alinement of the image. Examine the film for scratches that might indicate dirt or wear on the pressure and aperture plate.

65. Test and Repair Equipment

Actual test equipment is not necessary for the testing of the overhauled camera equipment. All of the standard repair tools

required for service, inspection, and repair of Camera PH-430-B are included in Tool Equipments TK–24/GF and TK-25/GF.

a. Tool Equipment TK-24/GF includes the hand tools used for general maintenance and repair.

b. Tool Equipment TK-25/GF includes the tools used in field maintenance and repair.

Section IV. INSPECTING, STRIPPING, CLEANING, AND LUBRICATION

66. Inspecting

Carefully examine the entire camera equipment to determine the general condition of the camera component. The inspections and tests outlined in paragraphs 61 through 64 will provide accurate information on the operating capabilities of the camera unit. Replacement of components, or assemblies, can be made by following the instructions outlined in paragraph 67.

67. Component Repair and Replacement

a. CAMERA DOOR. The camera door can be removed by turning the latch keys to the OPEN position. When installing a new camera door, lock the door in place by turning the latch keys to the CLOSED position. Then examine the fit of the door around the edges of the camera frame. It may be necessary to rap the cover around the edges with a fiber mallet until it fits properly on the frame.

b. VIEWFINDER TURRET. The viewfinder turret can be removed as a complete assembly by loosening the three set screws in the viewfinder tube collar at the front end of the camera door. If the turret fails to index properly or if the viewfinder objective lens mounts prove to be defective, this unit must be completely overhauled. The disassembly, cleaning, and repair of the viewfinder turret is outlined in paragraph 70.

c. VIEWFINDER TUBE. The viewfinder tube can be removed as an assembly by unscrewing the tube collar from the viewfinder opening in the camera door. This unit must be disassembled by experienced personnel. Replace defective viewfinder tube as a complete assembly.

d. WINDING KEY. The ratchet-winding key can be removed from the camera frame by inserting a screw driver or similar instrument between the camera frame and the key, prying the key from

its socket. This must be done before any further disassembly is attempted. If the key has been operating improperly or if the shaft appears bent or damaged in any way, repair the key as outlined in paragraph 69.

e. CAMERA HEAD. The camera head consists of the lens turret, the camera head casting, the shutter, and the intermittent film-driving mechanism (shuttle and shuttle cam). If the camera head has been damaged in any way, it can be completely removed from the camera frame by following the procedure outlined below :

(1) Remove the lenses from the lens bores. Then pry out the oil retaining pin ((2) of fig. 23) with a screwdriver or a knife blade.

(2) Remove the center locknut (3) from the lens turret. Then with the left hand, carefully turn the turret counterclockwise and pull it outward; at the same time cup the right hand around the camera head casting to catch the indexing roller studs (5), rollers (6), and springs (7).

(3) Lift off the lens turret (4) and remove the bearing plate (8) which is located between the turret and the camera head casting.

(4) Remove the four screws (1) which hold the camera head casting (29) to the camera frame.

(5) With the film gate open, carefully pull out the camera head casting by pressing the thumb against the aperture plate until the casting is free of the camera housing. Keep one finger on the camera starting button to prevent the button from jumping out.

68. Predisassembly Instructions

Make certain that the camera spring motor is completely run down before attempting to disassemble any portion of the camera. Three methods of disassembly can be followed depending on whether the camera is to be partially or completely disassembled. These three methods are discussed in *a*, *b*, and *c* below.

a. If disassembly of the camera is not to include removal of the driving mechanism from the camera frame, allow the camera to run down completely by pressing the starting button. Then follow the disassembly instructions outlined in paragraphs 69 through 71.

b. If the front mechanism plate is to be removed from the camera frame without disturbing the back mechanism plate or driving spring, proceed as follows:

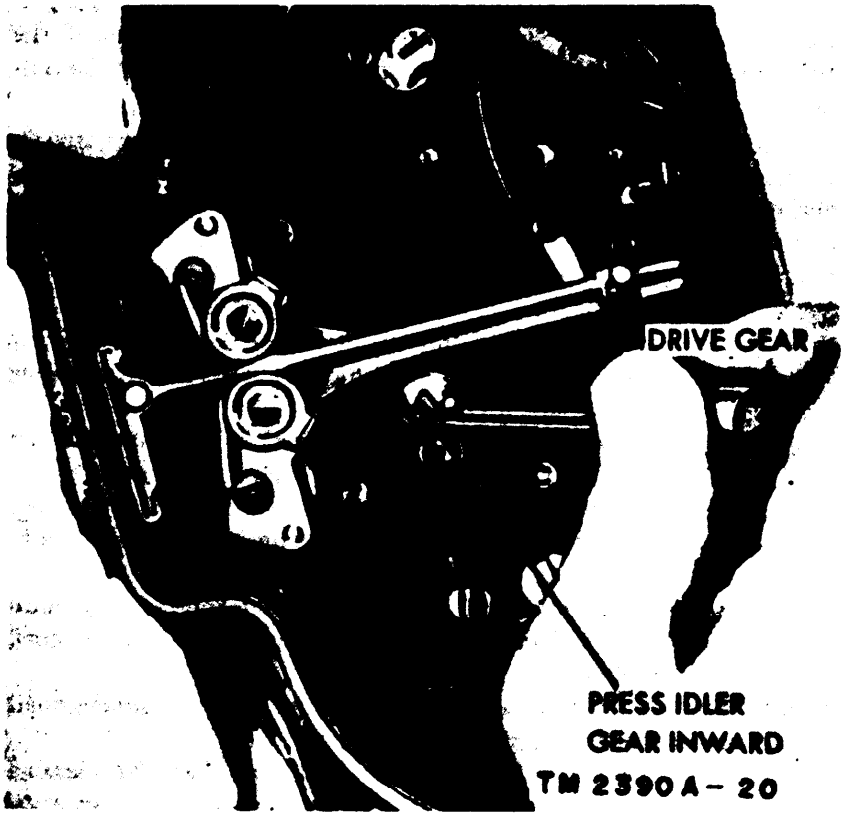


Figure 20. Locking the idler and drive gears.

(1) Press the camera starting button and allow the camera to run to the end of its capacity.

(2) Hold the idler gear in a disengaged position with a screw driver (fig. 20) ; depress the starting button and again allow the camera to run until it stops. This will allow the spring to unwind to its fullest capacity within the camera frame.

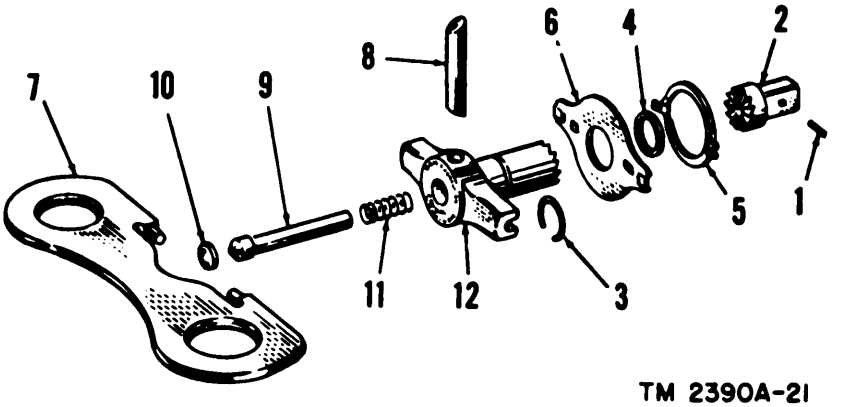
(3) Disassemble the camera up to and including the front mechanism plate (par. 73).

(4) Remove the front mechanism plate very carefully to avoid breaking the seal between the back mechanism plate and the camera frame.

c. If the camera is to be completely disassembled, proceed as follows :

(1) Wind the spring motor to capacity, remove the camera door, and set the camera at the slowest speed (8 fps).

(2) Press the camera starting button, and allow the camera to run until the first long tooth of the idler gear is completely visible in the gear opening of the front mechanism plate.
(3) While holding the idler gear in a depressed position with a screw driver, allow the camera to run until the shallow space between the drive gear teeth is visible in the opening.
(4) Release the idler gear so that the first long tooth is engaged in this shallow space, then press the camera starting button to make certain that the mechanism is locked.
(5) Proceed with the complete disassembly of the camera unit.



1. Pin.
2. Ratchet.
3. Retaining ring.
4. Split retaining collar.
5. Friction clip.
6. Clamp spring.
7. Handle plate.
8. Uncoupling bar.
9. Spring shaft.
10. Plug.
11. Compression spring.
12. Key body.

Figure 21. Winding key, exploded view.

69. Winding Key Repair
(fig. 21)

a. DISASSEMBLY.
(1) Pry the winding key from its socket by inserting a screw driver between the winding key and the camera frame and twisting the screw driver firmly.
(2) Drive out the pin (1) with a drift punch, and remove the ratchet (2) from the spring shaft.
(3) Pry the retaining ring (3) from the groove in the key body. Remove the retaining collar (4) and slide off the friction clip (5), clamp spring (6), and handle plate (7).
(4) Pull on the end of the spring shaft to compress the spring and press out the uncoupling bar (8). Then tap lightly

on the end of the spring shaft (9) until the plug (10), spring shaft, and spring (11) come out of the key body (12).

b. CLEANING AND LUBRICATION. Wash all parts with solvent (SD) and dry thoroughly before attempting to reassemble. After reassembly, place a drop of oil (LO) on each of the winding key handle pins.

c. REPAIR AND REASSEMBLY.

(1) It is not practicable to attempt repair of any of the winding key parts. Such items as the ratchet (2), retaining ring (3), friction clip (5), spring shaft (9), and compression spring (11) must be replaced if damaged.

(2) Insert the spring (11) and spring shaft (9) down into the key body (12) and install the plug (10).

(3) Compress the spring by pulling the end of the spring shaft until the uncoupling bar (8) can be inserted through the opening of the key body.

(4) Hold the handle plate (7) in position with the prongs in the key body slots, and install the clamp) spring (6) and split retaining collar (4). Then slide the friction clip (5) up over the key body, and install the retaining ring (3).

(5) Slide the ratchet (2) onto the lower end of the spring shaft so that the ratchet teeth engage the teeth on the key body and the hole in the ratchet is alined with the hole in the shaft. Install the pin (1) to hold the ratchet in place.

70. Camera Door Repair

(fig. 22)

a. DISASSEMBLY.

(1) To remove the cover from the camera simultaneously turn both latch cam keys on the cover one-fourth turn to the OPEN position. Grasp the viewfinder housing and lift the cover from the camera frame.

(2) Do not attempt to disassemble the viewfinder or view. finder turret unless these items are inoperative, because the viewfinder tube is alined accurately when assembled at the factory and cannot be realined without special fixtures. Ordinary repair of the camera door consists of removing the objective lenses and eyepiece for cleaning.

This can be done without disturbing the alinement of the viewfinder tube.

(3) If the condition of the viewfinder turret and tube is such that complete disassembly and replacement of parts is necessary, proceed as follows:

(a) Remove the complete positive viewfinder assembly (2) from the camera door by unscrewing the turret mount collar (2J) from the camera door.

(b) Remove the three setscrews (2A) that lock the turret to the collar and lift off the assembled turret. Remove the screw (2B) and spring washer (2C), and disassemble the turret and masks assembly (2D) from the turret mount (2E). Be careful not to lose the indexing spring (2F) and indexing roller (2G).

(c) The viewfinder tube assembly (2K) must not be disassembled from the turret mount collar (2J) unless absolutely necessary for replacement of either one of those two parts. The tube is held within the collar with the tube retaining setscrew (2H).

(4) The knob (3), spring (4), clutch (5), latch cam key assembly (6), and upper latch cam (9) are stakedinassembly. The latch cam key (7), the latch cam hub (8), and lower latch cam (10) also are staked in assembly. These parts must not be removed from the camera door unless replacement of any of the parts is absolutely necessary.

(5) The upper and lower door latches (12 and 13) are fastened to the inner side of the camera door with shoulder screws (14) and spring washers (15). The eccentric washer (17) can be removed from the door by unscrewing the fillister headscrew (16).

b. CLEANING. Wash all of the door parts, with the exception of the viewfinder objectives, eyepiece and tube, with solvent (SD) and clean and wipe dry with a clean lint-free cloth. None of the camera door parts will require lubrication.

c. REPAIR AND REASSEMBLY.

(1) Secure the camera door latches (12 and 13) to the camera door with the shoulder screws (14) and spring washers (15). Fasten the eccentric washer (17) temporarily in place with the fillister headscrew (16).

(2) Position the latch cam link (11) on the inside surface of

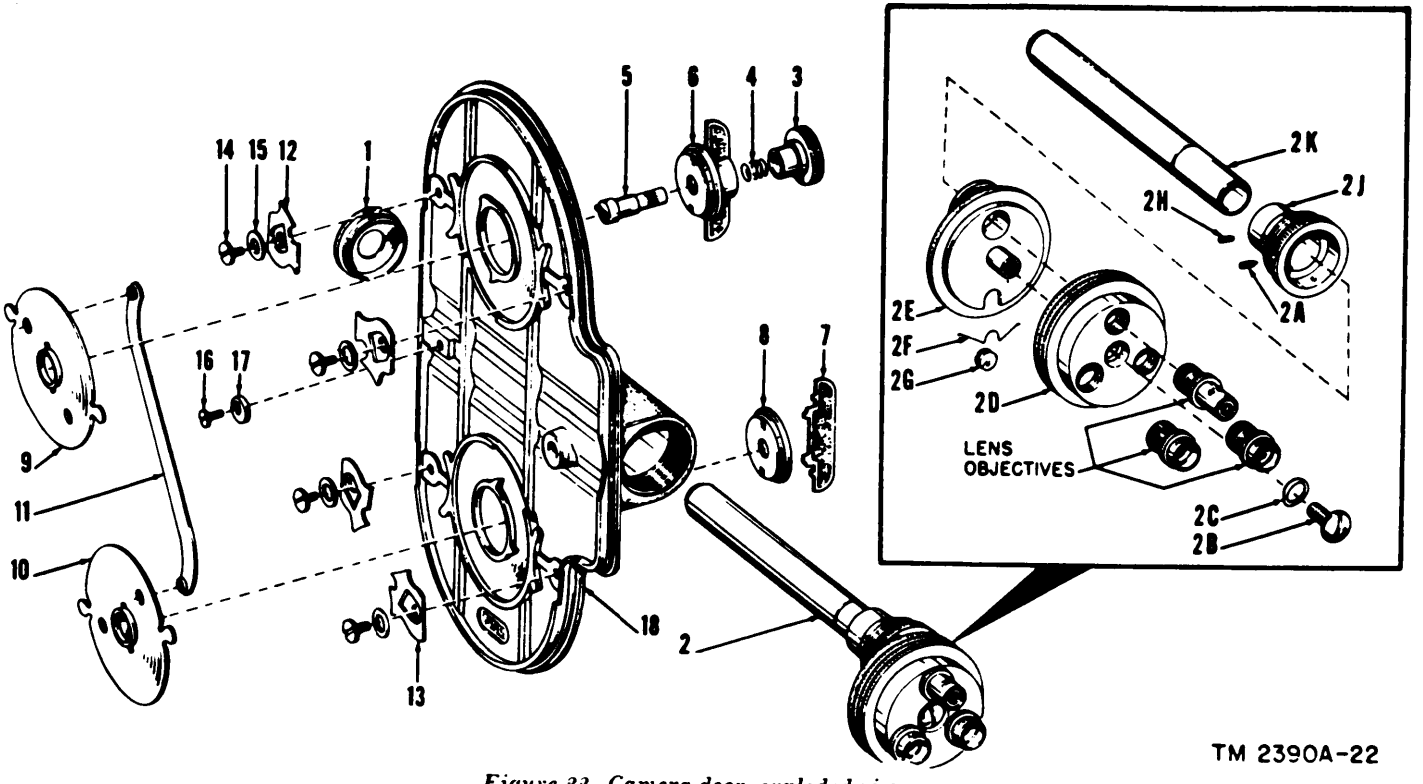


Figure 22. Camera door, exploded view.

1. Viewfinder eyepiece.
2. Positive viewfinder assembly.
2A. Turret retaining set screw.
2B. Truss headscrew.
2C. Spring washer.
2D. Turret and masks assembly.
2E. Turret mount.
2F. Indexing spring.
2G. Indexing roller.
2H. Tube retaining set screw.
2J. Turret mount collar.
2K. Viewfinder tube assembly.
3. Knob.
4. Spring.
5. Clutch.
6. Latch cam key assembly.
7. Latch cam key.
8. Latch cam hub.
9. Upper latch cam.
10. Lower latch cam.
11. Latch cam link.
12. Upper door latch (two).
13. Lower door latch (two).
14. Shoulder screw (four).
15. Spring washer (four).
16. Fillister headscrew.
17. Eccentric washer.
18. Camera door.

Figure 22—Continued.

the door. Lay the upper latch cam (9) in place and engage it with the link.

(3) Insert the splined end of the clutch (5) through the latch cam key assembly (6). Slip the spring (4) over the clutch, and press the knob (3) down firmly over the splined shaft. Insert the latch cam sleeve assembly through the opening in the camera door so that the key prongs protrude through the slots in the upper latch cam. Stake over the key prongs, leaving no noticeable play but allowing the latch key to turn freely.

(4) Insert the lower latch cam hub (8), key slots vertical, through the lower opening in the door; then install the latch cam key (7) so that the prongs protrude through the hub and the lower latch cam (10). Stake over the key prongs, leaving no noticeable play but allowing the latch key to turn freely.

(5) Insert the end of the viewfinder tube assembly (2K) into the turret mount collar (2J), and temporarily lock it in place with the tube retaining set screw (2H). Position the indexing spring (2F) and indexing roller (2G) at the lower edge of the turret and masks assembly (2D). Assemble the turret mount (2E) and turret and masks assembly (2D) with the truss headscrew (2B) and spring washer (2C).

(6) Loosen the tube retaining set screw (2H). The viewfinder tube must be focused to form an image of the mask 10 feet (plus 16, minus 4) in front of the eye. When this adjustment has been made, lock the set screw and seal with sealing compound.

(7) Assemble the turret to the tube with the turret retaining set screws (2A). Insert the assembled tube and turret into the opening in the camera door. Install the viewfinder eyepiece (1); then loosen the turret retaining set screws and rotate the turret until the masks are square when viewed through the eyepiece. Tighten the set screws.

d. ADJUSTMENTS. The gate arm backlash adjustment eccentric washer holds the camera gate closed when the door is on the camera. This eccentric washer is held in place with the screw ((16) of fig. 22). Adjust the gate arm eccentric washer as instructed in paragraph 78e. Place the door on the camera frame, fit it into position, and close it with the latches. Examine the fit of the door around the edges. If the camera door has been bent, it can be fitted by tapping the edges into shape with a fiber mallet.

71. Camera Head Repair

The camera head consists of the lens turret, the camera head asting, the shutter, and the intermittent driving mechanism (shuttle and shuttle cam). Failure of the camera to function properly may be due to particles of dirt or small pieces of film lodged between the shutter cam and shuttle, or to the lack of oil on these parts. Carefully examine the camera during the disassembly procedure to ascertain the cause of trouble.

a. DISASSEMBLY (fig. 23).

(1) Remove the oil retaining pin (2) from the center of the lens turret by prying it out with a screw driver or a knife blade. Then unscrew the center locknut (3) from the lens turret.

(2) With the left hand, carefully turn the turret counterclockwise; at the same time, cup the right hand around the lower portion of the camera head casting to catch the three sets of index studs (5), rollers (6), and springs (7). Remove the lens turret (4) and lens turret bearing plate (8).

(3) Remove the four screws (1) which fasten the camera head casting (29) to the camera frame. With the film gate open, carefully pull out the camera head casting by pressing the thumb against the aperture plate until the casting is free of the camera housing. Keep one finger on the camera starting button to prevent the button and spring from jumping out.

(4) Remove the screw (9) which fastens the plunger spring (10) and plunger (11) into the groove on the face of the camera head casting.

(5) Remove the guide rail (12) by taking out the two screws (13). Remove the two screws (15) from the aperture plate (14), and lift out the aperture plate, film tension rail (16), and guide rail tension spring (17).

(6) Take out the two screws (18) that hold the shuttle pins (20) in place and lift out the shuttle (19). Be careful not to lose the shuttle pins (20), shuttle spring (21), or washer (22) during this operation. Lift out the stop pawl assembly (23).

(7) Carefully lift the shutter and cam assembly (24) from the shuttle cam spindle (28), being very careful not to lose the shims (25 and/or 26). Handle the shutter gen-

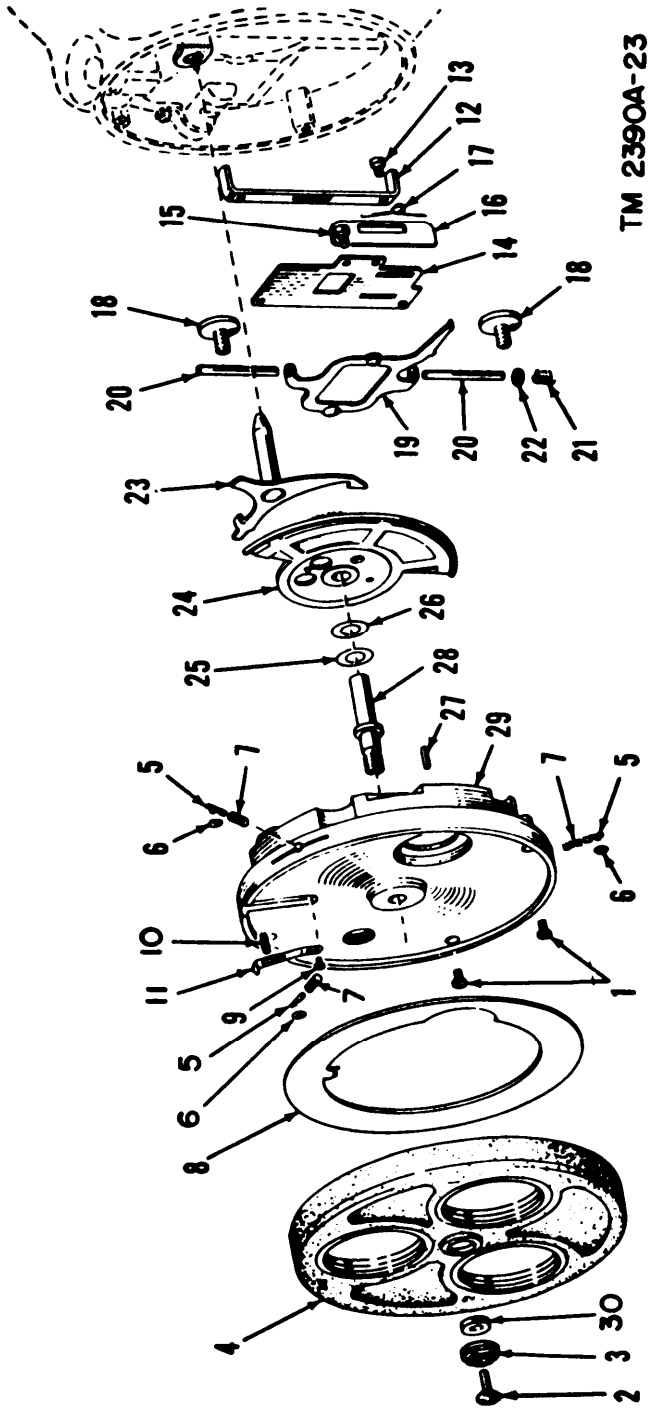


Figure 23. Camera head components.

1. Fillister headscrew.
2. Oil retaining pin.
3. Center locknut.
4. Lens turret.
5. Index roller stud.
6. Index roller.
7. Index spring.
8. Bearing plate.
9. Fillister headscrew.
10. Plunger spring.
11. Plunger.
12. Film guide rail.
13. Film headscrew.
14. Aperture plate.
15. Fillister headscrew.
16. Film tension rail.
17. Tension spring.
18. Shuttle pin screw.
19. Shuttle.
20. Shuttle pin.
21. Shuttle spring.
22. Washer.
23. Stop pawl assembly.
24. Shutter and cam.
25. Shim.
26. Shim.
27. Dowel pin.
28. Shuttle cam spindle.
29. Head casting.
30. Washer.

Figure 23—Continued.

tly, as the leaf is easily bent or nicked. The dowel pin (27) need not be removed from the front plate. Do not remove the shuttle cam spindle (28) from the head casting (29) unless it is loose in the casting. If such is the case, both the head casting and spindle must be replaced.

b. CLEANING AND LUBRICATION. Before reassembling the camera head, thoroughly clean the parts of this unit with solvent (SD). In the course of reassembly, lubricate according to the instructions given in paragraph 42.

c. REPAIR AND REASSEMBLY (fig. 23).

(1) Lubricate the shuttle cam spindle (28) with a drop of oil (LO), and slip the shims (25 and 26) over the spindle. Install the shutter and cam assembly (24) over the spindle shaft. The shims act as a bearing surface and regulate the closeness of the fit of the shuttle and cam assembly. The height of the shuttle tooth will project through the aperture plate. Correct adjustment may require the use of more shims. It may be necessary to determine this by trial and test. Spin the shutter around several times to see that it turns freely and that it does not strike against the head casting.

(2) Inspect the shuttle (19) for evidence of wear. Slight grooves in the shuttle teeth may be removed by filing. If the bearing surfaces of the shuttle teeth are worn severely, replace this part with a new one. Insert the shuttle pins (20) into the openings in the shuttle (19), and install the washer (22) and then the spring (21) on the lower shuttle pin. Position the shuttle on the shuttle cam so that the shuttle pins lie in the grooves in the camera head casting. Spread the pins far enough apart to allow a full shuttle stroke, and install the shuttle pin screws (18) to hold the shuttle pins in place.

(3) Rotate the shutter to determine if it revolves easily and if it drives the shuttle. There should be very little play between the shuttle and the cam, both up and down and sideways. However, parts should not bind and the shuttle and cam should spin easily. Replace worn parts with new ones. Place the aperture plate temporarily in position and check the height that the shuttle teeth project through the aperture plate openings. The height should be enough to allow the teeth to engage the film perforations. If the shuttle teeth are too low, use thicker

shims beneath the cam; if they are too high, use thinner shims. Do not try to adjust the shuttle by filing the grooves in which the shuttle pins rest.

(4) Inspect the aperture plate (14) with a magnifying glass, if one is available, for any nicks and scratches. A camera lens can be used in the absence of a magnifying glass. A light buffing with fine crocus cloth will sometimes remove minor abrasions. Do not attempt to polish deep pits or scratches because changes in the thickness of the plate affect the focal distance and depth of focus. If the plate is nicked or scratched to any great extent, replace the aperture plate with a new one. Thoroughly clean the aperture plate before installing.

(5) Place the aperture plate (14) in the recess of the film tension rail (16) and position both parts (approximate position) on the front plate casting. Lift the outer edge of the plate just enough so that the tension spring (17) can be slipped into the recess in the casting. It may be

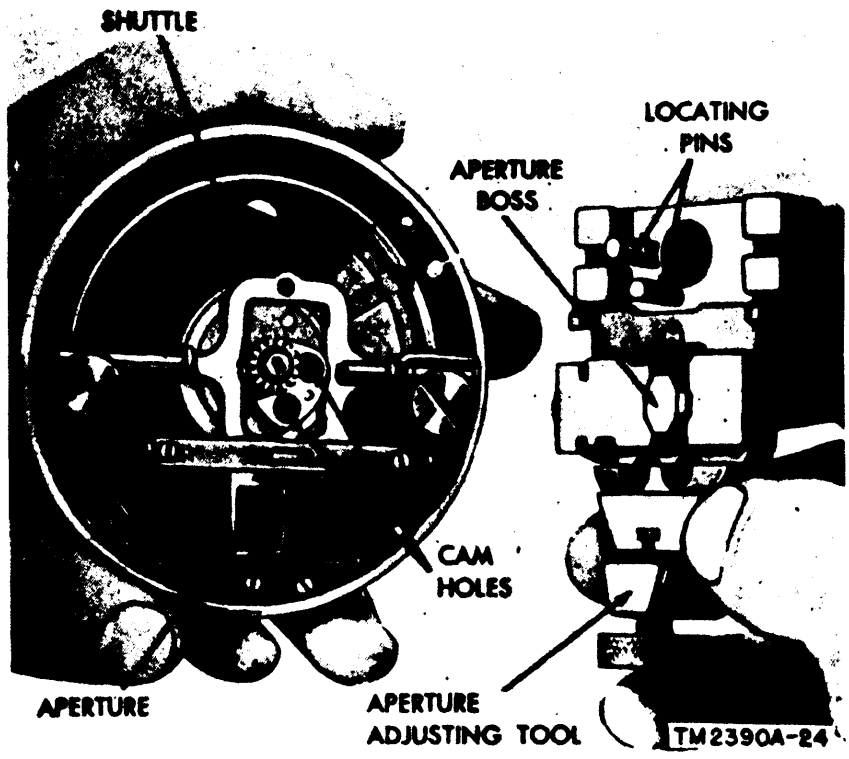


Figure 24. Positioning shutter for aperture tool.

necessary to bend the ends of the spring away from the front plate casting. Then hold the aperture plate in position and install the two screws (15) just enough to hold the plate securely. Position the film guide rail (12) along the opposite edge of the aperture plate and fasten it loosely in place with the two screws (13). Now adjust the aperture plate as follows:

(a) Rotate the shutter so that the two large holes in the cam are in the positions shown in figure 24. Note that the shuttle teeth are at the beginning of the stroke. Position the aperture adjusting tool over the aperture plate so that the two pins fit into the large holes and the aperture boss of the tool fits into the aperture opening.

(b) Slightly loosen the four screws which hold the aperture plate in place, and turn the knurled knob on the adjusting tool (fig. 25) until it is tight. This will pull the

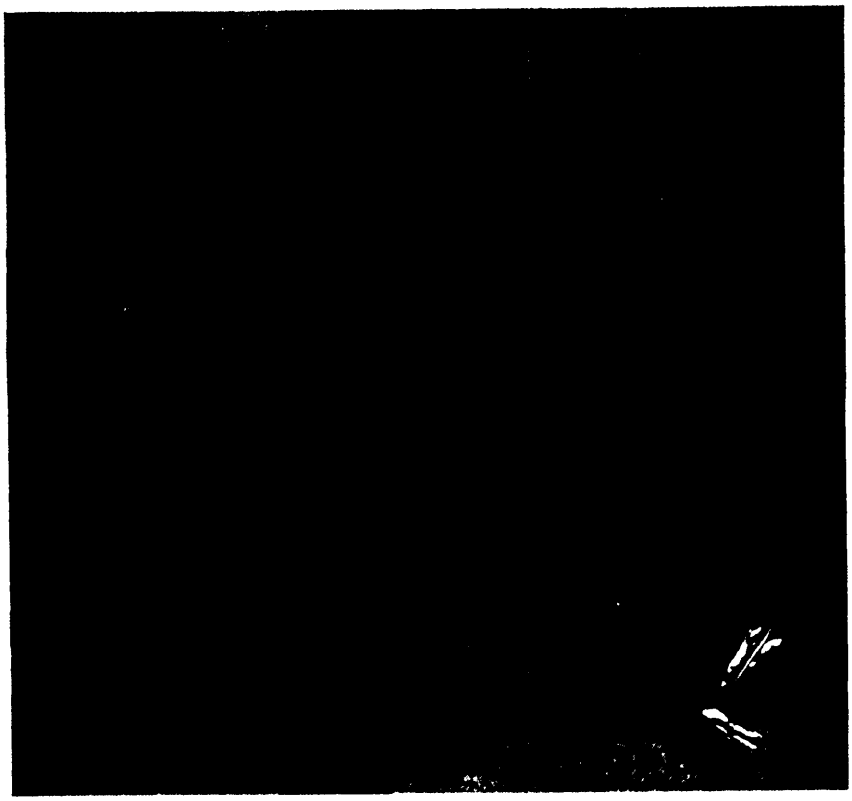


Figure 25. Adjusting aperture.

aperture plate to the correct position. Then tighten the aperture plate attaching screws and remove the adjusting tool.

(c) The aperture plate position tool (fig. 25) is used to check the position of the aperture plate with relation to the shuttle stroke. One end of the tool is marked NO GO. With the tool positioned on the aperture plate as shown in figure 25 (boss on under side of the tool inserted into aperture opening) and the NO GO end nearest the shuttle teeth, the shuttle teeth should just strike the tool when the shutter is rotated. When the tool is reversed so that the GO end is nearest the shuttle teeth, the teeth should just *clear* the tool as the shutter is rotated. It may be necessary to shift the aperture plate slightly until this condition is met. Then repeat the step described above, and securely tighten down the aperture plate attaching screws.

(d) After completing the adjustment of the aperture plate, loosen the upper shuttle pin screw (18) so that the upper shuttle pin (20) may be moved temporarily out of position. Then slide the stop pawl assembly (23) into place so that one leg is underneath the shuttle pin and the other leg is between the aperture plate and the casting. Move the shuttle pin back into position and tighten the shuttle pin screw.

d. INSTALLING CAMERA HEAD.

(1) Place the camera on the workbench with the front plate opening facing up. Remove the starting button and spring temporarily from the camera frame. Inspect the front plate assembly for cleanliness, and lubricate sparingly according to the instructions given in paragraph 42.

(2) Install the camera head assembly so that the stop pawl stud fits into the bearing brackets on the upper mechanism plate. Before pressing the front plate completely down into place, reinstall the starting button and spring, and engage the button with the stop pawl assembly. Then press the front plate down into place.

(3) Install the four screws (1) that fasten the camera head casting to the camera frame. Install the plunger (11), and fasten the plunger spring (10) to the head casting with the screw (9).

(4) Position the bearing plate (8) on top of the head casting so that the cut-out in the bearing plate is squarely over the lens opening. Carefully insert the three springs (7)

into the slots around the edge of the front plate. Place the index rollers (6) on the index roller studs (5) and insert them partially into the slots. Then place the lens turret (4) in position on the head casting; and, while holding it firmly with one hand, press the indexing rollers and studs into the slots, in which springs were inserted, one at a time until the lens turret is firmly seated.

(5) Revolve the turret to make certain that the indexing rollers properly position each lens opening at the aperture. Install the lens turret locknut (3), being very careful not to turn the nut on too tightly. Then press the oil retaining pin (2) into position.

Note. The turret must turn with some amount of resistance, but must not be so tight that the snap of the indexing rollers, as they position the lens openings, cannot be felt.

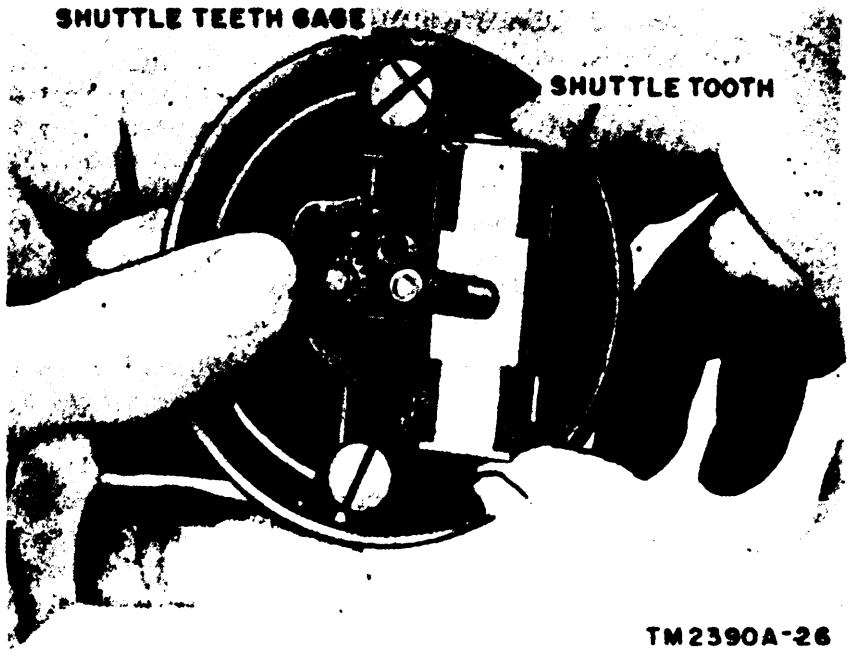
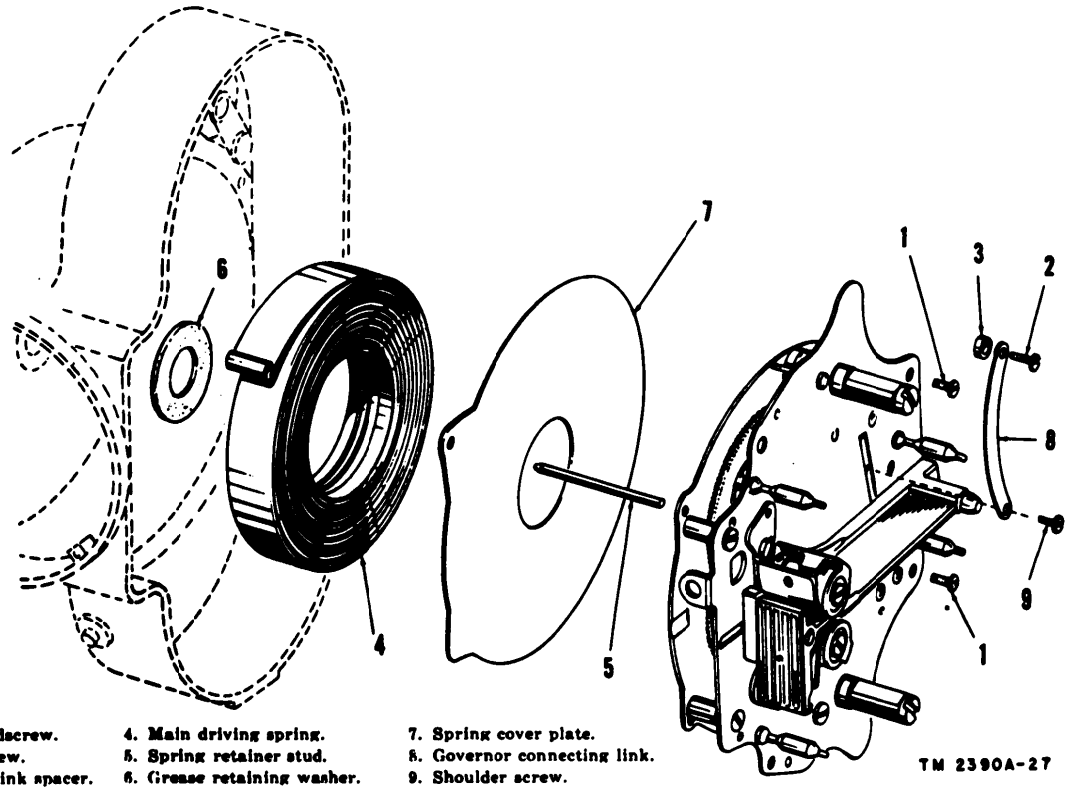


Figure 26. Testing shuttle stroke.

72. Driving Mechanism and Spring

(fig. 27)

a. REMOVAL. Before attempting to remove the driving mechanism assembly (the assembled f rent mechanism plate, back mechanism, and spring), remove the hand-crack housing, items 21 through 25 of figure 42, from the camera frame. Then follow the



1. Fillister headscrew.
2. Shoulder screw.
3. Connecting link spacer.
4. Main driving spring.
5. Spring retainer stud.
6. Grease retaining washer.
7. Spring cover plate.
8. Governor connecting link.
9. Shoulder screw.

Figure 27. Removing driving mechanism and spring.

predisassembly instructions outlined in paragraph 68c, and proceed with the removal of the driving mechanism and spring as instructed in (1) and (2) below:

(1) Remove the four screws (1) that fasten the complete driving mechanism (fig. 27) into the camera frame. Also remove the shoulder screw (2) and spacer (3) that attach the governor connecting link (8) to the governor speed dial.

(2) Grasp the gate arm between the thumb and forefinger, and carefully lift the driving mechanism out of the camera frame.

Caution: As soon as the driving mechanism has been removed, place it in the timing fixture and wind the spring tight; use the hand crank. Place the safety retaining ring around the main driving spring as shown in figure 30. In its coiled position in the mechanism, the spring is extremely dangerous. Be careful not to drop or jar the mechanism so as to cause the spring to release. Do not attempt to remove the spring unless the special fixtures mentioned in b(1) and (2) below are available.

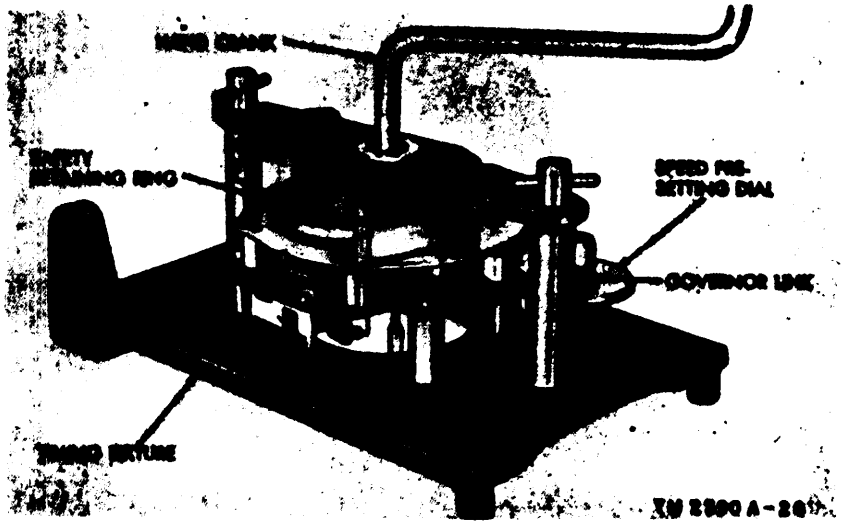


Figure 28. Driving mechanism in correct position on timing fixture.

b. DISASSEMBLY .

(1) Place the driving mechanism in the timing fixture (fig. 28). Insert the hand crank, and wind the spring just enough so that the gears can be unlocked. This can be done by pressing the idler gear downward with a small

screw driver while holding the hand crank firmly (fig. 29). Check the safety retaining ring to make certain that it still encircles the spring and, with the gears disengaged, allow the spring to unwind slowly until it is tight within the retaining ring. With a screw driver, disengage the inner end of the spring (4) from the spring retaining stud (5). Then remove the grease retaining washer (6) and cover plate (7) from the timing fixture and the driving mechanism.

(2) To unwind the spring fully, place it over the hub of the spring winding fixture (fig. 30). Then install the wind-

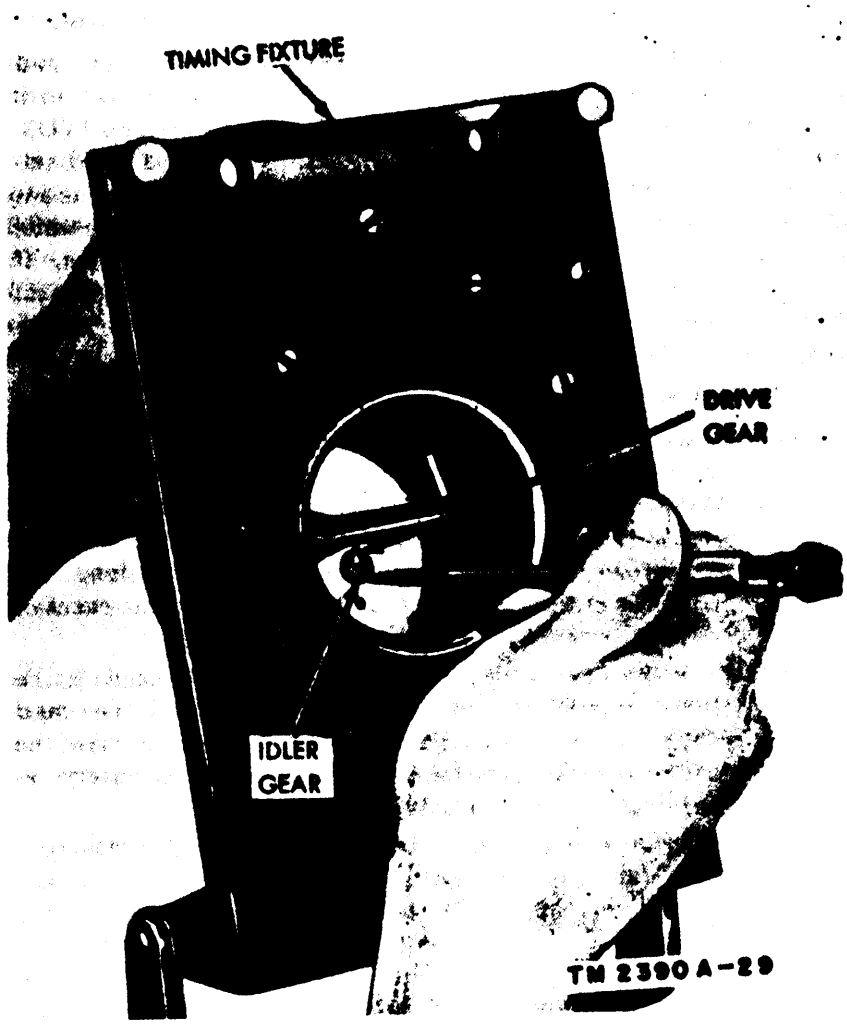


Figure 29. Unlocking the gears.

ing fixture crank, and engage the looped end of the winding fixture retaining arm. Wind the spring carefully until the retaining ring can be removed. Then unwind the spring completely, remove the hand crank, and carefully lift the spring from the unwinding fixture.

Caution: Be careful when removing the spring from the spring winding fixture, because the spring still has a bit of tension and will be very slippery because of accumulated graphite lubricant. It is advisable to wear gloves when handling the spring in order to avoid cutting the hands on the sharp edges.

(3) Remove the shoulder screw ((9) of fig. 27) that fastens the governor connecting link (8) to the front plate.

c. CLEANING AND LUBRICATING. Secure one end of the main drive spring to the work bench and stretch the spring out to its full length. Wipe the spring with a cloth dampened with oil (LO), and dry with a clean, lint-free cloth. Remove the hardened shellac and old graphite from the main spring cover plate and the inside of the camera frame. Brush or blow as much dust as possible from the driving mechanism. Lubricate the mechanism as instructed **in** paragraph 42a. Spread approximately 1 teaspoonful of lubricating graphite (GFS) around the bottom of the camera frame within the recess that houses the spring.

d. REPAIR AND REASSEMBLY.

(1) Before replacing the driving mechanism and spring into the camera frame, apply a thin film of orange shellac (Federal spec TT-S-27la) around the shoulder of the casting recess. Allow the film to dry until it is fairly firm before replacing the mechanism in the casting. This will act as a seal and prevent the graphite from reaching the driving gears or film chamber.

(2) Wind the spring by hand until it can be placed in the spring unwinding fixture (fig. 30). Install the hand crank, tighten down the clamping knob, and wind the spring, making sure the coils lie flat, until the safety retaining ring can be placed about it.

(3) Slide the spring cover plate (7) over the hub of the main drive shaft and up against the under side of the back mechanism plate. Lift the spring from the unwinding fixture, and slide it over the hub of the drive shaft on the under side of the back mechanism plate. Install the grease retaining washer (6). Insert the spring retaining stud (5) through the mechanism plates. Engage

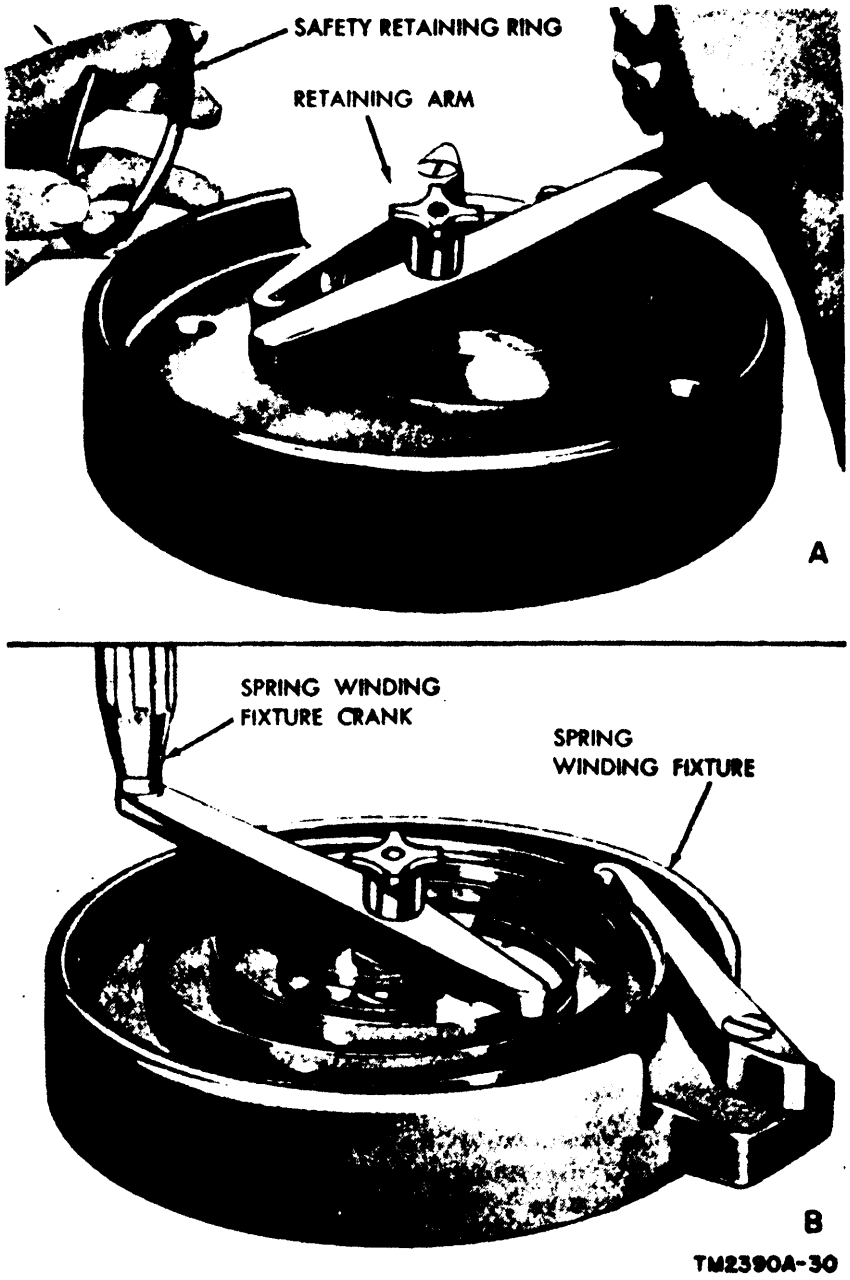


Figure 30. Unwinding the spring.

one end of the spring with a drive shaft hub, and slip the looped end of the spring over the retaining stud.

(4) Attach the lower end of the governor connecting link (8) to the tapped hole in the governor housing with the shoulder screw (9). The tapped hole in the governor housing can be seen through the long slot in the mechanism plate.

e. FOOTAGE PRESETTING ADJUSTMENT.

(1) Place the assembled driving mechanism in the timing fixture (fig. 28). Install the hand crank, and slowly and carefully wind the spring until it is tight. Remove the safety retaining ring from the drive spring.

(2) Release the hand crank, and count the number of complete revolutions that the hand crank makes before the drive and idler gears lock. The hand crank should make 7 complete revolutions, which is equivalent to approximately 21 feet of film.

(3) If the hand crank made only 6 revolutions, wind the spring completely, and unlock the gears (fig. 29). Each tooth of the drive gear represents approximately 3 feet of film; allow the spring to unwind until one drive gear has moved back past the idler gear. Then engage the gears.

(4) If the hand crank made 8 revolutions, unlock the gears and wind the spring until one tooth of the drive gear has moved back past the idler gear. Then re-engage the gears.

(5) After resetting the gears, recheck the amount of footage recorded and the number of turns made. Wind the spring motor to its full capacity, and reset the footage dial at 0. Press the starting button and allow the camera to run until it stops.

f. GOVERNOR PRESETTING ADJUSTMENT.

(1) Hook the loose end of the governor link over the pin on the back of the timing fixture speed indicating dial. Set the dial pointer between the two notches at the high-speed end of the dial and wind the spring slowly until it is tight.

(2) Release the hand crank. The hand crank should make 7 complete revolutions in 13 to 14 seconds.

(3) With the dial pointer set between the two notches at the low-speed end of the dial, the hand crank should make 1 complete revolution in approximately 15 seconds.

(4) If unable to attain the speed adjustments outlined in (2) and (3) above, remove the governor and adjust it as instructed in paragraph 73d. If the presetting speeds appear to be correct, wind the spring completely and lock the idler and drive gears by engaging the first long tooth of the idler gear with the shallow space between the drive gear teeth. Then install the safety retaining ring around the spring.

Caution: As a safety measure, it is advisable to leave the safety retaining ring around the spring until just before the driving mechanism is to be installed in the camera frame.

g. INSTALLING SPRING AND DRIVING MECHANISM.

(1) Remove the safety retaining ring from around the main spring, and lift the driving mechanism carefully from the timing fixture. Lubricate the grease retaining washer lightly with grease (GL).

(2) Grasp the gate arm between the thumb and forefinger, and insert the driving mechanism carefully into the camera frame. Spread the two pawls until they straddle the film meter ratchet, and press down firmly on the driving mechanism until it is seated solidly in the frame. Check the locking pawl to make certain that it operates the footage dial freely.

(3) Install the driving mechanism attaching screws ((1) of fig. 27) and turn them in until tight. Attach the upper end of the governor connecting link to the speed control dial with the shoulder screw ((2) of fig. 27) and spacer ((3) of fig. 27). The speed control dial should turn freely and should move the governor housing back and forth. Install the crank handle housing parts (items (21) through (25) of fig. 42). During this operation, the cranking gear must be slipped into position so that it meshes with the second compound pinion assembly of the driving mechanism.

(4) Reassemble the camera head to the camera frame (par. 71). Reinstall the camera door (par. 70) and the winding key (par. 69).

73. Front Mechanism Plate Repair

a. REMOVAL.

(1) Prepare the camera for disassembly by following the instructions outlined in paragraph 68c.

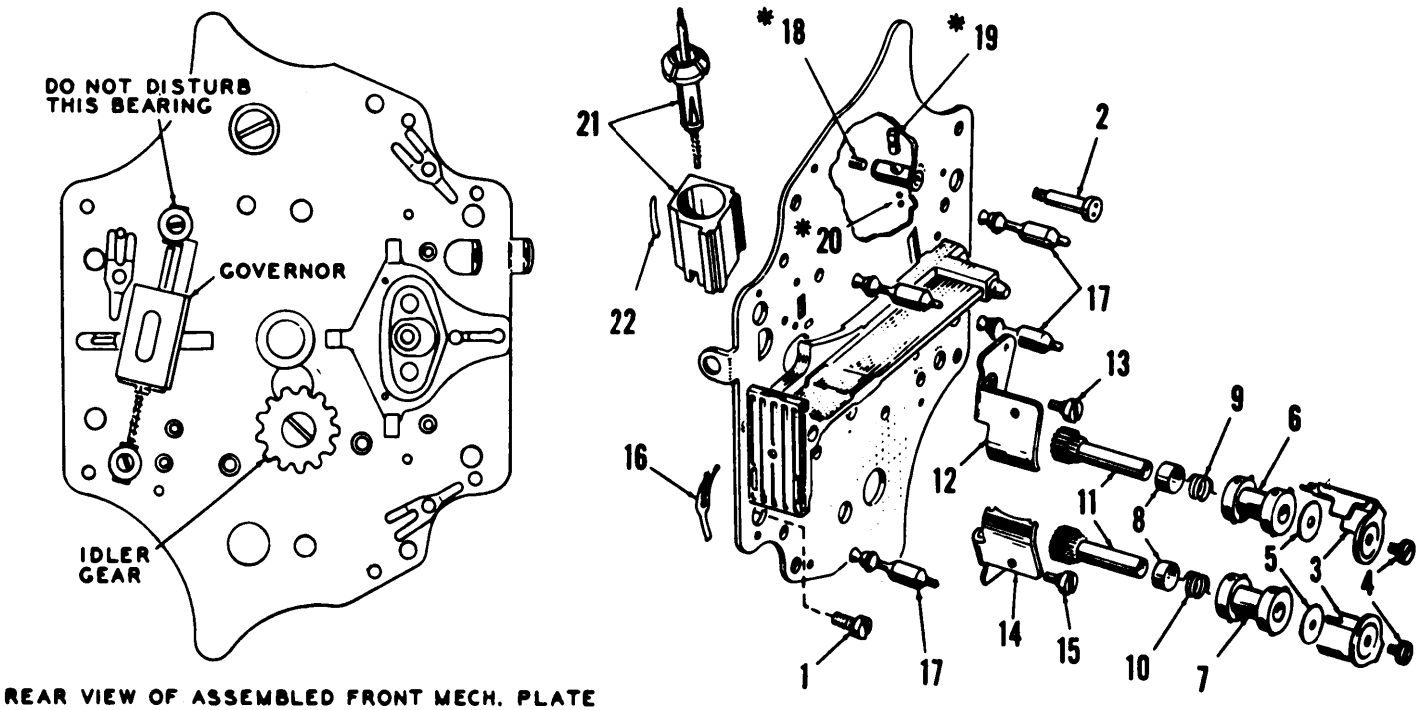


Figure 31. Removing governor and sprockets from front plate.

1. Fillister headscrew.
2. Special headscrew.
3. Sprocket guard.
4. Fillister headscrew.
5. Shim.
6. Feed sprocket.
7. Take-up sprocket.
8. Spring cover tube.
9. Rh sprocket spring.
10. Lh sprocket spring.
11. Gear and sleeve assembly.
12. Upper guide shoe.
13. Film guide screw.
14. Lower guide shoe.
15. Film guide screw.
16. Film guard spring.
17. Film guard.
18. Set screw.
19. Governor bearing.
20. Bearing ball.
21. Governor and worm.
22. Pressure spring.

Figure 31—Continued.

(2) Remove the winding key (par. 69), camera door (par. 70), and camera head (par. 71). Remove the spring and driving mechanism (par. 72).

(3) Remove the fillister headscrews ((1) of fig. 31) that fasten the front and back mechanism plates together. Then remove the special headscrew ((2) of fig. 31) with the driving mechanism pin wrench (fig. 32). Lift the front mechanism plate assembly from the back mechanism plate assembly.

b. DISASSEMBLY (fig. 31).

(1) Move the gate arm to its open or back position. Remove the screw (4) that attaches each sprocket guard (3) to the sprockets, and lift off the guards and the shims (5). Then remove the feed sprocket (6), take-up sprocket (7), spring cover tubes (8), torsion springs (9 and 10), and sprocket gear and sleeve assemblies (11) from the film sprocket studs. The sprocket guide shoes (12 and 14) can be removed by taking out the film guide screws (13 and 15) that fasten each shoe to the front mechanism plate.

(2) Remove the spring (16) which holds each of the four film guards (17) to the front mechanism plate.

(3) The governor and worm assembly (21), which regulates the speed of the camera within the prescribed range of

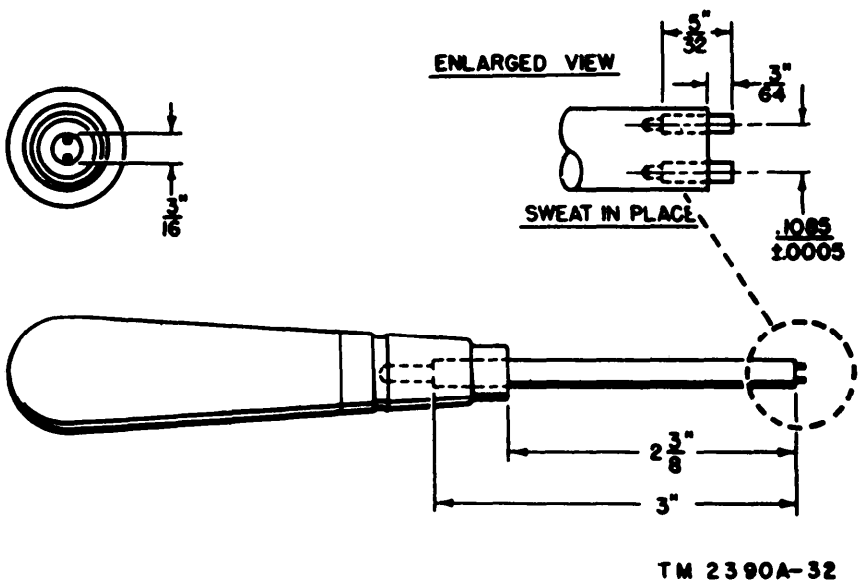


Figure 32. Driving mechanism pin wrench.

8 to 64 fps, is alined critically at the factory and must not be disassembled except to remove the governor assembly from the housing assembly. If either of these assemblies is damaged, it must be replaced with a new one. Special fixtures are needed for the reassembly and adjustment of the governor. To remove the governor assembly, loosen the set screw (18) located in the center of the stud at the worm gear end of the governor shaft on the under side of the mechanism plate. Then back the bearing (19) at the end of the governor worm shaft halfway out of the stud, and remove the governor shaft from the opposite bearing (19). The governor assembly now maybe lifted free of the two mechanism plate studs that retain its bearings. Be careful not to lose the two ball bearings (20) that are housed in each bearing or the pressure spring (22) that is located in the recess of the governor housing.

Note. Do not disturb the bearing which carries the end of the shaft opposite from the worm, or great difficulty will reexperienced when attempting to mesh the governor worm gear and drive gear during reassembly.

(4) *(The remainder of the disassembly procedure outlined herein is keyed to figure 33.)* From the under side of the mechanism plate, take out the screw (2) that holds the gate arm assembly (1) in place. The pressure plate (3) can be removed from the arm by pressing on the gate arm tension pin (through the opening in the center of the pressure plate) with a pointed wooden instrument and then sliding the plate from the arm. Be very careful not to scratch the pressure plate.

(5) The pressure plate adjusting hexagonal nut (4) and set screws (5) need not be removed from the pressure plate. Remove the front retaining stud (6) and rear retaining stud (9) from the gate arm; be very careful not to lose the single coil springs (7 and 10) and spacer washers (8 and 11).

(6) To disassemble the feed spindle mechanism, it will be necessary to clamp the spindle in a smooth-jaw vice. Tighten the vice just enough to hold firmly. Remove the shoulder screw (12), friction collar (13), spring washer (14), return spring (16), and return spring housing (15) from the spindle shaft. Then loosen the vice and lift out the feed spindle (17) ; be very careful not to lose the friction washer (18).

(7) Slide the stud carrier (19) forward until it can be separated from the mechanism plate. Remove the screw (20) that fastens the stop gear spring (21) and idler stop gear (22) to the mechanism plate. The bushings (23 and 24) must not be removed from the plate (25) except for replacement.

c. REPAIR AND LUBRICATION. Clean all front mechanism plate parts thoroughly with solvent (SD). Examine the sprocket teeth, gears, and other moving parts for wear or damage. Wear of sprocket and gear teeth will not affect materially the operation of the camera. If gear teeth or sprocket teeth are broken, however, these damaged items must be replaced.

d. ADJUSTING THE GOVERNOR.

(1) If the presetting speed check (par. 72f) proved unsatisfactory, it may mean that the governor springs and weights are in need of adjustment. Remove the weight carrier and shaft assembly from the governor housing, and carefully insert the governor spring distance gage (fig. 34). The gage should just clear the governor weights, and all four weights should be equidistant from the governor shaft.

(2) If the four weights are not of equal distance from the governor shaft, it may be necessary to bend each spring individually. Insert the governor spring setting tool under the weight (fig. 35), and slight] y bend the weight outward from the shaft. Be careful not to insert the tool too deeply under the weight, as it may cause the spring to break.

(3) If none of the four weights are far enough away from the shaft, use the governor spring spreading tool and the governor spreading tool ring (fig. 36). As the spreading tool is pressed inward, it will spread all four weights equally. This must be done carefully so that the weights are not opened too far.

Note. Always check the weight clearance frequently with the governor spring distance gage (fig. 34) when spreading weights as instructed in (2) and (3) above.

(4) The governor flexure control washer retainer (fig. 37) must be positioned very precisely so that it does not interfere with the governor springs. Install the governor spring gaging fixtures (fig. 37) and loosen the retainer screws. Adjust the retainer so that it clears the unknurled portion of this fixture, and tighten the retainer screws securely.

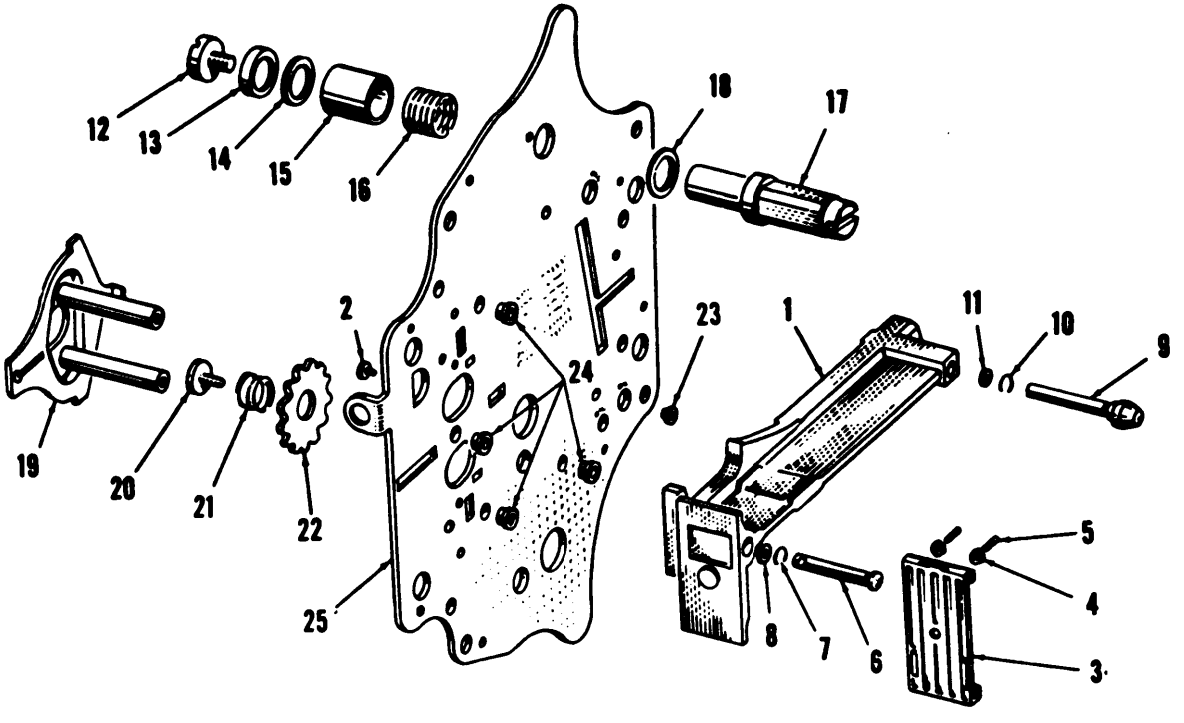


Figure 33. Front mechanism plate, exploded view.

1. Gate arm assembly.
2. Fillister headscrew.
3. Pressure plate.
4. Hexagonal nut.
5. Set screw.
6. Front retaining stud.
7. Spring.
8. Washer.
9. Rear retaining stud.
10. Spring.
11. Washer.
12. Shoulder screw.
13. Friction collar.
14. Spring washer.
15. Return spring housing.
16. Return spring.
17. Feed spindle.
18. Friction washer.
19. Stud carrier.
20. Fillister headscrew.
21. Stop gear spring.
22. Idler stop gear.
23. Governor bushing.
24. Drive gear bushing.
25. Front plate.

Figure 33—Continued.

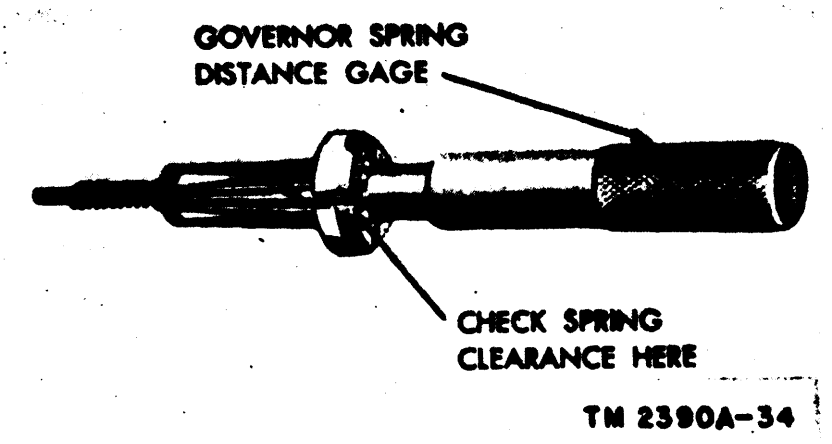


Figure 34. Checking distance of governor weights from shaft.

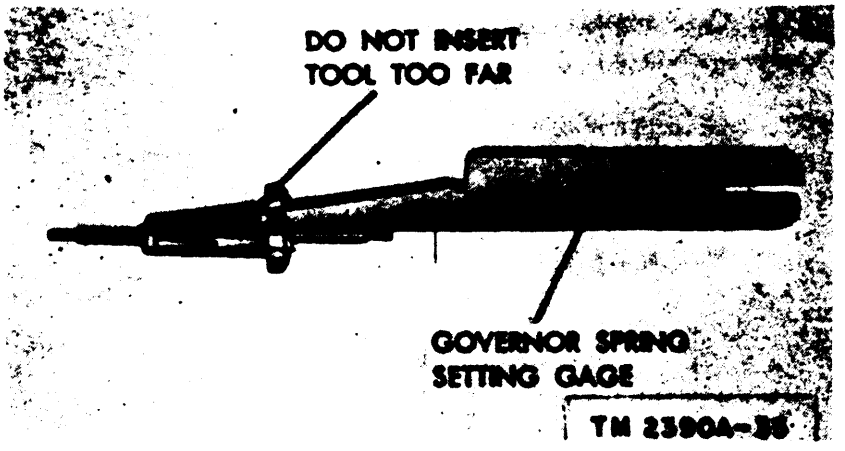


Figure 35. Spreading individual governor springs.

(5) If the governor weights are too far away from the governor shaft, insert the end of a piece of steel which is one-thirty-second inch square under the governor springs one at a time. Bend each spring carefully toward the shaft and then check the adjustment with the governor spring distance gage (fig. 34). Repeat the adjustment until all four weights just clear the outer circumference of the gage.

e. REASSEMBLY. The reassembly instructions outlined in (1) through (9) below refer to the parts illustrated on figure 33. The remaining steps of the reassembly procedure are keyed to figure 31.

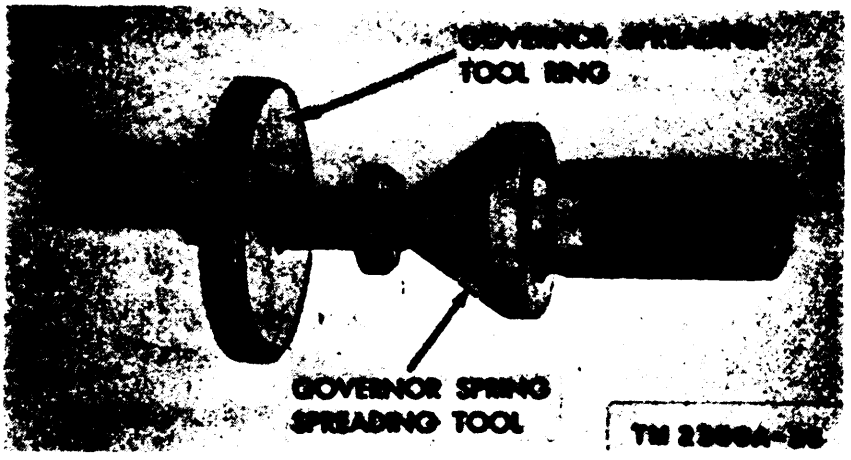


Figure 36. Governor spreading tool and ring in operation.

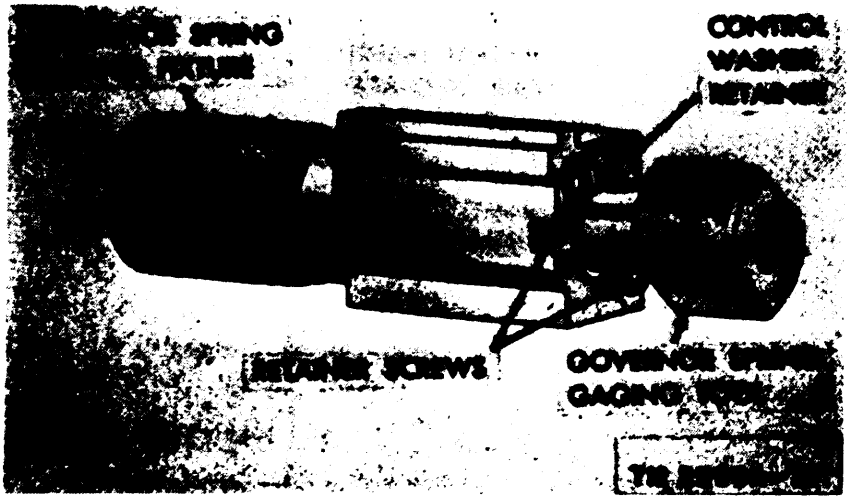


Figure 37. Adjusting control washer retainer.

(1) If any of the bushings (23 and 24) were removed for replacement, press new ones into the front mechanism plate (26). Install the idler stop gear (22) and spring (21) with the screw (20). Place the stud carrier (19) into position on the under side of the front mechanism plate, and slide it forward until it is held by the two flanges, or ears, of the plate.

(2) Hold the gate arm assembly (1) in place on the front mechanism plate, and press the rear retaining stud (9), with the spring (10) and washer (11) installed, down through the opening in the rear of the gate arm until

the groove in the stud can be engaged with the slot in the mechanism plate. Shift the gate arm and stud carrier just a bit toward the rear of the mechanism plate so that the rear retaining stud holds. Then press the front retaining stud (6), with spring (7) and washer (8) installed, down through the front end of the gate arm until the groove in the stud engages with the slot in the stud carrier. Hold the gate arm firmly, and press the stud carrier forward as far as it will go. Then move the gate arm back until the hole in the under side of the gate arm is visible behind the stud carrier. Install the screw (2).

(3) Install the friction washer (18) over the tapped end of the feed spindle (17), and insert the tapped end through the opening in the front mechanism plate. Slide the return spring (16), return spring housing (15), spring washer (14), and friction collar (13) over the spindle shaft, and secure all parts with the shoulder screw (12). Clamp the feed spindle in a smooth-jaw vice, and tighten the screw (12) as tightly as possible.

(4) Insert the four film guards (17) through their openings in the front mechanism plate, and slip the forked end of the film guard springs (16) around the grooves at the lower ends of the guards. The springs must not interfere with any openings in the front mechanism plate.

(5) Attach the lower guide shoe (14) and upper guide shoe (12) to the mechanism plate with the film guide screws (13 and 15). Slide the spring cover tubes (8) down. onto

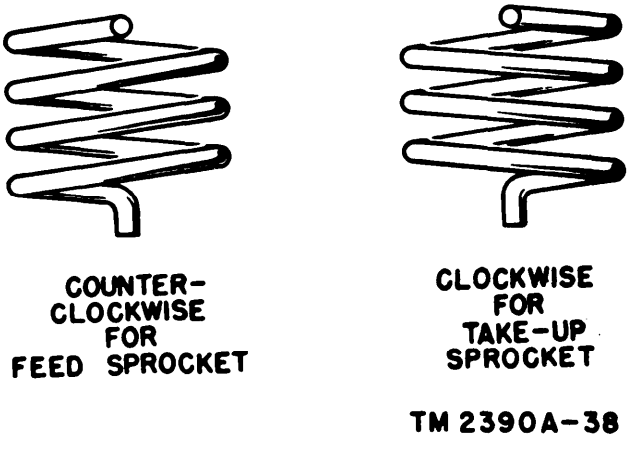


Figure 38. Sprocket gear torsion springs.

the sprocket gear and sleeve assemblies (11). Install the torsion springs (9 and 10) so that each spring fits down into the spring cover tube and the end of each spring fits into the recess in the gear. The clockwise-wound spring (fig. 38) must be installed with the take-up sprocket, so be sure to note with which assembly each spring was installed. Install each sprocket (6 and 7) on its respective sleeve assembly so that the bent-out end of the torsion spring fits into the recess at the lower end of each sprocket. Fasten the sprocket guards (3) and shims (5) temporarily in place with the screws (4). The sprockets must be synchronized before the camera is assembled completely. Refer to paragraph 78b for sprocket synch ionization.

(6) Insert the plain end of the governor shaft into the bearing (19) that was not touched during disassembly, and the worm end of the shaft into the bearing (19) which was backed part way out of the bearing support. Press the latter bearing back down into the bearing support so that the long, key-like projection of the governor and worm assembly (21) fits into the slot in the front mechanism plate. Install the set screw (18) to lock the worm shaft bearing in place. Move the governor housing back and forth to make certain that it operates freely. Apply a light film of grease (GL) to the spring (22), and install it in the opening in the top of the governor housing. Place a drop of oil (LO) on each of the bearings which retain the governor worm shaft.

f. INSTALLING FRONT MECHANISM PLATE.

(1) Grasp the gate arm between the thumb and forefinger, and place the assembled front mechanism plate carefully on the assembled back mechanism plate gears. It may be necessary to shift the gears slightly with a pointed tool until the gear shafts enter the proper shaft openings in the upper mechanism plate. Fasten the two mechanism plates together with the screws (1 and 2).

(2) It will be necessary to adjust the screw (2) with the driving pin wrench illustrated in figure 32. The instructions for accomplishing this adjustment are outlined in paragraph 78a.

(3) Turn the hub of the main drive gear (on the back mechanism plate), and check the gears for freedom of movement. Also make certain that all gears are in mesh,

and that they have the proper clearance in relation to other gears.

(4) Install the assembled spring and driving mechanism (par. 72). Reassemble the camera head to the camera casting (par. 7l). Install the camera door (par. 70) and winding key (par. 69). Then make the final adjustments outlined in paragraph 78.

74. Bock Mechanism Plate Repair

a. REMOVAL.

(1) Prepare the camera for disassembly of the back plate as instructed in paragraph 68c. Remove the winding key (par. 69), camera door (par. 70), and camera head (par. 71). Remove the driving mechanism and spring from the camera frame (par. 71), and disassemble the front mechanism plate from the back mechanism plate (par. 73a).

(2) The disassembly instructions for the various components other than the back mechanism plate assembly are outlined in the paragraphs mentioned in (1) above. If a visual examination proves that these component assemblies are in good operating condition, set them aside for reassembly into the camera frame after the back mechanism plate has been repaired and reassembled.

b. DISASSEMBLY (fig. 39).

(1) With the front mechanism plate removed, note that the driving mechanism gear shafts are set in bushings pressed into the front and backplanes. All of these gears can be removed from the back plate simply by lifting them out of the bushings. As each is removed, make a note of its assembled position.

(2) Lift the pull pawl (1), locking pawl (2), and tension spring (3) from ‘the shaft of the eccentric shaft gear (4). Then remove the stop gear (5), intermediate spindle and gear (6), governor worm gear pinion (7), governor lubricating wheel (8), second compound pinion (9), first compound pinion (10), and the shaft and idler gear (11).

(3) Place the take-up spindle assembly in a smooth-jaw vice, and tighten just enough to hold it firmly. Remove the shoulder screw (12), and slide the two take-up friction washers (13), the key washer (14), drive shaft gear (15), and compression springs (16) from the spindle and collar assembly (17).

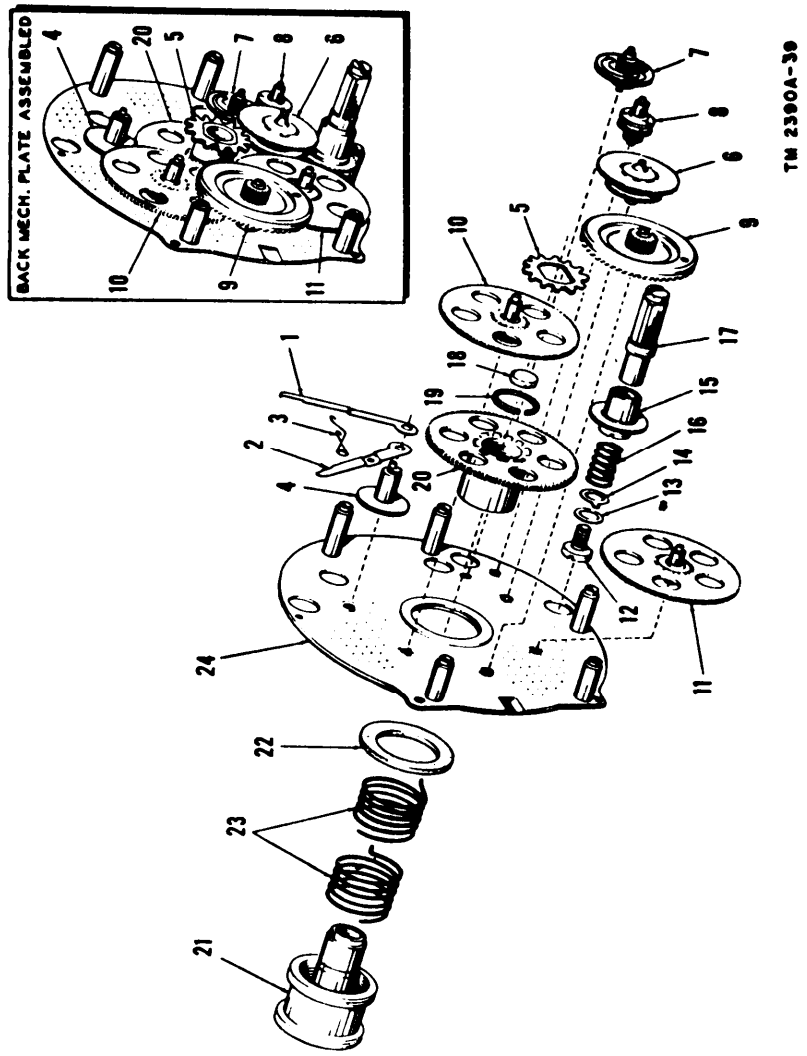


Figure 39. Back mechanism plate, exploded view.

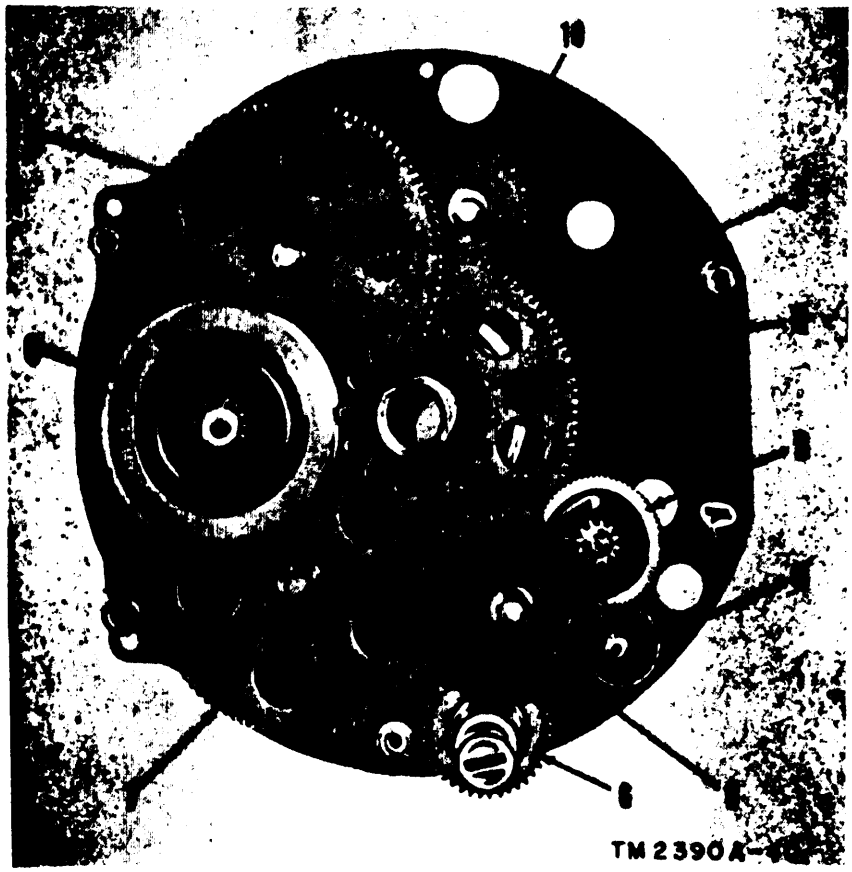
1. Pull pawl.
2. Locking pawl.
3. Tension spring.
4. Eccentric shaft gear.
5. Stop gear.
6. Intermediate spindle and gear.
7. Governor worm gear pinion.
8. Governor lubricating wheel.
9. Second compound pinion.
10. First compound pinion.
11. Shaft and idler gear.
12. Shoulder screw.
13. Friction washer.
14. Key washer.
15. Drive shaft gear.
16. Spring.
17. Spindle and collar.
18. Grease retaining washer.
19. Split retaining ring.
20. Main driving gear.
21. Main drive shaft.
22. Packing washer.
23. Tension spring.
24. Back mechanism plate.

Figure 39—Continued.

(4) Pry the grease retaining washer (18) from inside the main drive shaft (21). Remove the split retaining ring (19) with a screw driver, and lift the main driving gear (20) from the drive shaft. Press against the main drive shaft (21) until it is forced out from the under side of the back mechanism plate (24). The packing washer (22) is shellacked in place and should be removed only if in need of replacement. Lift the spring (23) from the drive shaft.

e. CLEANING AND LUBRICATING.

(1) Thoroughly wash the back mechanism plate and all gears with solvent (SD). Wipe these parts dry with a clean,



1. Main driving gear.
2. Stop gear.
3. Worm gear pinion.
4. Governor lubricating wheel.
5. Intermediate spindle and gear.
6. Drive shaft gear.
7. Shaft and idler gear.
8. Second compound pinion.
9. First compound pinion.
10. Eccentric shaft gear.

Figure 40. Back mechanism plate with gears in place.

lint-free cloth. Inspect all gear teeth to make certain that none of the teeth have brokan off. Gears that have been damaged must be replaced with new ones.

(2) Lubrication of the various components of the back mechanism plate is accomplished during reassembly of the components (d below). After reassembly of the complete camera, follow the lubrication instructions outlined in paragraph 42b.

d. REPAIR AND REASSEMBLY (fig. 39).

(1) In order that the installation of the gears to the back plate will be understood more easily, figure 40 show the back plate with all gears in position. The first compound pinion (9) engages the main driving gear (1) and the hand-crank gear (not shown in figure 39) which, in turn, drives the second compound pinion (8) and the intermediate spindle and gear assembly (5). The second compound pinion (8) drives the intermittent mechanism and engages the geared ends of the sprockets. The intermediate spindle and gear assembly (5) rotates both the take-up spindle drive shaft gear (6) and the governor worm gear pinion (3). The worm gear pinion drives the governor worm shaft. The governor lubricating wheel (4) is automatic in action. Its purpose is to assure a constant film of oil to the contact surfaces of the govenor worm and worm gear. The eccentric shaft gear (10) is driven directly by the main driving gear (1) and, through the action of an eccentric, operates the footage indicator pawls. The drive shaft stop gear (2) meshes witht the idler gear on the upper mechanism plate. It is free to turn until the shallow space between two of the drive gear teeth is engaged by the long tooth of the idler gear. This action stops the motor. Now proceed with the reassembly of the back mechanism plate.

(2) If the packing washer ((22) of fig. 39) was removed, apply a thin coat of orange shellac to the new washer before installing. Insert the hub of the main driving gear (20) through the opening in the back plate (24), Turn the back plate over and install the tension spring (23) on the gear hub. The end of the spring must be engaged with the slot in the driving gear hole. Lubricate the spring lightly with grease (GL). Insert the hub of the main drive shaft (21) through the hollow gear hub, and press these parts together until the tension spring is inclosed completely by the drive shaft collar. Then in-

stall the split retaining ring (19) around the drive shaft to lock all parts in place. Saturate the felt washer (18) with oil (LO) and press it into the opening in the gear end of the drive shaft.

(3) Insert the spring (16), key washer (14), and friction washer (13) into the take-up drive shaft gear (15). Install the screw (12) loosely, maintaining a slight pressure on the screwhead with the thumb while turning the gear until the key washer engages the slot in the gear. Then turn the screw down into place, and turn the spindle and collar assembly (17) down onto the screw. Place this assembled group in a smooth-jaw vice, and tighten the screw as tightly as possible. Test the operation of the assembly by holding the spindle and turning the gear. Then set this group aside temporarily.

(4) Prepare a back plate holding fixture from a piece of wood 2 inches thick by 5 inches wide by 8 inches long (fig. 41). Place the back mechanism plate in the fixture with

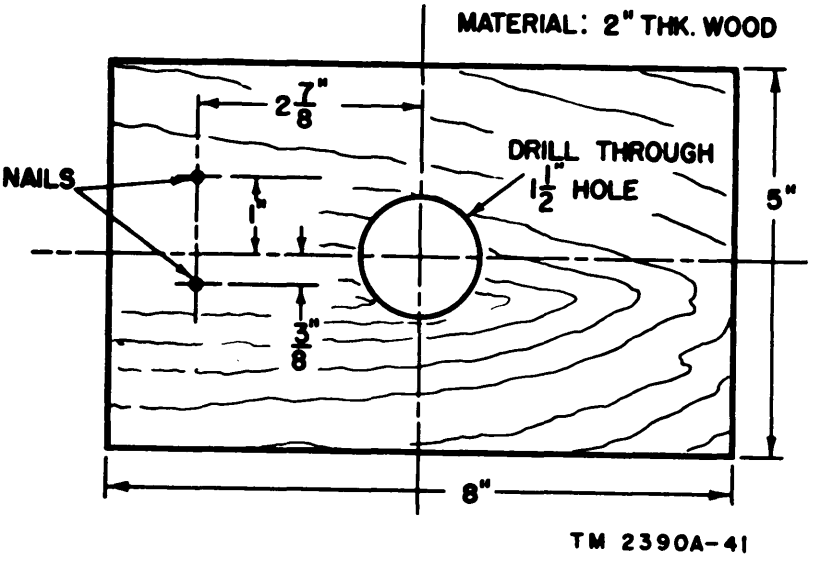


Figure 41. Back mechanism plate holding fixture.

the main driving gear facing up and the top of the plate near the two nails. When reassembling the gears on the back plate, apply a drop of oil wherever a pinion or gear shaft enters a bearing or bushing in the mechanism plate. Avoid oiling to excess since the residual qualities of oil will cause dust and dirt particles to adhere and

accumulate on the surfaces. Then install the gears in the following order: shaft and idler gear assembly (11), first compound pinion and gear assembly. (10), second compound pinion assembly (9), and the intermediate spindle and gear assembly (6). Lift the intermediate spindle and gear assembly enough so that the take-up spindle (assembled in (3) above) can be installed. Install the governor worm gear pinion assembly (7). Saturate the lubricator felt of the governor lubricating wheel (8) with oil (LO) and install it on the backplane. Install the eccentric shaft gear assembly (4), and press the drive shaft stop gear (6) down on the hub of the drive shaft.

(5) Install the tension spring (3), locking pawl (2), and pull pawl (1) on the shaft of the eccentric shaft gear assembly (4). Place the assembled back mechanism plate assembly in a clean spot for reassembly of the major components of the camera.

e. INSTALLING BACK MECHANISM PLATE. Before joining the front and back mechanism plates, check all gears to see that they are seated properly and turn freely. Reassemble the front mechanism plate to the back mechanism plate and install all components into the camera frame (par. 73f).

75. Camera Frame Repair

a. REMOVING COMPONENT ASSEMBLIES FROM FRAME.

(1) Prepare the camera for complete disassembly (par. 68c).

(2) Remove the winding key (par. 69), camera door (par. 70), camera head (par. 71), and driving mechanism and spring (par. 72). Set these component assemblies aside for reassembly of the complete camera unit.

b. DISASSEMBLY (fig. 42).

(1) The critical focuser (1), critical focuser eyepiece (2), and focuser carrier (3) are held in place with the focuser clamp (2) and clamp screw (30). These parts are shown exploded on figure 42 only for illustrating purposes. The alinement of the focuser parts is very critical and requires the use of special factory equipment. Do not remove them from the camera frame.

(2) Lift out the starting button (4) and starting button spring (5). Remove the retaining spring (6) from the stop plunger (7), and lift out the plunger and the fric-

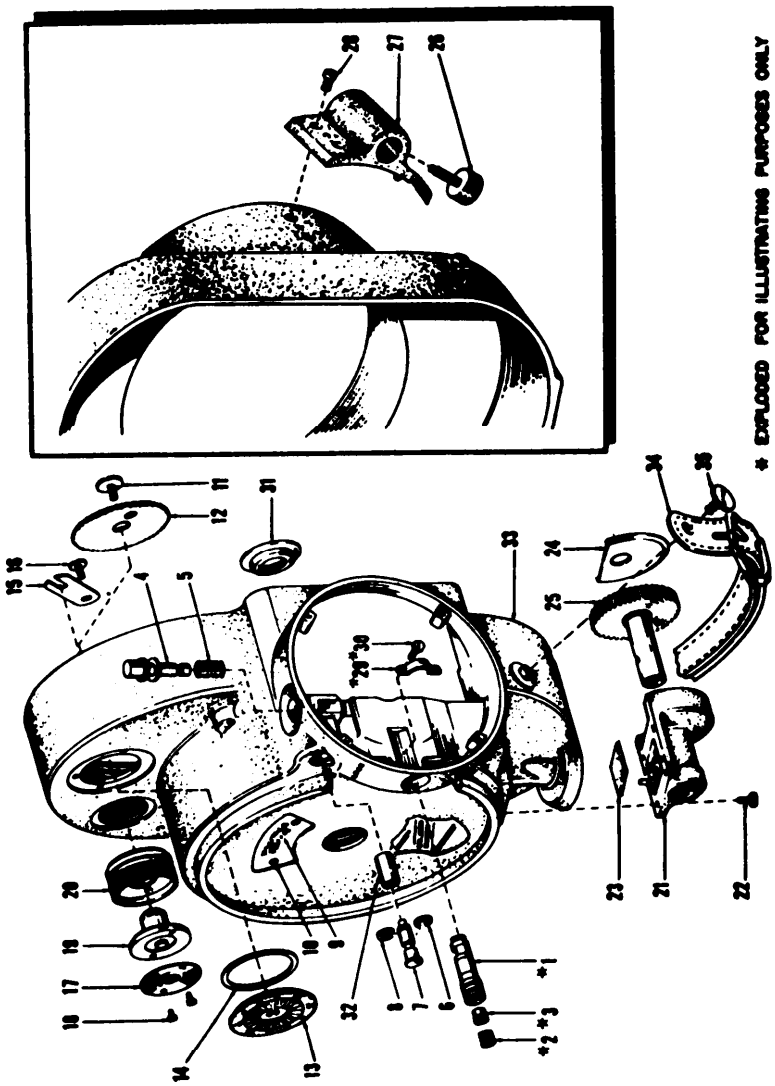


Figure 42. Stripping owners frame.

1. Critical focuser.
2. Focuser eyepiece.
3. Focuser carrier.
4. Starting button.
5. Spring.
6. Retaining ring.
7. Stop plunger.
8. Friction ring.
9. Identification plate.
10. Oval headscrew.
11. Fillister headscrew.
12. Footage dial ratchet.
13. Footage dial.
14. Friction washer.
15. Retaining spring.
16. Fillister headscrew.
17. Governor dial.
18. Oval headscrew.
19. Dial holder.
20. Speed control knob.
21. Hand-crank housing.
22. Fillister headscrew.
23. Lubricating pad.
24. Housing cover.
25. Cranking gear.
26. Knurled screw.
27. Motor bracket.
28. Bracket screw.
29. Focuser clamp.
30. Clamp screw.
31. Drive shaft bushing.
32. Stop plunger bushing.
33. Camera frame.
34. Carrying strap.
35. Carrying strap screw.

Figure 42—Continued.

tion spring (8). The identification plate (9) not be removed.

(8) Take out the screw (11) from inside the camera frame, and remove the film meter ratchet (12), dial (13), and friction washer (14). Remove the screw (16) that fastens the speed control retaining spring (15) to the inside of the camera frame, and withdraw the assembled governor dial (17), dial holder (19), and speed control knob (20). The dial (17) is fastened to the holder (19) with two oval headscrews (18).

(4) The crank housing (21), which was taken off in order to facilitate removal of the driving mechanism (par. 71a), can be disassembled as follows: Lift the lubricating pad (23) from the camera frame side of the housing. Remove the housing cover (24), and press out the cranking gear (25).

Note. The bushings within the cranking gear housing are reamed after assembly and must not be removed.

(6) Unscrew the knurled screw (26) from the motor bracket assembly (27). The motor bracket assembly is fastened to the rear of the camera frame with four bracket attaching screws (28). Do not attempt to remove the locating pins from the motor bracket. Press out the main drive shaft bushing (31). Do not remove the stop plunger bushing (32) from the camera frame unless it is dellnitely in need of replacement.

c. CLEANING AND LUBRICATING .

(1) Wipe the camera frame, inside and out, with a cloth dampened in solvent (SD). Old grease and oil must be completely removed. Remove the hardened shellac and old graphite from the spring recess of the camera frame. Inspect the camera frame carefully for cracks or nicks.

(2) Spread approximately 1 teaspoonful of lubricating graphite (GFS) around the bottom of the camera frame within the recess that houses the spring. Then apply a thin film of orange shellac (Federal spec TT-S-271a) around the shoulder of this recess. This will act as a seal to prevent the graphite from reaching the driving gears or film chamber after reassembly of the unit.

d. REPAIR AND REASSEMBLY (fig. 42).

(1) If the stop plunger bushing (32) was removed for replacement, press a new bushing into the camera frame (33). Install the main drive shaft bushing (31).

(2) Insert the cranking gear (25) into the crank housing (21), and press the housing cover (24) into place. Insert

the lubricating pad (23) into the recess in the bottom of the crank housing, and apply several drops of oil (LO). Do not install this assembled group until after the driving mechanism has been inserted into the camera frame (par. 73).

(9) Press the speed control dial holder (19) into the control knob (20) and fasten a new governor dial (17) to the holder with two oval headscrews (18). Insert the shaft of the dial holder through the camera frame, and slip the arms of the retaining spring (15) around the groove in the shaft. Secure the retaining spring to the inside of the camera frame with the flllister headscrew (16). The governor speed dial must be calibrated as instructed in paragraph 78g.

(4) Hold the film meter (footage) dial (13) and friction washer (14) in place against the outside of the camera frame. Place the footage dial ratchet (12) on the fillister headscrew (11), and thread the screw into the footage dial from inside the camera frame. The teeth of the ratchet (12) must curve in a counterclockwise direction (fig. 43).

(5) Assemble the friction ring (8) and retaining ring (6) into their respective positions on the plunger (7), and insert the plunger into the stop plunger bushing (32). Make certain that the rings are carefully compressed so that the bushing is not scored. Temporarily insert the starting button spring (5) and starting button (4) into the starting button opening. Tap the plunger (7) until the end of the plunger engages the keyway, or slot, at the end of the starting button.

e. ASSEMBLING CAMERA COMPONENTS.

(1) Insert the assembled driving mechanism and spring into the camera frame (par. 72). Assemble the camera head to the camera frame (par. 71).

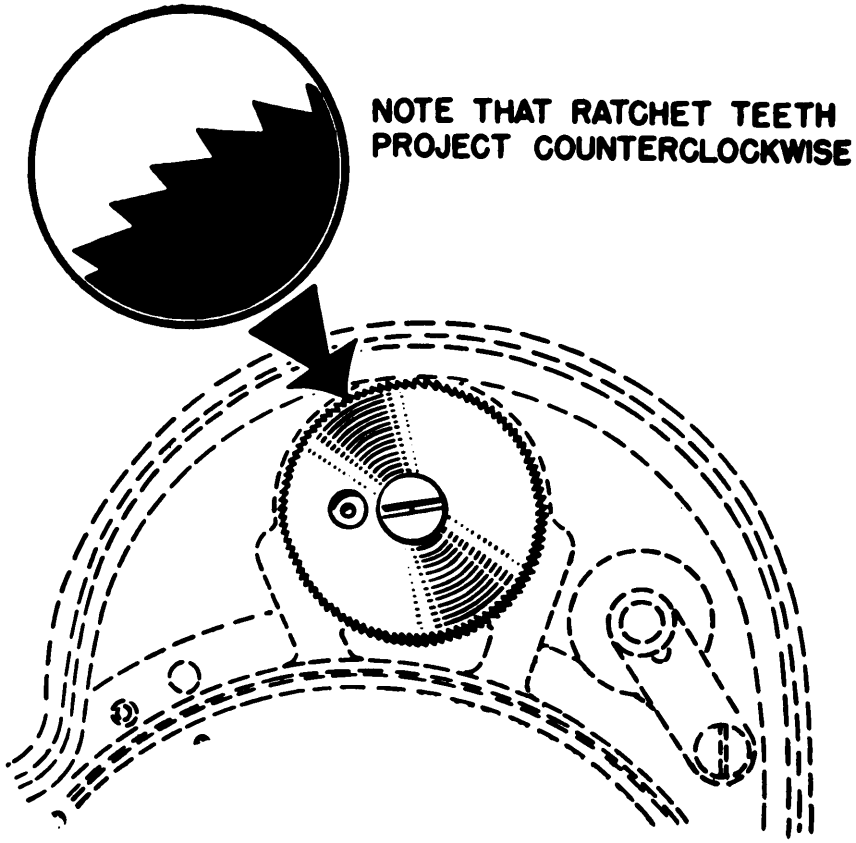
(2) Install the camera door (par. 70) and winding key (par. 69). Adjust the camera as outlined in paragraph 78.

76. Hand-Crank Repair

a. DISASSEMBLY (fig. 44).

(1) Remove the hand-crank dial locking ring (1) and pull the dial (2) from the hand-crank stem. Be careful not to lose the two steel balls (3) and the compression spring (4).

(2) Take out the fillister headscrew (5) and remove the crank handle (6) from the hand crank (7).



Figre 43. Correct installation of footage rachet.

b. CLEANING AND LUBRICATION. Wash the hand-ank parts with advent (SD) and dry with a clean, lint-free cloth. Place 1 or 2 drops of oil (L()) on the spindle of the hand crank.

c. REPAIR AND REASSEMBLY (fig. 44).

(1) Fasten the crank handle (6) to the spindle of the hand crank (7) with the fillister headscrew (5).

(2) Insert the compression spring (4) and two steel balls (3) into the opening in the crank stem, and hold them with the thumb and forefinger while slipping the hand-crank dial (2) up into place. Install the dial locking ring (1).

77. Tripod Repair

a. DISASSEMBLY (fig. 45).

(1) Remove the tripod handle (1) and inspect the grip (2)

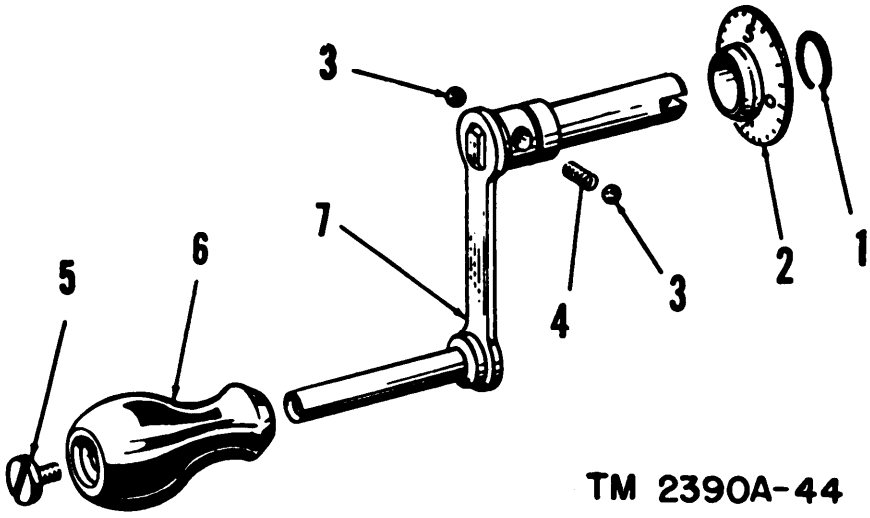


Figure 44. Camera hand-crank components.

for damage or wear. If replacement is necessary, force the grip from the handle. Remove the screws (3) and lift off the top plate (4) and the camera lock knob (5).

(2) Unscrew the tension knob (6) and remove the tension disk (7) and the brass tension- washer (8). Remove screws (9) and pull off the tilt lock handle (10) and the pan lock handle (11). Unscrew the tapped studs (12) from the tripod head. Remove screws (13) and carefully pry out the L-shaped level (14).

(3) Loosen the shaft locking screw (15), drive out the tilt shaft (16), and remove the tilting head (17) and the fiber friction disk (18). Drive out the taper pin (19) and remove the tilt locking ring (20). The tilt lock handle stop pin (21) need not be removed unless damaged.

(4) Unscrew the locknuts (22) from the leg attaching studs (23). These nuts must be discarded and replaced. Drive out the studs and catch the tie-down eyelets (24) as the studs are removed. Detach the assembled tripod legs from the tripod base; be careful not to lose the fiber washers (25). Set the legs aside for further disassembly ((7) and (8) below).

(5) Loosen the lockscrew (26) and unscrew and remove the pan friction adjusting nut (27) and the fiber friction washer (28). Disassemble the tripod head (29) from the base and remove the large fiber friction disk (30).

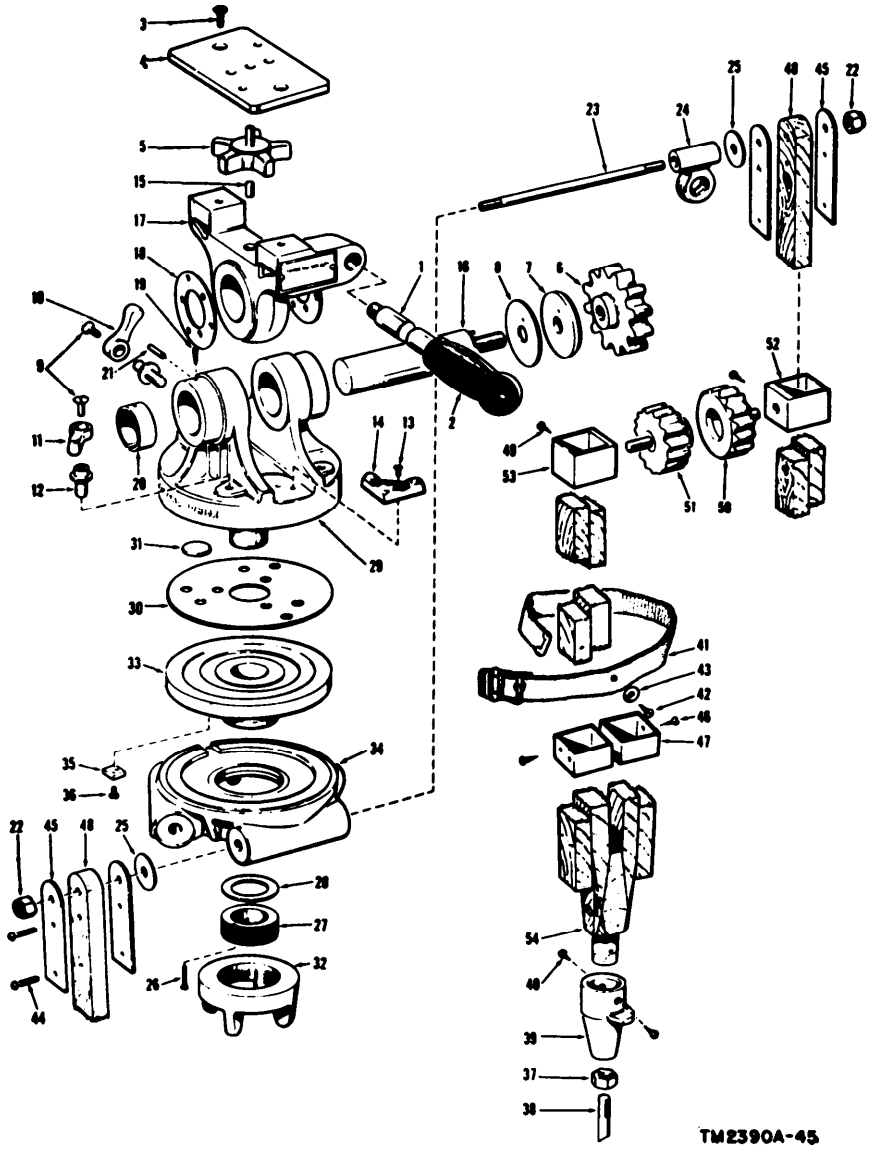


Figure 45. Camera tripod, components.

1. Tripod handle.
2. Rubber grip.
3. Flathead screw.
4. Top plate.
5. Camera lock knob.
6. Tension knob.
7. Tension disk.
8. Tension washer.
9. Flat headscrew.
10. Tilt lock handle.
11. Pan lock handle.
12. Tapped studs.
13. Oval headscrew.
14. L shaped level.
15. Locking screw.
16. Tilt shaft.
17. Tilting head.
18. Friction disks.
19. Taper pin.
20. Locking ring.
21. Stop pin.
22. Locknut
23. Leg stud.
24. Tie-down eyelet
25. Fiber wader.
26. Lockacrew.
27. Adjusting nut
28. Friction washer.
29. Tripod bad.
30. Fricticn disk.
31. Friction pad.
32. Special wingnut=
33. Friction centerpiece
34. Tripod base.
35. Positioning key.
36. Drivescrew.
37. Locknut.
38. Tripod shoe point.
39. Tripod *shoe.*
40. Oval head wood screw.
41. Leg strap.
42. Oval head wood screw.
43. Cup washer.
44. Rivet.
45. Reinforcement strap.
46. Roundhead wood screw.
47. Guide bracket.
48. Straight leg.
49. Roundhead wood screw.
50. Rh adjusting knob.
51. Lh adjusting knob.
52. Rh clamp bracket.
53. Lh clamp bracket.
54. V-shaped leg.

Figure 45-Continued.

Rap the head lightly just above the pan lockscrew opening to dislodge the friction pad (31) from its recess in the under side of the head.

(6) Unscrew the wingnut (32) and dhaaoemble the friction centerpiece (33) from the tripod base (84). The pod. tioning key (35) is fastened to the under side of centerpiece with two drivescrews (36) and need not be removed except for replacement.

(7) Loosen the locknut (37) and remove the tripod shoe point (38) from each leg. The tripod shoes (39) can be replaced by taking out the wood screws (40). To replace the fiber leg strap (41), remove the wood screw (42) and the cup washer (43) which attach the fiber leg strap to one of the tripod legs.

(8) The rivets (44) fasten the reinforcement straps (45) to the straight tripod legs. Do not disassemble the straps from the legs except as a salvaging measure. Remove the wood screws (46) ; this leaves the lower leg guide brackets (47) free on the tripod legs. Loosen the leg adjusting knobs (50 and 51) and slide the straight legs (48) from the V-shaped legs (54). Remove the wood screws (49) and disassemble the adjusting knobs (50 and 51) and the leg clamp brackets (52 and 53) from the V-shaped legs (54). Note that the screw of the knob (50) and the tapped hole of the bracket (52) are right-hand threaded; the screw of the knob (51) and the tapped hole of the bracket (53) are left-hand threaded. The brass inserts need not be removed from the V-shaped legs (54).

b. CLEANING AND LUBRICATION.

(1) Wash all tripod parts in solvent (SD) and wipe dry with a clean, lint-free cloth.

(2) Lubricate the following items lightly with grease (GL): the mating surfaces of the tripod head, centerpiece, and tripod base; the threaded portion of the head shaft, centerpiece, shaft bearing surfaces of the tilting head, and tripod head.

C. REPAIR AND REASSEMBLY (fig. 45).

(1) Damaged threads of any of the tripod component should be repaired, if possible, by rethreading or using a file. If the wooden components of the tripod legs are cracked or broken, they must be replaced. Assemble the adjusting knobs (50 and 51) and the leg clamp brackets

(52 and 53) and compress the V-shaped legs (54) enough so that this assembled group can be installed to the upper end of the legs. Note that the knob with the raised boss (51) is left-hand threaded; the knob with the recess (50) is right-hand threaded. Be sure to assemble these knobs to the proper clamp brackets. Secure the brackets to the upper ends of the V-shaped legs with the wood screws (49).

(2) Slide the straight legs (48) down into the leg guide brackets (47) and tighten the adjusting knobs securely. Lift the lower leg guide brackets (47) up into place and fasten them to the straight legs with the wood screws (46).

(3) Fasten the fiber leg strap (41) to one of the tripod legs with the wood screw (42) and the cup washer (43). Install the tripod shoes (39) and fasten them in place with the wood screws (40). Turn the tripod shoe points (38) into the bottom end of each shoe. The shoe points can be locked in place with the locknuts (37). Set the legs aside until the tripod head has been reassembled.

(4) Fasten the positioning key (35) to the under side of the friction centerpiece (33) with the two drivescrews (36). Assemble the centerpiece to the tripod base (34) so that the positioning key fits into the slot in the base. Then install the wingnut (32).

(6) Press the friction pad (31) into its recess in the under side of the tripod head (29). Slide the large fiber friction disk (30) over the threaded shaft of the tripod head (29) and up against the head bearing surface. Assemble the tripod head to the assembled centerpiece and base and install the pan friction adjusting nut (27) and the fiber friction washer (28). Tighten the lockscrew (26) securely.

(6) Spread the tripod legs enough so that they can be clamped about the tripod leg mounting ears of the base casting. A fiber washer (25) must be inserted between each leg and its mating casting ear. Insert the leg attaching studs (23) partly through the leg and one of the ears. Then install the tie-down eyelet (24) on the stud and push the stud on through the opposite ear and leg. Install the locknuts (22) to each end of the stud.

(7) Press the tilt locking ring (20) into the tripod head tilt shaft opening nearest the locking handles. Lock the ring

in place with the taper pin (19). Assemble the tilt shaft (16), tilting head (17), and the fiber friction disk (18) to the tripod head and lock them in place with the shaft locking screw (15).

(8) With the screws (13), fasten the L-shaped level (14) to the tripod head. Turn the tapped studs (12) into the tripod head, install the tilt lock handle (10) and the pan lock handle (11), and fasten the handles securely with the screws (9). Slide the brass tension washer (8) and the tension disk (7) over the threaded end of the tilt shaft. The small hole in the washer and in the disk must engage the pin in the end of the shaft. Screw the tension knob (6) firmly down onto the tilt shaft. Assemble the camera lock knob (5) to the top plate (4) and fasten the top plate to the tilting head with the two screws (3). Screw the tripod handle into the tilting head.

78. Final Camera Adjustments

a. FEED SPINDLE ADJUSTMENT.

(1) Place the film spool on the feed spindle and turn the spool 3 or 4 complete revolutions in a clockwise direction. When released, the spool should recoil about 1½ turns.

(2) The tension on the feed spindle is regulated by turning the feed spindle tension regulating screw (fig. 46). Turning the screw clockwise with the drive mechanism pin wrench (fig. 32) increases the feed spindle tension; turning the screw counterclockwise decreases the tension of the feed spindle.

b. SPROCKET SYNCHRONIZATION.

(1) Synchronization of the sprockets must be made after the camera is completely assembled and with the mechanism at least partly wound, so that the mechanism is stopped with the shutter in the CLOSED position.

(2) Remove the screw which holds the sprocket guard in place. Lift the sprocket enough to unmesh the gears and revolve the sprocket until the tooth farthest from the gate arm points away exactly at right angles to the centerline of the gate arm (fig. 46).

(3) When both sprockets have been adjusted properly, there will be sufficient clearance between the sprocket teeth and the gate arm (with the gate open) to permit easy film threading.

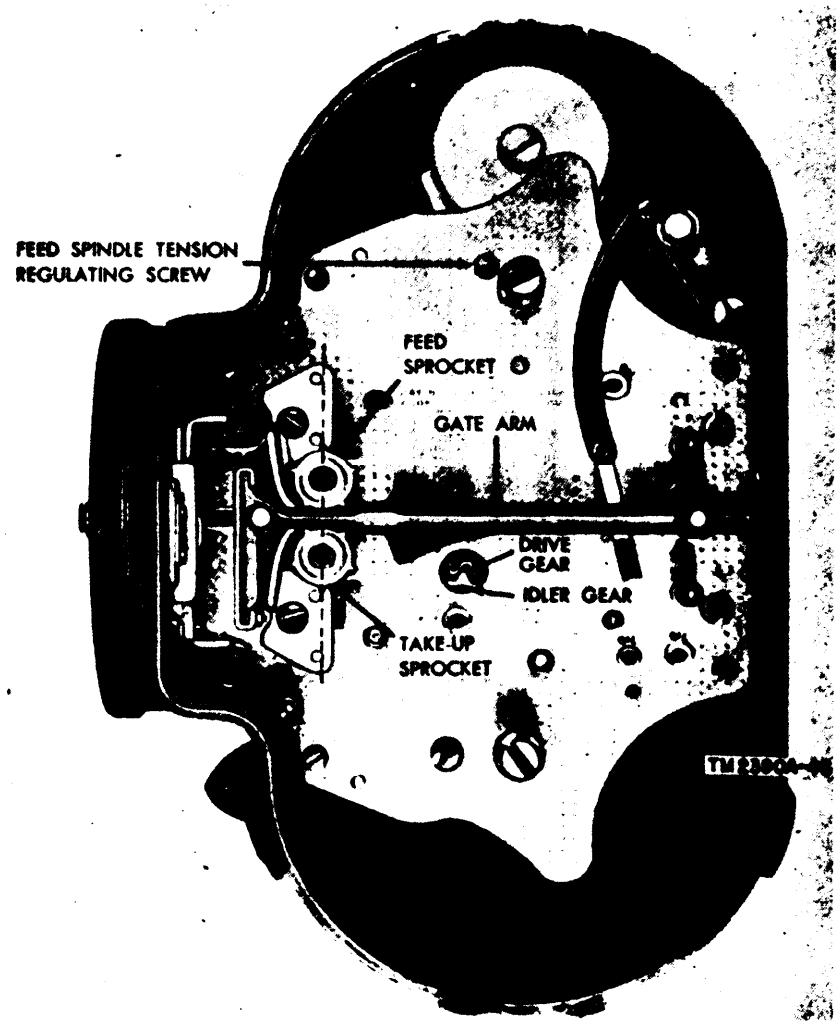


Figure 46. Feed spindle and sprocket adjustments.

c. FOCAL LENGTH ADJUSTMENT (fig. 47).

(1) The focal length of the camera is measured from the film plane (surface of the aperture plate) to the lens seat. This measurement, which can be taken with a standard l-inch micrometer, should read .690 inch ±.001 inch at all points on the lens seat. The distance must be exact, because errors may cause pictures to be out of focus.

(2) If the micrometer reading is less than .690 inch, paper shims must be inserted under the aperture plate until

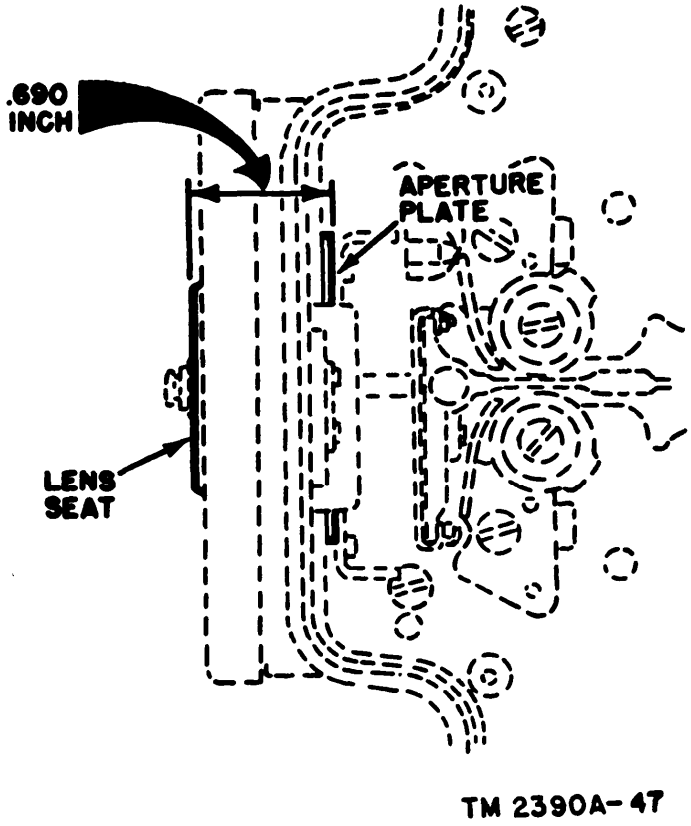


Figure 47. Camera focal length adjustment.

the reading is correct. If the micrometer reading exceeds .690 inch, the lens seat must be accurately and carefully ground or filed to the exact dimension. Use a No. 00 mill file for this purpose. Lay the file across the lens seat and file gently with a straight, smooth movement: turn the camera frequently so that the filing can be done in all directions. Check the local length frequently until the micrometer reading is exact from all points on the lens seat.

Note. When making the measurements, be sure that there are no particles of lint or dust on the aperture plate, seat, or micrometer. Be sure to check each lens seat individually.

d. FILM CLEARANCE ADJUSTMENT.

(1) The film clearance is the distance between the aperture plate and the pressure plate when the film gate is in its CLOSED position. This clearance should be .0065 inch. Allow the mechanism to run down so that the

shuttle teeth are retracted and behind the aperture plate.

(2) With a .0065-inch feeler gage, check the distance between the pressure plate and aperture plate at the four corners of the pressure plate. The feeler gage should just slide into the space without forcing.

(3) To adjust the film clearance, loosen the hexagonal nuts on the three pressure plate set screws, and turn the set screws in or out with an Allen wrench until the clearance is correct. Then tighten the hexagonal nuts securely.

e. GATE ARM ECCENTRIC ADJUSTMENT.

(1) A small eccentric washer ((27) of fig. 48) is located near the center of the camera door on the inside of the door casting. Its purpose is to lock the gate in the CLOSED position whenever the door is in place, so that it cannot open while the camera is in use.

(2) To adjust the eccentric, open the film gate approximately one-sixteenth inch. Install the camera door and turn the latchkeys to the CLOSED position. Then remove the cover and press forward on the gate arm. If the gate arm can be moved forward, the eccentric needs adjusting.

(3) Loosen the screw that holds the eccentric in place and revolve the eccentric a little to bring the thicker side slightly more toward the camera head. Then tighten the screw and repeat the step in (2) above. This procedure must be repeated until the adjustment has been made properly. Note also that if the cover goes on with difficulty, chances are that the eccentric is not set properly.

Caution: Do not adjust the eccentric so that it forces the gate arm forward too tightly; it may cause the gate to pinch the film and result in binding or jamming the camera.

f. CAMERA FOOTAGE ADJUSTMENT.

(1) The idler and drive gear are visible through the opening in the front mechanism plate just below the gate arm (fig. 46). Adjust the camera mechanism to run not less than 21 feet and not more than 23 feet on one full winding of the main drive spring. Make this adjustment by setting the teeth of the idler gear in relation to the shallow space between the teeth of the drive gear.

(2) Wind the spring to capacity and set the footage indicator dial at zero. Press the camera starting button and allow the camera to run until it stops. Then check the footage dial to see how many feet the camera has run.

(a) As an example, suppose the footage dial registers a

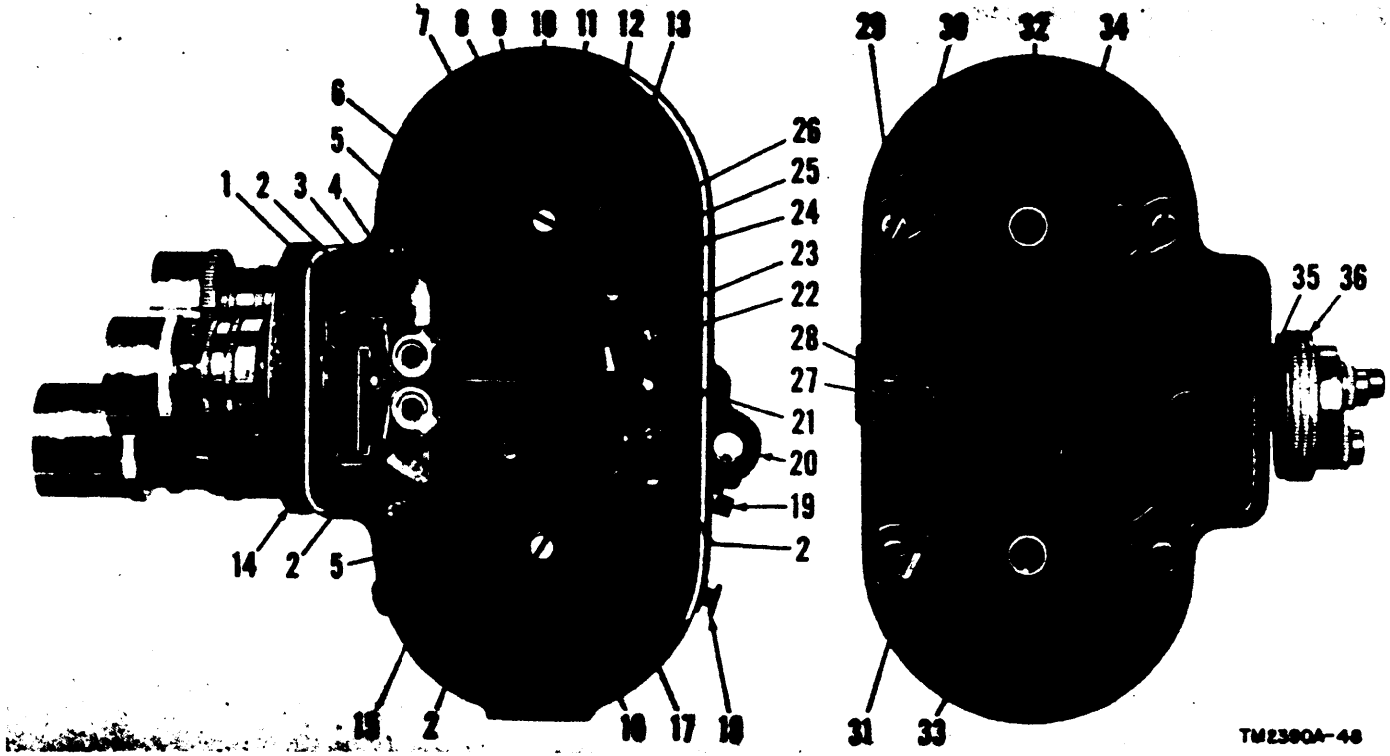


Figure 48. Location of parts in film chamber and on door.

1. Sprocket guard (two).
2. Front plate attaching screws (six).
3. Guard shoe retaining screw.
4. Sprocket guard shoe.
5. Drive mechanism attaching screw (four).
6. Front mechanism plate.
7. Locking pawl.
8. Footage dial.
9. Tension regulating screw.
10. Footage dial retaining screw.
11. Feed reel spindle.
12. Pull pawl.
13. Connecting link screw (long).
14. Lens turret.
15. Idler gear.
16. Take-up spindle.
17. Main drive shaft stop gear.
18. Carrying strap screw.
19. Motor bracket knurled screw.
20. Motor bracket.
21. Gate arm.
22. Film guards.
23. Connecting link screw (short).
24. Governor spring screw.
25. Governor retaining spring.
26. Governor connecting link.
27. Eccentric washer.
28. Eccentric washer screw.
29. Door latch screws.
30. Upper door latch.
31. Lower door latch.
32. Upper latch cam.
33. Lower latch cam.
34. Latch cam link.
35. Turret retaining collar.
36. Viewfinder turret.

Figure 48—Continued.

camera run of 19 feet. Since each tooth of the drive gear represents approximately 3 feet, one tooth of the drive gear must be moved forward (clockwise) to bring the long tooth of the idler gear and the shallow space between two of the drive gear teeth to the correct locking position at the end of the 22-foot run. Turn the winding key slightly and depress the idler gear with a screw driver until the gears are disen. gaged; then press the starting button momentarily to allow one tooth of the drive gear to pass by and re-engage the gears.

(b) If, for example, the footage dial should register a camera run of 30 feet on one complete winding, disengage the idler gear with a screw driver and turn the winding key slowly until three drive gear teeth (representing 9 feet) have passed by the idler gear in a counterclockwise direction. Then re-engage the gears.

(3) Test the adjustment by winding the spring motor to capacity; reset the footage dial to zero and allow the spring motor to run down.

g. GOVENOR SPEED DIAL CALIBRATION. Whenever the camera has been completely disassembled, it will be necessary to install a new speed dial and recalibrate as follows:

(1) With the new speed dial in place, set the index line of the outer ring approximately midway over the fps marking to be checked. Check the speed as instructed in paragraph 62d.

(2) If the speed is fast, move the outer ring in a clockwise direction from its location. If the speed is slow, move the ring in a counterclockwise direction. When the outer ring has been accurately positioned, with a sharp instrument, mark the stationary dial exactly opposite the index line. Repeat the procedure with all speeds.

79. Service Trouble-Shooting Chart

Trouble	Probable cause	Remedy
Spring cannot be wound.	Winding key broken ---------	Install new winding key.
	Hub or spring broken ----------	Replace defective parts (par. 69).

Trouble	Probable cause	Remedy
Camera does not run without film.	Camera needs oiling	Refer to paragraphs 41 through 45.
	Drive and idler gears improperly adjusted.	Adjust gears (par. 78f).
	Dirt in camera mechanism	Overhaul camera (ch. 6).
Camera does not run with film.	Film threaded incorrectly	Reload camera (par. 18).
	Camera needs oiling	Lubricate as instrutted in para - graphs 41 through 45.
	Accumulation of emulsion on aperture plate.	Clean aperture plate (par. 17c).
Film loses loop	Film threated incorrectly	Reload camera (par. 18).
	Improper film clearance	Adjust film clearance (par. 78d).
	Shuttle broken or intermittent mechanism worn.	Overhaul camera.
	Too much play in shuttle	Overhaul camera head (par. 71).
	Backlash in gate arm	Adjust as instructed in paragraph 78c.

80. Picture Defect Trouble-Shooting Chart

Trouble	Probable cause	Remedy
Pictures have fuzzy edges.	Edges of aperture dirty	Clean aperture (par. 17c).
Film is light-struck_	Film loaded or unloaded in bright light.	Load in shady spot. Unload in dark room.
	Camera cover does not fit properly.	Check fit of cover (par. 67a).
Pictures too dark	Film underexposed	Use larger lens stop, or (indoors) use stronger lighting.
Pictures too light	Film overexposed	Use smaller lens stop.
Light spots or halation on pictures.	Direct rays of light source striking the lens.	Avoid pointing camera toward source of light.

Trouble	Probable cause	Remedy
Scratches on film	Aperture plate or pressure plate dirty-accumulation of emulsion.	Clean aperture and gate plates (par. 17c).
	Aperture plate or pressure plate nicked or damaged.	Replace damaged part.
	Film clearance too tight	Adjust film clearance (par. 78d).
Pictures unsteady	Camera not held steady	Mount camera on tripod.
	Intermittent mechanism worn	Overhaul camera.
	Film clearance too tight or too loose.	Adjust film clearance (par. 78d).
Pictures out of focus.	Lens focus improperly set	Focus the lens (par. 23).
	Lenses or filters dirty	Clean as instructed in paragraph 17e and *f*.
	Lens focal length out of adjustment	Replace lens.

Section V. FITS AND TOLERANCES AND FINAL TESTING

81. Replacement of Parts

Under normal operation, the maximum anticipated wear of individual parts will not affect the operation of the camera to such an extent that these parts will need replacement. All fine clearances are adjustable. Replacement of parts, therefore, will depend on actual material damage or breakage, such as broken gear teeth, stripped threads, bent shafts, broken springs, cracked or bent castings, and so forth.

82. General Mechanical Test Procedure

a. Wind the spring motor to capacity. Press and release the starting button several times. The starting button must return to its original position each time it is released.

b. Watch the footage dial while the camera is running. It must move only one graduation at a time.

c. Check the tension of the speed control dial. It must have sufficient tension to prevent its being disturbed during normal handling of the camera.

d. Rewind the spring motor to full capacity and set the footage dial at zero. Press the starting button and allow the camera to

run down. The camera footage dial must show a run of not less than 21 and not more than 23 feet. If necessary, adjust as instructed in paragraph 78f.

e. While the camera is running, note carefully any irregularities in operation, such as spring jump or unusual noises which may be caused by a lack of lubrication.

83. Film Test

a. Load the camera with a 100-foot roll of positive film as instructed in paragraph 18. Light-struck film may be used repeatedly for testing purposes.

b. Thread-run the entire 100-feet of film to determine that the camera functions properly when loaded. See that the sprocket teeth release the film smoothly and evenly.

c. During running of the film, check the action of the take-up spool. The film must wind tight on the spool.

d. To check the tension of the feed spindle, place a film spool on the feed spindle and turn the spool 3 or 4 complete revolutions in a clockwise direction. When released, the spool should recoil about 1½ turns. Adjust, if necessary, as instructed in paragraph 78a.

84. Photo Test

a. Thread the camera with a short strip of unexposed positive or negative film. Set the camera in the normal manner for taking pictures.

b. Make a short photo test, process the film, and check the test for sharpness, film scratches, and proper framing of the pictures.

85. Light-leak Test

a. Thread the camera in total darkness in the usual manner with a short piece of unexposed Super XX Panchromatic film; use both the feed and take-up spools.

b. Close the camera door securely and place the camera in the direct sunlight (door side up) for at least 15 minutes. Move the camera frequently so that all edges of the door are exposed to the direct light.

Note. If it is not possible to place the camera in the sunlight, use several photo flood bulbs and expose the camera in the same manner. Make certain that the lens cap, or caps, are in place during test.

c. Process and inspect the film to see whether or not it has been affected in any way by the light.

CHAPTER 6

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

86. Disassembling and Packing Camera Unit and Accessories

Remove the camera from the tripod and cushion the camera by wrapping it in neutral cellulose wadding. Secure the cushioning with pressure-sensitive tape. Stow the cushioned camera within the designed compartment of the carrying case. Individually package the accessories in accordance with the provisions of JAN-P-658(1). Stow each packaged item within the designated compartment of the carrying case. Cushion the interior of the carrying case, which contains the packaged camera unit and accessories, with corrugated fiberboard cells to prevent movement of the equipment. Close the lid and secure the fastenings. Cushion the carrying case on all surfaces with cells designed to absorb the shock of impact normally encountered in handling and transit. Place the carrying case, cushioned as specified, together with the required amount of desiccant, within a close-fitting corrugated fiberboard box. Seal all openings with waterproof tape. Place the boxed carrying case within a waterproof barrier material, and heat-seal the barrier. Place the barrier containing the box within a water-greaseproof lined wooden box. Fold the lining over the boxed camera, seal all openings with waterproof tape, and nail the wooden box shut.

87. Packaging Tripod

Wrap the tripod head in water-greaseproof paper and seal with waterproof tape. Compress the lower ends of the tripod legs until the shoe points fit into a 3½-inch hole cut part way through a 3-inch thick, 5-inch square wooden block. Wrap the tripod in corrugated fiberboard paper and insert into the tripod carrying case. Wrap the carrying case in corrugated fiberboard paper, insert it into a fiberboard box, and seal all openings with waterproof tape. Wrap this box in waterproof barrier material, heat-

seal the barrier, and place within a water-greaseproof lined wooden box. Fold the lining over the boxed tripod, seal all openings with waterproof tape and nail the wooden box shut.

88. Oversea Shipment

As an additional precaution, boxed cameras and tripods which are designated for oversea shipment must be secured with two ¾-inch metal straps each.

Section II. DEMOLITION TO PREVENT ENEMY USE

89. Methods of Demolition

a. SMASH. Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.

b. CUT. Use axes, handaxes, machetes.

c. BURN. Use gasoline, kerosene, oil, flame throwers, incendiary grenades.

d. EXPLODE. Use firearms, grenades, TNT.

e. DISPOSE. Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

f. OTHER. Use anything immediately available for destruction of this equipment.

90. Destruction of Components

When ordered by your commander, destroy all equipment to prevent its being used or salvaged by the enemy.

a. Smash (par. 89a) all lenses, filters, camera cases, adapters, all glass, internal parts, and metal tripod parts.

b. Cut (par. 89b) film, fabric, and leather.

c. Burn (par. 89c) film, wooden tripod legs, fabric, leather, and this instruction book.

d. Bury or scatter (par. 89e) all remaining parts of the equip ment.

e. Destroy everything.

APPENDIX I
REFERENCES

Note. For availability of items listed, check SR 310-20-3 for JANAP's Check SR 310-20-4 for technical manuals, technical bulletins, supply bulletins, modification work orders, and changes.

1. Publications

a. PAINTING AND PRESERVING.

SB 11-76	Signal Corps Kit and Materials for Moisture- and Fungi-Resistant Treatment.
TB SIG 123	Preventive Maintenance Practices for Ground Signal Equipment.

b. TECHNICAL PUBLICATIONS.

TB SIG 13	Moistureproofing and Fungiproofing Signal Corps Equipment.
TB SIG 66	Winter Maintenance of Signal Equipment.
TB SIG 219	Operation of Signal Equipment at Low Temperatures.
TB SIG 69	Lubrication of Ground Signal Equipment
TB SIG 72	Tropical Maintenance of Ground Signal Equipment.
TB SIG 75	Desert Maintenance of Ground Signal Equip ment.
TB SIG 149	Tropicalization of Photographic Equipment.
TB SIG 189	Cold Weather Photography.
TM 11-453	Shop Work.
TM 11-462	Signal Corps Technical Communication Reference Data.
TM 11-2324	Fundamentals of Photography.
TM 11-2325	Specialized Photography.
TM 11-2366	Exposure Meters PH-260 and PH-260-A.

2. Packaging and Packing Instructions

a. JOINT ARMY-NAVY PACKAGING SPECIFICATIONS.

JAN-P-100	Packaging and packing for overseas ship ment-General specification.

JAN-P-116(2) Packaging and packing for overseas shipment—Preservation, methods of.

JAN-P-125(1) Packaging and packing for overseas shipment—Barrier-materials, waterproof, flexible.

MIL-B-131A Barrier-materials, water-vaporproof, flexible.

JAN-P-658(1) Packaging and packing of electrical equipment and spare parts (electronic, electrical, and electro-mechanical).

b. U. S. ARMY SPECIFICATIONS.

100-2E Marking Shipments by Contractors, Standard Specifications For (and Signal Corps Supplement thereto).

3. Supply Publications

SB 11-47 Preparation and Submission of Requisitions for Signal Corps Supplies.

4. Other Publications

SR 310-20-3 Index of Training Publications (Field Manuals, Training Circulars, Firing Tables and Charts, Army Training Programs, Mobilization Training Programs, Graphic Training Aids, Joint Army-Navy-Air Force Publications, and Combined Communications Board Publications)"

SR 310-20-4 Index of Technical Manuals, Technical Regulations, Technical Bulletins Supply Bulletins, Lubrication Orders, Modification Work Orders, Tables of Organization and Equipment, Reduction Tables, Tables of Allowances, Tables of Organization, and Tables of Equipment.

SR 700-45-5 Unsatisfactory Equipment Report (Reports Control Symbol CSGLD-247).

SR 745-45-5 Report of Damaged or Improper Shipment
AFR 71-4 (Reports Control Symbols CSGLD-66 (Army) and AF-MC-U2 (Air Force)).

SB 11-124 Repair of Photographic Material.

APPENDIX II
IDENTIFICATION TABLE OF PARTS

Note. The fact that a part is listed in this table is not sufficient basis for requisitioning the item. Requisitions must cite an authorized basis, such as T/O&E, T/A, SIG 7&8, list of allowances of expendable material, or another authorized supply basis. The Department of the Army Supply Catalog applicable to the equipment covered in this manual is SIG 7&8-PH-430. For an index of available supply catalogs in the Signal portion of the Department of the Army Supply Catalog, see the latest issue of SIG 1.

Fig. No. and ref symbol	Name of part and description	Function of part	Signal Corps stock No.
Figure 1	CAMERA EQUIPMENT: PH-430-B (Sig C); 16 mm; incl 1 ea following lenses: 0.7" f/2.5, 1" f/1.9, 2" f/3.5, 4" f/4.5; accessory kit; Tripod PH-520/U; and tripod carrying case.	A 16-mm silent motion picture camera.	8A430B
	CAMERA GROUP		
Figure 2	CAMERA, motion picture: 16 mm; rotary disk shutter; built-in spring motor drive; 21 to 23' per winding.		8A335-1
O-2	ADAPTER, lens: screw-on type	Attaches hood to lens assembly	8P10-5101
O-8	ADAPTER, lens: screw-on type	Attaches hood to lens assembly	8P10-5102
Figure 31 (20)	BALL, bearing: steel, chrome; .0625 dia	Serves as governor worm bearing.	3H305-171
O-302	BALL, bearing: steel	Part of hand crank assembly	3H320-132
	BAR, locking: locks handle to shaft	Locks key in position on shaft	8P10-5104
Figure 31 (19)	BEARING, sleeve: 11/32" lg by .1595" OD	Serves as bearing for governors worm.	3H121-46
	BEARING, sleeve: 29/32" OD, .665" dia crown	Serves as bearing for main drive shaft.	8P10-66
Figure 23 (24)	BLADE ASSEMBLY, shutter: shaft mounted	Alternately admits and excludes light to film.	8P10-3025
H403	BUTTON, plug: .253" dia hole 3/64" d	Plugs winding key shaft hole	8P10-5114
Figure 22 (2)	BUTTON, plug: brass; .193" dia mtg hole required	Plugs shaft oilhole	8P10-802
H34	BUTTON, push	Stops and starts camera mechanism.	8P10-5113
O-16	CLUTCH, friction: to engage motor	Engages film spool shaft	8P10-5123
O-50	COLLAR, spindle: steel	Friction for feed reel spindle	8P10-153
A7	COVER, lens mount	Covers lens mount	8P10-5129
Figure 22 (18)	COVER: camera; die-cast aluminum; approx 7 15/16" lg by 5" d by 3 3/16" wd.	Serves as outside cover of camera.	8P10-5124

Fig. No. and ref symbol	Name of part and description	Function of part	Signal Corps stock No.
Figure 42 (17)	DIAL: speed; steel	Indicates frames per second	8P10–5134
I–2	DIAL: registers film	Indicates film speed	8P10–5133
O–21	ECCENTRIC: steel, black nickle finish	Pushes gate arm forward when closing door.	8P10–350
Figure 22 (1)	EYEPIECE, optical: brass; screw mount	Serves as eyepiece for viewfinder	8P10–5140
	FASTENER, latch: 2¼" dia by 7/32 thk o/a	Fastens latch on camera door	8P10–5116
	FASTENER, latch: 2.118" OD by .120" thk o/a	Fastens latch on camera door	8P10–5115
	GEAR: spur type; 38 teeth; .8332" OD, .566" lg, .376" bore	Take-up shaft drive	8P10–44
	GEAR: spur type; 13 teeth; .8475" OD, .251" bore, .057" thk	Acts as an idler gear	8P10–3085
	GEAR: spur type; 14 teeth; 1.008" OD, .058" thk	Acts as main driving gear	8P10–408
O–74	GEAR: spur type; 60 teeth; 1.292" OD, .312" bore, .185" thk	Transmits power to camera mechanism.	8P10–5158
O–66	GEAR ASSEMBLY: spindle; approx 1⅛" dia by 43/64" thk o/a; governor drive.	Aids in driving mechanism	8A430A/G1
O–6	GEAR: spur; 15 teeth; .354" OD, .219" bore, .148" thk	Drives feed and take-up sprocket	8P10–3095
O–59	GEAR ASSEMBLY: cir shape; approx 1.562" dia by .673" lg; shutter drive.	Helps drive mechanism	8P10–3094
O–61	GEAR: spur; 90 teeth; 1.916" OD, .058" thk	Acts as idler	8P10–5130
O–60	GEAR ASSEMBLY: 1.9166" OD by .671" lg	Helps drive mechanism	8P10–5154
O–63	GEAR: spur; 96 teeth; 2.0416" OD, .8175" bore, .072" thk	Driving gear for main drive	8P10–5155
O–55	GEAR: spur; 32 teeth; .708" OD, .218" bore, .058" thk	Helps drive mechanism	8P10–5156
O–57	GEAR ASSEMBLY: press on; c/o gear and pinion on single shaft.	Acts as ratchet control gear	8P10–5157
Figure 31 (21)	GOVERNOR: c/o governor and shaft with worm gear; approx 2¼" lg by ⅝" sq o/a.	Regulates speed of mechanism	8P10–5159

Figure 31 (17)	GUARD: steel, chromium pl, cyl shape	Retains film on reels	8P10–4030
O–39	GUIDE, film: ¼" CRS, chromium pl; approx 1 17/32" lg by 13/16" wd by .010" thk.	Guides film around sprockets	8P10–5161
H301	HANDLE: approx 1½" lg by 27/32" dia o/a; drilled center hole for mtg.	Facilitates turning of hand crank	8P10–214
H401	HANDLE: chromium pl; CRS	Grip for fingers to turn key	8P10–5163
O–9	Holder, strap: brass; .312" lg by 7/16" dia o/a	Secures carrying strap	8P10–5208
A–11	HOUSING: CRS; black oxide finish; barrel shaped, slot on one end.	Houses feed reel spindle return spring.	8P10–1054
O–19	HUB: steel; chromium pl	Hub for lower latch cam	8P10–102
O–17	HUB: chromium; approx 1⅝" lg by .3765" dia o/a	Closes and opens upper lever	8P10–5169
O–18	KEY, latch cam: chromium; approx ½" wd by 1⅝" h by ⅛" thk o/a.	Locks lower door	8P10–5171
Figure 21	KEY, winding: approx 3½" wd by 2 7/16" lg by 15/16" thk	Winds spring motor	8P10–5172
	KNOB: rd; brass, chromium finish; .740" dia by ⅜" h o/a	Engages clutch	8P10–5174
	KNOB: rd; CHS; index mark on outer dia	Adjusts exposures per second	8P10–5173
Figure 22 (12)	LATCH, fastener: spring steel; dull black finish	Fastens lower part of camera door in place.	8P10–4050
Figure 22 (13)	LATCH, fastener: spring steel; dull black finish	Fastens upper part of camera door in place.	8P10–4051
O–20	LINK, cam: steel; black finish; approx 4 5/64" lg by 1/16" thk o/a	Connects upper and lower door latch.	8P10–115
O–38	LINK, governor: spring steel; approx 2¼" lg by ¼" wd by .022" thk o/a.	Connects governor dial to governor.	8P10–5190
H15	NUT, hexagon: #10–40 thd; ⅜" across flats, 15/32" dia, .047" thk; rd top.	Holds spacer in place	8A430A/B1
MS1	PAD, lubricating: felt; 9/16" sq by 3/32" thk	Serves as lubricating pad	8P10–5142
Figure 39 (18)	PAD, lubricating: felt; ⅜" dia by .125" thk	Lubricates main drive gear	8P10–5194

Fig. No. and ref symbol	Name of part and description	Function of part	Signal Corps stock No.
Figure 39 (1)	PAWL: steel; approx 1 15/16" lg by 5/32" wd by .025" thk	Operates ratchet pull pawl	8P10–736
Figure 39 (2)	PAWL: steel; 1 61/64" lg by 5/32" wd by .025" thk	Operates ratchet locking pawl	8P10–730
Figure 23 (23)	PAWL: approx length 3¼"; pin length 2⅛" o/a	Prevents movement of shuttle	8P10–5196
H402	PIN, dowel: 5/64" rd, SS	Prevents ratchet turning on shaft	8P10–5246
H1	PIN, dowel: steel		8P1–273
A15	PLATE, bearing: steel, black oxide finish; approx 3.045" OD by 2¼" ID by .005" thk o/a.		8P10–4073
A16	PLATE, retainer: brass; approx 4½" dia by 1/64" thk o/a	Retains graphite in spring motor.	8P10–202
Figure 23 (14)	PLATE, aperture: chromium pl, SS	Provides film aperture for exposure.	8P10–4071
Figure 39 (24)	PLATE MOUNTING: c/o plate and 4 studs; approx 4.8175" by 4.485" by .628" thk o/a.	Used as camera driving mechanism support.	8P10–5202
Figure 42 (7)	PLUNGER: steel; approx 1 3/16" lg by ¼" dia o/a	Actuates spring release	8P10–5204
O–26	PLUNGER: CHS, black finish	Provides tension for turret	8P10–5205
Figure 23 (16)	RAIL, guide: steel, black nickel; approx 1⅛" lg by .290" wd by .028" thk.	Helps guide the film	8P10–5000
Figure 23 (12)	RAIL, guide: steel, black nickel pl; approx 1 15/16" lg by .180" wd by .365" h.	Helps guide the film	8P10–462
Figure 21 (12)	RATCHET, film advance: SS; approx 1½" wd by 1 1/32" lg by ⅝" thk; 12 lh teeth.	Prevents reverse key winding	8P10–5207
Figure 21 (2)	RATCHET, film advance: 1 3/32" dia SS; 12 lh teeth	Serves as ratchet for winding spring motor.	8P10–5206

Figure 42 (12)	RATCHET, film advance: steel, black oxide finish; cir; 100 teeth.	Registers film advance	8P10–850
O–402	RING, retainer: steel, chromium pl	Holds ratchet in position	8P10–5005
Figure 21	RING, retainer: spring steel	Retains friction clip spring	8P10–5211
O–303	RING, retainer: music wire, .041" dia		8P10–1053
O–62	RING, retainer: steel, split		8P10–874
Figure 23 (6)	ROLLER, turret: HTS; washer shape	Aids indexing of turret	6L58021–5
Figure 22 (2G)	ROLLER, turret: SAE; .250" dia by .110" thk	Aids turret rotation	8P10–888
Figure 22 (2B)	SCREW, machine: truss head; #10–32 NF–2; ½" lg	Attaches turret	6L20910–8.91S
Figure 23 (1)	SCREW, machine: #3–56; 7/16" lg	Attaches front plate to frame	6L20903–7.58S
Figure 23 (13)	SCREW, machine: flathead; #2–56 NC–2; .2605" lg	Attaches guide rail	6L20902–4.7BS
Figure 23 (15)	SCREW, machine: flathead; #2–56 NC–3; .171" lg	Attaches aperture plate	6L20902–3.4S
Figure 23 (18)	SCREW, machine: truss head; #10–32 NF–2; .360" lg	Secures shuttle pins	6L20910–6.91S
Figure 27 (9)	SCREW, machine: flathead; #2–64 NF–2; 5/32" lg	Attaches governor link to mechanism.	6L20902–2.60S
Figure 31 (2)	SCREW, machine: flathead; #4–48 NF–3; ¾" lg	Adjusts feed spindle tension	8P10–894
Figure 42 (16)	SCREW, machine: flathead; #5–40 NC–2; 13/64" lg	Attaches speed control spring	8P10–923
Figure 31 (18)	SCREW, set: headless; #8–36; 3/16" lg	Retains governor shaft	6L18508–3.39FS
Figure 31 (13 and 15)	SCREW, shoulder: sp Fil H; #5–40 NC–2; 5/16" lg	Retains sprocket guide shoe	8P10–906
H35	SCREW, drive: #0; ⅛" lg	Attaches identification plate	6L5016–2–2

Fig. No. and ref symbol	Name of part and description	Function of part	Signal Corps stock No.
H10	SCREW, machine: slot drive; #5–40; 13/64" lg	Attaches cover latch locks	6L6540–4.3SF
H12	SCREW, machine: #5–40 NC–2; 19/64" lg o/a	Attaches eccentric on back of cover.	8P10–902
H42	SCREW, machine: slot drive; #8–32 NC–2; .326" lg	Attaches motor bracket to frame.	6L20908–5.47S
H36	SCREW, machine: slot drive; #5–40 NC–2; 1/8" lg	Attaches spring to frame	6L20905–2.47S
H41	SCREW, machine: slot drive; #4–40 NC–2; .316" lg	Attaches housing to frame	6L20904–5.47S
H44	SCREW, machine: slot drive; #2–56 NC–2; .260" lg	Attaches clamp to frame	6L20902–4.58S
H2	SCREW, machine: slot drive; #5–40 NC–2; .325" lg		6L20905–5.58S
H46	SCREW, machine: slot drive; #4–40 NC–2; .2515" lg		6L20904–4.91S
H17	SCREW, machine: slot drive; #2–56 NC–3; 1/8" lg	Attaches plunger spring	6L20902–2.58S
H21	SCREW, machine: slot drive; #3–56 NF–3; 5/16" lg	Attaches link to exposure dial	8P10–911
H39	SCREW, machine: slot drive; #1–72 NF–3; 1/8" lg	Attaches exposure dial	8P10–1415
H3	SCREW, machine: slot drive; #5–40 NC–3; 15/64" lg., slot drive		8P1–429
H47	SCREW, machine: slot drive; #2–56 NC–2; .180" lg o/a		8P10–901
H7	SCREW, set: slot drive; #4–48 NF–3; 3/32" lg	Attaches viewfinder tube to turret.	8P1–419
H4	SCREW, set: slot drive; .112" dia; #4–48; 3/16" lg	Fastens turret into bushing	6L18504–3.35S
Figure 43 (5)	SCREW, machine: #6–32; .138" dia, .330" lg	Attaches handle to hand crank	6L20906–5.91N
Figure 41 (35)	SCREW, machine: truss head; #8–32 NC–2; .2825" lg	Attaches camera carrying strap	6L20908–4.91S
H40	SHAFT: steel, black oxide finish; cir with 1/4" hub	Holds speed control dial	8P10–5165
O–407	SHAFT: 7/32" rd, SS; 1 13/32" lg by .125" dia o/a	Mounting for spring inside of key.	8P10–5212
O–34	SHAFT: cyl shaped; approx 1 1/8" lg by 1/4" dia o/a	Spindle for shuttle cam	8P10–5222
	SHIM: #42 ga .002" shim brass; black nickel pl	Prevents light entrance to critical focuser.	8P10–5214
O–33	SHIM: steel; washer shaped	Spacer for shutter	8P10–5215
O–32	SHIM: steel; washer shaped	Spacer for cam and governor	6L58023–27F

	SHOE, film: soft temper chromium pl; approx 1¾" lg by 1" wd o/a.	Guides film around film feed sprocket.	8P10–5218
	SHOE, film: soft temper chromium pl; approx 1½" lg by ⅞" wd o/a.	Guides film around lower sprocket	8P10–5216
Figure 23 (19)	SHUTTLE: spring steel; approx 1.776" lg by 1.760" wd	Advances the film	8P10–5219
O–78	SPINDLE, film take-up: approx 1.4975" lg, .313" dia	Film guide spindle	8P10–5221
O–69	SPRING: loop type; .166" OD o/a; 1 turn less 90°	Push button retainer	8P10–5227
O–12	SPRING: loop type; 1" lg by 5/32" wd o/a	Provides tension to viewfinder turret indexing roller.	8P10–1152
O–68	SPRING: helical compression type; ⅞" lg by 9/32" OD; 8 turns	Places tension on stop pawl	8P10–5041
O–15	SPRING: helical compression type; 15/64" lg by .255" ID; 4 turns	For stop gear tension	8P10–1114
O–24	SPRING: helical compression type; .013" dia; 7 rh turns	Provides compression for indexing stud.	8P10–5045
O–49	SPRING: helical compression type; .176" dia; 1/16" pitch; 1 lh turn.	Tension on gate retaining stud	8P10–1108
O–54	SPRING: tension type; 15/16" lg by ½" h by ⅛" ID of coil o/a	Applies tension to ratchet	8P10–1138
O–303	SPRING: helical compression type; .120" dia by 9/32" lg; 6 turns	Holds ball bearings in place	8P10–1037
O–403	SPRING: flat type; approx .806" dia by 1.076" lg by 5/32" thk o/a.	Maintains tension on key handle	8A430A/S1
O–404	SPRING: flat type; 1 13/32" lg by 30/32" dia	Provides tension for key position.	8P10–5223
O–71	SPRING: loop type; 1 1/64" OD; 1 turn less 3/64"	Applies retaining action and tension to push button.	8P10–5226
O–25	SPRING: flat type; .759" lg by .217" wd by .165" d o/a	Provides tension for plunger	8P10–5228
Figure 27 (4)	SPRING: motor type; developed length .198" by .750" wd by .030" thk.	Used as main driving spring	8P10–5225
Figure 23 (21)	SPRING: helical compression extension type; .012" music wire; approx ⅛" lg by 5/32" dia; 5 turns.	Provides compression for shuttle	8P10–5229
Figure 23 (17)	SPRING: torsion type; approx ⅞" lg by ⅛" dia o/a; rh turn	Provides tension for guide rail	8P10–5043

Fig. No. and ref symbol	Name of part and description	Function of part	Signal Corps stock No.
Figure 21 (11)	SPRING: helical compression type; 1 1/16" lg by .178" dia; 10 1/2 rh turns.	Provides tension for key turning.	8P10–5224
Figure 31 (9)	SPRING: torsion type; 3/16" lg by 5/16" dia; 3 1/2 rh turns	Used as tension on feed sprocket	8P10–5230
Figure 31 (10)	SPRING: torsion type; 5/16" lg by 5/16" dia; 3 1/2 lh turns	Used as tension on take-up sprocket.	8P10–5231
Figure 31 (16)	SPRING: flat type; spring steel; 7/8" lg by 1/4" wd o/a by .008" thk.	Retains film guard	8P10–1042
Figure 31 (22)	SPRING: flat type; spring steel; .497" lg by .154" wd by .032" thk when set.	Applies pressure to governor housing.	8P10–1084
Figure 33 (16)	SPRING: torsion type; 25/64" lg by .0396" OD; 12 1/4 lh turns	Used to provide reel spindle return action.	8P10–1102
Figure 39 (23)	SPRING: helical compression type; .909" OD by .811" ID by .423" lg o/a; 5 7/16" rh turns.	Serves to apply tension to main drive shaft.	8P10–1132
Figure 42 (15)	SPRING: flat type; 1 7/32" lg by 3/8" wd by 5/64" thk o/a	Retains speed control dial	8P10–1096
Figure 31 (7)	SPROCKET, film: brass; chromium pl; spool shaped with 5 teeth; .219" dia axial mtg hole.	Guides the film take-up sprocket	8P10–5065
Figure 31 (6)	SPROCKET, film: brass; chromium pl; spool shaped with 5 teeth.	Guides the film feed sprocket	8P10–5066
Figure 42 (34)	STRAP ASSEMBLY: leather 1" wd; length adjustable	Used as carrying strap for camera unit.	8P10–5234
Figure 23 (5)	STUD: steel; pentrate black finish	Aids in indexing turret	8A430A/P1
Figure 27 (5)	STUD: black oxide finish; 1.551" lg by .125" dia o/a	Retains free end of spring motor.	8P10–5087
Figure 23 (4)	TURRET, lens: approx 3.235" dia by .338" thk	Used as mounting for lens	8P10–5239

Figure 22 (2)	VIEW FINDER: approx 6½" lg by 1¾" dia on turret	Views object to be filmed	8P10–5150
Figure 22 (2C)	WASHER, spring: .400" OD by 9/32" ID by 5/64" thk	Provides tension under turret mounting screw.	6L73474–2
Figure 22 (15)	WASHER, spring: bronze; .360" OD by .220" ID by .0113" thk	Provides tension for door latches	8P10–1310
Figure 33 (14)	WASHER, spring: tempered steel; .454" OD by .292" ID x .007" thk.	Provides tension for shoulder screw.	8P1–557
Figure 42 (14)	WASHER, spring: 57/64" ID by 1 7/64" OD by .057" thk o/a	Applies drag to footage meter	8P10–1255
H30, H31	WASHER, flat: 3/16" OD by ⅛" ID by .010" thk	Spacer for gate studs	8P10–1238
H51	WASHER, flat: 27/32" ID by 1 5/16" OD by .063" thk		6L50423–1
H23	WASHER, flat: 1⅛" OD by 1 9/32" ID by .063" thk	Used as grease retainer	6L50428
Figure 39 (8)	WHEEL, lubricating: c/o spindle, lubricating felt, and spring	Used for lubricating purposes	8P10–5242
	TRIPOD GROUP		
Figure 1	TRIPOD PH–520/U: friction head type; approx 40" lg collapsed, approx 73" lg extended; maple wood legs, aluminum alloy cast head; tilt head.	Supports camera unit	8A4130
Figure 5	CASE: fiber; 46¼" lg by 8¼" OD o/a	Holds camera tripod	8A4160/C1
957	GRIP, handle	Used on tripod panning head handle.	8A4160/G1
PH–520/U/8	HANDLE: 12¾" lg by ⅝" dia o/a	Operates tripod head; tilts panning head any direction.	8A4160/H1
PH–520/U/4	LEG, tripod: maple	Supports tripod head	8A4160/L1
PH–520/U/6	LEVEL, spirit: T type; 1 9/32" lg by 1" wd by 5/16" thk o/a	Used for leveling tripod	6Q63169
PH–520/U/7	LEVER	Used to apply pressure to revolving pressure block.	8A4160/L3
PH–520/U/6	LEVER	Applies pressure to vertical swivel on panning head.	8A4160/L2
PH–520/U/16	NUT, hexagon: 1¼"–20 NC–2	Hardware	6L3504–20

Fig. No. and ref symbol	Name of part and description	Function of part	Signal Corps stock No.
PH–520/U/8	NUT, knurled: 7/16"–20 NF–2 thd	Hardware	8A4160/N1
PH–520/U/9	NUT, knurled: 1"–28	Hardware	8A4160/N2
PH–520/U/10	NUT, thumb: 1¾"–14	Hardware	8A4160/N3
PH–520/U/12	PLATE, friction	Used for lubrication and slippage on panning head.	8A4160/P1
PH–520/U/17	SCREW, machine: slot drive; RH; #10–32 NC–2; ½" lg	Attaches top plate	6L7032–8.49
PH–520/U/13	SCREW, machine: sp head; ¼"–20 NC–2; 1⅛" lg	Hardware	8A4160/S1
	SCREW, wood: slotted drive; flathead; #4; ¾" lg	Hardware	6L8004–6
PH–520/U/18	SCREW, wood: slotted drive; RH; #2; ½" lg	Hardware	6L9102–4
PH–520/U/14	STUD: 1½" lg, ¼" dia o/a; ¼"–20 thd, ½" lg	Hardware	6L31138–2
PH–520/U/15	WASHER, flat: 1" ID, 1 7/16" OD, .010" thk	Hardware	6L50536
	ACCESSORY EQUIPMENT GROUP		
Figure 9 (20)	BRUSH, cleaning: approx 4" lg by ¼" dia o/a; bristles ½" lg	Used to clean aperture plate	8P10–96
H200	BRUSH, painting: rd; 8 13/16" lg by ½" dia	For touch-up painting	8P10–5110
Figure 4	CAP: lens; approx 1.54" dia by .190" thk	Protects lens when not in use	8P13–500
Figure 9 (2)	CASE: camera carrying; wooden; olive drab finish; approx 14" lg by 11" h by 9" wd o/a.	Used for storing camera and accessories.	8P10–5118
Figure 9 (10)	CASE: filter; wooden and leather; approx 4½" lg by 2⅝" wd by 9/16" d o/a.	Used for storing filters	8P10–5117
Figure 9 (16)	CLEANER, lens: liquid form	Cleans lenses	8P10–5121
Figure 4	COVER: lens; aluminum; approx 1.125" dia by 3/16" thk	Protects lens opening when lens is not installed.	8P10–5125

Figure 9 (4)	CRAYON: blackboard marking; antidust type	Used to write on slate	8P10–5132
Figure 44 (2)	DIAL: hand crank; chromium pl; cir shape	Indicates number of feet of film wound.	8P10–5135
Figure 7	FILTER, light: color, light yellow; ring type mtg	Filters light rays	8P10–5143
Figure 7	FILTER, light: color, dark yellow; ring type mtg	Filters light rays	8P10–5144
Figure 7	FILTER, light: color, Wratten 23 (red); ring type mtg	Filters light rays	8P10–5145
Figure 7	FILTER, light: color, Wratten 1.0 ND; ring tpye mtg	Filters light rays	8P10–5146
Figure 7	FILTER, light: color, Wratten .5 ND; ring type mtg	Filters light rays	8P10–5147
Figure 7	FILTER, light: color, Wratten 5N5; ring type mtg	Filters light rays	8P10–5148
I–203	GAUGE, film spool: L shaped; 1.378″ lg by .020″ thk o/a; chrome pl.	Used to gage film spool	6Q44375
	HOOD, lens: aluminum; .703″ lg by 1.457″ OD	Protects lens from sun	8P13–578
I–200	LENS, motion picture: f/lg 2″ or 50.8 mm	Focuses picture to be taken	8P10–5181
I–201	LENS, motion picture: f/lg .7″ or 17.8 mm; wide angle type	Focuses picture to be taken	8P10–5180
I–202	LENS, motion picture: f/lg 4″ or 101.6 mm; telephoto type	Focuses picture to be taken	8P10–5182
I–4	LENS, motion picture; f/lg 1″ or 25.4 mm; normal type	Focuses picture to be taken	8P10–5179
I–5	LENS, viewfinder: positive objective type; used with 1″ or 25.4 mm f/lg lens.	Frames objective field	8P10–5186
I–205	LENS, viewfinder: positive objective type; used with 4″ or 101.6 mm f/lg lens.	Frames objective field	8P10–5187
I–207	LENS, viewfinder: positive objective type; used with 2″ or 50.8 mm f/lg lens.	Frames objective field	8P10–5188
I–209	LENS, viewfinder: positive objective type; used with .7″ or 17.8 mm f/lg lens.	Frames objective field	8P10–5189
Figure 9 (18)	OIL, lubricating: 2-oz glass bottle	For lubricating camera mechanism.	8P10–5192

Fig. No. and ref symbol	Name of part and description	Function of part	Signal Corps stock No.
Figure 9 (19)	OILER, hand: nonflexible needle point; 5" lg by ½" dia; push-bottom feed.	Lubricate moving parts	8P10–5193
Figure 9 (14)	PAPER, tissue: silicon treated; 70 sheets in cellophane envelope	Used to clean lenses	8P10–5195
Figure 9 (3)	SLATE PH–384–B	Identifies scenes being filmed	8A3700–384A
Figure 12	SPOOL, film: 16 mm, 100' capacity	Holds 100 feet of 16-mm film	8P10–2174
Figure 9 (17)	SYRINGE: bulb; rubber; balloon shape	Blows dust from lenses	8P10–5236

APPENDIX III
DEPTH OF FIELD CHARTS

1. Depth of Field and Object Size for 0.7-Inch 16-MM Camera Lens

Object distance		Object size		f/2.5	f/2.8	f/4	f/5.6	f/8	f/11	f/16	f/22	f/32
Hyperfocal distance				16'8"	14'7"	10'2"	7'4"	5'1"	3'8"	2'7"	1'11"	1'4"
15 ft	H	5'9"	F	140'	INF	INF	INF	INF	INF	INF	INF	INF
	W	7'9"	N	7'11"	7'6"	6'2"	5'	3'11"	3'	2'3"	1'8"	1'2"
10 ft	H	3'9"	F	24'8"	30'	21'	INF	INF	INF	INF	INF	INF
	W	5'3"	N	6'3"	6'	5'2"	4'3"	3'5"	2'9"	2'1"	1'7"	1'2"
8 ft	H	3'1"	F	15'5"	17'4"	34'8"	INF	INF	INF	INF	INF	INF
	W	4'2"	N	5'5"	5'2"	4'6"	3'10"	3'2"	2'7"	2'	1'6"	1'1"
6 ft	H	2'4"	F	9'5"	10'1"	14'3"	31'10"	INF	INF	INF	INF	INF
	W	3'1"	N	4'5"	4'3"	3'10"	3'4"	2'9"	2'4"	1'10"	1'5"	1'8"
5 ft	H	1'9"	F	7'2"	7'8"	9'8"	15'4"	138'	INF	INF	INF	INF
	W	2'6"	N	3'10"	3'9"	3'4"	3'	2'7"	2'2"	1'8"	1'4"	1'4"
4 ft	H	1'5"	F	5'3"	5'6"	6'6"	8'8"	17'4"	INF	INF	INF	INF
	W	2'1"	N	3'3"	3'2"	2'11"	2'7"	2'3"	1'11"	1'7"	1'3"	11.8"
3 ft	H	1'1"	F	3'8"	3'9"	4'2"	5'	7'1"	14'5"	INF	INF	INF
	W	1'5"	N	2'6.5"	2'6"	2'4"	2'2"	1'11"	1'8"	1'5"	1'2"	10.9"

1. Depth of Field and Object Size for 0.7-Inch 16-MM Camera Lens Continued

Object distance		Object size		f/2.5	f/2 8	f/4	f/5.6	f/8	f/11	f/16	f/22	f/32
Hyperfocal distance				16'8"	14'7"	10'2"	7'4"	5'1"	3'8"	2'7"	1'11"	1'4"
2 ft, 6 in.	H	11"	F	2'1"	3'	3'3"	3'9"	4'10"	7'4"	59'8"	INF	INF
	W	1'3"	N	2'2.1"	2'1.7"	2'	1'10"	1'8"	1'6"	1'3"	1'.9"	10.3"
2 ft	H	9"	F	23.3"	2'3.7"	2'6"	2'9"	3'3"	4'3"	8'8"	INF	INF
	W	1'	N	1'9.4"	1'9.2"	1'8"	1'7"	1'5"	1'4"	1'2"	11.7"	9.5"
1 ft, 6 in.	H	6"	F	1'7.8"	1'8"	1'9"	1'10"	2'1"	2'6"	3'6"	7'2"	INF
	W	9"	N	1'4.5"	1'4.4"	1'3.7"	1'3"	1'2"	1'.9"	11.4"	10.0"	8.4"
1 ft	H	4"	F	1'.77"	1'86"	1'1.8"	1'1.9"	1'3"	1'4"	1'8"	2'1"	4'4"
	W	5"	N	11.32"	11.24"	10.9"	10.6"	10.1"	9.5"	8.7"	7.9"	6 8"
10 in.	H	3"	F	10.53"	10.59"	10.87"	11 3"	11.9"	1'8"	1'2.7"	1'6"	2'5"
	W	4.5"	N	9.52"	9.47"	9.26"	9.0"	8.6"	8.2"	7.6"	6 9"	6.1"

H—height.
W—width.
F—far.
N—near.

2. Depth of Field and Object Size for 1-Inch 16-MM Camera Lens

Object distance		Object size		f/1.4	f/2	f/2.8	f/4	f/5.6	f/8	f/11	f/16	f/22	f/32
Hyperfocal distance				59'6"	42'8"	29'9"	20'10"	14'11"	10'5"	7'5.3"	5'2.5"	3'8.6"	2'7.2"
20 ft	H	5'7"	F	30'	38'2"	60'	420'	INF	INF	INF	INF	INF	INF
	W	7'5"	N	15'	13'7"	12'	10'3"	8'7"	6'11"	5'6"	4'2"	3'2"	2'4"
10 ft	H	2'9"	F	12'	13'2"	15'1"	19'4"	30'9"	277'	INF	INF	INF	INF
	W	3'8"	N	8'1"	8'1"	7'6"	6'9"	6'	5'1"	4'4"	3'5"	2'9"	2'1"
7 ft	H	1'11"	F	7'11"	8'5"	9'2"	10'6"	13'3"	21'4"	93'	INF	INF	INF
	W	2'7"	N	6'3"	6'	5'9"	5'3"	4'9"	4'2"	3'8"	3'	2'6"	1'11"
5 ft	H	1'4"	F	5'6"	5'8"	6'	6'7"	7'6"	9'7"	14'8"	16'5"	INF	INF
	W	1'10"	N	4'7"	4'6"	4'3"	4'	3'9"	3'5"	3'	2'7"	2'2"	1'9"
4 ft	H	1'1"	F	4'4"	4'5"	4'7"	4'11"	5'6"	6'6"	8'6"	17'4"	INF	INF
	W	1'5"	N	3'9"	3'8"	3'6"	3'4"	3'2"	2'11"	2'7"	2'3"	1'11"	1'7"
3 ft, 6 in.	H	11"	F	3'9"	3'10"	4'	4'2"	4'7"	5'3"	6'6"	10'8"	46'	INF
	W	1'3"	N	3'4"	3'3"	3'2"	3'	2'10"	2'7"	2'5"	2'1"	1'10"	1'6"
3 ft	H	10"	F	3'2"	3'3"	3'4"	3'6"	3'9"	4'2"	5'	7'1"	14'5"	INF
	W	1'1"	N	2'10.3"	2'9.6"	2'8.7"	2'7.5"	2'6"	2'4"	2'2"	1'11"	1'8"	1'5"
2 ft, 8 in.	H	8"	F	2'9.5"	2'10.2"	2'11"	3'1"	3'3"	3'7"	4'1"	5'6"	9'	INF
	W	11"	N	2'6.6"	2'6.1"	2'5.4"	2'4"	2'3"	2'2"	2'	1'9"	1'7"	1'4"

2. Depth of Field and Object Size for 1-Inch 16-MM Camera Lens Continued

Object distance		Object size		f/1.4	f/2	f/2.8	f/4	f/5.6	f/8	f/11	f/16	f/22	f/32
Hyperfocal distance				59'6"	42'8"	29'9"	20'10"	14'11"	10'5"	7'5.3"	5'2.5"	3'8.6"	2'7.2"
2 ft, 4 in.	H	7"	F	2'5.1"	2'5.7"	2'6.4"	2'8"	2'9"	3'	3'4"	4'3"	6'1"	22'6"
	W	10"	N	2'2.9"	2'2.5"	2'2"	2'1"	2'	1'11"	1'9"	1'7"	1'5"	1'3"
2 ft	H	6"	F	2'0.8"	2'1.2"	2'1.7"	2'2.5"	2'4"	2'6"	2'9"	3'3"	4'3"	8'7"
	W	8"	N	1'11.2"	1'10.9"	1'10.5"	1'10"	1'9"	1'8"	1'7"	1'5"	1'4"	1'2"
1 ft, 9 in.	H	5"	F	1'9 6"	1'9.9"	1'10.3"	1'11"	2'	2'1"	2'3"	2'8"	3'3"	5'4"
	W	7"	N	1'8.4"	1'8.1"	1'7.8"	1'7.4"	1'6.8"	1'6"	1'5"	1'4"	1'2"	1'1"
1 ft, 6 in.	H	4"	F	1'6.5"	1'6.7"	1'7"	1'7.4"	1'8"	1'9"	1'10"	2'1"	2'6"	3'6"
	W	6"	N	1'5.6"	1'5.4"	1'5.1"	1'4.8"	1'4.3"	1'4"	1'3"	1'2"	1'1"	11"

H—height.
W—width.
F—far.
N—near.

3. Depth of Field and Object Size for 2-Inch 16-MM Camera Lens

Object distance		Object size		f/1.4	f/2	f/2.8	f/4	f/5.6	f/8	f/11	f/16	f/22	f/32
Hyperfocal distance				238′	167′	119′	83′	59′6″	41′8″	30′4″	20′10″	15′2″	10′5″
50 ft	H	7′	F	63′2″	71′3″	86′	124′	305′	INF	INF	INF	INF	INF
	W	9′3″	N	41′4″	38′6″	35′3″	31′4″	27′3″	22′10″	18′11″	14′9″	11′8″	8′8″
30 ft	H	4′2″	F	34′3″	36′6″	40′	46′8″	60′	105′	195′	INF	INF	INF
	W	4′6″	N	26′8″	25′6″	24′	22′1″	20′	17′6″	15′2″	12′4″	10′1″	7′9″
25 ft	H	3′5⅛	F	27′11″	29′5″	31′8″	35′9″	43′2″	62′9″	144′	INF	INF	INF
	W	4′6″	N	22′7″	21′9″	20′8″	19′3″	17′7″	15′7″	13′8″	11′4″	9′5″	7′4″
15 ft	H	2′1″	F	16′	16′6″	17′2″	18′4″	20′1″	23 5″	29′9″	53′8″	180′	INF
	W	2′8″	N	14′1″	13′9″	13′4″	12′8″	12′	11′	10′	8′9″	7′6″	6′2″
12 ft	H	1′6″	F	12′8″	12′11″	13′4″	14′	15′	16′10″	19′10″	28′3″	57′6″	INF
	W	2′2″	N	11′5″	11′2″	10′11″	10′6″	10′	9′4″	8′7″	7′7″	6′4″	5′7″
10 ft	H	1′4″	F	10′5″	10′8″	10′11″	11′4″	12′	13′2″	14′11″	19′3″	29′6″	256′
	W	1′8″	N	9′7″	9 5″	9′3″	8′11″	8′7″	8′1″	7′6″	6′9″	6′	5′1″
8 ft	H	1′1″	F	8′3″	8′5″	8′7″	8′10″	9′3″	9′11″	10′10″	13′	16′11″	34′5″
	W	1′4″	N	7′9″	7′8″	7′6″	7′4″	7′1″	6′8″	6′4″	5′9″	5′3″	4′6″
6 ft	H	10″	F	6′2″	6′3″	6′4″	6′6″	6′8″	7′	7′6″	8′5″	9′11″	14′2″
	W	1′1″	N	5′10.2″	5′9.5″	5′8.5″	5′7″	5′5″	5′3″	5′	4′8″	4′4″	3′10″

3. Depth of Field and Object Size for 2-Inch 16-MM Camera Lens Continued

Object distance		Object size		f/1.4	f/2	f/2.8	f/4	f/5.6	f/8	f/11	f/16	f/22	f/32
Hyperfocal distance				238′	167′	119′	83′	59′6	41′8″	30′4″	20′10″	15′2″	10′5″
5 ft	H	8″	F	5′1″	5′2″	5′3″	5′4″	5′6″	5′8″	6′	6′7″	7′6″	9′7″
	W	11″	N	4′10.8″	4′10.3″	4′9.6″	4′8.6″	4′7.4″	4.6″	4′4″	4′	3′9″	3′4″
4 ft	H	6″	F	4′0.8″	4′1.2″	4′1.7″	4′2.4″	4′3.5″	5′5″	4′7″	4′11″	5′5″	6′8″
	W	8″	N	3′11.2″	3′10.9″	3′10.4″	3′9.8″	3′9″	3′7.8″	3′6″	3′4″	3′2″	2′11″
3 ft, 6 in.	H	5″	F	3′6.6″	3′6.9″	3′7.8″	3′7.8″	3′8.6″	3′9.9″	4′	4′2″	4′9″	5′3″
	W	7″	N	3′5.4″	3′5.1″	3′4.8″	3′4″	3′3.7″	3′3″	3′2″	3′	2′10″	2′7″
3 ft	H	4.5″	F	3′0.5″	3′0.7″	3′0.9″	3′1.3″	3′1.9″	3′2.8″	3′4″	3′6″	4′2″	4′3″
	W	6″	N	2′11.6″	2′11.3″	2′11.1″	2′10.7″	2′10.3″	2′9.6″	2′8.8″	2′7.5″	2′6″	2′4″
2 ft, 9 in.	H	4.2″	F	2′9.4″	2′9.6″	2′9.8″	2′10.1″	2′10.6″	2′11.3″	3′0.3″	3′2″	3′4″	3′9″
	W	5.5″	N	2′8.6″	2′8.5″	2′8.2″	2′7.9″	2′7.5″	2′7″	2′6.3″	2′5.2″	2′4″	2′2″
2 ft, 6 in.	H	3.5″	F	2′6.3″	2′6.5″	2′6.6″	2′6.9″	2′7.3″	2′7.9″	2′8.7″	2′10″	3′	3′4″
	W	5″	N	2′5.7″	2′5.6″	2′5.4″	2′5.1″	2′4.8″	2′4.3″	2′4″	2′3″	2′2″	2′
2 ft, 3 in.	H	3″	F	2′3.3″	2′3.4″	2′3.5″	2′3.8″	2′4.1″	2′4.5″	2′5.2″	2′6″	2′8″	2′10″
	W	4.5″	N	2′2.8″	2′2.6″	2′2.5″	2′2.3″	2′2″	2′1.6″	2′1″	2′	1′10.5″	1′10.2″
2 ft	H	2″	F	2′.2″	2′.3″	2′.4″	2′.6″	2′.8″	2′1.2″	2′1.7″	2′2.5″	2′3.6″	2′6″
	W	4″	N	1′11.8″	1′11.7″	1′11.6″	1′11.4″	1′11.2″	1′10.9″	1′10.5″	1′9.9″	1′9.2″	1′8.1″

H—height. W—width. F—far. N—near.

4. Depth of Field and Object Size for 4-Inch 16-MM Camera Lens

Object distance		Object size		f/4.5	f/5.6	f/8	f/11	f/16	f/22	f/32
Hyperfocal distance				296′	238′	167′	121′	83′	60′	42′
50 ft	H	3′5″	F	60′	63′	71′	85′	125′	286′	INF
	W	4′8″	N	43′	41′	38′	35′	31′	27′	23′
30 ft	H	2′1″	F	33′	34′	37′	40′	47′	59′	107′
	W	2′9″	N	27′3″	26′8″	25′5″	24′1″	22′1″	20′	17′
20 ft	H	1′4″	F	21′5″	21′10″	22′9″	23′11″	26′	30′	38′
	W	1′10″	N	18′9″	18′5″	17′10″	17′2″	16′2″	15′	14′
15 ft	H	1′	F	15′10″	16′	16′6″	17′1″	18′	20′	23′
	W	1′4″	N	14′3″	14′1″	13′9″	13′4″	12′9″	12′	11′
12 ft	H	9.5″	F	12′2″	12′1.6″	12′11.2″	13′3.8″	14′0.5″	15′	16′10″
	W	1′1″	N	11′6.4″	11′5.1″	11′2.8″	10′11″	10′6″	10′	9′4″
10 ft	H	7.8″	F	10′4.2″	10′5.3″	10′7.7″	10′10.8″	11′4″	12′	13′2″
	W	10.5″	N	9′8.1″	9′7.2″	9′5.2″	9′3″	8′11″	8′7″	8′1″
8 ft	H	6.2″	F	8′2.7″	8′3.3″	8′4.8″	8′7″	8′10″	9′3″	9′11″
	W	8.3″	N	7′9.5″	7′8.9″	7′7.6″	7′6″	7′4″	7′1″	6′8″
7 ft	H	5.3″	F	7′2″	7′2.5″	7′3.7″	7′5.1″	7′7.7″	7′11″	8′5″
	W	7.1″	N	6′10.1″	6′9.6″	6′8.6″	6′7.4″	6′6″	6′3″	6′

4. Depth of Field and Object Size for 4-Inch 16-MM Camera Lens Continued

Object distance		Object size		f/4.5	f/5.6	f/8	f/11	f/16	f/22	f/32
Hyperfocal distance				296′	238′	167′	121′	83′	60′	42′
	H	4.5″	F	6′1.5″	6′1.9″	6′2.7″	6′3.8″	6′5.6″	6′7.9″	7′
6 ft	W	6″	N	5′10.6″	5′10.2″	5′9.5″	5′8.6″	5′7.2″	5′5.5″	5′2.9″
5 ft,	H	4.1″	F	5′7.2″	5′7.6″	5′8.2″	5′9.1″	5′10.7″	6′.6″	6′4″
6 in.	W	5.4″	N	5′4.8″	5′4.5″	5′3.9″	5′3.1″	5′1.9″	5′.5″	4′10.3″
	H	3.6″	F	5′1″	5′1.3″	5′1.8″	5′2.6″	5′3.8″	5′5.4″	5′8.2″
5 ft	W	4.9″	N	4′11″	4′10.8″	4′10.3″	4′9.6″	4′8.6″	4′7.9″	4′5.6″
4 ft,	H	3.2″	F	4′6.8″	4′7″	4′7.5″	4′8.1″	4′9.1″	4′10.3″	5′.5″
6 in.	W	4.3″	N	4′5.2″	4′5″	4′4.6″	4′4.1″	4′3.2″	4′2.3″	4′.7″
	H	2.8″	F	4′.6″	4′.8″	4′1.2″	4′1.6″	4′2.4″	4′3.4″	4′5.1″
4 ft	W	3.8″	N	3′11.4″	3′11.2″	3′10.9″	3′10.5″	3′9.8″	3′9″	3′7.8″
3 ft,	H	2.4″	F	4′.5″	4′.6″	4′.9″	4′1.2″	4′1.8″	4′2.6″	4′3.8″
6 in.	W	3.2″	N	3′5.5″	3′5.4″	3′5.1″	3′4.8″	3′4.3″	3′3.7″	3′2.8″

H--height.
W—width.
F—far.
N—near.

85. Operation Tests

(fig. 51)

a. Test Equipment and Materials.

(1) Tripod, Photographic LM–41 (tripod).
(2) Meter, Photographic Exposure LM–46A (light meter).
(3) Measuring tape (part of Tool Kit, Photographic Repair TK–109/GF).
(4) Film, photographic, 16-mm (film).
(5) Lamp Equipment PH–218 (lamp equipment).
(6) Developing Equipment PH–253–C (developing equipment).
(7) Splicer, Photographic Film FM–3(1) (splicer).
(8) Screen, Projection BM–1(1) (screen).
(9) Projector, Motion Picture, Sound AQ–2A(1) (projector).

b. Test Connections and Conditions.

(1) Load the camera with unexposed film. About 10 feet of film is required for these tests.
(2) Mount the camera securely on the tripod.
(3) Select a stationary, flat, and well-illuminated object for use as a target. (When set up at the same height as the camera, the camera scene slate (part of KS–10(1) and KS–10(2)) may be used for this purpose.)
(4) Before each operational test, mark the target so that it will be possible to identify the lens under test when the pictures are viewed later.

c. Procedure. Some of the following test procedures apply to only one model of the equipment; these procedures are labelled either *KS–10(1)* or *KS–10(2)*. The test procedures that apply to both the KS–10(1) and the KS–10(2) are labelled *KS–10(*)*.

Step No.	Control settings: Test equipment	Control settings: Equipment under test	Test procedure	Performance standard
1	*KS–10(*)* None.	*KS–10(*)* None.	*KS–10(*)* *a.* Wind camera motor spring fully. *b.* Mount 0.7-inch lens and 1-inch lens on lens turret. *c.* Set up camera and target 2½ feet apart (A). (Measure distance from target to critical focuser.)	*KS–10(*)* *a.* None. *b.* None. *c.* None.
2	*KS–10(*)* None.	*KS–10(*)* Film counter: 000 Governor speed dial: 24. Lens under test: 0.7-inch Diaphragm ring: f/2.5	*KS–10(*)* Focus lens under test: *a.* Rotate lens turret (B) to click-stop position where lens under test is on same side of camera as critical focuser (LOCK position on camera frame). *b.* Look into critical focuser and adjust tripod head until target appears in center of viewing area. *c.* Adjust focusing ring of lens under test (C) until image is in sharp focus. *Note.* Other lenses mounted on lens turret should be focused at infinity to reduce their length and prevent interference.	*KS–10(*)* *a.* None. *b.* None. *c.* None.
3	*KS–10(*)* None.	*KS–10(*)* Unchanged.	*KS–10(*)* Check accuracy of focusing scale by noting which distance mark is closest to index mark on lens barrel.	*KS–10(*)* Distance mark of focusing scale closest to index mark is 2.5.
4	*KS–10(*)* Light meter: set to ASA emulsion speed index of film in camera. *Note.* Camera shutter speed is 1/40 second.	*KS–10(*)* Unchanged.	*KS–10(*)* Make operational check of lens under test: *a.* Rotate lens turret 180° to click-stop position where focused lens is in operating position (in front of aperture). *b.* Use light meter to determine diaphragm setting for normal exposure. Turn diaphragm ring of lens under test to this setting. *c.* Note reading on film counter. *d.* Press and hold starting button. When film counter has moved one unit, release starting button.	*KS–10(*)* *a.* None. *b.* None. *c.* None. *d.* None.
5	*KS–10(*)* None.	*KS–10(*)* Unchanged.	*KS–10(*)* Set up camera and target 4 feet apart (A).	*KS–10(*)* None.
6	*KS–10(*)* None.	*KS–10(*)* Lens under test: 1-inch Diaphragm ring: f/1.9	*KS–10(*)* *a.* Same as step No. 2. *b.* Same as step No. 3.	*KS–10(*)* *a.* None. *b.* Distance mark on focusing scale closest to index mark is 4.
7	*KS–10(*)* Same as step No. 4.	*KS–10(*)* Unchanged.	*KS–10(*)* Same as step No. 4.	*KS–10(*)* None.
8	*KS–10(*)* None.	*KS–10(*)* None.	*KS–10(1)* *a.* Set up camera and target 12 feet apart (A). *b.* Remove 1-inch lens. *c.* Mount 2-inch lens and 4-inch lens on lens turret. *KS–10(2)* *a.* Set up camera and target 12 feet apart (A). *b.* Mount 3-inch lens on lens turret.	*KS–10(1)* *a.* None. *b.* None. *c.* None. *KS–10(2)* *a.* None. *b.* None.
9	*KS–10(*)* None.	*KS–10(1)* Lens under test: 2-inch Diaphragm ring: f/3.5 *KS–10(2)* Lens under test: 3-inch Diaphragm ring: f/2.5	*KS–10(1)* *a.* Same as step No. 2. *b.* Same as step No. 3. *KS–10(2)* Same as step No. 2.	*KS–10(1)* *a.* None. *b.* Distance mark on focusing scale closest to index mark is 12. *KS–10(2)* None.
10	*KS–10(*)* Same as step No. 4.	*KS–10(*)* Unchanged.	*KS–10(*)* Same as step No. 4.	*KS–10(*)* None.
11	*KS–10(*)* None.	*KS–10(1)* Lens under test: 4-inch Diaphragm ring: f/4.5 *KS–10(2)* None.	*KS–10(1)* *a.* Same as step No. 2. *b.* Same as step No. 4. *KS–10(2)* None.	*KS–10(1)* *a.* None. *b.* None. *KS–10(2)* None.
12	*KS–10(*)* None.	*KS–10(*)* Unchanged.	*KS–10(*)* Set up camera and target 30 feet apart (A).	*KS–10(*)* None.
13	*KS–10(*)* None.	*KS–10(1)* Lens under test: 4-inch Diaphragm ring: f/4.5 *KS–10(2)* Lens under test: 3-inch Diaphragm ring: f/2.5	*KS–10(*)* *a.* Same as step No. 2. *b.* Same as step No. 3.	*KS–10(*)* *a.* None. *b.* Distance mark on focusing scale closest to index mark is 30.
14	*KS–10(*)* Same as step No. 4.	*KS–10(*)* Unchanged.	*KS–10(*)* Same as step No. 4.	*KS–10(*)* None.
15	*KS–10(*)* None.	*KS–10(1)* Lens under test: 2-inch Diaphragm ring: f/3.5 *KS–10(2)* None.	*KS–10(1)* *a.* Same as step No. 2. *b.* Same as step No. 4. *KS–10(2)* None.	*KS–10(1)* *a.* None. *b.* None. *KS–10(2)* None.
16	*KS–10(*)* None.	*KS–10(*)* None.	*KS–10(1)* *a.* Remove 2-inch lens and 4-inch lens. *b.* Mount 1-inch lens on lens turret. *KS–10(2)* Remove 3-inch lens.	*KS–10(1)* *a.* None. *b.* None. *KS–10(2)* None.
17	*KS–10(*)* Same as step No. 4.	*KS–10(*)* Lens under test: 1-inch Diaphragm ring: f/1.9	*KS–10(*)* *a.* Same as step No. 2. *b.* Same as step No. 4.	*KS–10(*)* *a.* None. *b.* None.
18	*KS–10(*)* Unchanged.	*KS–10(*)* Lens under test: 0.7-inch Diaphragm ring: f/2.5	*KS–10(*)* *a.* Same as step No. 2. *b.* Same as step No. 4.	*KS–10(*)* *a.* None. *b.* None.
19	*KS–10(*)* None.	*KS–10(*)* None.	*KS–10(*)* *a.* Set up one lamp from Lamp Equipment PH–218 beside camera (D). *b.* Turn lamp on for about 10 minutes. *c.* Rotate camera 90° every 2 minutes. ***Caution:*** **Do not allow lenses to point directly at light at any time.** *d.* Place lens caps on lenses. Press and hold starting button and allow remaining film to run through.	*KS–10(*)* *a.* None. *b.* None. *c.* None. *d.* None.
20	*KS–10(*)* None.	*KS–10(*)* None.	*KS–10(*)* *a.* Remove takeup reel from camera. *b.* Process film, using developing equipment. *c.* Use splicer to splice together ends of film to form loop. *d.* Set up projector and screen for normal operation.	*KS–10(*)* *a.* None. *b.* None. *c.* None. *d.* None.
21	*KS–10(*)* None.	*KS–10(*)* None.	*KS–10(*)* *a.* Project film and check quality of pictures. *b.* Inspect pictures for light streaks and evidence of fogging. *c.* Inspect film for scratches.	*KS–10(*)* *a.* Pictures are steady and in sharp focus, and properly framed. *b.* There are no light streaks and there is no evidence of fogging. *c.* There are no scratches.

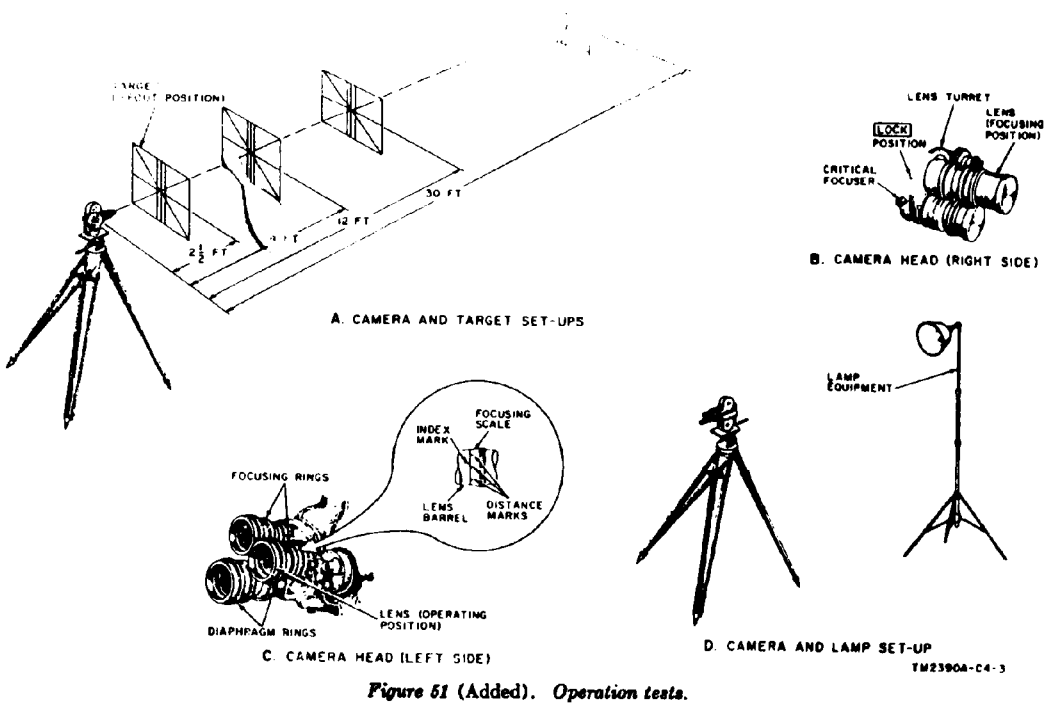


Figure 51 (Added). *Operation tests.*

83. Physical Tests and Inspection

(fig. 49)

a. Test Equipment and Materials.

(1) Tripod, Photographic LM–41 (tripod).

(2) Film, photographic, processed: 16-mm; 100-foot test reel (test film).

b. Test Connections and Conditions.

(1) Set up the tripod.

(2) Remove the camera from its case and fasten it securely to the head of the tripod.

c. Procedure. The following test procedures are applicable to both the KS–10(1) and the KS–10(2).

Step No.	Control settings		Test procedure	Performance standard
	Test equipment	Equipment under test		
1	N/A	Controls may be in any position.	*a.* Remove lenses (A) from camera and camera case. Remove lens caps.	*a.* None.
			b. Inspect each lens from both front and rear.	*b.* There are no scratches on glass elements of lenses.
			c. Inspect markings on each lens barrel.	*c.* Markings are legible.
2	N/A	Controls may be in any position.	*a.* Remove viewfinder lenses (B) from camera and camera case.	*a.* None.
			b. Inspect each lens from both front and rear.	*b.* There are no scratches on glass elements of lenses.
3	N/A	Controls may be in any position.	*a.* Inspect exterior of camera for loose or missing parts, for damage, and for condition of finish.	*a.* There are no loose or missing parts. There is no evidence of damage. Painted surfaces do not show bare metal. All equipment markings are legible. *Note.* Touchup painting is recommended instead of refinishing wherever practicable.
			b. Inspect carrying strap (A).	*b.* Carrying strap is not broken or torn.
4	N/A	Controls may be in any position.	*a.* Lift winding key until it is perpendicular to side of camera.	*a.* Shaft of key engages ratchet of spring motor.
			b. Fold winding key flat against side of camera.	*b.* There is sufficient spring tension to hold key flat.
			c. Rotate governor speed dial (outer knurled ring) throughout its range.	*c.* Governor speed dial operates smoothly without binding or excessive looseness.
			d. Inspect critical focuser for dust, dirt, and scratches.	*d.* No dust, dirt, or scratches are present.
			e. Inspect eyepiece of viewfinder (B) for dust, dirt, and scratches.	*e.* No dust, dirt, or scratches are present.
			f. Rotate viewfinder turret and note action of detent mechanism.	*f.* At each detent stop, motion of turret is halted.
			g. Rotate lens turret (A) and note action of detent mechanism.	*g.* At each detent stop, motion of turret is halted.
5	N/A	Controls may be in any position.	*a.* Examine fit of camera door (B) on camera frame.	*a.* Door fits snugly. There are no bent edges or gaps.
			b. Turn both latch cam keys on camera door to OPEN position. Remove camera door.	*b.* None.
			c. Inspect interior of camera door for damage, dirt, or other foreign matter.	*c.* No damage, dirt, or other foreign matter is present.
			d. Inspect interior of camera frame (C) for damage, dirt, or other foreign matter.	*d.* No damage, dirt, or other foreign matter is present.
			e. Inspect interior of camera for loose or missing screws or other small parts.	*e.* There are no loose or missing screws or other small parts.
			f. Open film gate. (Push gate arm to rear.)	*f.* Guards are forced away from feed and takeup sprockets.
			g. Inspect feed sprocket and takeup sprocket for evidence of wear or damage.	*g.* There is no evidence of wear or damage. Sprocket teeth are smooth and free from burs.
			h. Inspect feed sprocket guard and takeup sprocket guard.	*h.* Feed and takeup sprocket guards are in good condition, smooth and not burred.
			i. Inspect aperture and pressure plates.	*i.* Aperture and pressure plates are smooth, not deformed, and free from nicks, burs, and scratches.
6	N/A	Controls may be in any position.	*a.* Load camera with 100-foot test film (D).	*a.* None.
			b. Wind camera motor spring fully.	*b.* None.
7	N/A	Film counter: 000	*a.* Rotate lens turret (A) to click-stop position where one of index dots on lens turret is at LOCK position.	*a.* None.
			b. Press starting button.	*b.* Camera does not run.
			c. Rotate lens turret to click-stop position where one of index dots on lens turret is at RUN position.	*c.* None.
			d. Press and hold starting button.	*d.* Sound of the mechanism indicates that camera is running.
			e. Press in starting button lock.	*e.* Starting button is locked down.
8	N/A	Unchanged.	*a.* Observe action of film counter.	*a.* Film counter advances rapidly one unit for each foot of film that is run through camera.
			b. Observe action of takeup reel (D).	*b.* Film winds tightly on takeup reel.
			c. Observe action of feed reel.	*c.* Feed reel keeps slight tension on film.
			d. Observe action of sprocket teeth. Check to see that film loops stay as set.	*d.* Sprocket teeth release film smoothly and evenly. Film loops are maintained.
			e. Check for any irregularities in operation, such as spring jump or unusual noises.	*e.* There is no spring jump and no unusual noise.
			f. When spring has run down and motor has stopped, pull out starting button lock (A) and release starting button.	*f.* Starting button pops up.
			g. Note reading on film counter.	*g.* Film counter reading is 021, 022, or 023.
			h. Place camera door (B) on camera. Turn both latch cam keys to CLOSE position.	*h.* Camera door locks firmly in place.

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PIN : 028911-000