DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR AND ORGANIZATION MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOL LISTS

CAMERA, STILL PICTURE KA-G0C

This copy is a reprint which includes current pages from Changes 1 through 6.

HEADQUARTERS, DEPARTMENT OF THE ARMY
APRIL 1969

WARNING
HIGH VOLTAGE
is used in this equipment.
DEATH MAY RESULT IF SAFETY
PRECAUTIONS ARE NOT OBSERVED
Remove all power from the camera before
performing preventive maintenance.
DON'T TAKE CHANCESI

TECHNICAL MANUAL

No. 11-6720-242-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *15 April 1969*

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL

CAMERA, STILL PICTURE KA-60C
(NSN 672-00-890-7610)

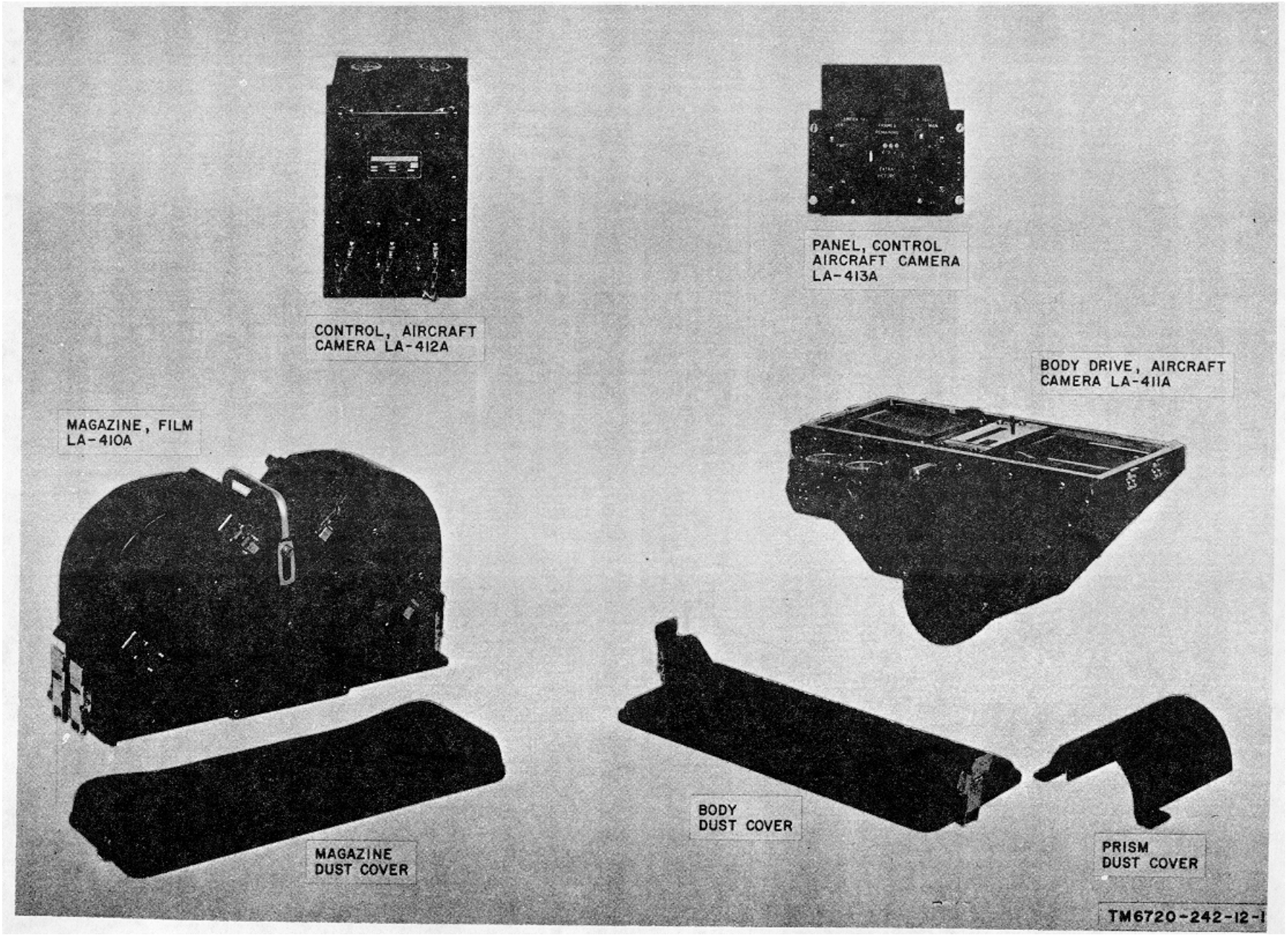


Figure 1-1. Camera, Still Picture KA-60C.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual describes Camera, Still Picture KA-60C (fig. 1-1) and covers its installation, threading, operation, and operator's and organizational maintenance. It includes operation under usual and unusual conditions, cleaning and inspection of the equipment, and replacement of parts available to operator and organizational maintenance.
b. This manual also contains procedures for testing the camera with Test Set, Camera LS-86A, which is a go-no-go type of test equipment.
c. The basic issue items list (BIIL) appears in appendix B; the maintenance allocation chart (MAC) appears in appendix C.

NOTE

Appendix B is current as of 19 May 1970.

1-2. 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.

1-3. 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 (Packaging Improvement Report) as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29A, and DSAR 4145.8.
c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment REPORT (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33A/AFR 75-18/MCO P4610.19B and DSAR 4500.15.

1-3.1. Reporting of Errors

You can help improve this manual by calling attention to errors and by recommending improvements and stating your reasons for the recommendations. Your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) should be mailed direct to Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, NJ 07703.

1-3.2. Reporting Equipment Improvement Recommendations (EIR)

EIR will be prepared using DA Form 2407 (Maintenance Request). Instructions for preparing EIR's are provided in TM 38750, The Army Maintenance Management System. EIR's should be mailed directly to Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, NJ 07703. A reply will be furnished directly to you.

1-3.3. Administrative Storage

Administrative storage of equipment issued to and used by Army activities shall be in accordance with TM 740-901.

1-3.4. Destruction of Army Electronics Materiel

Destruction of Army electronics materiel to prevent enemy use shall be accordance with TM 750-244-2.

Section II. DESCRIPTION AND DATA

1-4. Purpose and Use

a. Purpose. Camera, Still Picture KA-60OC provides panoramic, horizon-to-horizon reconnaissance photograph specifically for high-speed, low-flying aircraft.
b. Use. Camera, Still Picture KA-60C, mounted in either a forward oblique or vertical position, presents a sequence of photographs (in the flight direction) of the ground area beneath the aircraft through both lateral horizons.

1-5. Technical Characteristics

Type	Rotary prism, panoramic.
Scan angle	180.
Film format	2.25 by 9.4 inches (approx).
Frame length	11.4 inches (binary-coded dots format).
Operating voltage	+28 volts de, 5 volts dc, and 115 volts ac, 400-cycle, single phase.
Dc current rating	1 ampere at 5 volts dc. 0.7 ampere at 28 volts dc.
Ac current rating	2.1 amperes.
Modes of operation:	
Autocycle	0.177 to 1.5 knots/feet, 1 to 8.5 cycles per second.
Pulse	0.04 to 0177 knots/feet, 4.5 to 1 cycle per second (automatically switched at I cycle per second).
Aperture range	- F/2.8 through f/22.
Slit width range	0.200 inch through 0.020 inch.
Relative shutter speed	1/100 through 1/8500 second (established by cycling rate).
IMC range	Compensation for 60 percent overlap. (Not required in pulse mode or forward oblique position.)
Temperature range:	
Operating	0°F. to 1+120°F. (-17.8°C. to +48.9°C).
Nonoperating	-65°F. to +160°F. (-54°C. to +71.1°C.).
Altitude:	
Operating	20,000 feet.
Nonoperating	50,000 feet.
Lens	3-inch (75 mm) f/2.8.
Film type	Aerecon, Plus-X, 70mm perforated, Type 8401, AEI 80.
Film capacity	250 feet, nominal.
Light level	25 to 5,000 foot lamberts.
Data recording (auxiliary data annotation system)	Binary-coded dots, generated by a cathode-ray tube and located on film by optical system. 40 ms annotation time for 6 cps maximum.

1-6. Items Comprising ari Operable Equipment

NSN	Qty	Nomenclature, part no., and mfr code	Weight lbs	Dimensions (in.) Height	Depth	Width	Fig. No.
6720-00-890-7610		Camera, Still Picture KA-60C Consisting of: **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.					1-1
6720-00-890-7608	1	Camera Body Assembly LA-411 A:1214B1 (72314)	21.75	6.75	8.437	13.625	1-2
6760-00-922-5802	1	Camera Magazine Assembly LA410A: 1214Cln(72314)	11.5	7.625	6.25	13.75	1-3
6760-00-922-5803	1	Control Panel Assembly LA/413A: 1214-D6 (72314)	4.25	3.75	7.72	5.74	14
6720-00-890-7609	1	Camera Control Panel LA-412A: 1214-D6 (72314)	5.687	7.682	6.685	5.218	1-5
6720-00-400-2590	1	Control Panel LA428A: 1214D33 (72314)					

1-7. Common Names

Nomenclature	*Common name*
Camera, Still Picture KA-60C	Camera
Body Drive, Aircraft Camera LA-411A	Body
Magazine, Film LA410A	Magazine
Panel, Control Aircraft Camera LA413A.	Control panel
Control, Aircraft Camera LA412A	Camera control
Test Set, Camera LS-86A	Test set
Army Models OV-1C and OV-1D Aircraft (Mohawk).	Aircraft

1-8. Description of Camera

(fig. 1-1)

The camera is a moving film, panoramic type, consisting of four major components; the body, magazine, control panel, and camera control.

a. Body (fig. 1-2). The body achieves the photographic coverage of the camera. It includes the prism, lens, aperture and slit mechanisms, image motion compensation (IMC) mechanism, and the drive mechanism.

The aperture and slit mechanisms control film exposure. The drive mechanism transports the film, rotates the prism, and drives the IMC mechanism. The body supports the magazine (b below) and includes a linkage gear which mechanically couples the drive mechanism to the magazine. Four latch hooks secure the magazine to the body, and three trunnions allows the body to be rigidly mounted to the aircraft frame. Connector 1Jl electrically connects the body to the camera control and provides the necessary operating voltages to the body components. Connector 1J2 electrically interconnects the body data recording system to the auxiliary data notation system (ADAS). A dust cover is provided to protect the prism from dirt, dust, and damage. Also, a dust cover is supplied to protect the exposed body components when the magazine is not installed.

b. Magazine (fig. 13). The magazine supplies fresh film to the camera focal plane, where the film is exposed, and takes up the exposed film. It provides space for the supply spool (fresh film), takeup spool, keeper rollers (fig. 3-2), and pressure roller (fig. 3-6). The supply spool (fig. 1-3) stores up to 250 feet of film and is mounted on two keyed shafts. The takeup spool is also mounted on two keyed shafts. Four magazine fasteners latch the magazine to the body and eight cover fasteners latch the two film covers to the magazine. The magazine input gear mates with the body linkage gear (a above). A protective magazine cover is supplied to protect exposed magazine components when the magazine is not installed on the body.

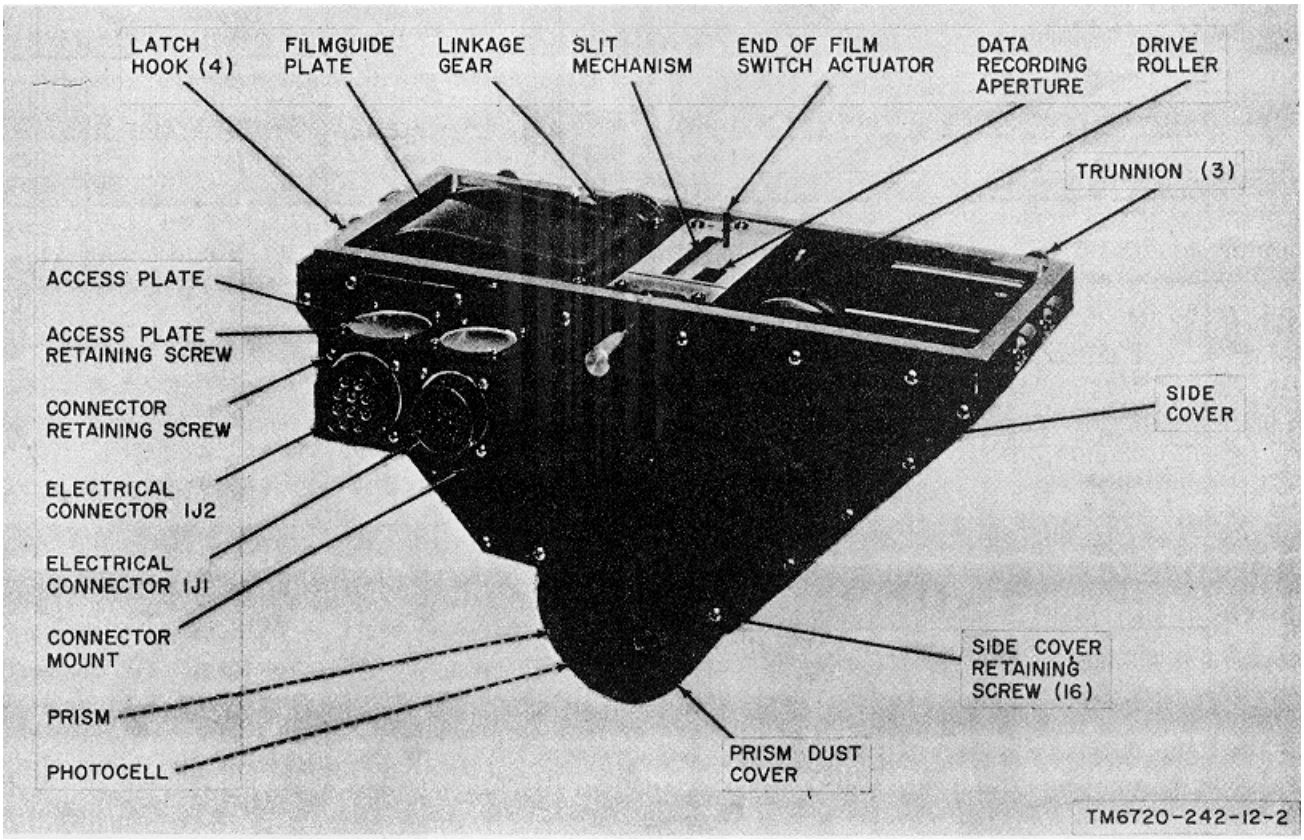


Figure 1-2. Body, front view.

c. Control Panel (fig. 1-4). The control panel contains all the controls and indicators of the camera. Electrical connections to the control panel are made through electrical connector 352 while E V/H (ratio of ground speed (V) and altitude (H) to voltage (E)) signal inputs are applied through electrical connector 3J1. Four Dzus fasteners facilitate mounting the control panel to the aircraft console.

d. Camera Control (fig. 1-5). The camera control contains most of the camera's electronic circuits. Electrical connections from the control panel (c above) are made through electrical connector 2J2, while electrical connections to the body (a above) are made through electrical connector 2J1. Two circuit breakers, 1.5 amperes direct current (dc) and 3 amperes alternating current (ac), are located on the front panel. Also included is a handle used for transport. Electrical connector 2J3 is connected to the test set for flight line as well as bench testing.

e. Transit Case (fig. 2-1). The transit case is made of aluminum with molded inserts to protect the camera components during transport or storage. The manually operated air equalizing valve (fig. 2-1) equalizes the pressure of the interior and the exterior of the transit case.

1-9. Additional Equipment Required

a. Camera Component Mounts. Mounting provisions for the body, camera control, and control panel are required. The camera control requires a shock-mounted device with a wingnut arrangement to secure the lower portion of the camera control. All mounts should allow access to the camera electrical inputs. The positions of both body electrical connectors may be changed for ease of installation (para 4-18).

b. Power and Control Cables. Electrical interconnecting cables, to be supplied by the using activity, are required between the camera components. These cables apply primary and E V/H control voltages to the camera and serve as the electrical interface between the camera components. Refer to figures 1-6 through 1-9 for cable fabrication information.

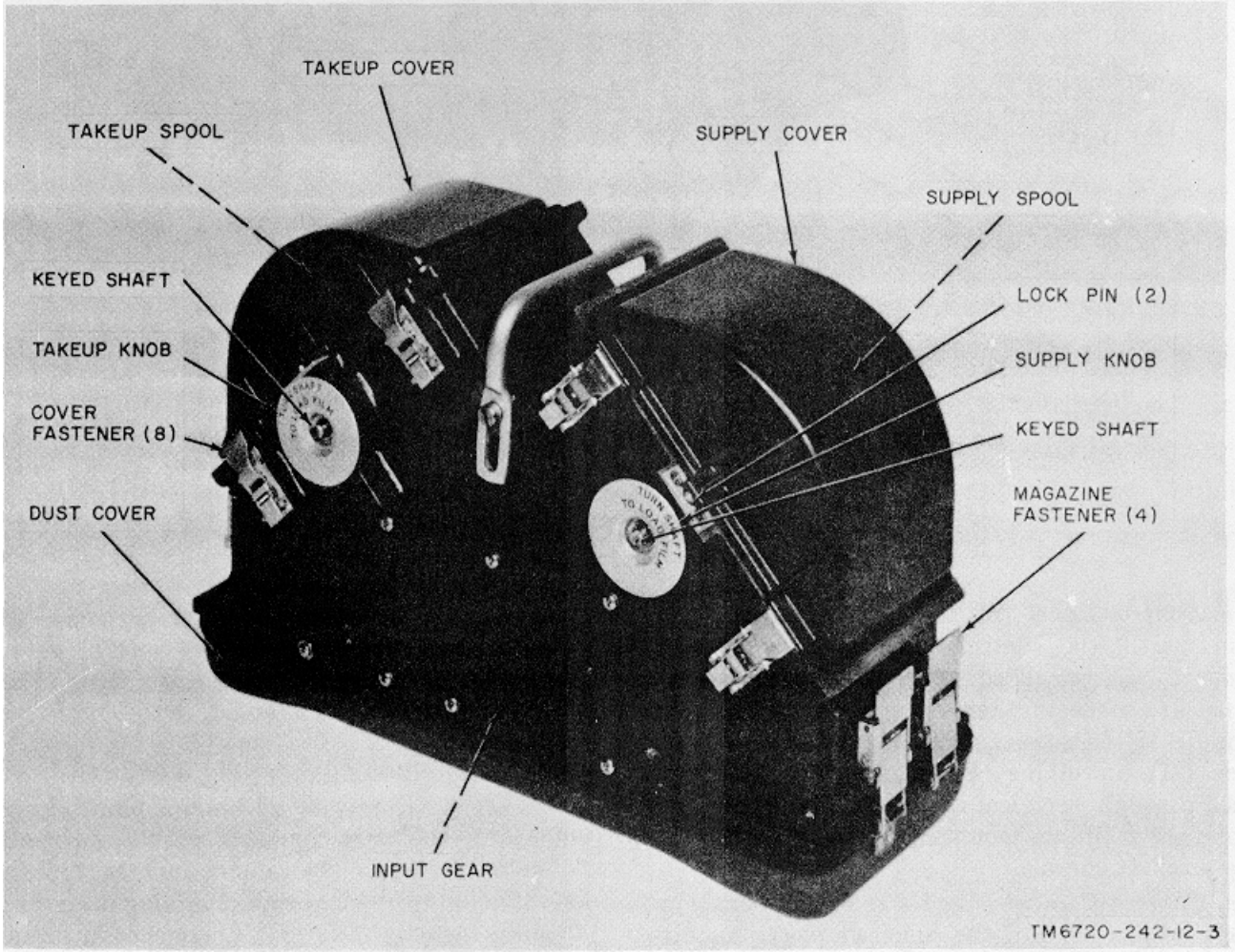


Figure 1-3. Magazine, front view.

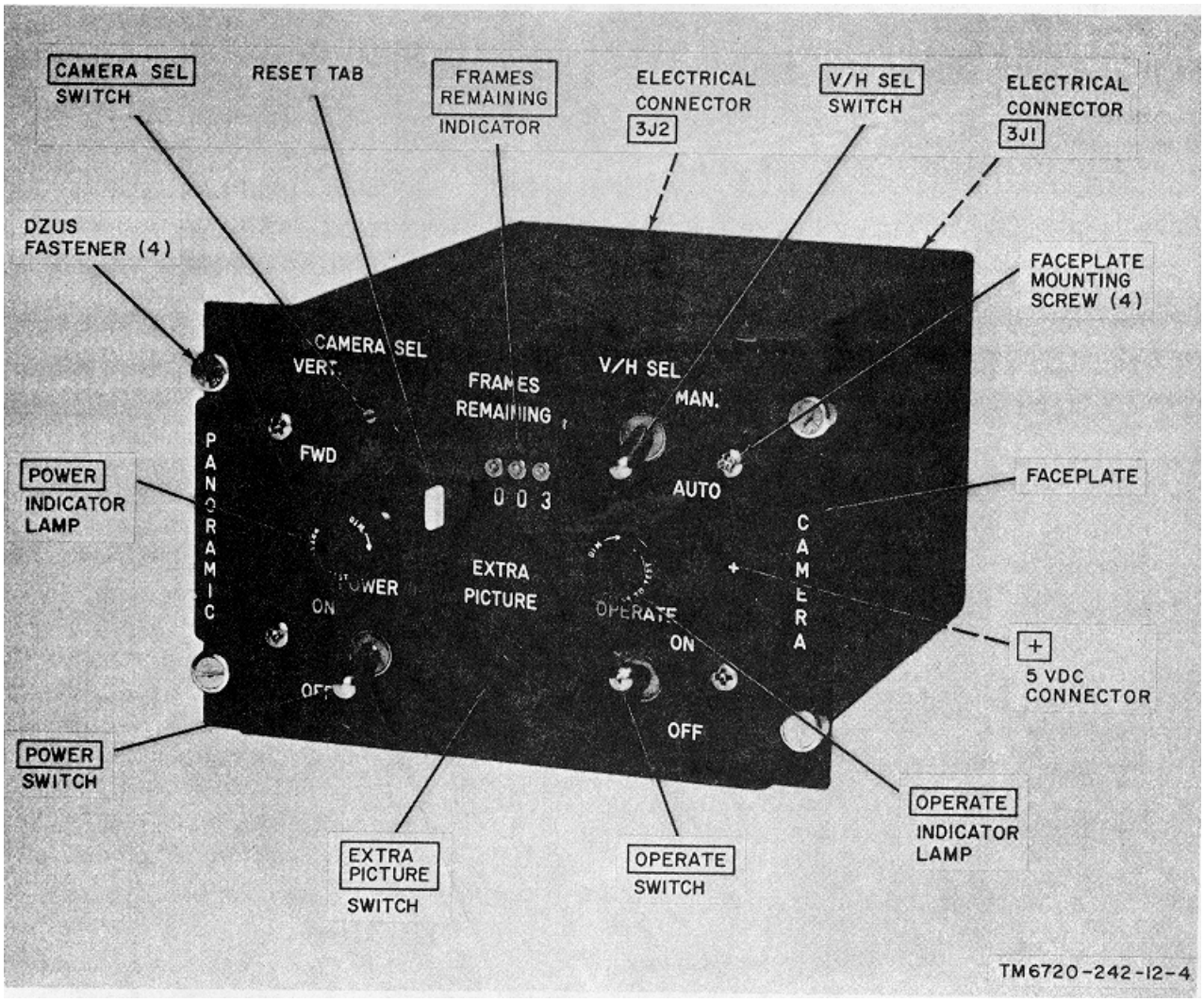


Figure 1-4. Control panel, front view.

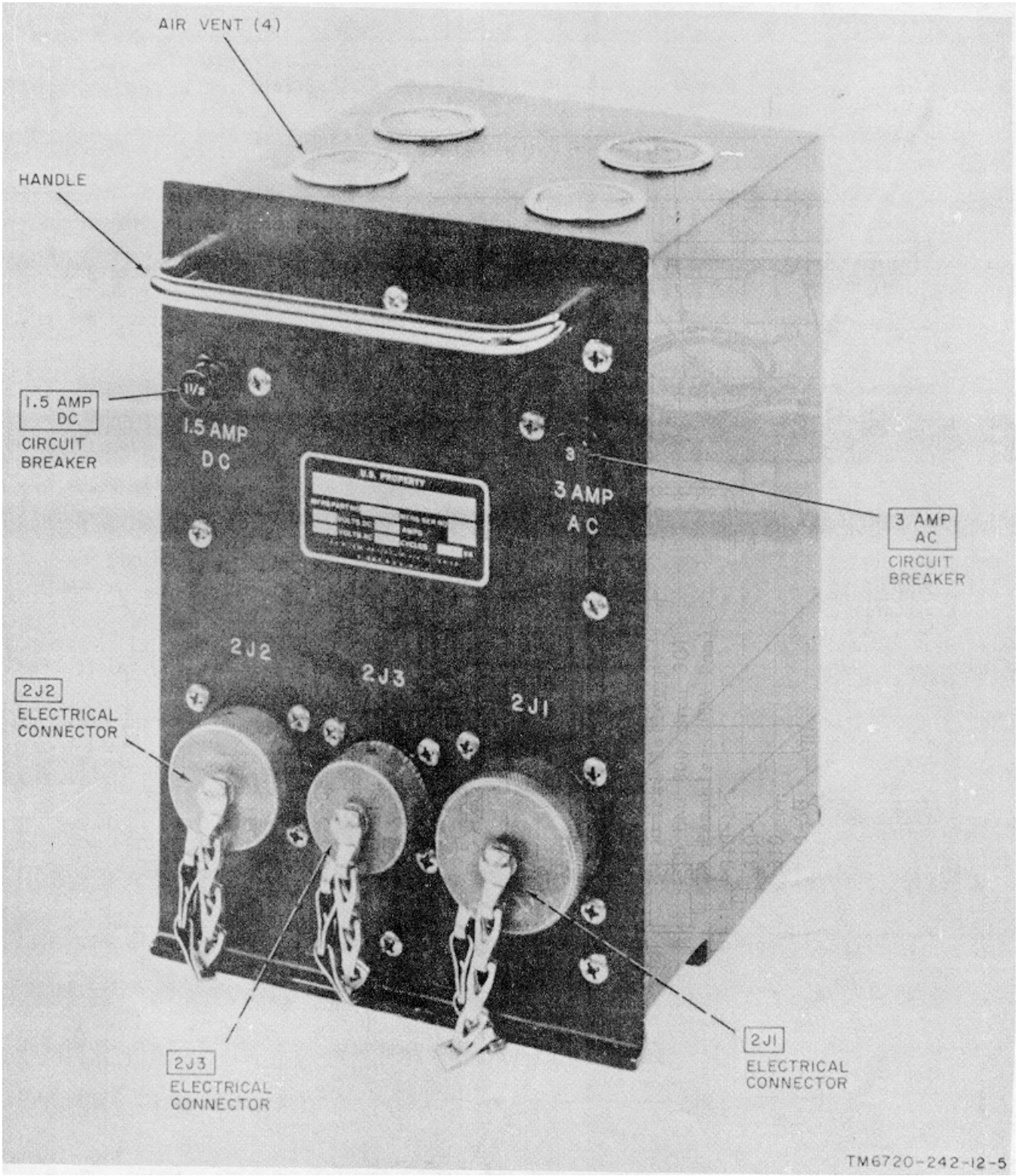


Figure 1-5. Camera control, front view.

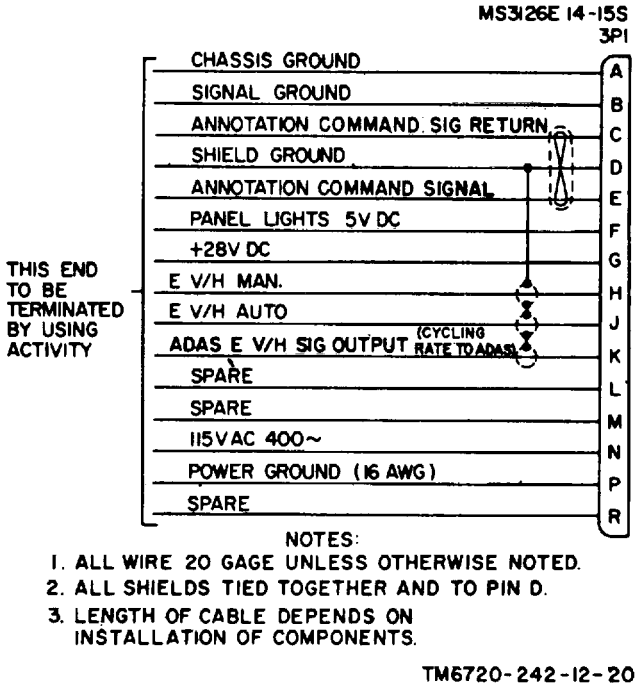


Figure 1-6. Control panel cable (Wv) fabrication.

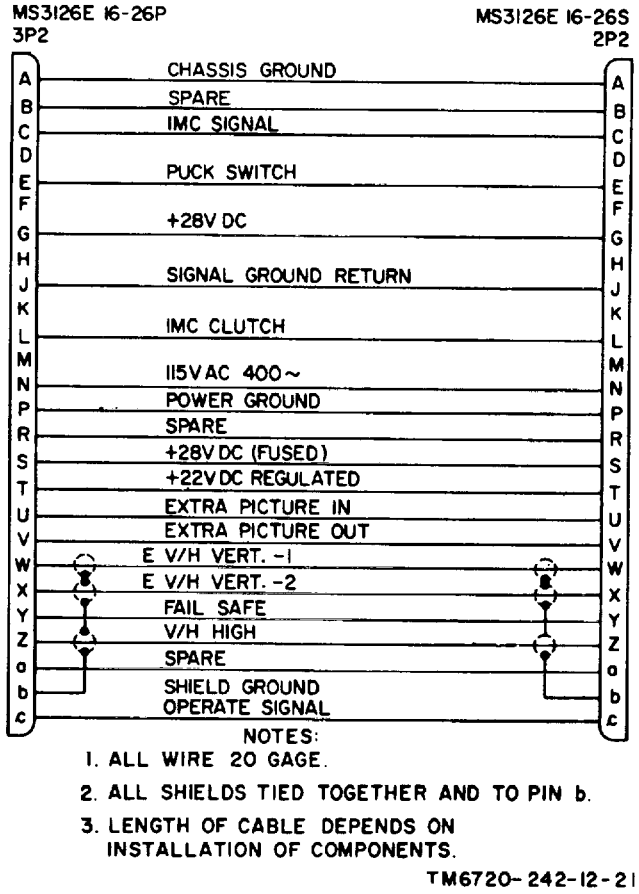


Figure 1-7. Camera control cable (We) fabrication

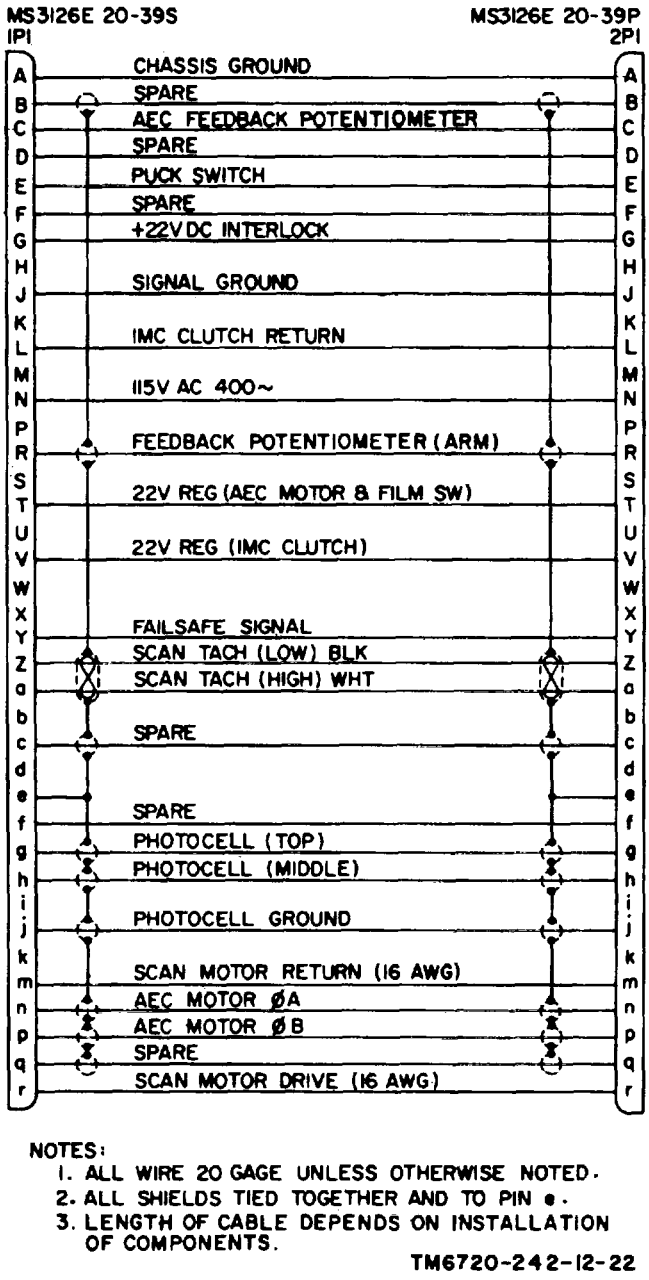


Figure 1-8. Body cable (W3) fabrication.

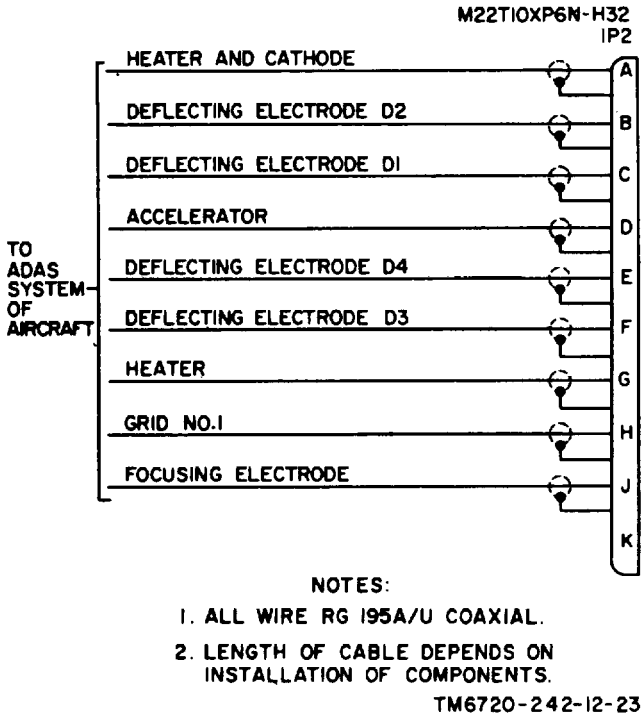


Figure 1-9. ADAS cable (W4) fabrication

CHAPTER 2

INSTALLATION

2-1. Unpacking

(fig. 21)

a. Packing Data.. The camera is shipped directly in its transit case with no other containers. The total weight of the packaged camera is 94 pounds.

b. Unpacking.

(1) Unscrew the air valve of the transit case.

(2) Release the transit case snap catches and remove the transit case top.

(3) Remove the camera components from the transit case.

(4) Check the camera components as out-lined in paragraph 2-2.

2-2. Checking Unpacked Equipment

a. Check all surfaces for scratches, nicks, dents, or other damage. If any camera component has been damaged, report it on DD Form 6 (para 1-3b).

b. Remove the prism dust cover (fig. 1-2) and check the prism for any damage. After the prism has been checked, replace the dust cover.

c. Check the camera electrical connectors for bent or missing pins.

d Check all exterior mounting screws for completeness and be sure that they are secured.

e. Check the overall equipment for any loss or damage that might have occurred during shipment.

f. Check the camera against the packing slip.

If a packing slip is not available, check the equipment against the basic issue items list (app B). Report any discrepancies in accordance with TM 38750. Shortage of a minor item that does not affect the proper functioning of the equipment should not prevent use of the equipment.

g. Replace all the camera components into the transit case.

h. Install the top on the transit case and secure it with the snap catches.

2-3. Mounting Camera in Aircraft

Installation of the camera requires mounts and interconnecting cables for the body, control panel, and camera control. Assume that applicable power requirements (para 1-5) are provided by the aircraft. Refer to figures 2-3, 2-4, and 25 for components installation data. Observe the following general rules when installing the camera.

a. Check to be sure that the mounts for the body and camera control have been installed in the aircraft.

b. Check to be sure that the aircraft instrument panel has been prepared to accommodate the control panel.

c. Install the body into its mount and secure it in place.

d. Install the camera control into its mount and secure it in place.

e. Install the control panel into the space provided on the aircraft instrument panel and secure it in place.

f. Interconnect the aircraft power source and the control panel with cable W1.

g. Interconnect the camera control and the control panel with cable W2.

h. Interconnect the body and the camera control with cable W3.

i. Interconnect the body and the aircraft ADAS system with cable W4.

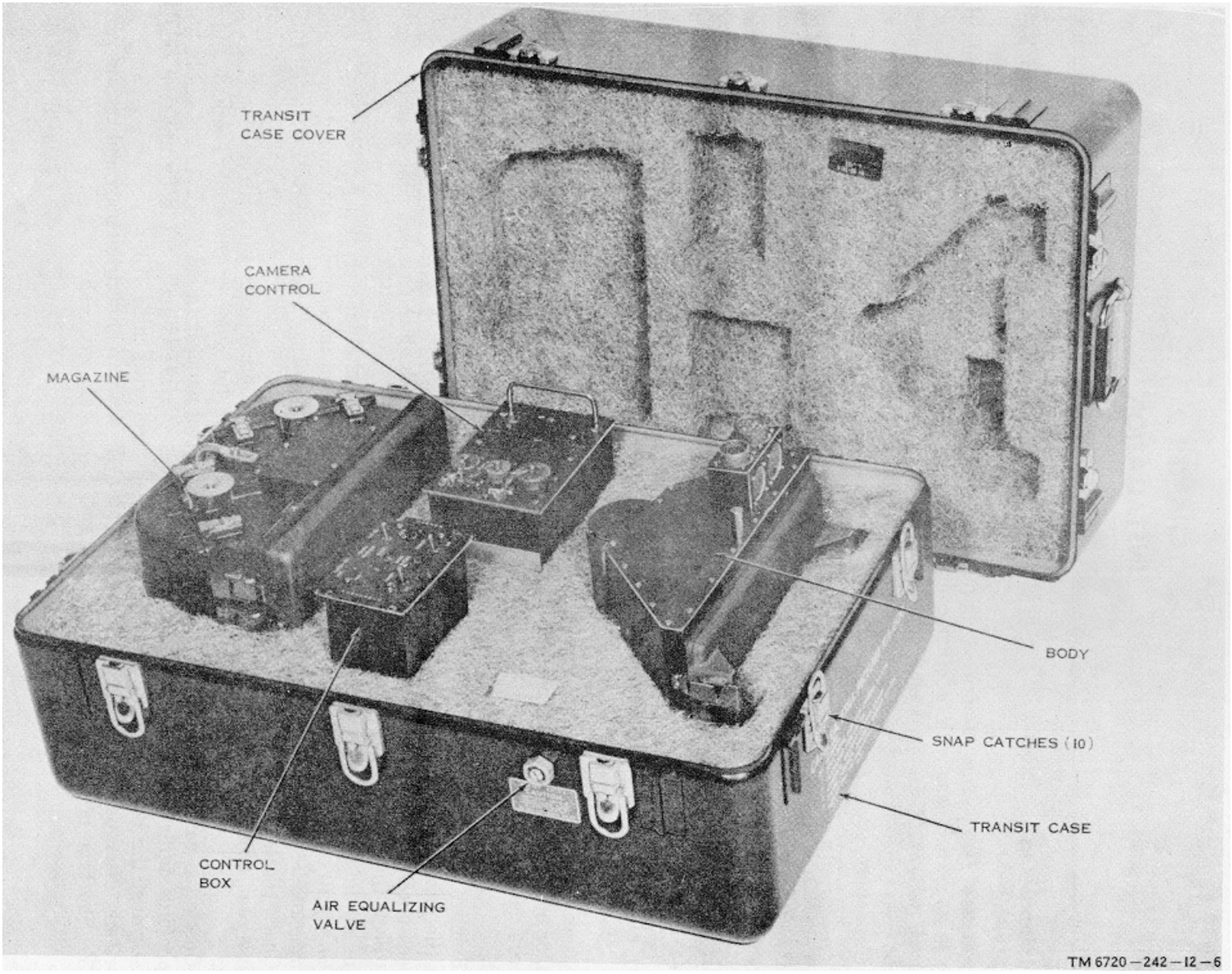


Figure 2-1. Transit case

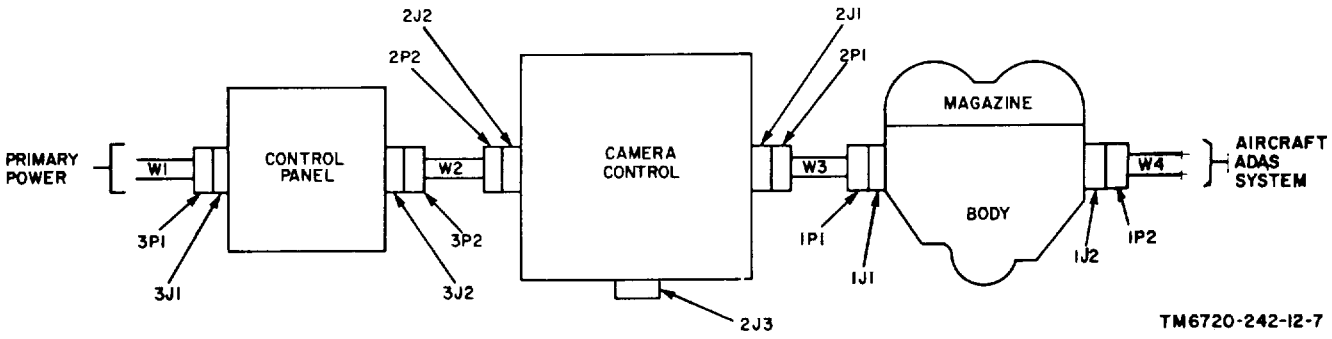


Figure 2-2. Camera interconnecting diagram.

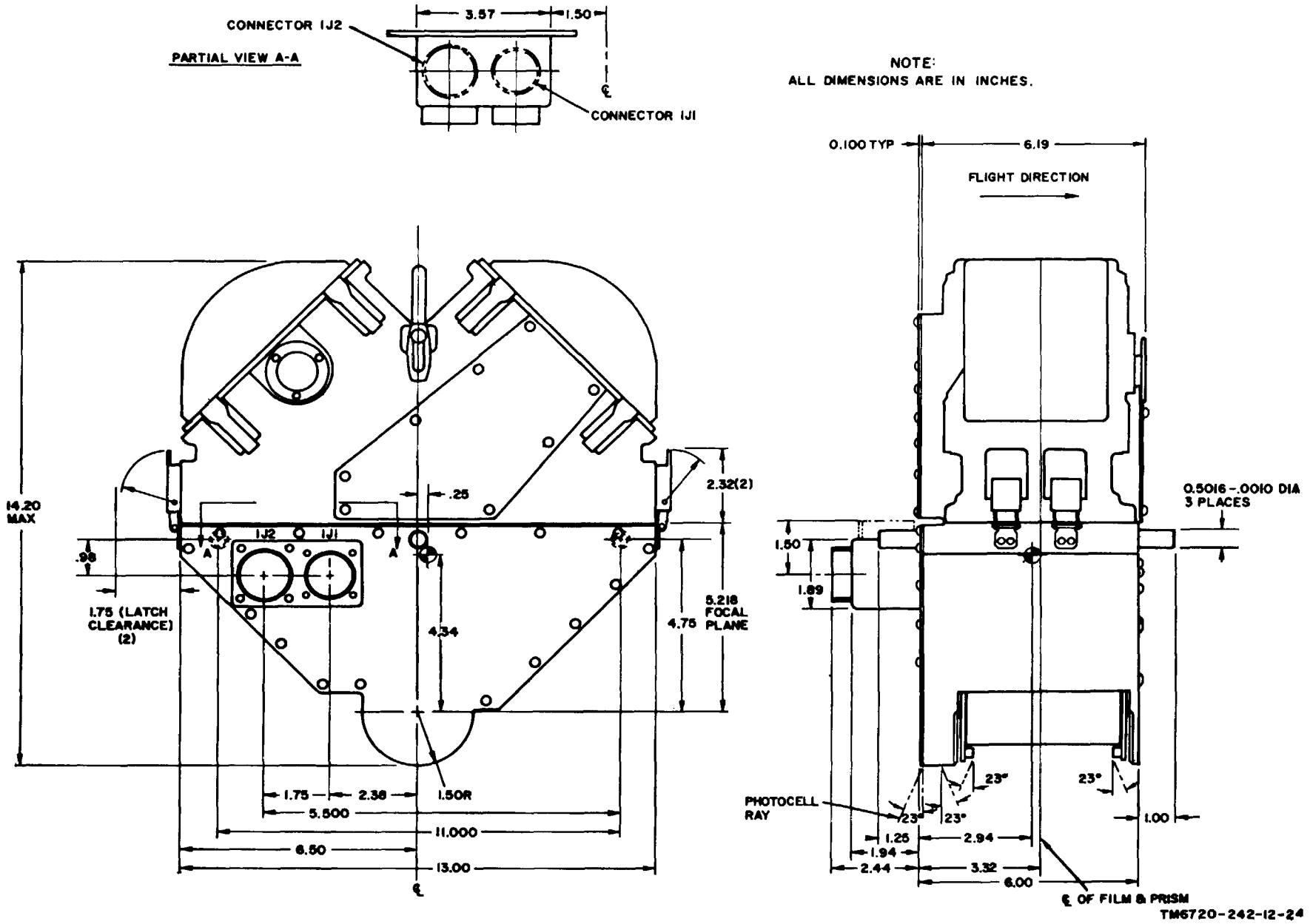


Figure 2-3. Body and magazine installation data.

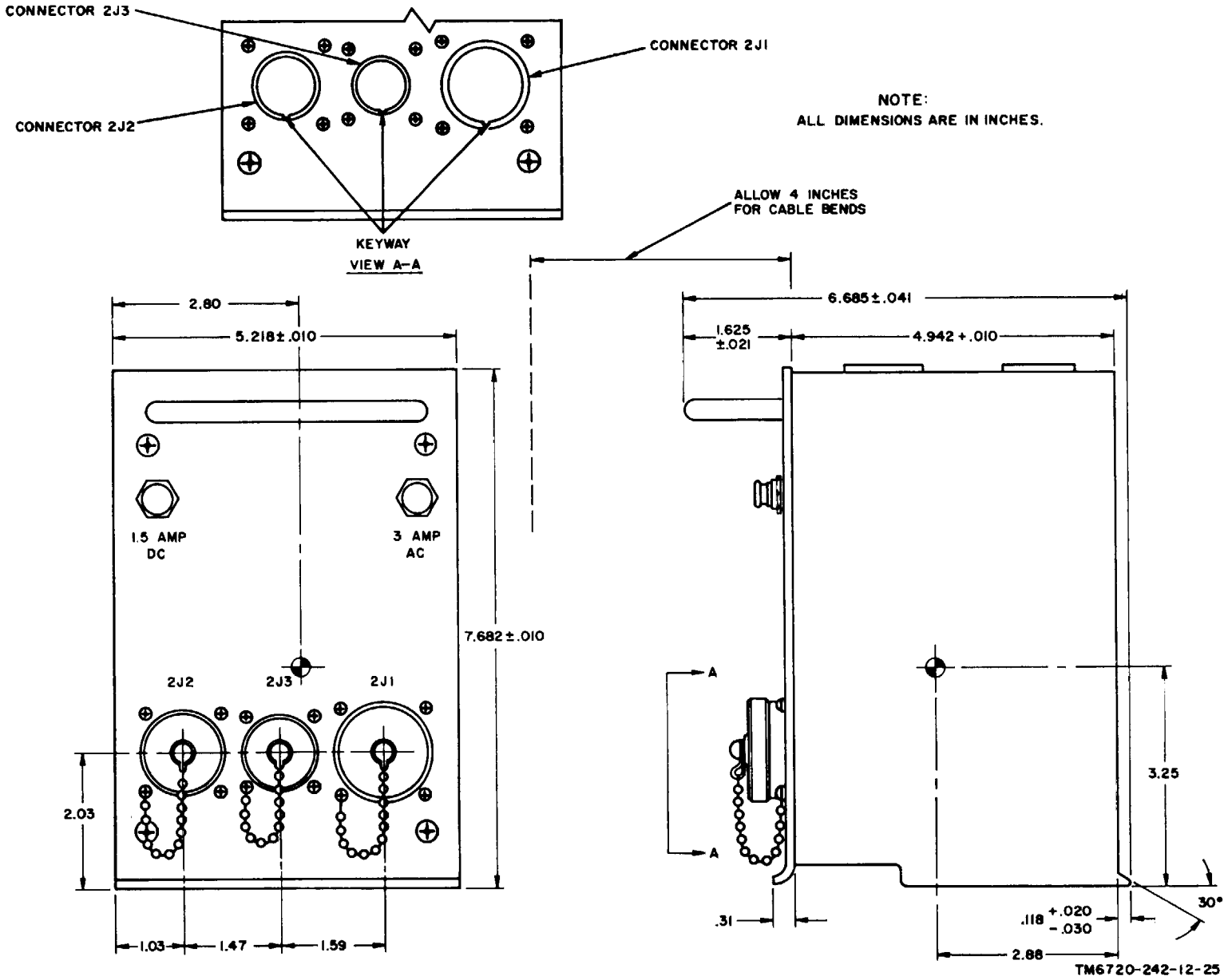


Figure 2-4. Camera control installation data.

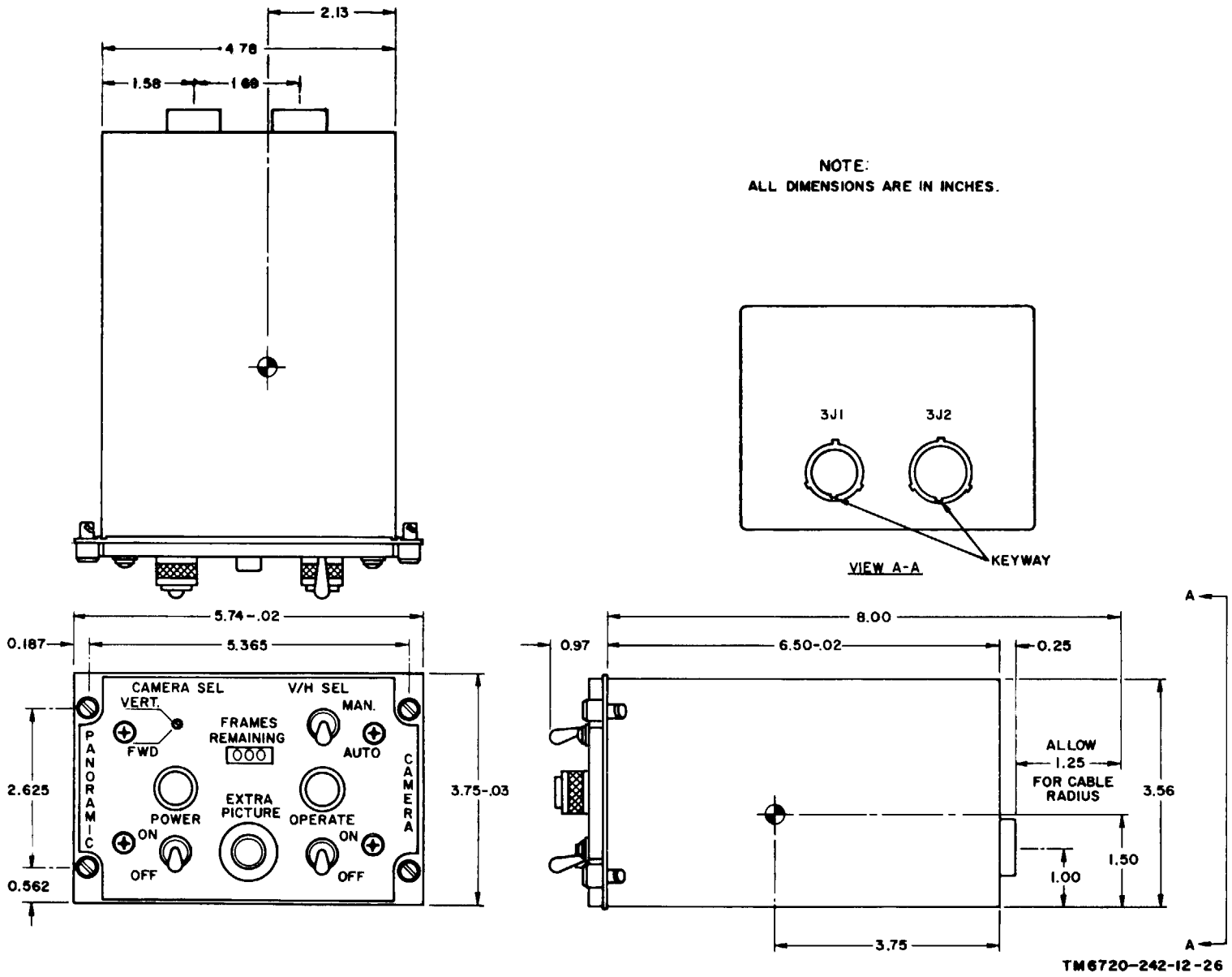


Figure 2-5. Control panel installation data.

CHAPTER 3

OPERATING INSTRUCTIONS

Section I. OPERATION UNDER USUAL CONDITIONS

Note
This chapter covers only items used by the operator and organizational maintenance personnel.

3-1. Controls, Indicators, and Connectors

The charts below list the camera's controls, indicators, and connectors and describes their functions.

a. Control Panel (fig. 1-4).

Costume indicator. or connector	*Function*
POWER switch	Two-position switch: *Sw pos* — *Function* OFF — Disconnects input ac and dc power from camera. ON — Applies input ac and dc power to camera.
POWER indicator lamp.	Illuminates to indicate presence of +28-volt dc power. When pressed, indicates presence of 115-volt ac power.
OPERATE switch	Two-position switch: Sw pos — Function OFF — Remove command voltage from camera, placing camera in a standby mode. ON — Applies command voltage to camera, causing camera to operate.
OPERATE indicator lamp.	a. When flashing indicates camera is operating. b. When it remains lighted, indicates end of film. c. When pressed, illuminates to indicate presence of +22 volts dc.
CAMERA SEL	---- Screwdriver-operated two-position switch: Sie po — Function VERT. — Sets camera to operate with IMC. Noe. This poaltion is to be used only for camera mounted In vertical InstUllation. FWD — Sets camera to operate without IMC. Note. This position is to be used only for camera mounted In forward oblique Installation.

Costume indicator. or connector	*Function*
V/H SEL SW poe	Two-position switch: Function AUTO. Selects automatic external E W/H signals produced from aircraft generator. MAN. Selects manually controlled external E V/H signals.
EXTRA PICTURE switch.	When depressed, camera takes a picture between predetermined time intervals. This switch is operational only when camera is in pulse mode.
FRAMES REMAINING	Indicates the total remaining exposures in the camera. indicator.
Reset tab	When depressed, resets FRAMES REMAINING indicator to 250.
+	Faceplate illumination lamps are supplied +5 vdc power through a connector located immediately behind + mark.
Electrical connector 3J1.	Receptacle for cable that interconnects control panel and aircraft primary power and control signals.
Electrical connector 3J2.	Receptacle for cable that interconnects control panel and camera control.

b. Camera Control (fig. 1-5).

Costume indicator. or connector	*Function*
1.5 AMP DC circuit breaker.	Pops out and opens de circuit when circuit is overloaded.
3 AMP AC circuit	Pops out and opens ac circuit when breaker. circuit is overloaded.
2J2 electrical connector.	Receptacle for cable that interconnects the camera control and the control panel.
2J1 electrical connector.	Receptacle for cable that interconnects the camera control and the body.
2J3 electrical connector.	Receptacle for cable that interconnects the camera control and the test set.

3-2. General Operation Information

Threading the magazine is divided into three parts; preliminary procedures (para 33), dark-room procedures (para 3-4), and subdued light procedures (para 3-5). The film path through the magazine is illustrated in figure 3-1 and should be referred to before threading procedures are attempted. Procedures for removing exposed film from the magazine are provided in paragraph 3-6.

3-3. Preliminary Procedures

Preliminary procedures consist of preparing the camera for film loading as described in paragraph 3-4 and 3-5.

a. Unlatch the four magazine fasteners (fig. 1-3) and remove the magazine from the body.

b. Rest the magazine on its takeup and supply covers on a clean, flat surface.

Note

When performing *c* below, squeeze the takeup and supply keeper rollers together to facilitate keeper release tab operation.

c. Pull the keeper release tab (fig. 3-2) upward until supply and takeup keepers rollers lock in open position.

d. Place the magazine in an upright position.

e. Unlatch the eight cover fasteners (fig. 1-3) and remove the supply and takeup covers from the magazine.

3-4. Darkroom Procedures

Caution

The following procedures must be performed in total darkness.

a. Unpackage the roll of film (supply film) to be used.

b. Rest the magazine on its side with the drag clutch (fig. 33) adjacent to the work surface.

c. Place the supply spool next to the magazine supply side so that the film rolls from the spool top and the film emulsion side faces away from the handle.

d. To facilitate threading, chamfer the leading end of the film as shown in figure 3-4.

e. Push the film between the guide roller and the magazine casting (fig. 3-3), into the film chute until approximately 6 inches of film extends from the underside of the magazine.

f. With the one hand, lift up and hold the supply knob (fig. 3-4).

g. With the other hand, place the supply spool on the drag clutch shaft and rotate the supply spool until it engages with the key on the drag clutch shaft.

h. Release the supply knob and engage the supply knob keyed shaft with the supply spool by rotating the keyed shaft.

i. Check to be sure that the supply spool is properly mounted by depressing the lockpin. If the lockpin cannot be depressed, repeat the procedures given in f, g, and h above.

Caution

To prevent film fogging, be sure that the supply cover is properly installed before exposing the magazine to subdued light.

j. Install the supply cover on the magazine supply side and secure by latching the four cover fasteners.

3-5. Subdued Light Procedures

Caution

Perform the procedures given below in subdued light.

a. Rest the magazine on the supply cover and housing (fig. 3-5).

b; Pull the film extending from the magazine until approximately 3 feet of film leader is available.

Caution

Be sure that the film does not twist or film damage will occur.

c. Guide the film leading edge over and around the pressure roller, and then between the takeup keeper idler and takeup sprocket and into its take-up slot (fig. 3-6).

d. Insert the film edges under the film keeper tabs (fig. 3-7).

e. Pull the film leading edge out through the takeup spool area until the film loop forms between the loop guide and the pressure roller. Be sure that the film is routed tightly around the pressure roller.

f. Remove the film from under the film keeper tabs, maintaining the film loop between the pressure roller and the loop guide mark.

g. Engage the film perforations with the supply and takeup sprocket teeth.

h. Push the keeper release tab down until the supply and takeup keepers engage the film with the sprockets.

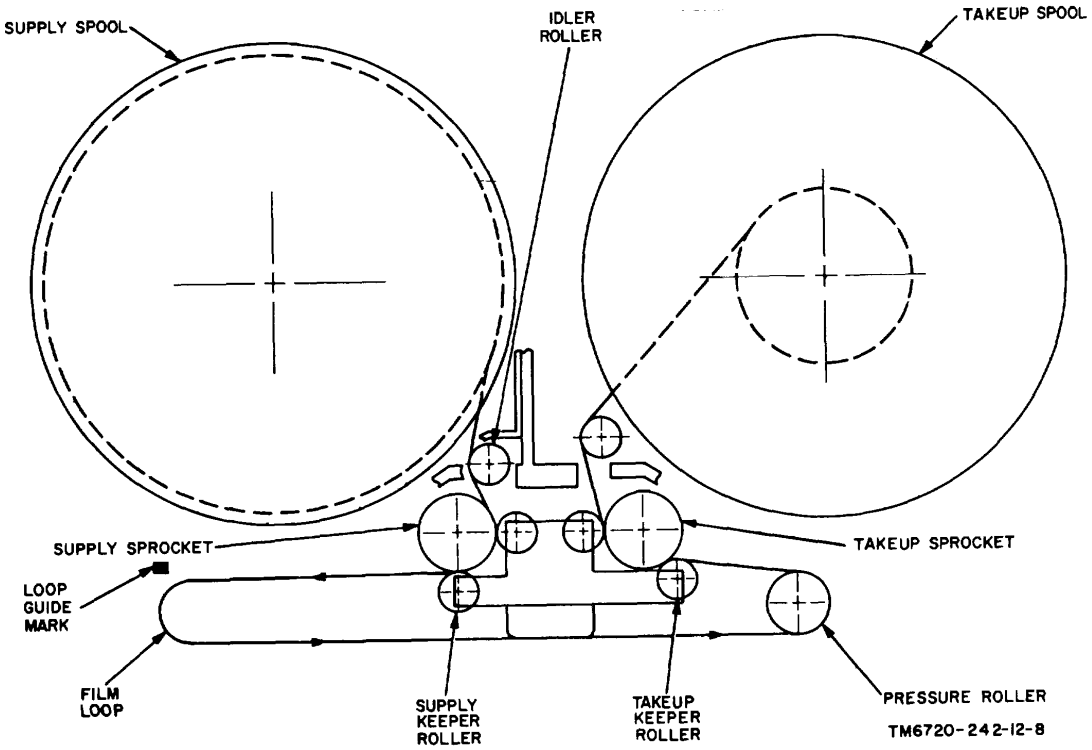
i. Insert the film edges under the film keeper tabs.

j. Guide the film edges under the pressure roller film guides.

Note

The following step governs the size of the film loop which is important to the proper operating of the camera. If the described conditions are not met, repeat the procedures given in b through j above.

k. Slide the film back and forth so that on the supply side, the edge of the film loop just reaches the loop guide mark and on the takeup side, the film loop just falls short of the magazine casting (fig. 3-8).



l. Place the magazine in an upright position (handle facing upward) (fig. 3-9).
m. While holding the magazine with one hand, and grasping the film with the other hand, rapidly pull approximately 18 to 24 inches of film from the magazine takeup area. Check the magazine underside for the proper film loop between the pressure roller and the loop guide mark.
n. With one hand, lift and hold the takeup knob.
o. With the other hand, engage the takeup spool with the keyed shaft opposite the takeup knob.

Caution

Use only aluminum film spools in the takeup chamber. Steel film spools, if used, will cause an imbalance in the magazine drive system.

p. Release the takeup knob and engage its keyed shaft with the takeup spool. Rotate the shaft if required.
q. Check to see that the takeup spool is mounted properly by depressing the lockpin (fig. 3-10). If the lockpin does not retract, repeat the procedure given in o above.
r. Route the leading edge of the film over the takeup spool core. Insert the film leading edge into the core slot.
s. Tilt the magazine slightly to reach the magazine input gear; while holding the magazine input gear, rotate the takeup spool until the slack film on the magazine takeup side is collected on the spool.
t. Mount the cover on the magazine takeup side and latch the four cover fasteners.

Caution

Be sure that the cover is properly mounted, or film fogging will occur.

u. Mount the magazine on the body and make sure that the magazine input gear meshes with the body linkage gear (fig. 1-2).
v. Secure the four magazine fasteners to the body latch hooks.

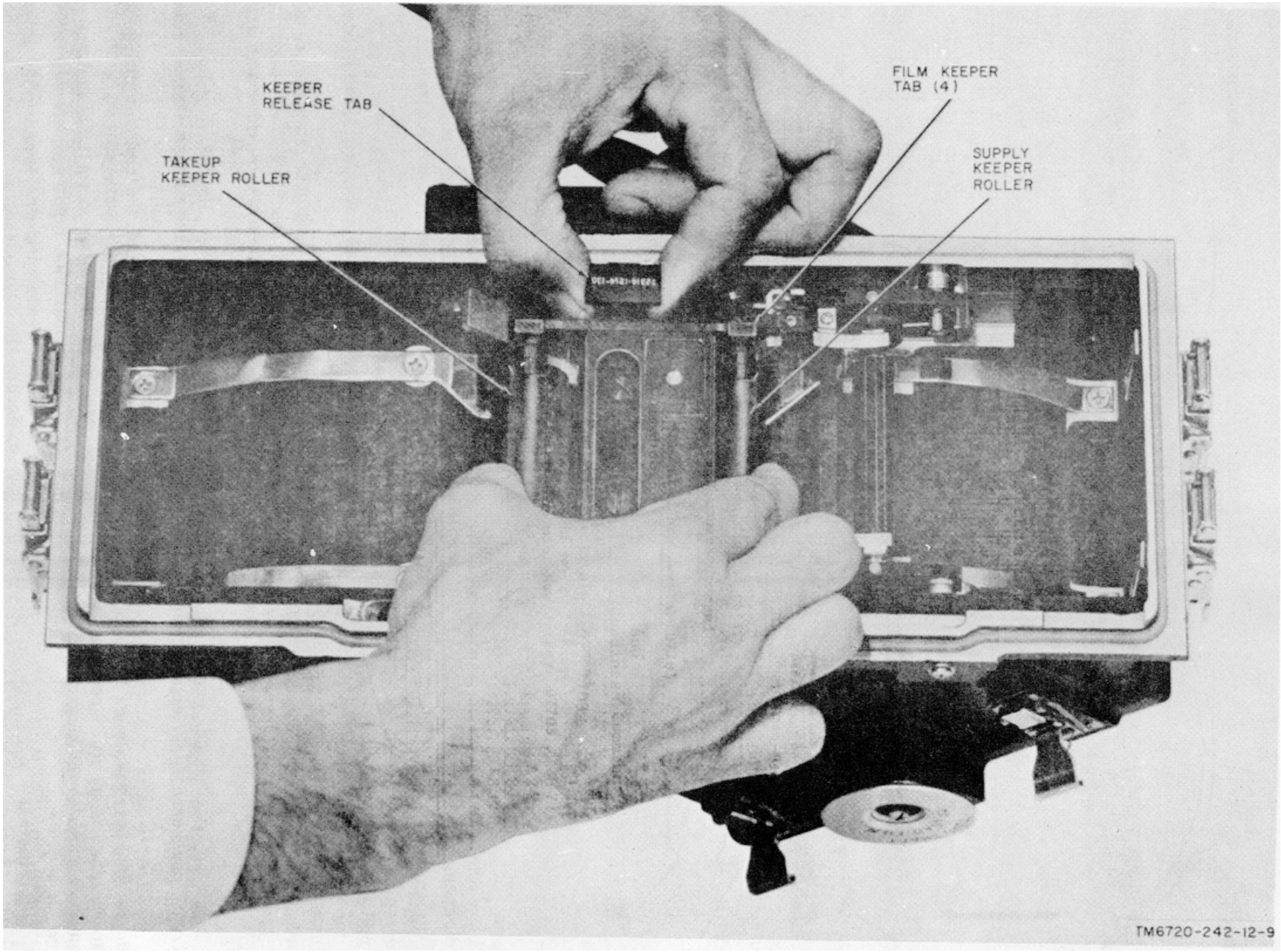


Figure 3-2. Pulling up keeper release tab.

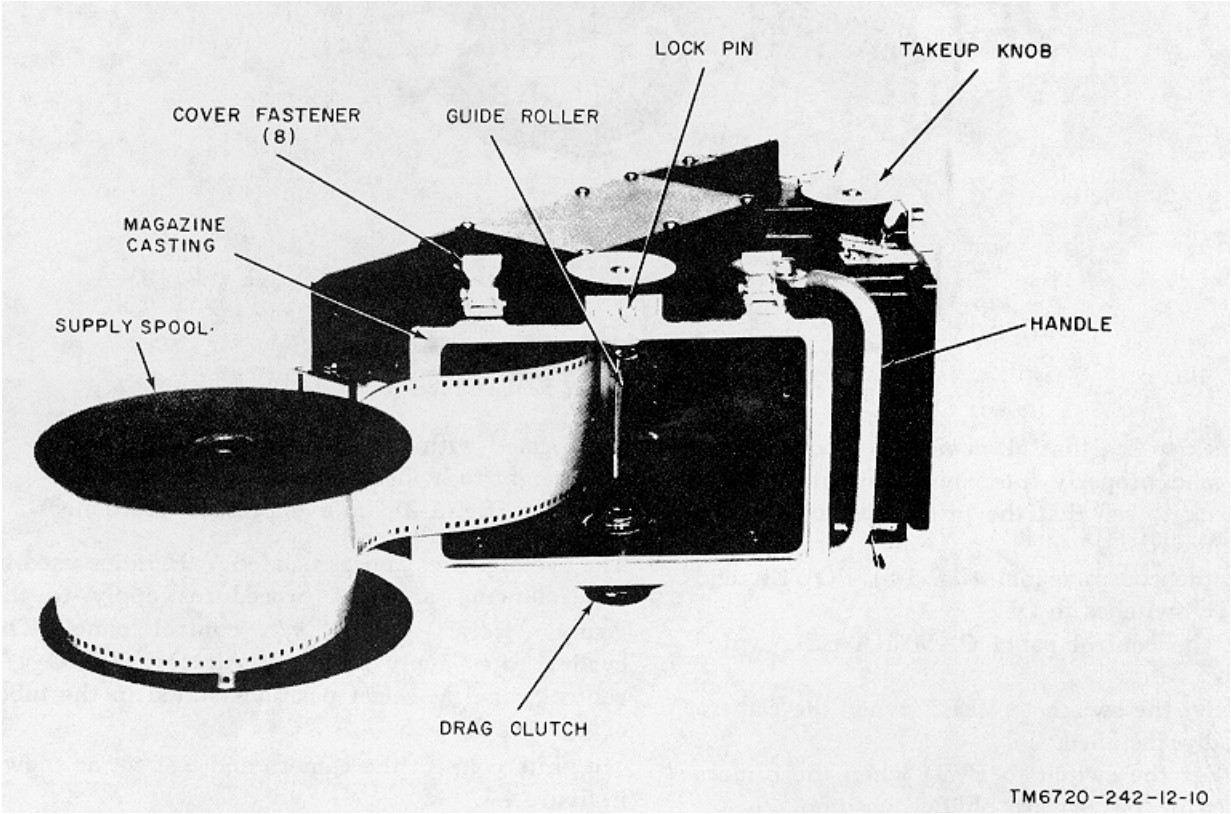


Figure 3-3. Start of film threading, total darkness.

3-6. Removing Exposed Film

To remove exposed film from the camera, proceed as follows:

a. Unlatch the four magazine fasteners and remove the magazine from the body.

b. Cut the film at the film loop on the underside of the magazine (fig. 3-7).

Caution

The following procedures must be accomplished in total darkness since light will damage exposed film.

c. Unlatch the four cover fasteners that mount the takeup side cover and remove the takeup side cover (fig. 3-10).

d. Turn the takeup spool until the end of the film is taken up on the takeup spool.

e. Take the loose end of the film to the roll to prevent the film from accidentally unrolling.

f. Pull the takeup knob out as far as possible.

g. Remove the takeup spool from the magazine and place it in a lightweight container.

3-7. Preflight Checks

After threading the magazine (para 3-2), perform the following procedures to be sure that the camera is ready for operation.

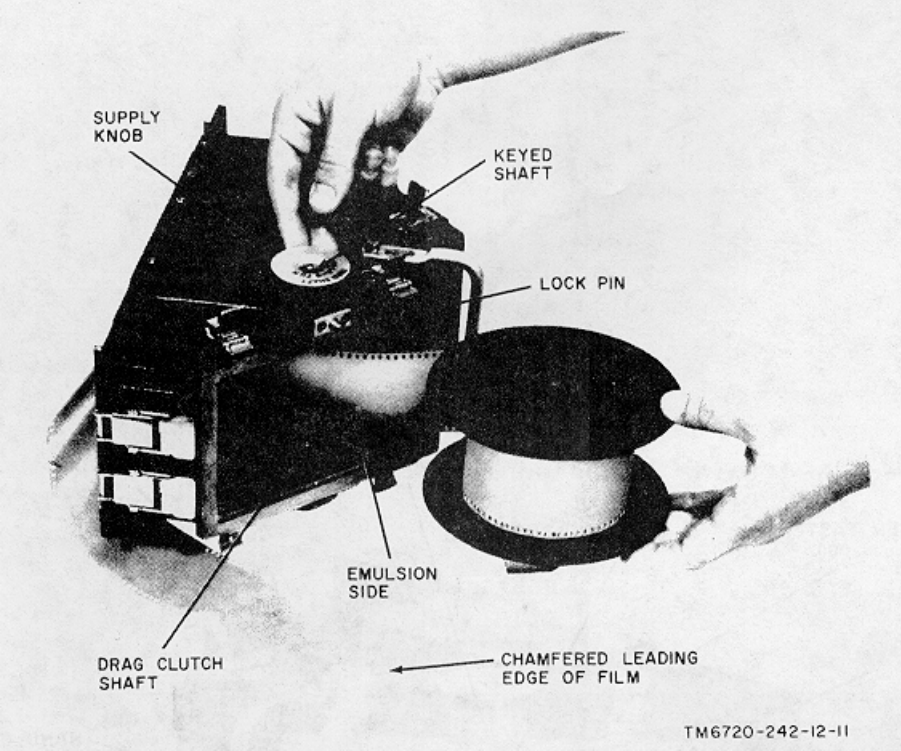


Figure 3-4. Installing su:

a. Check to see that all camera components are installed and properly interconnected (fig. 2-2).
b. Check to see that the prism dust cover (fig. 1-2) is removed.
c. Set the control panel (fig. 1-4) POWER and OPERATE switches to OFF.
d. Set the control panel CAMERA SEL switch as follows:
(1) Set the switch to VERT. when the camera is vertically installed.
(2) Set the switch to FWD when the camera is installed in the forward oblique position.
e. Set the control panel V/H SEL switch to the desired position.
f. Depress the reset tab, and note that the FRAMES REMAINING indicator indicates 250 if a new roll of film has been loaded.

3-8. Preflight Operation

To be sure that the camera is operational, the following procedures must be performed with the test set.

CAUTION

Be sure that the control panel POWER and OPERATE switches are set to OFF.

NOTE

The following test procedure must be per34 spool, total darkness. formed with the magazine removed. Use a weight to hold the end of film switch actuator (fig. 1-2) in a depressed position.

The cycling rates and associated V/H ratios used in the following preflight procedures apply to the Army Aircraft OV-1D v/h control panel. The cycling rates apply to Army Aircraft OV-1C v,/h control panel at select positions stated in the table of paragraph 6-2b.

a. Interconnect the camera and test set as shown in figure 4-1.
b. Set the aircraft external EV/H input control so that the camera operates at 6 cycles per second (V/I ratio: 1.065).
c. Set the control panel POWER switch to ON and note that the POWER indicator lamp lights.
d. Set the control panel CAMERA SEL switch to VERT.
e. Momentarily depress the POWER indicator lamp and make certain that the indicator lamp stays lighted, therefore indicating that 115 volts ac is being supplied to the unit.
f. Set the test set (fig. 3-11) POWER switch to ON and note that the test set indicators are as follows: (1) DC VOLTAGE indicates 24 to 28.5 volts dc.

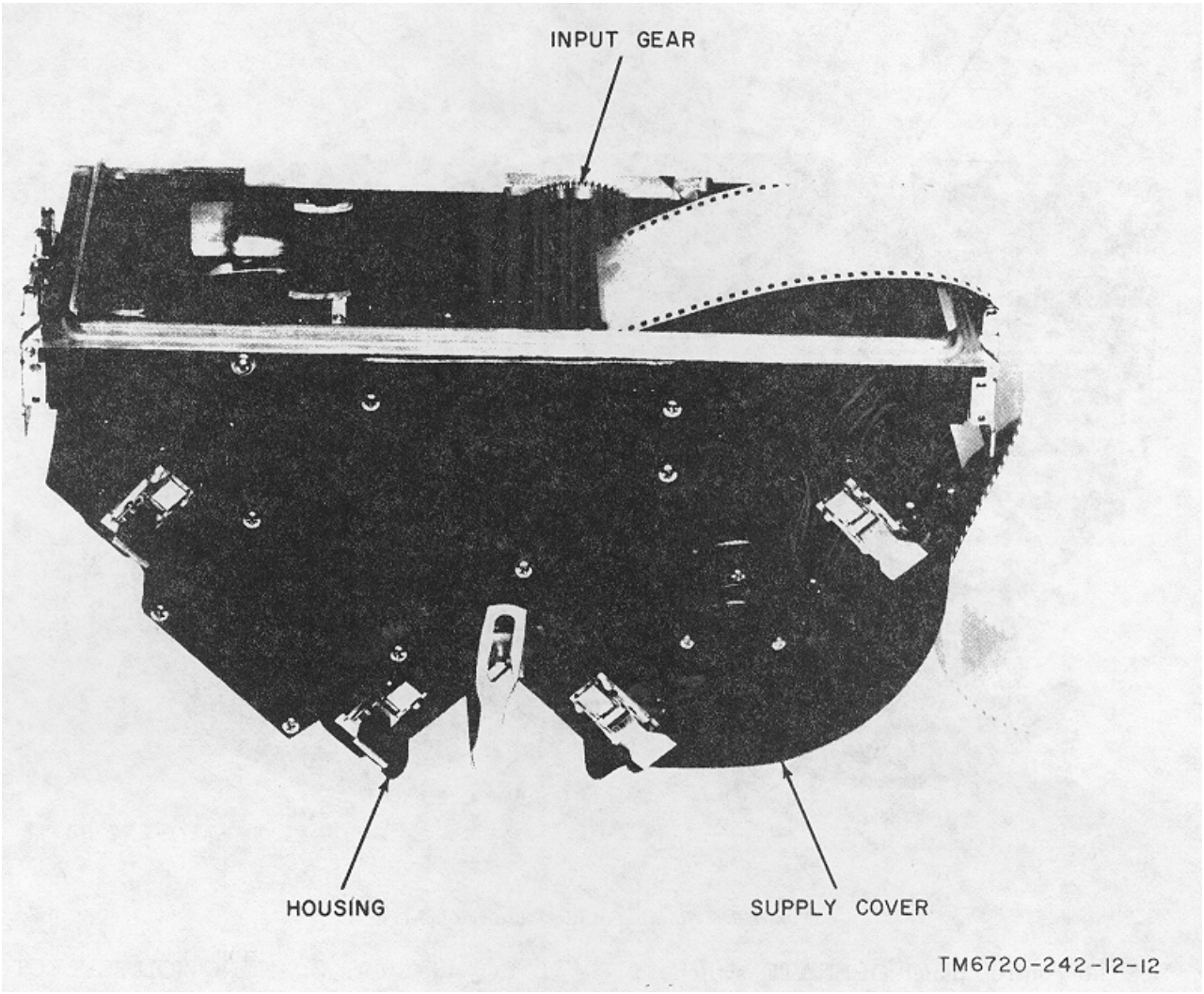


Figure 3-5. Ready to form loop, subdued light.

(2) AC VOLTAGE indicates 108 to 112 volts ac.

(3) PULSE lamp is Off.

(4) AUTO lamp is On.

(5) OPERATE lamp is Off.

(6) IMC lamp is Off.

(7) FILM lamp is Off.

g. Set the test set FUNCTION SELECTOR switch to V/H HI.

h. Set and hold the test set meter switch tc MOM ON. The FUNCTION TEST meter should indicate in the green area. Release the meter switch.

i. Set the test set FUNCTION SELECTOR switch to TACH HI.

j. Momentarily depress the control panel OPERATE indicator lamp; check to see that the in1 n loop, subdued light. dicator lamp illuminates (therefore indicating the unit is generating +22 volts dc). Release the lamp and note that the lamp extinguishes.

k. Set the control panel OPERATE switch to ON. The control panel and test set OPERATE indicator lamps should flash once for each camera cycle.

I. Release the end of film switch actuator by removing the weight. The OPERATE indicator lamp should light indicating that the end of film function is operating properly.

i Replace the weight on the end of the film switch actuator.

n. Set and hold the test set meter switch to MOM ON. The FUNCTION TEST meter should indicate in the green area. Release the meter switch.

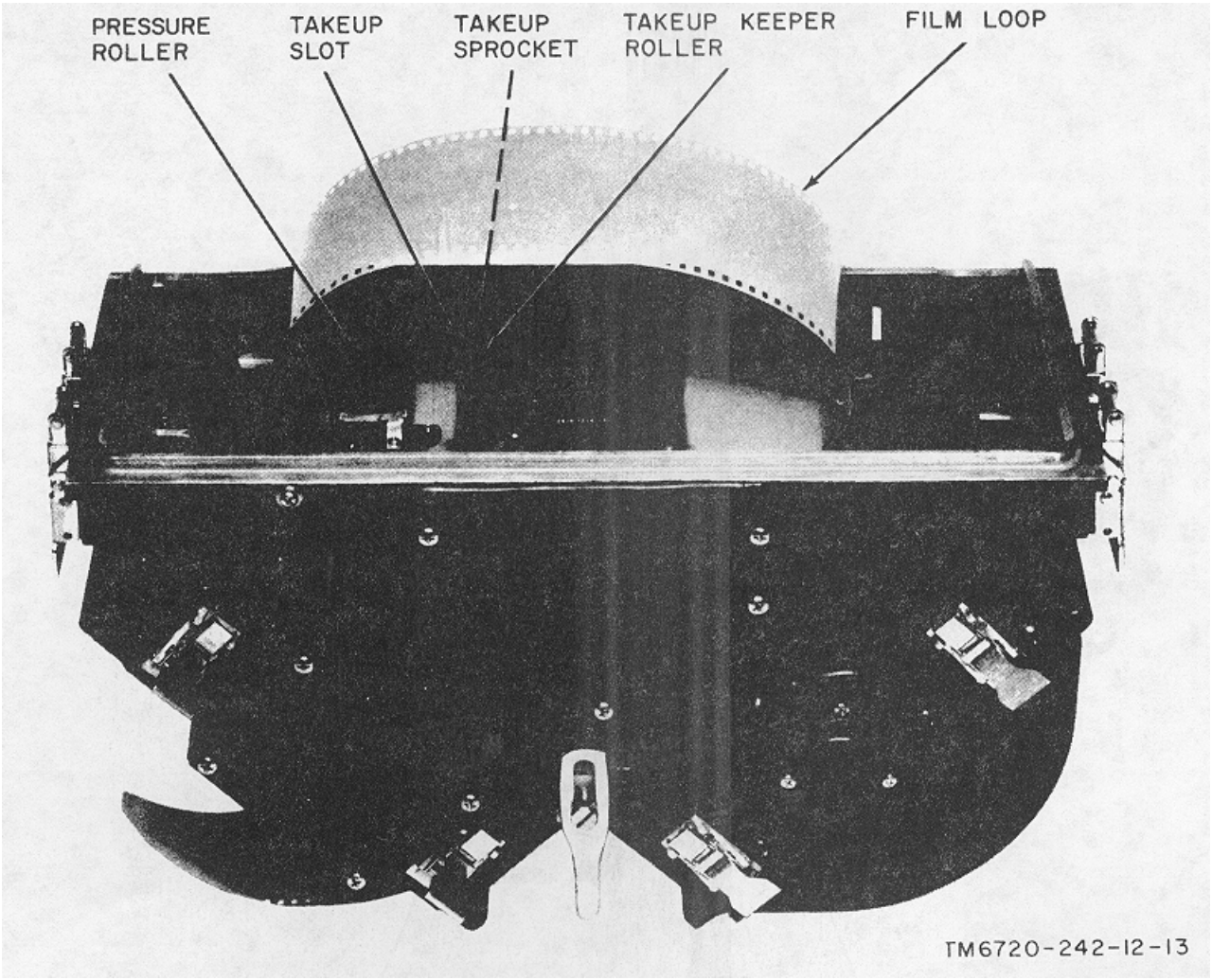


Figure 3-6. Routing of film, subdued light. .

o. Set the control panel OPERATE switch to OFF.

p. Set the test set FUNCTION SELECTOR switch to CELL HI.

NOTE

When checking the vertical camera, place a flashlight, as directed for the test set light source, and not the FUNCTION TEST me- ter deflection.

q. Set the test set LIGHT SOURCE switch to ON.

r. Set the test set meter switch to ON.

s. Connect the light source cable to TEST connector J1 and insert the test set light source into the LIGHT SOURCE CALIBRATE window. Ad- just the light source by loosening the locking ring and rotating the diaphragm adjusting ring until the FUNCTION TEST meter indicates in the center of the green area. Fully tighten the locking ring on the light source.

t. Set the test set FUNCTION SELECTOR switch to AEC HI.

u. Place the light source adjacent to the body photocell (fig. 1-2). Do not disturb the light source setting. The test set FUNCTION TEST meter (fig. 3-11) should indicate in the green area. Remove the light source from the body (for vertical camera, observe that relative meter deflection increases as the flashlight approaches the body photocell).

v. Operate the test set FUNCTION SELECTOR switch to CELL LO.

w. Insert the test set light source into the LIGHT SOURCE CALIBRATE window. Adjust the light source as described in s above until the FUNCTION TEST meter indicates in the center of the green area.

x. Set the test set FUNCTION SELECTOR switch to AEC LO.

y. Place the light source adjacent to the body photocell (fig. 1-2). Do not disturb the light

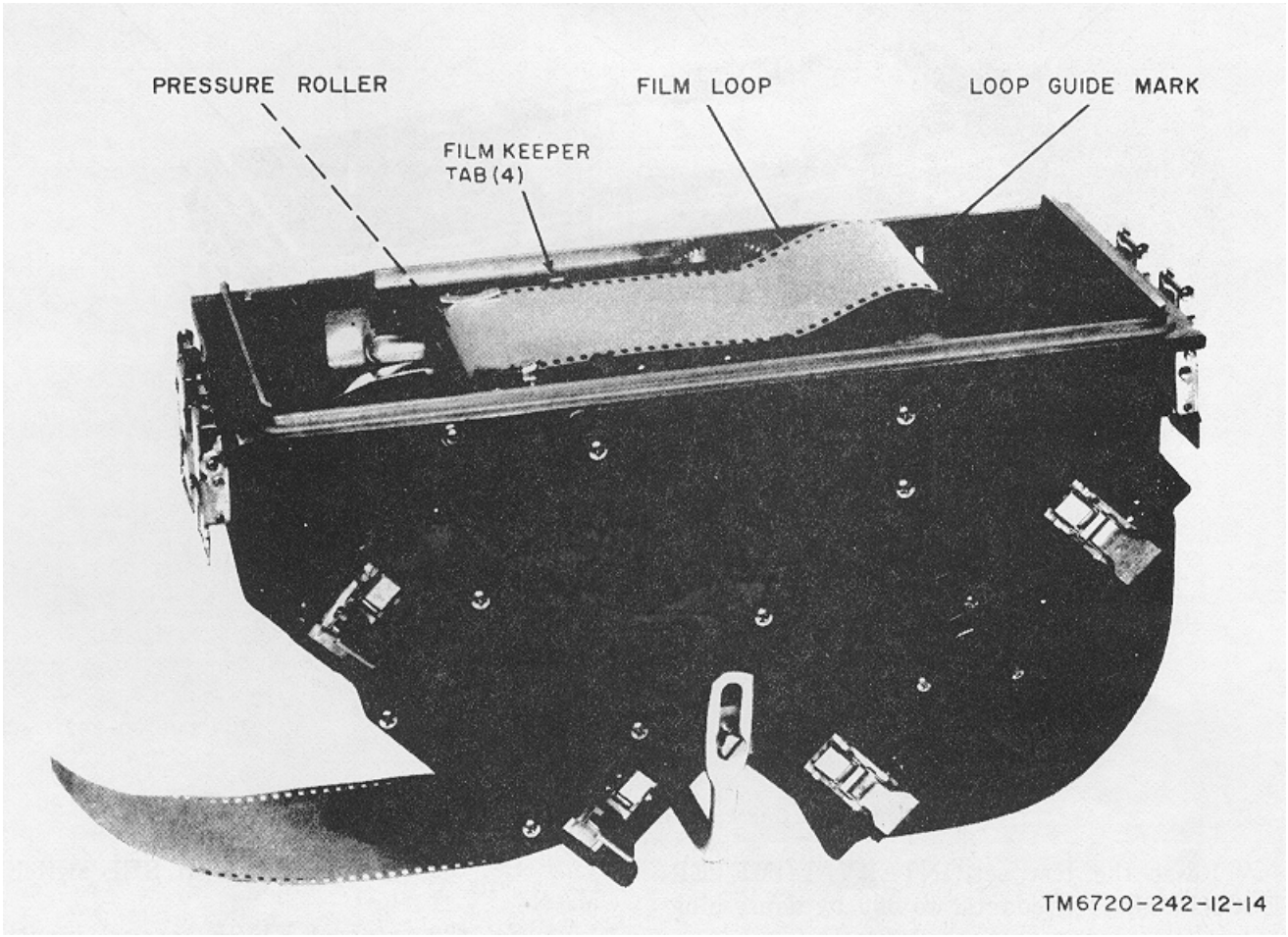


Figure 3-7. Forming film loop, subdued light.

source setting. The test set FUNCTION TEST meter should indicate in the green area. Remove the light source from the body.

z. Set the test set meter switch and LIGHT SOURCE switch to OFF.

aa. Set the external EV/H input control so that the camera operates at 2 cycles per second (V/H ratio: 0. 355).

ab. Set the test set FUNCTION SELECTOR switch to TACH LO.

ac. Set the control panel OPERATE switch to ON.

ad. Set and hold the test set meter switch to MOM ON. The test set FUNCTION TEST meter C 3, TM 116720242-12 should indicate in the green area. Release the meter switch.

ae. Set the test set FUNCTION SELECTOR switch to V/H LO.

af. Set and hold the test set meter switch to MOM ON. The test set FUNCTION TEST meter should indicate in the green area. Release the meter switch.

ag. Set the control panel OPERATE switch to OFF.

ah. Set the external EV/H input control so that the camera operates at 1 cycle every 2 seconds.
(V/H ratio: 0. 088). Note that the test set PULSE lamp lights and the AUTO lamp extinguishes.

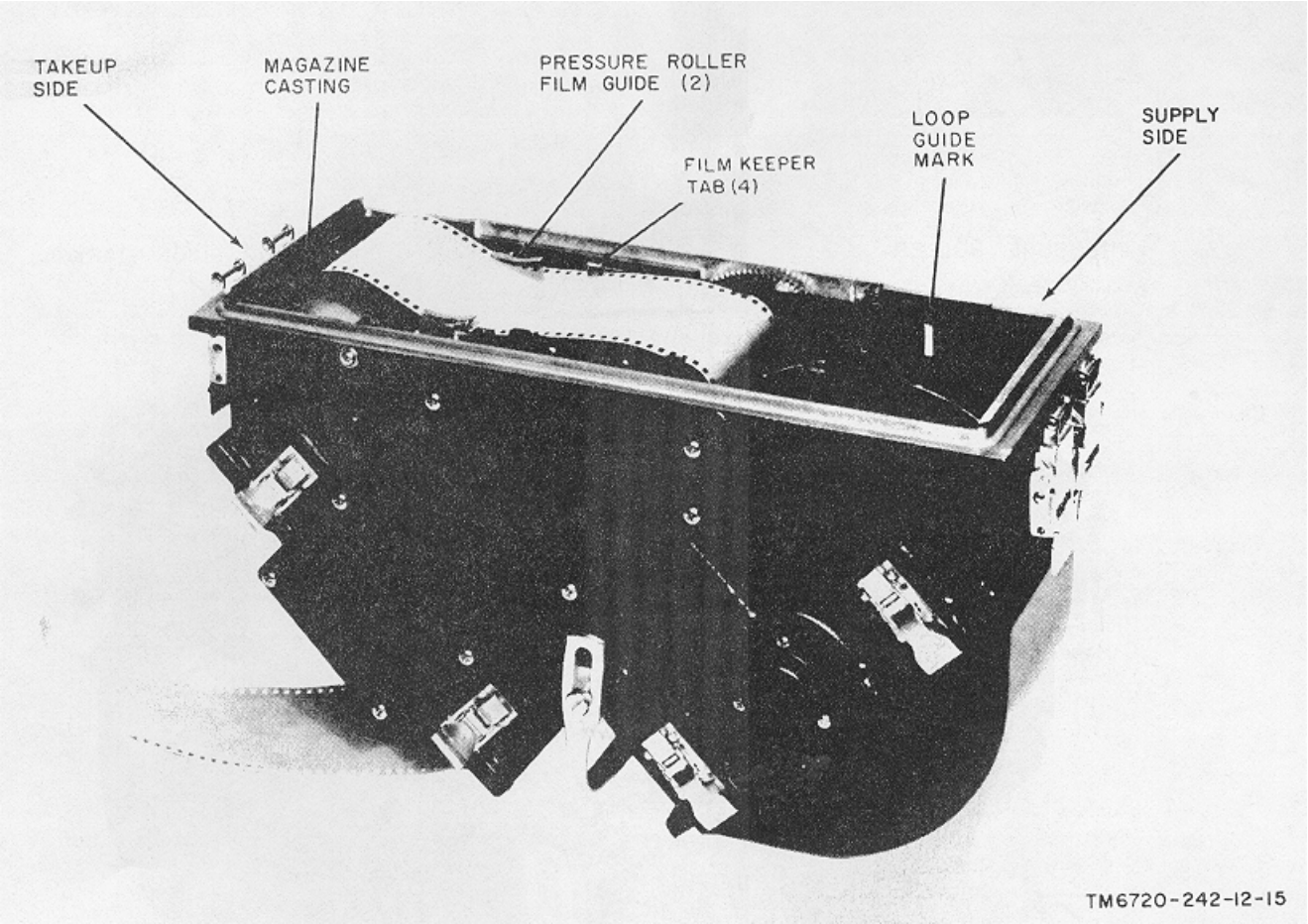


Figure 3-8. Checking film clearance, subdued light.

ai. Reset the test set INTERVALOMETER SECOND/FRAME counter to 000 by depressing the test set counter reset tab and lock.

aj. Set the control panel OPERATE switch to ON. Allow the camera to operate for approxi- mately 4 seconds, then depress the test set COUNTER ENABLE switch and set the control panel operate switch to OFF. The test set counter should indicate 40° + 4.

ak. Set the control panel POWER switch to OFF.

al. Set the test set POWER switch to OFF.

am. Disconnect the test set from the camera.

an. Remove and weight from the end of the film switch actuator.

ao. Install the magazine on the body.

ap. Depress the control panel reset tab (fig. 1-4). Note that the FRAMES REMAINING indi- cator indicates 250.

aq. Set the control panel POWER switch to ON.

ar. Set the control panel V/H SEL switch to MAN.

as. Set the external EV/H, manual input, to cause the camera to operate at 2 cycles per second (V/H ratio:0. 355).

Note. Do not allow the procedure given in at below to have a duration of more than 2 seconds.

at. Set the control panel OPERATE switch to ON. Note that the OPERATE indicator lamp flashes twice each second. After 4 cycles of operation, set the OPERATE switch to OFF.

au. The FRAMES REMAINING indicator should indicate 4 less than noted in ap above.

av. Set the control panel POWER switch to OFF.

3-9. Inflight Operation

To operate the camera, proceed as follows:

Note. Be sure that the control panel (fig. 1-4) CAMERA SEL and V/H SEL switches are properly set.

a. Set the control panel POWER switch to ON.

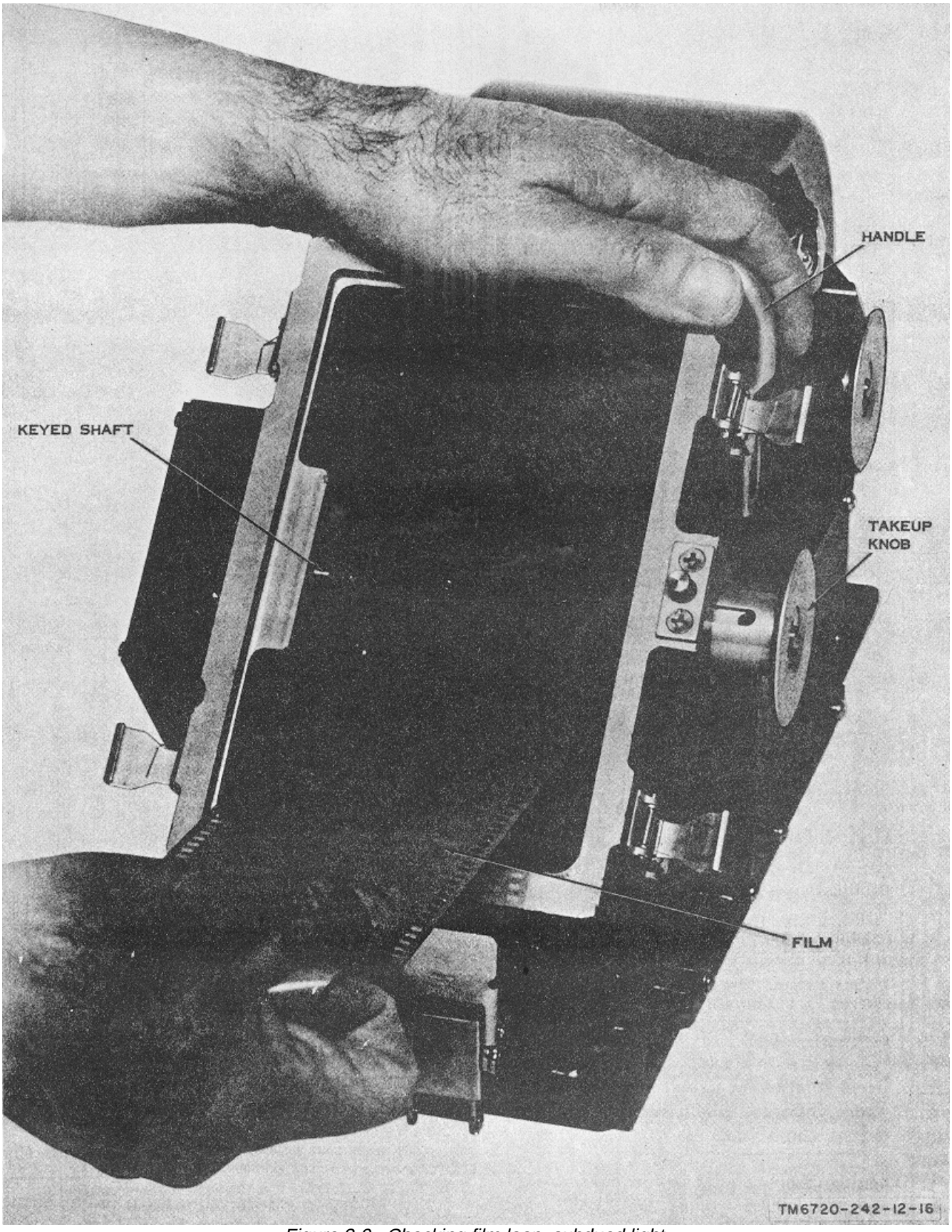


Figure 3-9. Checking film loop, subdued light.

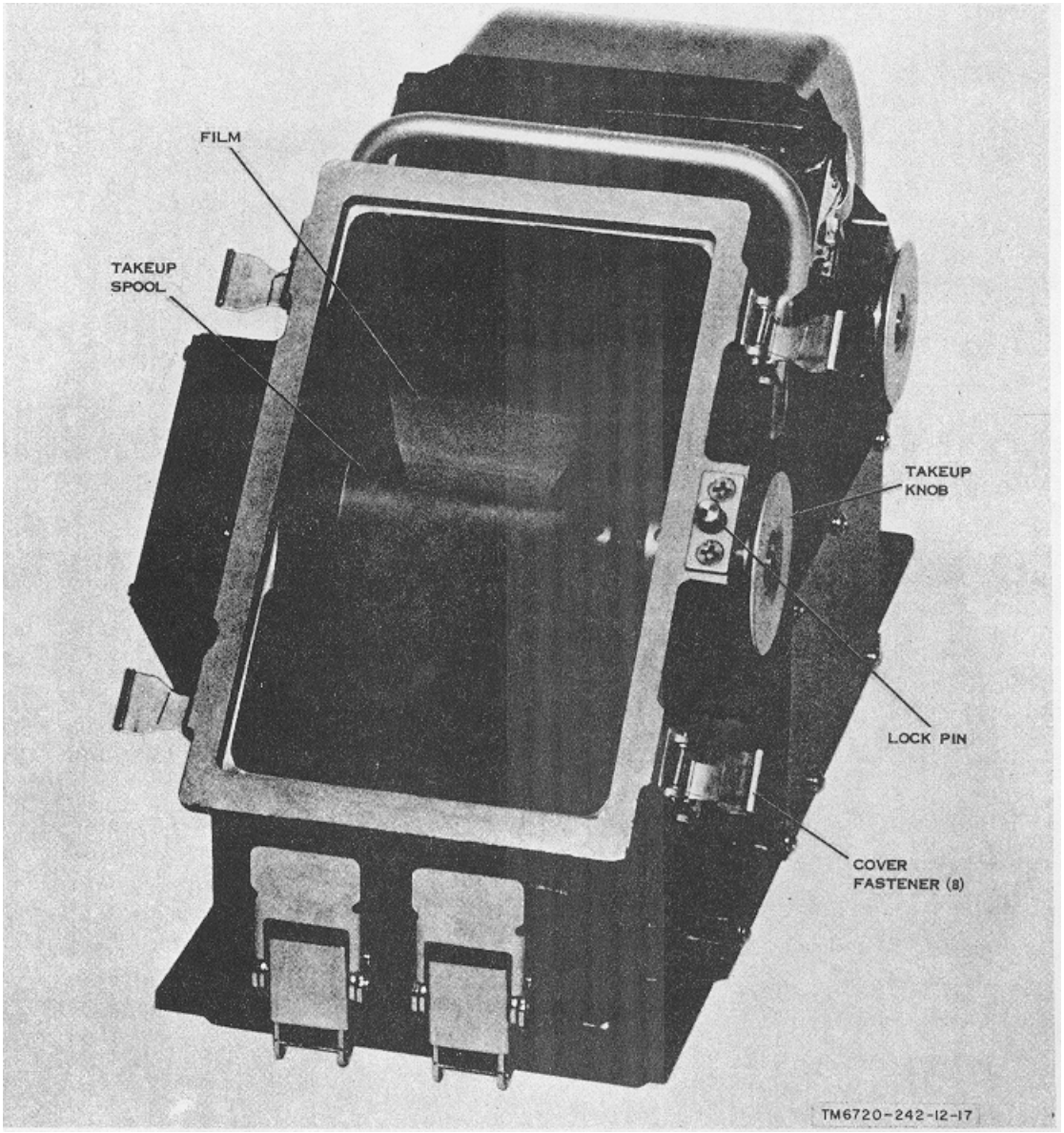


Figure 3-10. Film inserted into takeup spool, subdued light.

b. When the aircraft is over the target area, set the control panel OPERATE switch to ON.

Note. If the camera is operating in the pulse mode (1 cycle per second to 4. 5 seconds per cycle), extra photo- graphs can be taken by depressing the control panel EXTRA PICTURE switch.

c. At the end of a photographic run, set the control panel OPERATE switch to OFF.

d. If more than one photographic run is re- quired, repeat the procedures given in b and c above.

e. When no more photographic runs are re- quired, set the control panel OPERATE and POWER switches to OFF.

3-10. Stopping Procedures

After a photographic mission has been completed, proceed as follows:

a. Unlatch the four magazine fasteners (fig. 1-3) and=remove the magazine from the body.

b. Install the magazine dhst cover and secure it with the two magazines

c. Install the body dust cover and secure it with the two cover fasteners.

d. Install and secure the prism dust cover (fig. 1-2).

e. Remove the exposed film from the magazine as described in paragraph 3-6.

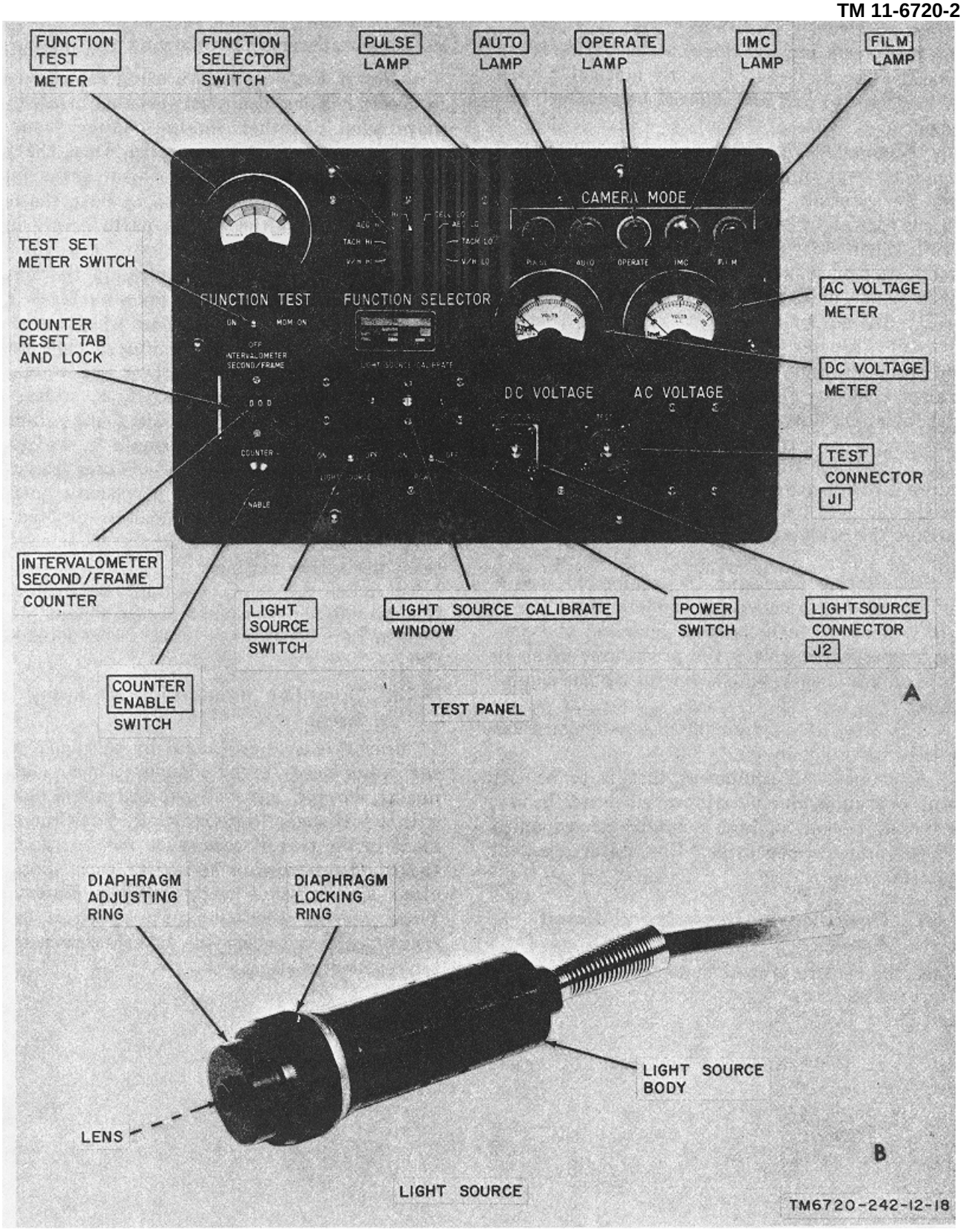


Figure 3-11. Test Set, Camera LS-86A.

Section II. OPERATION UNDER UNUSAUAL CONDITIONS

3-11. Operation in Arctic Areas

This equipment may be stored at temperatures as low as -65° F (-54° C). The lubricants used are resistant to cold and will not be adversely af fected.

a. Equipment operated at low temperatures should be kept in low temperatures when not in use. For storage, pack the equipment in the transit case and cover it with water-repellent material. When stored equipment is to be used in a much warmer temperature, follow the procedure given in (1) and (2) below before attempting to operate the equipment.

(1) Transfer the equipment from the cold to the warm location, and allow it to remain in the transit case covered with water repellent material for approximately 6 hours.

Caution: Do not uncover the equipment before it has been kept at the warmer temperature for the required time. Condensation may form and damage the equipment.

(2) Before operating the equipment, use a lint free cloth to remove any condensation.

b. When equipment is to be operated at freez ing temperatures, follow the procedures given in (1) and (2) below before operating the equip ment.

(1) Keep the equipment in low temperature storage when not in use.

(2) Cover all equipment that is to be left setup overnight, during winter, when not in use, or during periods of high humidity accompanied by freezing temperatures. Use water repellent material.

3-1. 2. Operation in Tropical and Desert Areas

When the camera is used under conditions of ex treme heat and humidity, such as desert and tropical regions, observe the following precautions.

a. Desert Regions. Before using the equipment in desert regions, use a soft bristled brush to re move sand or other foreign matter from the metallic surfaces of the camera. Dust the film loading area carefully before loading the magazine. Use a camel's hair brush to clean the outer glass surfaces of the optical parts before using lens tissue. If the optical parts are not first dusted, the lens tissue will pick up the foreign matter and may scratch the glass surfaces. Keep the equipment in the transit case when not in use.

b. Tropical Regions. In climates of high humid ity, such as the tropics, inspect the equipment daily for traces of fungus, mold, mites, and metallic corrosion. Remove all fouling immediately. Do not allow film to remain in the camera for periods longer than 24 hours because fungus may form on the film and contacting surfaces.

The equipment has been moisture proofed and fungiproofed during manufacture. Do not remove these protective coatings.

Note. Clean the camera frequently; if lubrication is required, refer the equipment to higher category of main tenance. When practicable, store the camera in its transit case.

3-13. Operation in Maritime or Rainy Areas

To prevent corrosion caused by salt laden air or salt water spray or by condensation or moisture during storage, wipe all exposed metal surfaces with a soft, clean, lint free cloth. Pack the equipment in the transit case when not in use. Check the equipment before and after each operation; clean all accessible parts without dissembling. When storing the equipment, pack it in the transit case and cover the transit case with wa ter repellent material.

CHAPTER 4

MAINTENANCE INSTRUCTIONS

Warning: **High voltage is used in this equipment. Disconnect all power from the camera before performing maintenance.**

Section I. OPERATOR'S MAINTENANCE

4-1. Scope of Operator's Maintenance The maintenance duties assigned to the operator of the camera are listed below together with a reference to the paragraphs covering the specific maintenance function. The tools and materials required are listed in paragraph 4-2.

a. Daily preventive maintenance checks and services (para 4-5).

b. Weekly preventive maintenance checks and services (para 4-6).

c. Cleaning (para 4-7).

d. Troubleshooting (para 4-8).

e. Replacing lamps (para 4-9).

4-2. Tools and Materials Required for Operator's Maintenance

The following tools and materials are required for the operator's preventive maintenance.

a. Camel's hair brush.

b. Cleaning Compound.

c. Lint free cloth.

d. Hand blower.

e. Lens cleaner.

f. Lens tissue.

4-3. 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 paragraphs 4-5, 46, and 4-7 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 charts (para 45 and 4-6) outline procedures to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in a combat serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining combat serviceability, the chart indicates what to check, how to check, and what the normal condition should be. The References column lists the illustrations, paragraphs, or manuals that contain detailed repair or replacement procedures. If the defect cannot be remedied by the operator, higher category maintenance is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 88 750.

4-4. Operator's Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the camera are required on a daily and weekly basis.

a. Paragraph 4-5 specifies checks and services that must be accomplished daily or at least once each week if the equipment is maintained in standby condition.

b. Paragraph 4-6 specifies the maintenance checks and services that must be performed each week. If the equipment is being maintained in standby condition, the daily (para 4-5) and weekly procedures should be accomplished at the same time.

4-5. Operator's Daily Preventive Maintenance Checks and Services Chart

Sequence No.	*Item to be Inspected*	*Procedure*	*Reference*
1	Completeness	Inspect equipment for completeness	Para 1 6.
2	Cleanliness	Inspect exterior surfaces of equipment for cleanl ness.	Para 4 7.
3	Cables	Inspect exposed cables for worn or damaged insulation.	
4	Prism	Inspect exterior surfaces of prism for scratches, chips, cracks, or other defects.	

4-6. Operator's Weekly Preventive Maintenance Checks and Services Chart

Sequence No.	*Item to be Inspected*	*Procedure*	*Reference*
1	Magazine covers	Check supply and takeup covers for tight fit, and for freedom from dents or cracks.	None.
2	Transit case	Inspect transit case for dents and broken fasteners.	None.
3	Electrical connectors	Check all electrical connectors for damaged, mis sing, or bent pins.	None.

4-7. Cleaning

a. Prism Surfaces

(1) Check all exposed prism surfaces for freedom from dust, dirt, and foreign matter.

(2) Carefully remove all dirt, dust, and foreign matter from the outer surfaces of the prism; use a camel's hair brush, hand blower, or a gentle flow of moisture free compressed air.

(3) Remove stubborn dirt with lens tissue slightly dampened with lens cleaner ((4) and (5) below).

Caution: Do not use lens tissue that consilicone to clean optical surfaces.

(4) Gently wipe the exposed optical surface with the moistened lens tissue; use a circular mo tion starting from the edge of the component and working toward the center.

(5) Dry the cleaned optical surface with a clean, dry lens tissue; use the circular motion described in (4) above.

b. Mechanical Surfaces.

Caution: Do not allow cleaning compound to come in contact with optical or lubricated sur faces. Use cleaning compound sparingly.

(1) Clean all exposed metal parts of the camera with a dry lint free cloth.

(2) Use a camel's hair brush or hand blower 4 2 to remove dust, film chips, and foreign matter from hard to reach parts.

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

(3) Remove grease, fungus, and ground in dirt from metallic parts with a cloth dampened (not wet) with cleaning compound.

4-8. Operator's Troubleshooting Chart

a. *General.* The troubleshooting chart helps the operator to sectionalize the correct camera troubles. The symptoms listed are those that can be noted by the operator during camera operation or the results of photographic processing. The corrective measures suggested in the checklist are those the operator can accomplish. If the corrective measure does not restore camera operation to normal, refer the camera to higher category of maintenance.

b. *Troubleshooting Chart.* If the camera is mechanically or electrically inoperative, and the malfunction is not immediately apparent, the chart below will aid in localizing the defect and also prescribe a corrective measure.

Warning: Observe all safety precautions when troubleshooting the camera. Voltages dangerous to life are present in this equipment.

Item No.	*Trouble symptom*	*Probable trouble*	*Checks and corrections Measures*
1	Camera will not operate.....	a Incorrect switch settings (fig 1 4)	a Be sure that POWER switch is set to ON before OPERATE switch is set to ON.
		b Connectors damaged or impro perly seated	b Disconnect cable W1 (fig 2-2) from primary power. Check for missing or bent pins in connectors If bent or broken i pins are observed, refer to higher category maintenance.
2	POWER indicator lamp does not light when POWER switch is set to ON	a Defective indicator lamp (fig 1 4).	a Replace lamp (para 4 9).
		b +28 volt dc power not applied to camera	b Check cable connections and cir cuit breakers (fig 1 5) If cables are properly connected and circuit breakers closed, refer to higher category of maintenance.
3	POWER indicator lamp does not illuminate when POWER switch is set to ON and POWER indi cator lamp is pressed	a Defective indicator lamp (fig 14).	a Replace lamp (para 4 9).
		b 115 volt ac power not applied to camera	b Check cable connections and cir cuit breakers (fig1 5). If cables are properly connected and circuit breakers closed, refer to higher category of maintenance.
4	OPERATE indicator lamp does not flash when camera is cycling.	Defective indicator lamp (fig 1 4).	Replace lamp (para 4 9).
5	Camera operates; film does not advance.	Film broken, improperly threaded, or damaged.	Reload camera (para 3 3).
6	Film scratched	Foreign matter or film chips in magazine.	Clean camera (para 4 7b).
7	Film not exposed	a Prism cover (fig.1 1) not re moved.	a Remove prism cover.
		b Defective camera	b Refer to higher category of maintenance.
8	Film spool does not fit properly.....	a Damaged spool	a Replace film spool. *Caution:* Use only aluminum film spools in the takeup chamber. Steel film spools will cause an imbalance in the magazine drive system.
		b Damaged magazine	b Refer to higher category of maintenance.
9	Fuzzy image on film.....	Foreign matter on prism	Clean prism (para 4 7).
10	All photographs fogged.....	a Covers not properly seated on magazine.	a Seat covers properly.
		b Magazine loaded with outdated	b Reload magazine with fresh

4-9. Indicator Lamp Replacement

The POWER and OPERATE indicator lamps are located on the control panel (fig. 1 4). To replace either indicator lamp, proceed as follows:

a. Set the POWER switch to OFF.

b. Rotate the indicator lamp counterclockwise until the jewel assembly separates from the control panel. The indicator lamp is located in the jewel assembly.

c. Remove the defective indicator lamp and re place with a new indicator lamp.

d. Insert the jewel assembly into its receptacle and rotate the jewel assembly clockwise until it is secure.

Section II. ORGANIZATIONAL MAINTENANCE

4-10. Scope of Organizational Maintenance

The maintenance duties assigned to organizational maintenance personnel are listed below with references to the paragraphs covering the specific maintenance functions. The tools, mate and test equipment required are listed in paragraph 4-11.

a. Preventive maintenance (para 4-12).

b. Monthly preventive maintenance checks and services (para 4 13).

c. Cleaning and touchup painting (para 4-14).

d. Organizational troubleshooting chart (para 4-15).

e. Continuity checks (para 4 16).

f. Replacing control panel faceplate (para 4-17).

g. Repositioning electrical connectors 1J1 and 1J2 (para 4 18).

4-11. Tools, Materials, and Test Equipment Required for Organizational Maintenance

In addition to the items listed in paragraph 4-2, the following items are required for organizational maintenance:

a. Tool Kit, Photographic Repairman' TK 77/GF.

b. Multimeter AN/URM 105.

4-12. Organizational Preventive Maintenance

a. Preventive maintenance is the systematic care and servicing of equipment to maintain it in serviceable condition, prevent breakdowns, and assure maximum operational capability. Preventive maintenance is the responsibility of all categories concerned with the equipment and includes inspection, testing and repair or replacement of parts, subassemblies, or units that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance checks of the equipment at organizational are made at monthly intervals, unless otherwise directed by the commanding officer.

b. Maintenance forms and records to be used and maintained on this equipment are specified in TM 38 750. Paragraph 1-3 contains additional information concerning submission of specific forms.

4-13. Organizational Monthly Maintenance

a. *General.* Perform the maintenance functions indicated in the monthly preventive maintenance checks and service chart (b below) once each month at the same time that the daily and weekly procedures (para 4 5 and para 4-6) are performed. A month is defined as approximately 30 calendar days of 8 hour per day operation. If the equip ment is operated 16 hours a day, the monthly preventive maintenance checks and services should be performed at 15 day intervals. Adjust V ment of the maintenance interval must be made to compensate for any unusual operating conditions. Equipment maintained in a standby (ready for immediate operation) condition must have monthly preventive maintenance checks and services performed on it. Equipment in limited storage (requires service before operation) does not require monthly preventive maintenance.

b. Organizational Monthly Preventive Maintenance

Checks and Services Chart

S$eSence ’o.	Itsm to be isupcted	Procedure	Retersn
1	Controls and indicators	Operate camera controls	Check for positive action, freedom from binding, and excessive looseness.
2	Captive screws	Check captive screws.	No captive screws should be missing or have worn threads.
3	Exterior surfaces	Inspect all exposed exterior surfaces for rust, corrosion, and	Para 4-14.

4-14. Touchup Painting

Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper.

Brush two thin coats of paint on the bare metal to protect it from further corrosion. Refer to the applicable cleaning and refinishing practices specified in TB SIG 364.

4-15. Organizational Troubleshooting Chart

The troubleshooting chart (b below) is furnished as an aid in localizing trouble in the camera. Only those corrective measures which organizational personnel can perform are listed. If the corrective measure does not restore normal operation of the camera, refer the camera to higher category of maintenance for repair.

a. *General.* Before using the troubleshooting chart, examine the operator's repair tag to see if the trouble has been sectionalized. If there has been no sectionalization, perform the preflight checks (para 3-7) and the procedures outlined in the operator's troubleshooting chart (para 4-8). If, after completing the procedure outlined in the troubleshooting chart the trouble has not been localized, use Test Set, Camera LS 86A to localize the trouble.

Warning: Observe all safety precautions when troubleshooting the camera. Voltages dangerous to life are present in this equipment.

b. Organizational Troubleshooting Chart.

Item No	*Trouble symptom*	*Probable trouble*	*Checks and corrective measures*
1	Camera will not operate	a. Loose cables	a. Check all cable connections.
		b. Control cables defective	b. Perform continuity checks (para 4-16).
		c. Dc circuit breaker (fig. 1-5) released	c. Depress dc circuit breaker. If circuit breaker releases again, refer to higher category of maintenance.
		d. Ac circuit breaker released	d. Depress ac circuit breaker. If circuit breaker releases again, refer to higher category of maintenance.
2	With POWER switch set to ON, OPERATE indicator lamp does not light when pressed	a. Indicator lamp defective	a. Replace lamp (para 4-9).
		b. +22 volt regulator in control panel defective	b. Refer to higher category of maintenance.
3	With POWER switch set to ON, OPERATE indicator lamp does not light (magazine not installed on body).	End of film switch or end of film switch actuator mechanism	Refer to higher category of main tenance.
4	OPERATE indicator lamp does not flash when camera is cycling	Puck switch, control panel circuits, or camera control circuits defec tive.	Refer to higher category to main tenance.
5	Faceplate engravings on control panel not illuminated.	Illumination lamps defective	Replace faceplate (para 4-17).
6	Photographs under or over ex posed	AEC system defective	Refer to higher category of main tenance.
7	ADAS data not exposed on film	_ ADAS system defective	Refer to higher category of main tenance.
8	Photographs are under exposed and lacking contrast	a. Dirty prism	a. Clean prism surfaces (para 4 7).
		b. Dirty lens	b. Refer to higher category of maintenance.
9	Film emulsion scratched in direc-tion of film travel	Burrs on body film platen	Refer to higher category of main tenance.

4-16. Continuity Checks

a. *General.* Use the continuity checks (b, c, and d below) to locate a faulty component when the malfunction cannot be fully determined by the troubleshooting chart.

Caution: When making continuity checks, the 10OX or the 1OOX resistance scale of the multi meter must be used. Failure to do so could result in damage to electronic components being checked.

(1) Disconnect all cables from components.

(2) Use Multimeter AN/URM 105 to per form the continuity checks. If the indications ob tained are other than those given in the right hand column of the charts, refer the equipment to higher category of maintenance.

Note. Do not use continuity checks to determine whether the components of the camera are functioning properly. Use them only to supplement the troubleshooting chart (para 4-15b) and to locate faulty components.

b. *Control Panel* (fig. 1-4).

Conditions	*sJ1 to sJ2*	*Full deflection of meter (x)*
	P to P	x
	P to A	X
	B to J	X
POWER switch to ON	G to G	X
	N to N	x
	K to Z	x
V/H SEL switch to AUTO.	J to Z	x
V/H SEL switch to MAN.	H to Z	X
	Chassis to A (3J2)	X
	Chassis to b (3J2)	X
	A to chassis	x
	D to chassis	x

c. Camera Control (fig. 1).

Conditions	*sJ1 to sJ2*	*Full deflection of meter (x)*
	Y to Y	X
	L to L	X
With 3 AMP AC circuit breaker de pressed.	N to N	X
With 1.5 AMP DC circuit breaker de pressed.	G (2J2) to S (232)	X
	T (2J1 to V (2J1)	X
	A (2J1) to chassis	X
	e (2J1) to chassis	X
	Chassis to A (2J2)	X
	Chassis to b (2J2)	X

d. Body (fig. 1 2).

Conditions	*sJ1 to sJ2*	*Full deflection of meter (x)*
End of film switch (depressed).	T to G	X
End of film switch (not depressed).	T to Y	X
	A to e	X
Rotate drive roller (fig 1 2)	E(2J1) to chassis	(momentary)

4-17. Replacing Control Panel Faceplate

The control panel illumination lamps are not re placeable. If the lamps become defective, a new faceplate must be installed. To replace the face plate, proceed as follows:

a. Remove power from the control panel.

b. Remove the faceplate mounting screws (fig. 1-4 4).

c. Remove the faceplate.

d. Install the new faceplate.

Note. When installing the new faceplate, be sure that the +5 volt de supply is properly connected by applying pressure, with the thumb, on the 5 volt dc connector + mark.

e. Replace the faceplate mounting screws.

4-18. Repositioning Electrical Connectors 1JI and 1J2

For various aircraft installations, cable routing may require repositioning of electrical connectors 1Jl and 1J2. To reposition the connectors, proceed as follows:

a. Remove the 16 screws that secure the side cover to the body casting; carefully separate the side cover from the body casting taking care not to strain the wiring harness.

b. Remove the eight connector retaining screws that secure electrical connectors lJ1 and 1J2 to the connector mount.

c. Remove the access plates by removing the eight access plate retaining screws.

d. Reposition the electrical connectors so that each connector key way is in the 6 o'clock position, and secure in place with four screws each.

e. Install the access 'plate (from inside the connector mount) over the exposed holes and se cure in place with four screws each.

f. Carefully replace the side cover on the body casting and secure with the 16 screws.

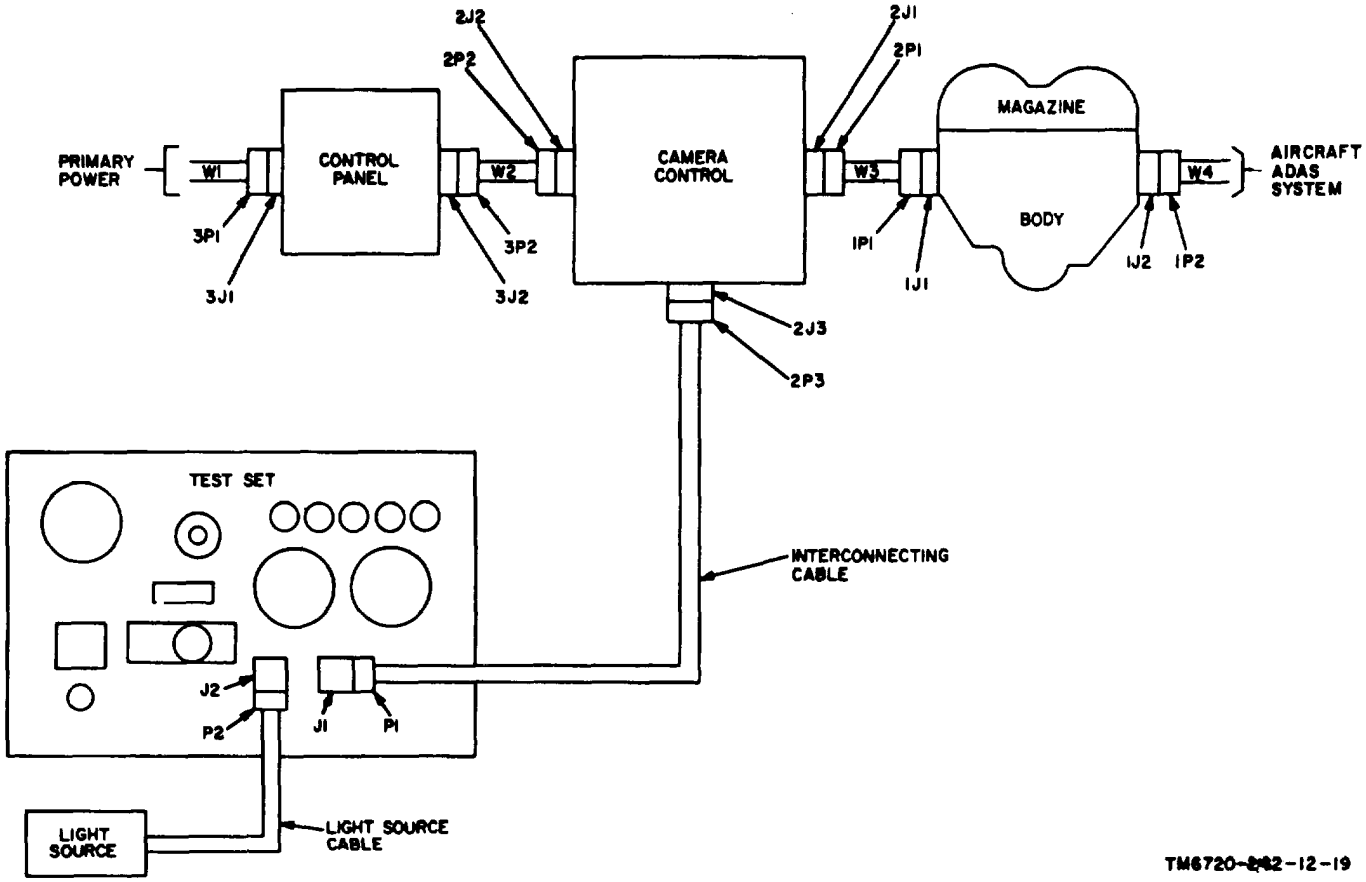


Figure 4-1. Test set and camera interconnection diagram.

CHAPTER 5
SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

5-1. General

The equipment is normally disassembled and placed in the transit case. Place nine units of desiccant in the transit case. No further preparation is necessary for shipment or limited storage.

5-2. Disassembly of Equipment

Disassemble the camera as follows:

a. Remove all interconnecting cables between the components of the camera.

b. Remove the body from its mount in the air craft.

Note. Check to make sure that all film has been removed from the magazine.

c. Place the body, magazine, control panel, and camera control in the transit case.

Section II. DEMOLITION OF MATEIAL TO PREVENT ENEMY USE

5-3. Authority for Demolition

Demolition of the equipment will be accomplished only upon the order of the commander. Use the destruction procedures outlined in paragraph 5 4 to prevent further use of equipment.

5-4. Methods of Destruction

a. If complete destruction of the equipment cannot be accomplished in the time available, des troy the following components in the order given:

(1) Body and magazine.
(2) Camera control.
(3) Control panel.

b. Use any of the following methods:

(1) *Smash.* Smash the controls, switches, lenses, printed circuit cards, film spools, and lamps; use sledges, axes, handaxes, pickaxes, hammer or crowbars.

(2) *Cut.* Cut all cords, cables, and wiring; use axes, handaxes or machetes.

(3) *Bend.* Bend the chassis and control connections.

Warning: Be extremely careful with ex plosives and incendiary devices. Use these items only when the need is urgent.

(4) Burn. Burn cords, cables, and technical manuals; use gasoline, kerosene, oil, flame throwers, or incendiary grenades.

(5) Explode. If explosives are necessary, use firearms, grenades, or TNT.

(6) Dispose. Bury or scatter the destroyed parts in slit trenches, foxholes, or throw them into streams.

CHAPTER 6
AUXILIARY EQUIPMENT
CONTROL PANEL LA 428A

6-1. Scope

This chapter describes Control Panel LA 428A (v/h control panel) and covers its installation (para 6 4), operation (para 6 7), and operator's and organizational maintenance (para 6 10 and 6 13).

6-2. Description and Data

a. Purpose and Use. The v/h control panel (fig. 6 1) generates dc voltage levels relative to the ratio of aircraft velocity (in knots) over its altitude (in feet). Any one of twelve EV/H signals is manually selectable at the v/h control panel faceplate. The EV/H signals are sent to the KA 60C camera where they are used to compensate for aircraft movement relative to the scene being photographed.

NOTE

The v/h control panel is used only in the Army Aircraft OV 1C.

b. Technical Characteristics.

Operating voltage 115 vac, 400 Hz, single phase
5 vdc (for edgelights)
Current rating 0.42 amp
1 ampere at 5 vdc
KNOTS PER FOOT selector and corresponding dc voltages

Select position	EV/H voltage	Cycling rate
.04 .05 ,_	2.23 .11 vdc	
.0 .06 _	2.77+ .14 vdc	
.06 .08 _.. _._._._...	352+ .18 vdc	
.08 .10	4.46+ .22 vdc ..	1 cycle every 2 seconds
.10 .20 _ _ _	755+ .48 vdc	
.20 .40 ...	17.85 .89 vdc	2 cycles per second
.40 .60	.....25.15+1.26 vdc	
.60 .80	3520+1.76 vdc	
.81 1.0 . .__.	4527+2.26 vdc	
1.0 1.2 ..	53.67+2.68 vdc	.....6 cycles per second
12 1.4 . _	65.37+3.27 vdc	
1.4 1.5 _	75.45+3.77 vdc	

c. Description of V/h Control Panel. The v/h control panel is a chassis containing a printed circuit board and several other electrical components. It has an edgelight faceplace and a protective cover. Electrical connections to the v/h control panel are made through a single connector at the rear. Four dzus fasteners secure the v/h control panel to its mounting rack and two screws at the rear of the panel hold the cover in place. Overall dimensions of the v/h control panel are: 5¾3/ inches wide, 33% inches high, and 8% inches deep. It weighs 1.8 pounds.

6-3. Service Upon Receipt of Equipment

a. *Unpacking Data.*

The v/h control panel is shipped in a padded card board carton. Open the carton and remove the v/'h control panel.

b. *Checking Unpacked V/h Control Panel.*

(1) Check electrical connector, located at rear of unit, for bent or missing pins.

(2) Check all surfaces for scratches, nicks, dents, or other damage. If any damage is observed, report in on DD Form 6 (Report of Packaging and Handling Deficiencies) (para 1 3b).

6-4. Installation

Installation of the v/h control panel requires the interconnecting cable.

a. Check to be sure that the aircraft instrument panel has been prepared to accommodate the v/h control panel.

b. Connect the interconnecting cable to the con nector located at the rear of the v/h control panel.

c. Lower the v/h control panel into place and when it is properly positioned secure it with its dzus fasteners.

6-5. Operator's Controls and Indicators (fig. 6 1)

This paragraph describes the function of the con trols and indicators and provides instructions for operating the v/h control panel. The following chart lists the controls and indicators and lists their functions.

control or indicator	Function
MANUAL V/H CONTROL	Selects one of twelve available EV/H levels.
POWER circuit breaker	Applies or removes primary power to the v/h control panel.
POWER indicator lamp	Lights when primary power is applied to the v/h control panel.
Edgelight (+) connector	Point of connection to 5 vdc.

6-6. Operation Under Usual Conditions

The v/h control panel is used to provide the EV/H signal to the camera when the V/H SEL switch on the camera control is set to MAN. It is also used to provide EV,/H signals for preflight operation of the camera (para 3 8). To generate EV/H signals from the v/h control panel proceed as follows:

a. Set the MANUAL V/H CONTROL to the desired knots per foot setting.

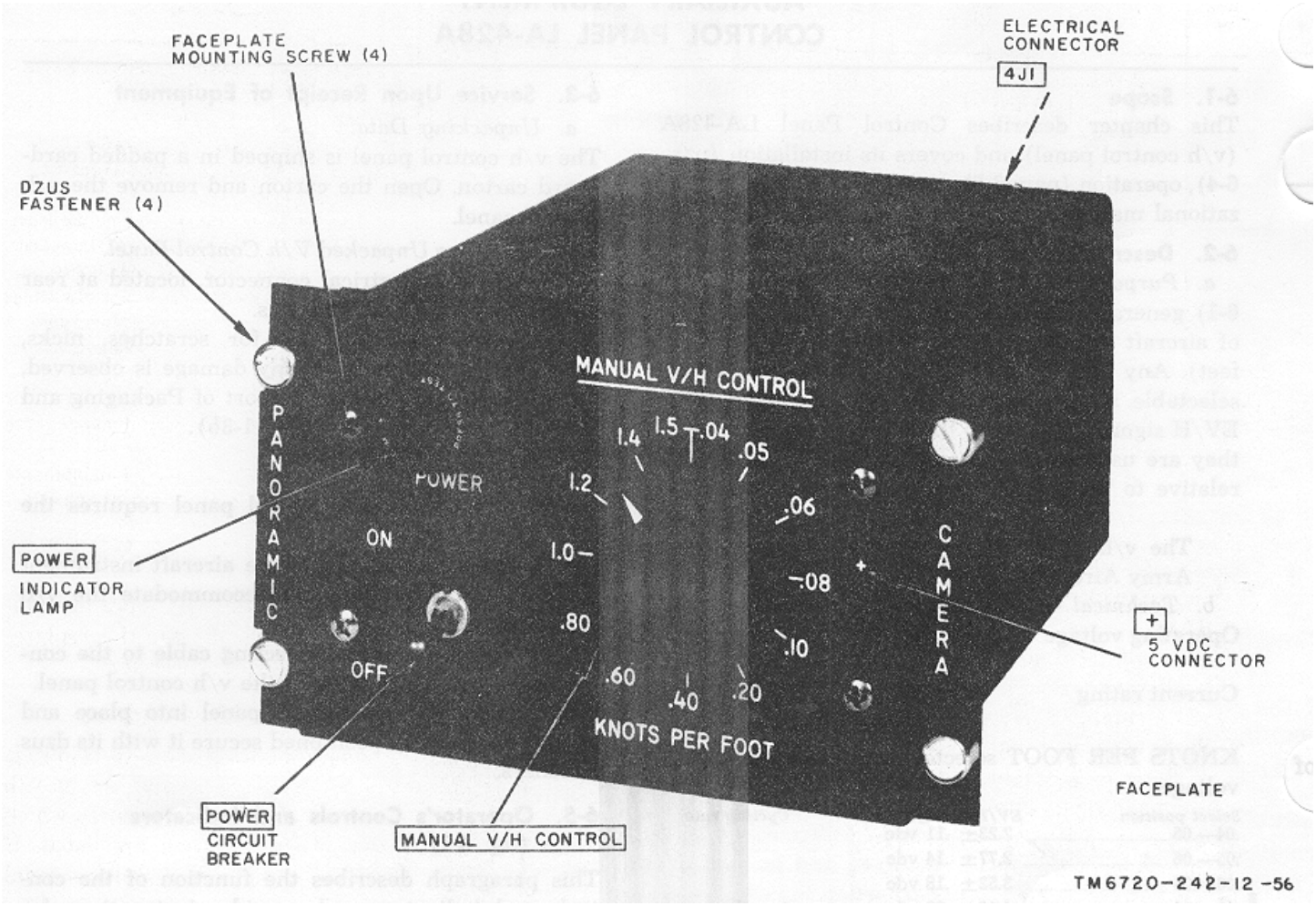


Figure 6-1. Control Panel LA-428A.

NOTE

The pointer on the MANUAL V/H CON TROL stops halfway between adjacent KNOTS PER FOOT markings.

b. Turn POWER circuit breaker ON. The POWER indicator lamp should light.

6-7. Stopping Procedures

To terminate operation of the v/h control panel set the POWER circuit breaker to OFF.

6-8. Operation Under Unusual Conditions

For operation in arctic areas refer to paragraph 3 11. For operation in tropical, desert, maritime, or rainy areas refer to paragraphs 3 12 and 3 13.

6-9. Operator's Maintenance

The scope of the operator's maintenance is the same as indicated in paragraph 4 1. Perform the preventive maintenance described in paragraphs 4 5, 4 6, and 4 7.

6-10. Operator's Troubleshooting Chart

a. *General.* The troubleshooting chart helps the operator sectionalize and correct v/h control panel troubles. The symptoms listed are those that can be noted by the operator during operation. The corrective measures suggested in the checklist are those the operator can accomplish. If the corrective measure does not restore normal operation, refer the v/h control panel to higher echelon maintenance.

b. *Operational Troubleshooting Chart.*

Item No.	Trouble symptom	Probable trouble	Corrective measure
I	POWER indicator lamp does not light when POWER circuit breaker is set to ON	a. Lamp fully dimmed	a. Rotate lamp housing counterclockwise.
		b. Lamp defective	b. Replace lamp (para 6 111.
		c. Primary power not turned on	c. Turn camera power on (para 3 8).
		d. Defective input power connection	d. Refer to organizational maintenance(para 6 13).
		e. POWER circuit breaker defective	e. Refer to higher category of maintenance.
		f Indicator light assembly defective	f Refer to higher category of maintenance.
2	No EV/H signals received at the camera	a. V/h control panel defective	a. Press POWER lamp. If lamp lights when depressed, recheck control settings and operation of camera. If lamp does not light, refer to higher category of maintenance.
		b. Camera defective	b. Refer to higher category of maintenance.
3	Incorrect EV/H signals received at the camera.	a. Defective v/h control panel	c. Refer to higher category of maintenance.
		b. Camera defective	b. Refer to higher category of maintenance.
4	No edgelights when POWER circuit breaker is set to ON.	Defective edgelight panel or circuit	Refer to higher category of maintenance.

6-11. Replacement of POWER Indicator Lamp

a. Set POWER circuit breaker to OFF.

b. Rotate indicator lamp counterclockwise until jewel assembly separates from the panel. The lamp is in the separated jewel assembly.

c. Remove the defective lamp from the jewel as sembly and replace it with a new lamp.

d. Insert jewel assembly into its receptacle and rotate it clockwise until secure.

6-12. Organizational Maintenance

The information in paragraphs 4 11 through 4 15 apply to the v/h control panel as does the trouble shooting procedure of paragraph 6 10. Organization al maintenance is also responsible for the replace ment of the v/h control panel when necessary.

6-13. Organizational Troubleshooting

a. *General.* The troubleshooting chart (b below) is furnished as an aid in localizing trouble in the v/h control panel. Only those corrective measures which organizational personnel can perform are listed. If the corrective measure does not restore normal operation, refer the v/h control panel to higher category of maintenance.

b. *Organizational Troubleshooting Chart*

Item No.	Trouble symptom	Probable trouble	Corrective measure
1	POWER indicator light does not light when POWER circuit breaker is set to ON	Defective input power connection	Remove v/h control panel from its mount ing (para 6 14 and check that connector is properly seated
2	Incorrect or no EV/H signals received at the camera	Defective v/h control panel	Replace v/h control panel (para 6 14). Refer defective unit to higher category of maintenance.

6-14. Removal and Replacement of V/h Control Panel

a. *Removal.*

(1) Set POWER circuit breaker to OFF (fig. 6 1).

(2) Release the four dzus fasteners securing the v/h control panel to its mounting. Pull the panel out ward.

(3) Remove the connector located at the rear of the v/h control panel.

b. *Replacement.*

Install new v/h control panel in the reverse order of removal.

APPENDIX A

REFERENCES

The following publications contain information applicable to the operation of Camera, Still Picture KA 60C.

DA Pam 310 4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8 and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310 7	U.S. Army Equipment Index of Modification Work Orders.
TB 746 10	Field Instructions for Painting and Preserving Electronics Command Equipment.
TM 11 401 1	Army Pictorial Techniques, Equipments, and Systems: Pictorial Funda mentals.
TM 11 6625 203 12	Operator and Organizational Maintenance: Multimeter AN/URM 105, Including Multimeter ME 77/U.
TM 11 6760 244 12	Operator's and Organizational Maintenance Manual Including Repair Parts and Special Tool Lists: Test Set, Camera LS 86A.
TM 38750	Army Equipment Record Procedures.

APPENDIX B
BASIC ISSUE ITEMS LIST (BILL) AND ITEMS TROOP INSTALLED OR AUTHORIZED LIST (ITIAL)

Section I. INTRODUCTION

B-1. Scope
This appendix lists only basic issue items required by the crew/operator for installation, operation, and maintenance of the Camera, Still Picture KA 60C.

B-2. General
This Basic Issue Items and Items Troop Installed or Authorized List is divided into the following sections:

a. *Basic Issue Items 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 Section III*. Not applicable.

B-3. Explanation of Columns

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

a. *Illustration.* This column is divided as follows:

(1) *Figure number*. Indicates the figure number of the illustration in which the item is shown.

(2) *Item number*. Not applicable.

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

c. *Description*. Indicates the National item name and a minimum description required to identify the item.

(1) *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.

(2) *Federal supply code for manufacturer (FSCM).* The FSCM is a 5digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., and is identified in SB 70842.

d. *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 a unit of issue that will satisfy the required units of measure will be requisitioned.

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

Section II. BASIC ISSUE ITEMS LIST

(1) Illustration (A) Fig No	(1) Illustration (B) INteo No.	(2) National stock number	(3) Description Part number & FSCM	Usable on code	(4) Qty furn with equip
2	1		CASE, CARRYING: 1214353 (72314)		1
1	1	6720-00-112-4772	COVER DUST, BODY: 1214 192 (72314)		1
1	1	6760-00-110-9897	COVER DUST, MAGAZINE: 1193C71 (72314)		1
1	1	6720-00-106-7875	COVER DUST, PRISM: 1214 B39 (72314)		1

APPENDIX C
MAINTENANCE ALLOCATION

Section I. INTRODUCTION

C-1. General

This appendix provides a summary of the maintenance operations for the KA 60C. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

C-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

a. *Inspect.* To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. *Test.* To verify serviceability and to detect inci pient failure by measuring the mechanical or electrical characteristics of an item and comparing those charac teristics with prescribed standards.

c. *Service.* Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compres sed air supplies.

d. *Adjust.* To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. *Align.* To adjust specified variable elements of an item to bring about optimum or desired performance.

f. *Calibrate.* To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment's used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. *Install.* The act of emplacing, seating, or fixing into position an item, part, module (component or as sembly) in a manner to allow the proper functioning of the equipment or system.

h. *Replace.* The act of substituting a serviceable like type part, subassembly, or module (component or as sembly) for an unserviceable counterpart.

i. *Repair.* The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system. This function does not include the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

j. *Overhaul.* That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the high est degree of maintenance performed by the Army.

Overhaul does not normally return an item to like new condition.

k. *Rebuild.* Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipments/components.

C-3. Column Entries

a. *Column 1, Group Number.* Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. *Column 2, Component/Assembly.* Column 2 contains the noun names of components, assemblies, sub assemblies, and modules for which maintenance is authorized.

c. *Column 3, Maintenance Functions.* Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for purpose of having the group numbers in the MAC and RPSTL coincide.

d. *Column 4, Maintenance Category.* Column 4 specifies, by the listing of a "work time" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in col

umn 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "work time" figures will be shown for each category. The number of task hours specified by the "work time" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

C-Operator/Crew
O-Organizational
F-Direct Support
H-General Support
D-Depot

e. *Column 5, Tools and Equipment.* Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. *Column 6, Remarks.* Not applicable.

C-4. Tool and Test Equipment Requirements (Sect. 111)

a. *Tool or Test Equipment Reference Code.* The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. *Maintenance Category.* The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. *Nomenclature.* This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. *National/NATO Stock Number.* This column lists the NationaVNATO stock number of the specific tool or test equipment.

e. *Tool Number.* Not applicable.

C-5. Remarks (Sect. IV)

Not applicable.

(Next printed page is C-3)

SECTION II MAINTENANCE ALLOCATION CHART FOR

CAIRA, STILL PILCURE KA 60C

(1) Group number	(2) Component/assembly	(3) Maint. function	(4) Maint. category C	O	F	H	D	(5) Tool/ equipment	(6) Remarks
00	CAMERA,, STILL PICTURE KA-60C	Inspect	0.3						
		Test		0.5				1,5,7,8	
		Service	0.3					8	
		Replace		0.3				1,5,7,8	
		Repair				8		2 thru 7, 9 thru 17	
		Overhaul					135.0	2 thru 6, 9 thrul7	
01	BODY, DRIVE LA 411A (LA)	Test				2.0		3,5,6,9, 10, 17	
		Replace		0.1					
		Repair				1.0		3,5,6,9, 10, 17	
0101	AEC ASSEMBLY (1A1A1)	Align				1.0		3,5,6,9, 10,17	
		Replace			0.3			5,6,17	
		Repair				2.0		3,5,6,9, 10,17	
0102	CAM PUCK ASSEMBLY (lAIRDI50)	Repair				1.0		5,6	
		Replace				1.0		5,6	
0103	MCTOR CEAR ASSEMBLY (IAlA3)	Repair				1.0		5,6,9	
		Replace						5,6	
0301	CIRCUIT CARD ASSEMBLY	Repair				1.0		5,6	
		Replace		1.0				5,6	
0104	PRISM ASSEMBLY (1AP275)	Replace				1.0		5,6	
		Repair				0.5		5,6	
0105	SHAFT COUPLING ASSEMBLY (1AlMP342)	Replace				1.0		5,6	
		Repair				1.0		5,6	
02	CAMERA CONTROL LA 412A	Replace		0.1					
		Repair				2.0		5,6,7,11, 12.13	
		Repair			1.0			5,6	
0201	PAML ASSEMBLY (lA2Al)	Repair			1.0			5,6	
		Repair				2.0		5,6	
020101	IRTRCOI{ECTING BOARD ASSMBBLY (UAAIA)	Test				0.5		7	
		Replace				1.0		5,6,7,11, 12,13	
		Repair				0.5		5,6,7,11, 12,13	
0202	COFITROL BOARD ASSE8 LY (A2Ab)	Test			0.5		1.0	5,6,7	
		Replace			0.2				
		Repair				1.0		5,6,7	
0203	SCAN BOARD ASMBLY (1A23)	Test			0.5	1.0		5,6,7	
		Replace			0.2				
		Repair				1.0		5.6,7	
0204	ARC BOARD ASSELY (1A2A5)	Test			0.5	1.0		5,6,7	
		Replace			0.2				
		Repair				1.0		5,6,7	

SECTION II MAINTENANCE ALLOCATION CHART
FOR
CAMERA, STILL PICTURE KA 60C

(1) Group number	(2) Component/assembly	(3) Maint. function	(4) Maint. category C	O	F	H	D	(5) Tool/ equipment	(6) Remarks
0205	HEAT SIFK ASSEMBLY (1A2A6)	Test			0.5	5,7			
		Repair			0.5	5,6			
0206	POWER SUPPLY ASSEMBLY (1A2A2)	Test			0.5	1.0		5,6,7	
		Replace			0.1				
		Repair				0.5		5,6,7	
020601	CIRCUIT CARD ASSEMBLY (lA2A2Al)	Test				0.5		7	
		Replace				0.5		5,6	
		Repair				1.0		5,6	
03	CONTROL PANEL ASSEMBLY LA 413A (1A3)	Replace		0.14					
		Repair			2.0			5,6,7,9, l14,15,16	
		Test		0.3				1	
0301	REAT SINf CARD ASSEMLY (1A3A1)	Replace			0.5			5,6	
		Repair				1.0		5,6,9	
030101	CIRCUIT CARD ASSEMBLY (IA3AlAl)	Test				1.0		7	
		Replace				1.0		5,6	
		Repair				1.0		5,6	
04	FILM KAGAZIWE LA 410A	Replace		0.1					
		Repair				1.0		5,6,9,10	
01401	IrEPRE BLOCK ASSEMBLY	Repair				0.5		5,6,9	
0402	PRESSURE PLATE ASSEMBLY	Repair				0.5		5.6,9,10	
0403	PRESSURE ROLLER ASSEMBLY	Repair				0.5		5,6,9,10	
05	COTrROL PANEL LA 428A (4)	Replace		0.1					
		Repair				2.0		5,6,7	
		Test				1.0		3,7	
0501	V/l BOARD ASSEMBLY (4AlHP4)	Test			0.5	1.0		5,6,7	
		Replace			0.2				
		Repair				1.0		5,6,7	

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS FOR

CAMERA, STILL PICTURE KA-60C

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	O,F	TEST SET, CAERA SYSTEM LS 86A	6760-00-922-2680	
2	N,D	COUNTER, ELECTRONIC, DIGITAL AN/USM 207	6625-00-911-6368	
3	F,N,D	YOLTN1ER, DIGITAL AN/CsM 64	6625-00-870- 2264	
4	N,D	OSCILLOSCOPE, AN/UN 281A	6625-00-228-2201	
5	O,F,N,D	TOOL KIT, PNOTOORAPHIC REPAIRMAN TK T7/GF	5180-00-752-9068	
6	F,H,D	TOOL KIT, PHOTORAPHIC REPAIRMAN TK 109/CF	5180-00-856- 653	
7	O,F,H,D	MULTIMETE ANIUSM 223	6625-00-999-7465	
8	C,O,F	HAND BLOWER	5120-00-284-4612	
9	H,D	DIAL TEST INDICATOR (STARRETr i 711F)	5210-00-591-2771	
10	H,D	VERNIER HEIGHT GAUGE (STARRETr 1454 12)	5210-00-256-7518	
11	F,H,D	EXRACTING TOOL MS 24256R20	5120-00-079-4601	
12	F,H,D	INSERTING TOOL MS 24256A20	5120-00-079-4598	
13	F,H,D	CRIMPING TOOL MB 3191 1	5120-00-064-5631	
14	F,H,D	TORQUE WREIICH 0 60 INCH POUNDS	5120-00-529-2552	
15	F,N,D	SOCKET, TORQUE WRENCH 3/8 INCH	5120-00-242-3352	
16	F,N,D	SOCKET, TORQUE WRENCH 7/16 INCH	5120-00-235-5869	

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

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

Distribution:
To be distributed in accordance with DA Form 12 38, Operator Maintenance requirements for OV 1A and OV 1C air craft

*U.S. GOVERNMENT PRINTING OFFICE. 1984 421 302/10431

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter 10 Millimeters 0 01 Meters 0 3937 Inches
1 Meter 100 Centimeters 1000 Millimeters 39 37 Inches
1 Kilometer 1000 Meters 0 621 Miles

WEIGHTS

1 Gram 0 001 Kilograms 1000 Milligrams 0 035 Ounces
1 Kilogram 1000 Grams 2 2 Lb
1 Metric Ton 1000 Kilograms 1 Megagram 1 1 Short Tons

LIQUID MEASURE

1 Milliliter 0 001 Liters 0 0338 Fluid Ounces
1 Liter 1000 Milliliters 33 82 Fluid Ounces

SQUARE MEASURE

1 Sq Centimeter 100 Sq Millimeters 0 155 Sq Inches
1 Sq Meter 10,000 Sq Centimeters 10 76 Sq Feet
1 Sq Kilometer 1,000,000 Sq Meters 0 0386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter 1000 Cu Millimeters 0 06 Cu Inches
1 Cu Meter 1,000,000 Cu Centimeters 35 31 Cu Feet

TEMPERATURE

5/9 (F 32) C
212 Fahrenheit is equivalent to 100 Celsius
90 Fahrenheit is equivalent to 32 2 Celsius
32 Fahrenheit is equivalent to 0 Celsius
9/5 C + 32 F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2 540
Feet	Meters	0 305
Yards	Meters	0 914
Miles	Kilometers	1 609
Square Inches	Square Centimeters	6 451
Square Feet	Square Meters	0 093
Square Yards	Square Meters	0 836
Square Miles	Square Kilometers	2 590
Acres	Square Hectometers	0 405
Cubic Feet	Cubic Meters	0 028
Cubic Yards	Cubic Meters	0 765
Fluid Ounces	Milliliters	29 573
Pints	Liters	0 473
Quarts	Liters	0 946
Gallons	Liters	3 785
Ounces	Grams	28 349
Pounds	Kilograms	0 454
Short Tons	Metric Tons	0 907
Pound-Feet	Newton-Meters	1 356
Pounds per Square Inch	Kilopascals	6 895
Miles per Gallon	Kilometers per Liter	0 425
Miles per Hour	Kilometers per Hour	1 609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0 394
Meters	Feet	3 280
Meters	Yards	1 094
Kilometers	Miles	0 621
Square Centimeters	Square Inches	0 155
Square Meters	Square Feet	10 764
Square Meters	Square Yards	1 196
Square Kilometers	Square Miles	0 386
Square Hectometers	Acres	2 471
Cubic Meters	Cubit Feet	35 315
Cubic Meters	Cubic Yards	1 308
Milliliters	Fluid Ounces	0 034
Liters	Pints	2 113
Liters	Quarts	1 057
Liters	Gallons	0 264
Grams	Ounces	0 035
Kilograms	Pounds	2 205
Metric Tons	Short Tons	1 102
Newton-Meters	Pound-Feet	0 738
Kilopascals	Pounds per Square Inch	0 145

TEAR ALONG PERFORATED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

THEN. . JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER	SIGN HERE:

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ▸ ARE OBSOLETE.

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

PIN: 016197 000