DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL MAINTENANCE MIANUAL TESTING MACHINE, CAMERA SHUTTER SPEED LS-33A; TEST SYSTEM, PHOTOGRAPHIC SURVEILLANCE LS-34A; TEST SET, PHOTOGRAPHIC SURVEILLANCE SYSTEM COMPONENTS LS-46A; AND TOOL KIT, CAMERA ALIGNMENT AND ADJUSTMENT LS-49A; AS USED FOR TESTING: CAMERA, STILL PICTURE KA-39A; CAMIERA SET, STILL PICTURE KS-53( ); AND CAMERA SYSTE I, STILL PICTURE KS-54A

This copy Is a reprint which includes current pages from Changes 1.

HEADQUARTERS, DEPARTMENT OF THE ARMY
18 SEPTEMBER 1964

WARNING

Be careful when working on the 115-volt ac line connections and the 28-volt dc equipment connections. Serious injury or death may result from contact with these terminals.

DON'T TAKE CHANCES!

TECHNICAL MANUAL
No. 116760221-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC 20315, *18 September 1964*

Operator and Organizational Maintenance Manual
TESTING MACHINE, CAMERA SHUTTER SPEED LS-33A; TEST SYSTEM, PHOTOGRAPHIC SURVEILLANCE LS-34A; TEST SET, PHOTOGRAPHIC SURVEILLANCE SYSTEM COMPONENTS LZ 4UA; AND TOOL KIT, CAMERA ALIGNMENT AND ADJUSTMENT LS-49A; AS USED FOR TESTING: CAMERA, STILL PICTURE KA-39A; CAMERA SET, STILL PICTURE KS53( ); AND CAMERA SYSTEM, STILL PICTURE KS-54A

***This technical manual supersedes TM 11-6760-221-12, 17 January 1964.**

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

This technical manual covers the test equipments listed in a through d below as they are used for testing Camera, Still Picture KA-39A; Camera Set, Still Picture KS-53( ); and Camera System, Still Picture KS54A Collectively the test equipments listed, for the purpose of this manual, are referred to as camera system test equipment. The maintenance allocation chart (MAC) appears in appendix II. Appendix III contains the basic issue items list (BIIL) and items troop installed or authorized list (ITIAL).

NOTES

‘

a. Testing Machine, Camera Shutter Speed LS-33A.

b. Test System, Photographic Surveillance LS-34A

c. Test Set, Photographic Surveillance System Components LS46A.

d. Tool Kit, Camera Alignment and Adjustment LS49A.

2. Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 3104 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.

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 (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 Corpse

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)

3.1. Reporting of Errors

Report 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-C, Fort Monmouth, NJ. 07703.

Section II. DESCRIPTION AND DATA

4. Purpose and Use

a. Purpose. The camera system test equipment of Camera, Still Picture KA-39A and the various provides the means for making operational checks aircraft camera

control system (ACCS) components used with Camera, Still Picture KA-39A.

b. Use. The camera system test equipment, consisting of four major groupings of equipment ((1) through (4) below), is used to test the components of Camera, Still Picture KA-39A and the ACCS components.

(1) *Test System, Photographic Surveillance LS-34A* (fig. 1, 2, and 3). The LS-34A consists of three major components: Analyzer, Photographic Surveillance System LS-35A, Simulator, Control System, Camera LS-36A, and Simulator Group LM-97A.

(a) Analyzer, Photographic Surveillance System LS-35A (fig. 1). The LS-35A is used to select, route, and measure the output signal voltages of an ACCS that is being tested.

(b) Simulator, Control System, Camera LS-36A (fig. 2). The LS-36A is used to simulate the ACCS when Camera, Still Picture KA39A is being tested. Test Set, Vacuum Regulator Assembly LA185A (stored in the cover of the carrying case of the LS-36A) is used to check the operation of the camera vacuum system by measuring the vacuum at the platen.

(c) Simulator Group LM-97A (fig. 3). The LM-97A is used to provide simulated flash burst, scanner, and terrain brightness signals to an ACCS being t e s t e d by Analyzer, Photographic Surveillance System LS-35A.

(2) *Test Set, Photographic Surveillance System Components LS-46A* (fig. 4). The LS-46A is used to check the KA-39A ACCS flash detector and the overall camera, the camera amplifier and over run circuit, the camera magazine, and the ACCS control box of Camera, Still Picture KA-39A.

(3) *Testing Machine, Camera Shutter Speed LS-33A (fig. 5). The LS-33A* is used to test the effective exposure time (accuracy) and the efficiency of the mechanically actuated shutter mechanism contained in the lens cone of Camera, Still Picture KA-39A.

(4) Too ll Kit, Camera Alignment and Adjustment LS-49A (fig. 6). The LS-49A consists of three tools which are used to align and adust the magazine assembly of Camera, Still Picture KA-39A.

(a) IMC adjusting plate. The IMC adjusting plate is used to index and set the altitude adjustment control.

(b) Spool support spacing fixture. The spool support spacing fixture is used to establish the required spacing between the film spool supports.

(c) Back focal length fixture. The back focal length fixture is used as a measuring base for the alignment of the platen in the optimum film focal plane.

5. Technical Characteristics

a. Test System, Photographic Surveillance LS-34A.

(1) *Analyzer, Photographic Surveillance System LS-35A* (fig. 1).

Power requirements, standby:
Ac ..... 115 volts, 400 cps, 0.99 ampere, 10.35 watts.
Dc ..... 28 volts, 2.2 amperes, 61.6 watts.
Power requirements, operation:
Ac ..... 115 volts, 400 cps, 0.25 ampere (max), 28.75 watts.
Dc ..... 28 volts, 10 amperes (max), 280 watts.
TIMER clock:
Type ..... Continuous running motor, clutch controlled, 280 watts.
Range ..... .0 to 60 seconds (graduated in increments of 0.01 second and 1 second).
TEST CONDITIONS meter:
Type ..... D'Arsonval movement, 50-microampere sensitivity.
Range..... Direct reading in GO or NO-GO graduations.

(2) *Simulator, Control System, Camera LS-36A (fig. 2).*

Power requirements, standby:
Ac ..... 115 volts, 400 cps, 0.6 ampere, 69 watts.

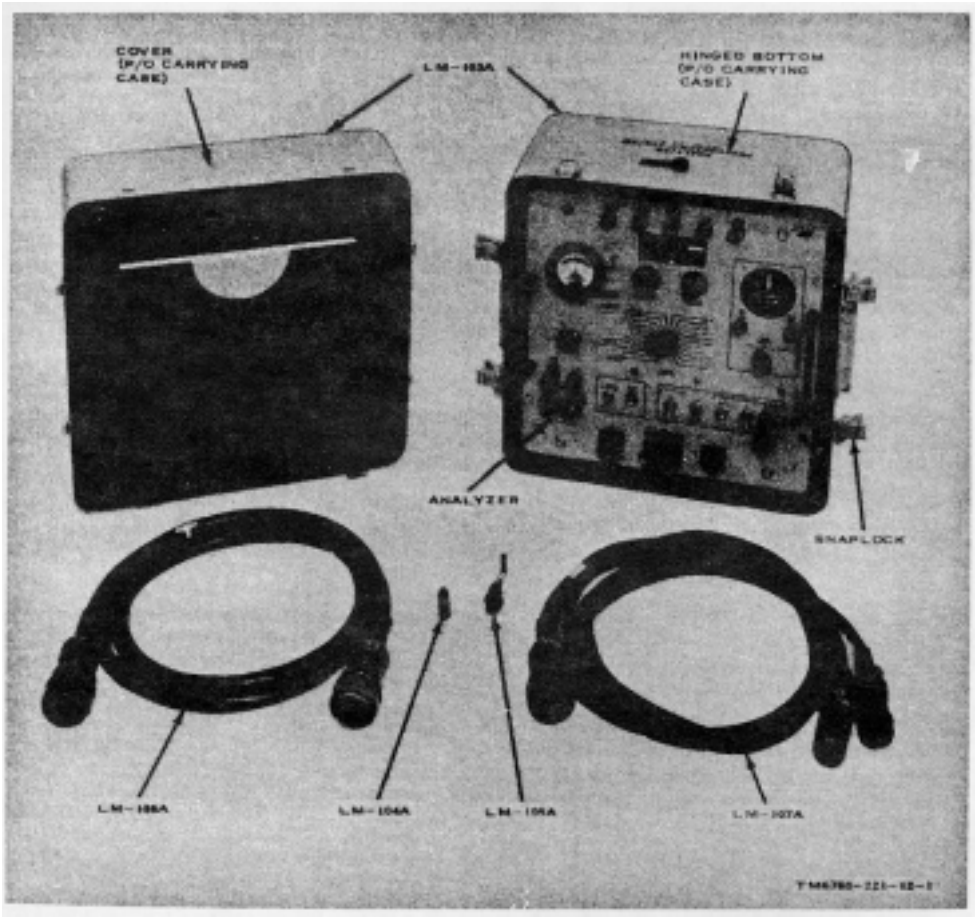


Figure 1. Analyzer, Photographic Surveillance System LS-35A (less running spares); part of Test System, Photographic Surveillance LS-34A.

Dc ..... 28 volts, 1.3 amperes, 36.4 watts.
Power requirements, operation:
Ac ..... 115 volts, 400 cps, 3 amperes (max), 345 watts.
Dc ..... 28 volts, 12 amperes, 336 watts.
SOURCE VACUUM gage:
Type..... Diaphragm actuated, calibrated in inches of mercury.
Range..... 0 to 10 inches of mercury.
Test Set, Vacuum Regulator Assembly LA-185A:
Type of indication Direct reading gage.
Calibration of gage ..... 0 to 16 inches of water, in increments of 1/2 inch.
Type of gage..... Diaphragm actuated.

(3) *Simulator Group LM-97A* (fig. 3).

(a) Exciter, Scanner LM-113A.

Input signal..... 28 volts dc at 10 or 30 pulses per second (from Analyzer, Photographic Surveillance SystemLS-35A).

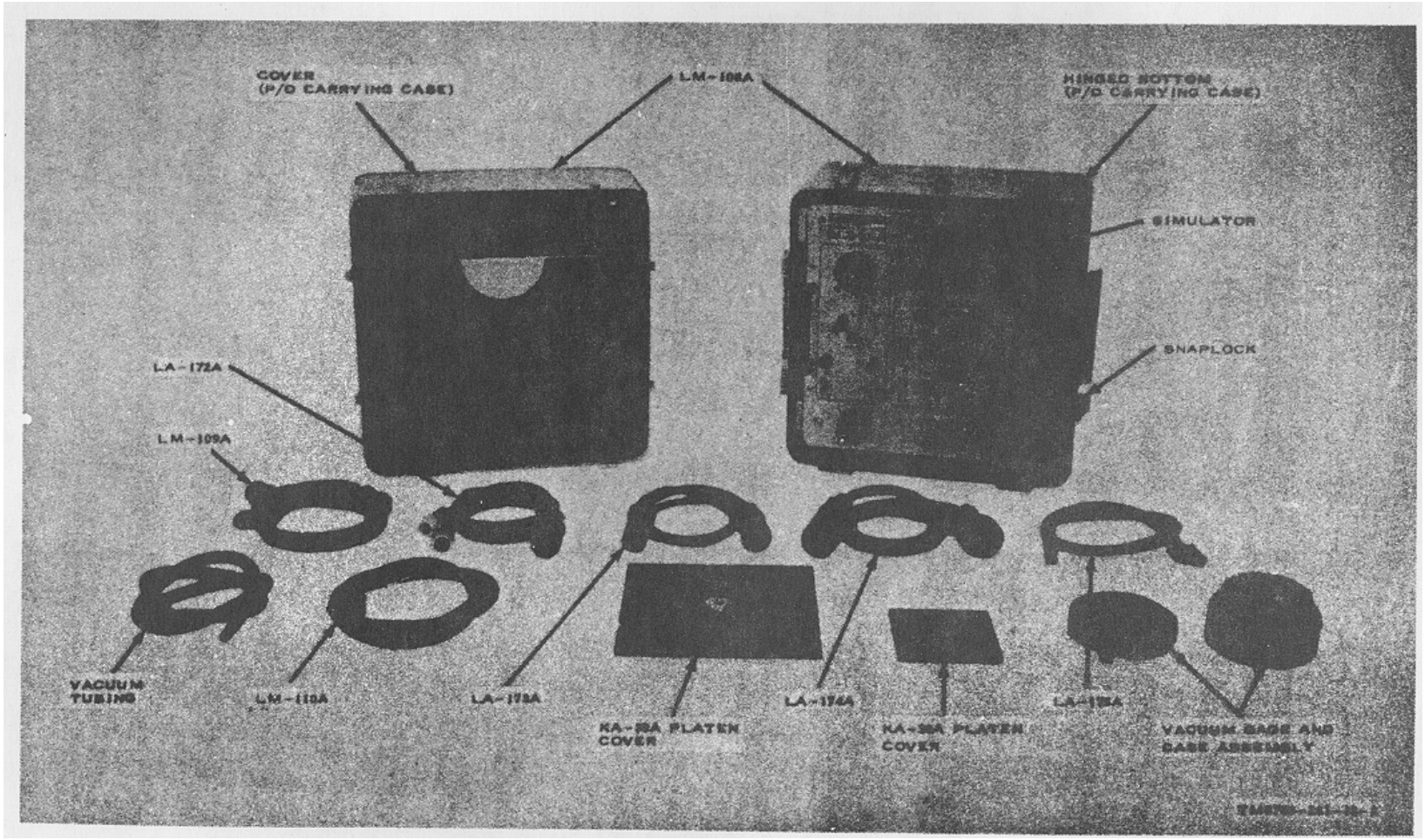


Figure 2. Simulator, Control System, Camera LS-36A (less running spares); part of Test System, Photographic Surveillance LS-34A.

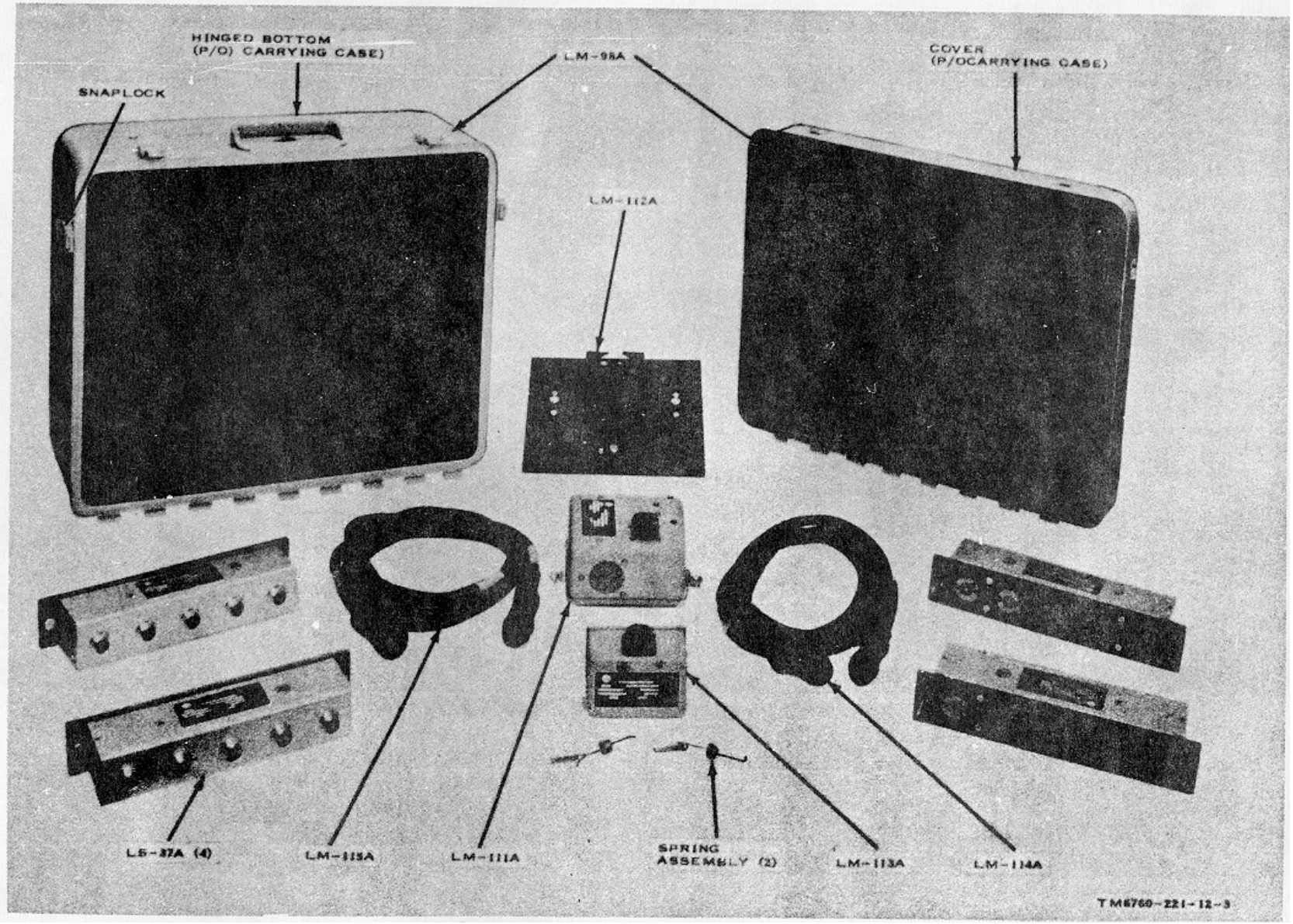


Figure 3. Simulator Group LM-97A (less running spares); part of Test System, Photographic Surveillance LS-34A.

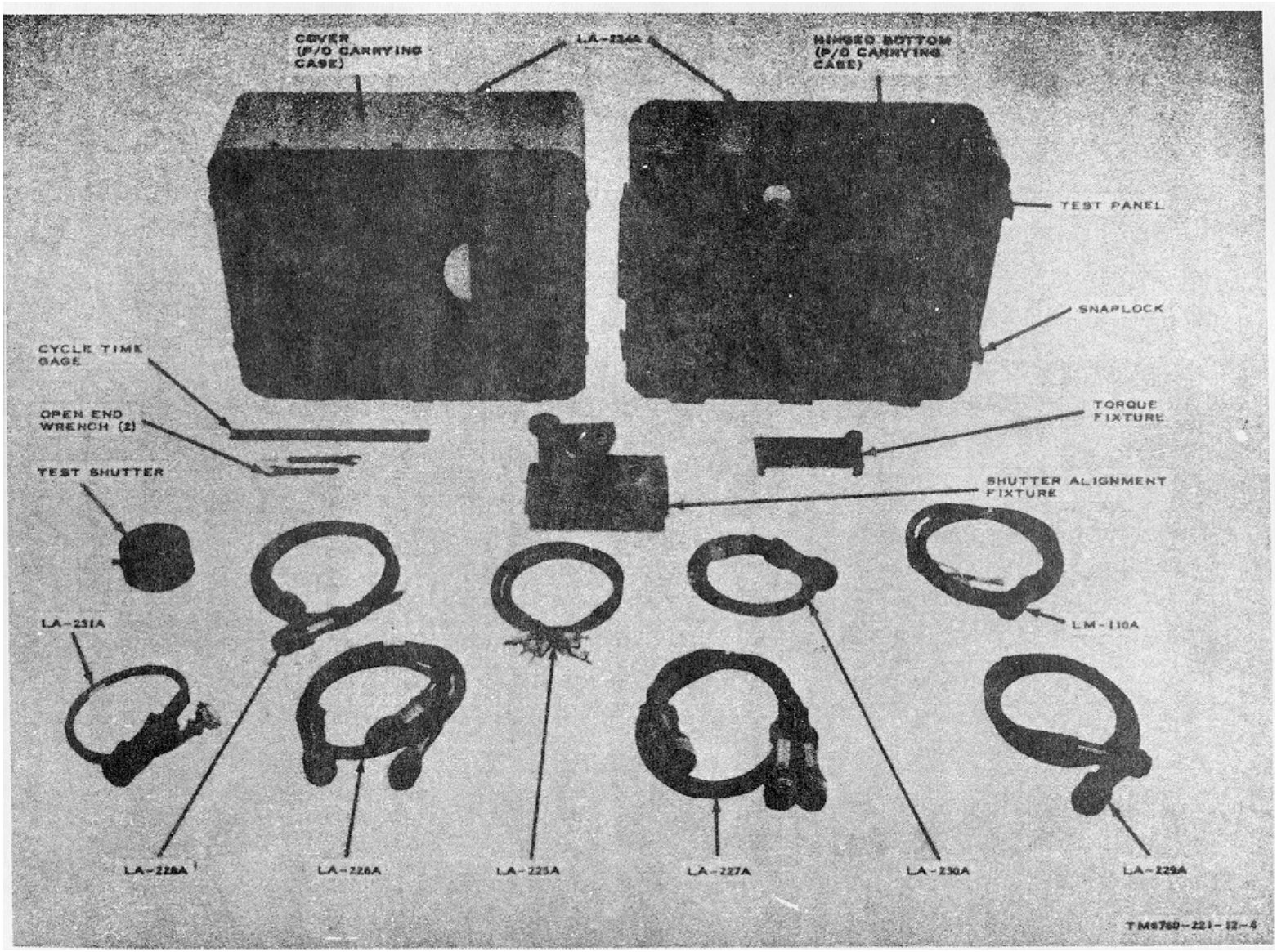


Figure 4. Test Set, Photographic Surveillance System Components LS-46A, less running spares.

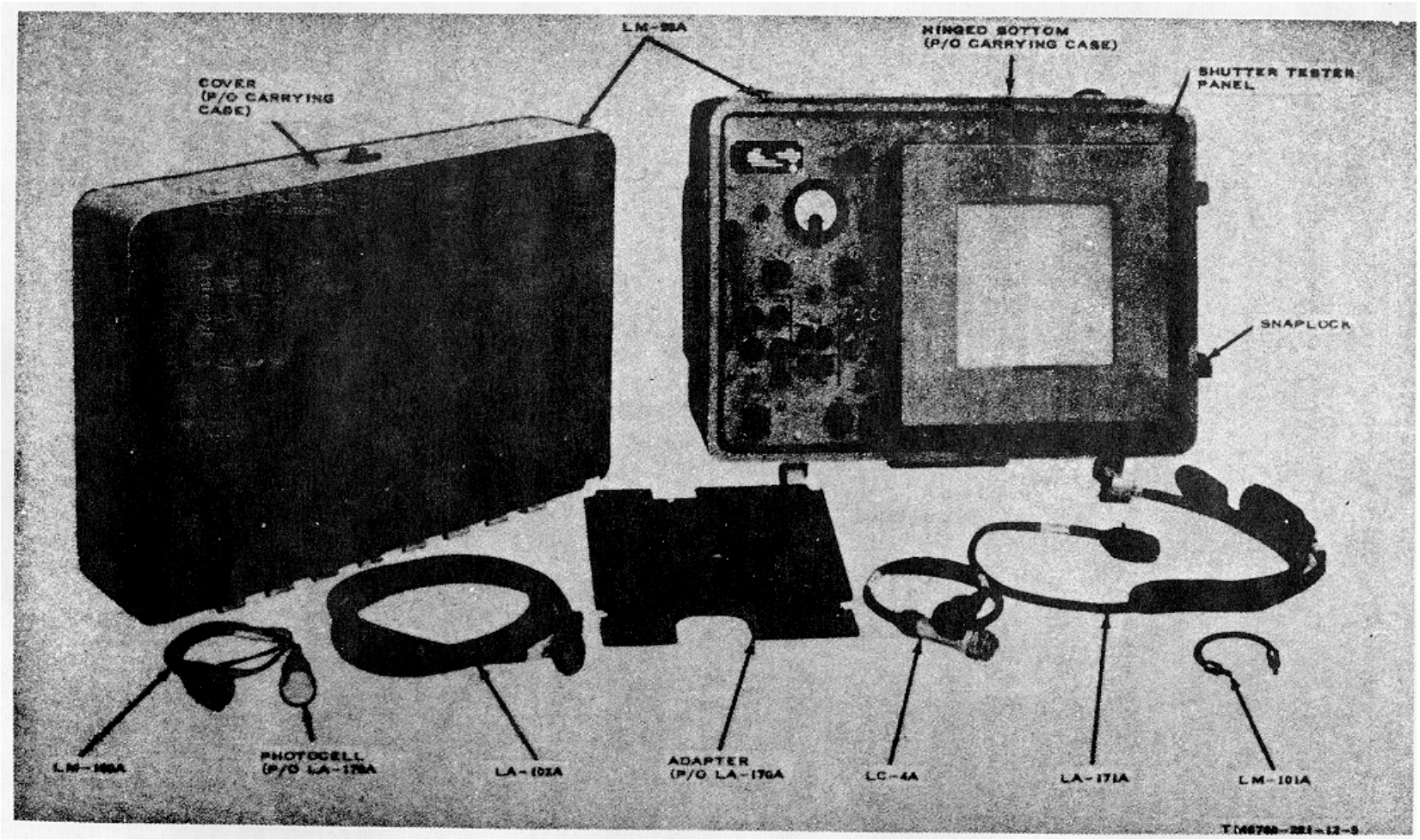


Figure 5. Testing Machine, Camera Shutter Speed LS-33A, less running spares.

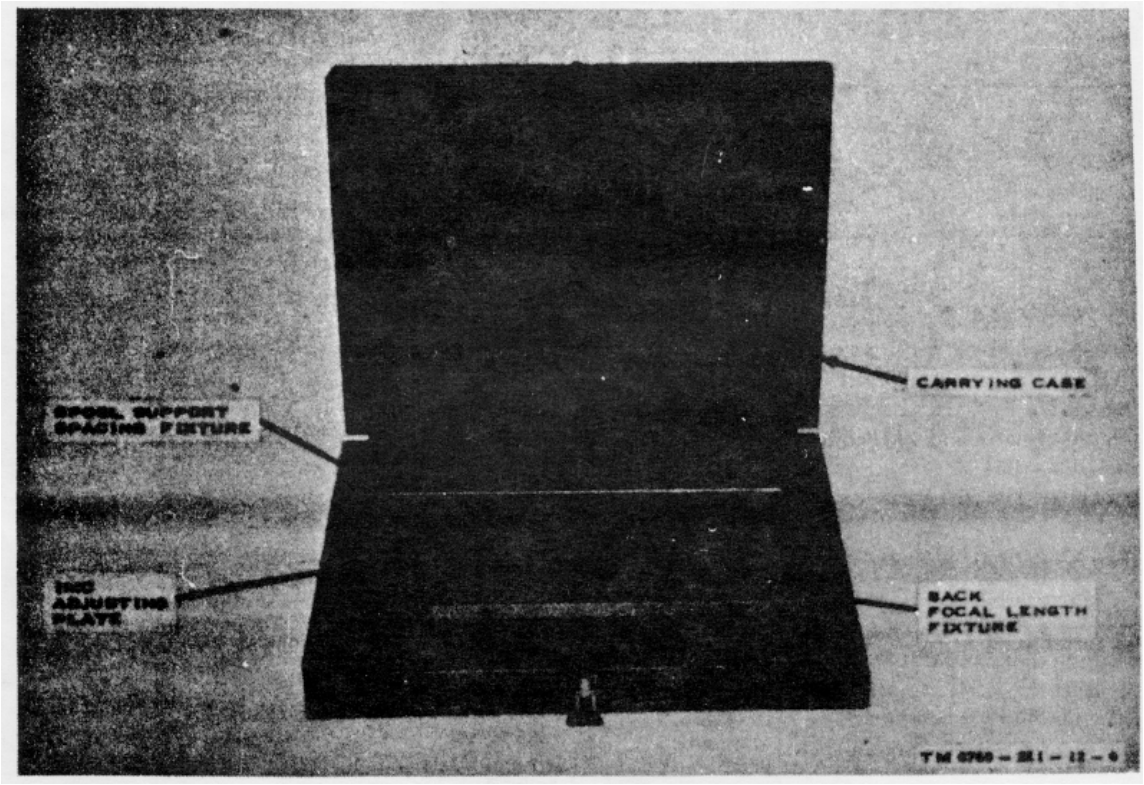


Figure 6. Tool Kit, Camera Alignment and Adjustment LS-49A.

Output.....Pulsating light at rate corresponding to input (10 or 30 pulses per second)

(b) Simulator, Flash Burst LM-111A.

Input.....28 volts de, manually pulsed (from known Analyzer, Photographic Surveillance System LS-35A).
Output.....Pulsating light of variable intensity.

(c) Test Set, Photoflash Cartridge Ejector LS-37A.

Input.....28 volts de (from flash ejectors of aircraft).
Output indication.....Light from incandescent lamps.

(4) Test System Photographic Surveillance LS-34A; Simulator, Control System Camera LS-36A; and Simulator Group LM-97A.

Operating temperature range .....0°F (-18°C) to 125°F (51°C).
Operating humidity range .....0% to 95%
Storage temperature range .....-65°F (-54°C) to 160°F (71°C).
Storage humidity range .....0% to 100%.

b. Test Set, Photographic Surveillance System Components LS-46A.

Power requirements:
Ac .....115 volts, 400 cps, 2 amperes, 230 watts
Dc .....28 volts, 15 amperes, 420 watts.
MILLISECOND TIMER meter:
Range.....0 to 300 milliseconds in five ranges.
Accuracy.....±5% at 77°F (25°C).
PULSE TIMER clock:
Type .....Continuous running motor, clutch controlled, electrical reset.
Rated operating voltage.....28 vdc.
Range.....0 to 60 seconds (graduated in increments of 0.01 second on outer scale and 1 second on inner scale

Number of electron tubes.....10.
Number of transistors.....8.
Operating temperature range .....0°F (-18°C) to 125°F (51°C)
Operating humidity range .....0% to 95%.
Storage temperature range .....-65° (-54°C) to 160°F (71°C).
Storage humidity range .....0% to 100%.

c. Testing Machine, Camera Shutter Speed LS-33A.

Power requirements (standay):
Ac .....115 volts, 400 cpa single phase, at 0.4 ampere, 46 watts
Dc ..... 2429 volts at 0.15 ampere, 435 watts (max).
Power requirements (operation):
.....115 volts, 400 cps, single, phase, at 5 amperes (max), 575 watts.
Dc .....24-29 volts at 20 amperes (max) 580 watts (max).
Meter:
Type.....Direct reading, calibrated in milliseconds.
Ranges .....0-3, 0-10, 30, 0-100, and 0300.
Number of electron tubes .....16.
Accuracy of measurments .....±5%.
Types of lens cones tested.....Aerial still-picture camera lens cones: actuated (KA-30A. T11, or KC-1( )), and mechanically actuated (KA-39).A
Operating temperature range .....0°F (-18°C) to 125°F (51°C).
Operating humidity range .....0% to 95%.
Storage temperature range .....65°F (-54°C) to 160°F (71°C)
Storage humidity range .....0% to 100%.

d. Tool Kit, Camera Alignment and Adjustment LS-49A.

(1) *IMC adjusting plate.*
Type .....Dowel-pin-located indexing fixture.
Length .....2.391 inches.
Width .....0.375 inch.
Height.....0.063 inch
(2) *Spool support spacing fixture*.
Type .....Recessed clearance spacing gage.
Length .....9.680 to 9.682 inches
Diameter.....0.5 inch.
(3) *Back focal length fixture.*
Type .....Perforated parallel bar.
Length .....9.375 to 9.437 inches.
Width .....0.995 to 1.005 inches.

6. Items Comprising the Operable Equipment

a. Test Set, Photographic Surveillance System Components LS-46A (Group I).

FSN	Quantity		Nomenclature, part No., and mfr code
	LS-46A	LS-46	
6760-971-5126	1		Cable Assembly, Power Electrical LM-110A: CAI 2996-264 (Not installed) (Not mounted)
6760-951-5186	1		Cable Assembly, Special Purpose, Electrical LA-230A: CAI 2998-238 (Not installed) (Not mounted)
6760-951-5185	1		Cable Assembly, Special Purpose, Electrical LA-231A: CAI 2998-239 (Not installed) (Not mounted)
6760-977-8993	1		Cable Assembly, Special Purpose, Electrical, Branched LA-225A: CAI 2998-233 (Not installed) (Not mounted)
6760-973-2648	1		Cable Assembly, Special Purpose, Electrical, Branched LA-227A: CAI 2998-235 (Not installed) (Not mounted)
6760-977-8996	1		Cable Assembly, Special Purpose, Electrical, Branched LA-228A: CAI 2998-236 (Not installed) (Not mounted)

FSN	Quantity LS-46A	Quantity LS-46	Nomenclature, part No., and mfr code
6760-977-8998	1		Cable Assembly, Special Purpose, Electrical, Branched LA-226A: CAI 2998-234 (Not installed) (Not mounted)
6760-977-8997	1		Cable Assembly, Special Purpose, Electrical, Branched LA-229A: CAI 2998-237 (Not installed) (Not mounted)
6760-977-8994	1		Fixture, Shutter Alignment: CAI 2998-300 (Not installed) (Not mounted)
6760-977-8995	1		Fixture, Torque Wrench: CAI 2998-508 (Not installed) (Not mounted)
6760-977-8992	1		Test Set, Photographic Surveillance System Components LA-224A: CAI 2998-260 (Not installed) (Not mounted)
6760-977-8990	1		Test Shutter: CAI 2998-240 (Not installed) (Not mounted)
5120-977-7450	1		Wrench, Torque: CAI 2998-506 (Not installed) (Not mounted)

b. Test System, Photographic Surveillance LS-34, LS-34A (Group II).

FSN	Quantity LS-34	Quantity LS-34A	Nomenclature, part No., and mfr code
6760-874-4550	1		Analyzer, Photographic Surveillance System LS-35: this equipment is used to select, route and measure the output signal voltages of an aerial camera control system that is under test; CAI 2996-300 (Not installed) (Not mounted)
6760-083-0363		1	Analyzer, Photographic Surveillance System LS-35A: this equipment is used to select, route and measure the output signal voltages of an aerial camera control system that is under test; CAI 2996-300-1 (Not installed) (Not mounted)
6760-874-4548	1		Simulator, Control System Camera LS-36: this equipment simulates the aircraft camera control system of an aircraft camera such as Camera, Still Picture KA-30A and Camera, Still Picture KA-39A while the camera is being bench tested; CAI 2996-200 (Not installed) (Not mounted)
6760-083-8322		1	Simulator, Control System Camera LS-36A: this equipment simulates the aircraft camera control system of an aircraft camera such as Camera, Still Picture KA-30A and Camera, Still Picture KA-39A while the camera is being bench tested; CAI 2996-200-1 (Not installed) (Not mounted)
6760-874-4552	1		Simulator Group LM-97: this equipment is used to provide simulated scanner signals, terrain brightness signals and flash burst signals to an aerial camera control system being tested by the photographic system analyzer; CAI 2996-400 (Not installed) (Not mounted)
6760-083-0362		1	Simulator Group LM-97A: this equipment is used to provide simulated scanner signals, terrain brightness signals, and flash burst signals to an aerial camera control system being tested by the photographic system analyzer CAI 2996-400-1 (Not installed) (Not mounted)

c. Analyzer, Photographic Surveillance LS-35, LS-35A (Group IIa).

FSN	Quantity LS-35	Quantity LS-35A	Nomenclature, part No., and mfr code
6760-856-6674	1		Analyzer, Photographic Surveillance System LM-103: CAI 2996-1000 (Not installed) (Not mounted)
6760-083-8323		1	Analyzer, Photographic Surveillance System LM-103A: CAI 2996-370 (Not installed) (Not mounted)
6760-855-9292	1	1	Cable Assembly, Special Purpose, Electrical LM-106A: CAI 2996-309 (Not installed) (Not mounted)
6760-855-9291	1	1	Cable Assembly, Special Purpose, Electrical, Branched LM-107A: CAI 2996-308 (Not installed) (Not mounted)
6760-855-9290	1	1	Lead, Electrical LM-104A: CAI 2996-305 (Not installed) (Not mounted)
6760-855-9289	1	1	Lead, Electrical LM-105A: CAI 2996-304 (Not installed) (Not mounted)

d. Simulator Control System, Camera LS-36, LS-36A (Group Ib).

FSN	Quantity LS-36	Quantity LS-36A	Nomenclature, part No. and mfr code
6760-971-5126	1	1	Cable Assembly, Power, Electrical LM-110A: CAI 2996-264 (Not installed) (Not mounted)
6760-740-0704	1	1	Cable Assembly, Special Purpose, Electrical LA-173A: CAI 2996-208 (Not installed) (Not mounted)
6760-740-0707	1	1	Cable Assembly, Special Purpose, Electrical LA-174A: CAI 2996-209 (Not installed) (Not mounted)
6760-740-0708	1	1	Cable Assembly, Special Purpose, Electrical LA-175A: CAI 2996-254 (Not installed) (Not mounted)
6760-740-0701	1	1	Cable Assembly, Special Purpose, Electrical, Branched LA-172A: CAI 2996-207 (Not installed) (Not mounted)
6760-740-0699	1	1	Cable Assembly, Special Purpose, Electrical, Branched LM-109A: CAI 2996-206 (Not installed) (Not mounted)
6760-972-0251	1	1	Cover And Gasket Assembly: CAI 2998-457 (Not installed) (Not mounted)
6760-083-0365	1	1	Cover and Gasket Assembly: CAI 2998-458 (Not installed) (Not mounted)
6685-063-4735	1	1	Gage, Compound Pressure Vacuum, Dial Indicating: CAI 2998-451 (Not installed) (Not mounted)
6760-856-6671	1	1	Simulator, Control System, Camera LM-108: CAI 2996-1100 (Not installed) (Not mounted)
6760-083-8325		1	Simulator, Control System, Camera LM-108A: CAI 2996-273 (Not installed) (Not mounted)
6760-874-4549	1		Test Set, Vacuum Regulator Assembly LA-185: CAI 2998450 (Installed in equip) (Not mounted)
6760-083-8324		1	Test Set, Vacuum Regulator Assembly LA 185A: CAI 2998471 (Installed in equip) (Not mounted)
4720-740-0709	1	1	Tubing, Rubber: 48 in lg; CAI 2996-260-1 (Not installed) (Not mounted)

e. Simulator Group LM-97, LM-97A (Group IIc).

FSN	Quantity LM-97	Quantity LM-97A	Nomenclature, part No. and mfr code
6760-874-4555	1	1	Adapter, Flash Burst Simulator LM-112A: CAI 2996401 (Not installed) (Not mounted)
6760-740-0698	1	1	Cable Assembly, Special Purpose, Electrical LM-114A: Light source; CAI 2996-307 (Not installed) (Not mounted)
6760-740-0697	1	1	Cable Assembly, Special Purpose, Electrical LM-115A: scanner exciter CAI 2996-306 (Not installed) (Not mounted)
6760-874-4556	1	1	Exciter Scanner LM-113A: CAI 2851400 (Not installed) (Not mounted)
6760-874-4553	1	1	Simulator, Flash Burst LM-111A: CAI 2996450 (Not installed) (Not mounted)
6760-970-8889	1	1	Strap And Spring Assembly: CAI 2996406 (Not installed) (Not mounted)
6760-874-4554	1	1	Test Set, Photoflash Cartridge Ejector LS-37A: CAI 2851-600 (Not installed) (Not mounted)

f. Testing Machine, Camera Shutter Speed LS-33, LS-33A (Group III).

FSN	Quantity LS-33	Quantity LS-33A	Nomenclature, part No., and mfr code
6760-874-4551	1	1	Adapter, Photoelectric Cell To Camera Lens Cone LA-170A: CAI 2998406 (Not installed) (Not mounted)
6760-740-0695	1	1	Cable Assembly, Power, Electrical LM-102A: CAI 2998-401 (Not installed) (Not mounted)
6760-740-0693	1	1	Cable Assembly, Special Purpose, Electrical LC-4A: CAI 2998-399 (Not installed) (Not mounted)
6760-740-0694	1	1	Cable Assembly, Special Purpose, Electrical LM-100A: CAI 2998-400 (Not installed) (Not mounted)
6760-896-3158	1	1	Cable Assembly, Special Purpose, Electrical, Branched LA-171A: CAI 2998-398 (Not installed) (Not mounted)
6760-740-0696	1	1	Lead, Electrical LM-101A: CAI 2998-501 (Not installed) (Not mounted)
6760-856-6673		1	Testing Machine, Camera, Shutter Speed LM-99: CAI 2996-1300 (Not installed) (Not mounted)
6760-977-1014		1	Testing Machine, Camera Shutter Speed LM-99A: CAI 2998-475 (Not installed) (Not mounted)

g. Tool Kit, Camera Alignment And Adjustment LS-49A (Group IV).

FSN	Quantity LS-49A	Quantity LS-49	Nomenclature, part No., and mfr code
6760-083-0360	1		IMC Adjusting Plate: CAI No. 5001-100 (Not installed) (Not mounted)
6760-064-5358	1		Spool Support: CAI 5002-100 (Not installed) (Not mounted)
6760-064-5359	1		Back Focal Length Fixture: CAI 5078-100 (Not installed) (Not mounted)

6.1. Components and Dimensions

a. Test System, Photographic Surveillance LS-34A (fig. 1, 2, and 3).

NOTE

This listing is based on the original shipment by the contractor on order No. AF 33(657)7642.

Quantity	Item	Dimensions (in.) Height	Depth	Width	Weight (lb)
1	Analyzer Photographic Surveillance System LS-35A (fig. 1), consisting of:				
1	Analyzer, Photographic Surveillance System LM-103A	18-½	15-1/8	15-1/8	40
1	Lead, Electrical LM-104A (Cable 2996-305)	1-11/16 lg	.....	.....	0.063
1	Lead, Electrical LM-105A (Cable 2996-304)	4-½ lg	.....	.....	0.063
1	Cable Assembly, Special Purpose, Electrical, Branched LM-106A (Cable 2996-309).	99 lg	.....	.....	3
1	Cable Assembly, Special Purpose, Electrical, Branched LM-107A (Cable 2996-308).	99 lg	.....	.....	3
1	Simulator, Control System, Camera LS-36A (fig. 2), consisting of:				
	Simulator, Control System, Camera LM-108A	15	15-1/8	15-1/8	55
1	Cable Assembly, Special Purpose, Electrical, Branched LM-109A (Cable 2996-206).	48 lg	.....	.....	0.875
1	Cable Assembly, Power, Electrical LM-I OA (Cable 2996-264)	72 lg	.....	.....	1.063
1	Cable Assembly, Special Purpose, Electrical Branched LA-172A (Cable 2996-207).	48 lg	.....	.....	0.875
1	Cable Assembly, Special Purpose, Electrical, LA-173A (Cable 2996-208).	48 lg	.....	.....	1.063
1	Cable Assembly, Special Purpose, Electrical, LA-174A (Cable 2996-209).	48 lg	.....	.....	1.375
1	Cable Assembly, Special Purpose, Electrical, LA-175A (Cable 2996-254).	36 lg	.....	.....	0.5
1	Vacuum tubing (Tubing 2996-260-1)	48 lg	3/8 id	.....	0.29
1	Test Set, Vacuum Regulator Assembly LA-185A (fig. 2), consisting of:				
	Vacuum gage and case assembly (CAI Part No. 2998451)	4-½ dia	3	.....	1
1	DA-30A platen cover (CAI Part No. 2998-458)	4-½ dia	½	4-½	0.625
1	KA-39A platen cover (CAI Part No. 2998457)	9	3/8	9	2.188

7. Common Names

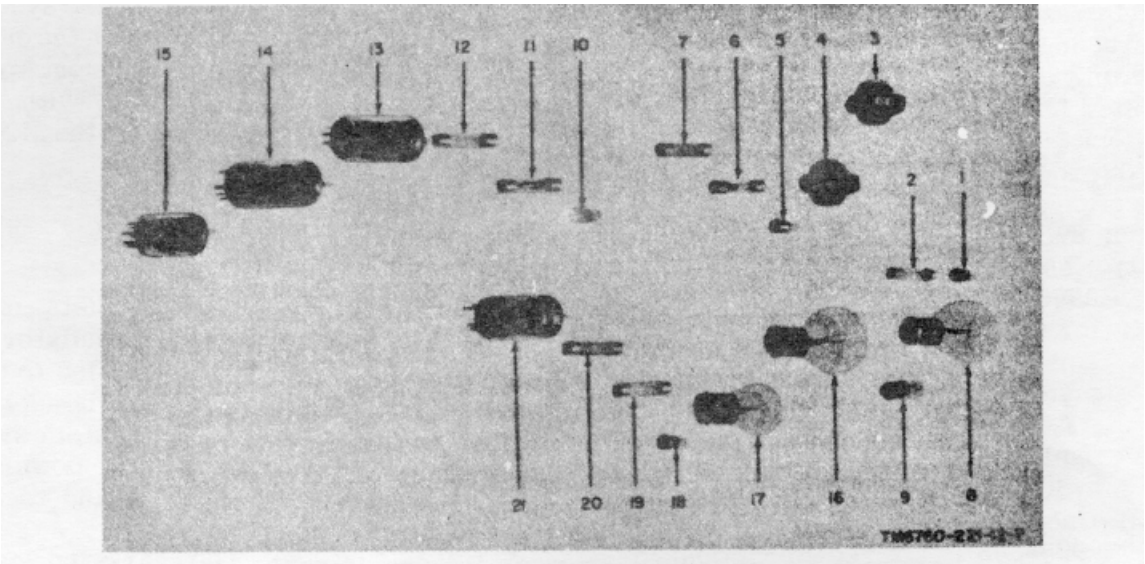
The following chart lists the common names assigned to the components of the camera system test equipment.

Common name	*Item*
ACCS	Aircraft Camera Control System
Analyzer	Analyzer, Photographic Surveillance System LM-103A.
Analyzer acces-sories kit	Simulator Group LM-97A.
KA-30A	Camera, Still Picture KA-30A (camera component).
Camera	Camera, Still Picture KA-39A (camera component).

Common name	*Item*
ACCS control box	Camera, Still Picture KA-39A (control box assembly component
T-11 (KC-1)	Camera Aircraft Mapping camera T-11 (or KC-1).
Flash ejector tester	Test Set, Photoflash Cartridge, Ejector LS-37A.
Light box adapter	Adapter, Flash Burst Simulator LM-112A
Light source	Simulator, Flash Burst LM-111A.
Maintenance kit	Test System, Photographic Surveillance LS-34A.
Photocell and adapter assembly.	Adapter, Photoelectric Cell to Camera Lens Cone LA-170A.
Scanner exciter	Exciter, Scanner LM-113A.
Shutter tester	Testing Machine, Camera Shutter Speed LS-33A.
Shutter tester. panel	Tester Machine, Camera Shutter Speed LM-99A.
Simulator	Simulator, Control System, Camera LM-108A.
System analyzer	Analyzer, Photographic Surveillance System LS-35A.
System components test set	Test Set, Photographic Surveillance System Components LS-46A.
System simulator	Simulator, Control System Camera LS-36A.

Common name	*Item*
Test panel.....	Test Set, Photographic Surveillance System Components LA-224A.
Tool kit.....	Tool Kit, Camera Alignment and Adjustment LS-49A.
Vacuum regulator test set.	Test Set, Vacuum Regulator Assembly LA-185A.
Cable 2996-206--	Cable Assembly, Special Purpose, Electrical, Branched LM-109A.
Cable 2996-207--	Cable Assembly, Special Purpose, Electrical, Branched LA-172A
Cable 2996-208--	Cable Assembly, Special Purpose, Electrical LA-173A.
Cable 2996-209--	Cable Assembly, Special Purpose, Electrical LA-174A.
Cable 2996-254--	Cable Assembly, Special Purpose, Electrical LA-175A.
Cable 2996-264--	Cable Assembly, Power, Electrical LM-110A.
Cable 2996-304--	Lead, Electrical LM-105A.
Cable 2996-305--	Lead, Electrical LM-104A.
Cable 2996-306--	Cable Assembly, Special Purpose, Electrical LM-115A.
Cable 2996-307--	Cable Assembly, Special Purpose, Electrical LM-114A.
Cable 2996-308--	Cable Assembly, Special Purpose, Electrical, Branched LM-107A.

Common name	*Item*
Cable 2996-309--	Cable Assembly, Special Purpose, Electrical LM-106A.
Cable 2998-233--	Cable Assembly, Special Purpose, Electrical, Branched LA-225A.
Cable 2998-234--	Cable Assembly, Special Purpose, Electrical, Branched LA-226A.
Cable 2998-235--	Cable Assembly, Special Purpose, Electrical, Branched LA-227A.
Cable 2998-236--	Cable Assembly, Special Purpose, Electrical, Branched LA-228A.
Cable 2998-237--	Cable Assembly, Special Purpose, Electrical, Branched LA-229A.
Cable 2998-238--	Cable Assembly, Special Purpose, Electrical, Branched LA-230A.
Cable 2998-239--	Cable Assembly, Special Purpose, Electrical, Branched LA-231A.
Cable 2998-398--	Cable Assembly, Special Purpose, Electrical, Branched LA-171A.
Cable 2998-399--	Cable Assembly, Special Purpose, Electrical LC-4A.
Cable 2998-400--	Cable Assembly, Special Purpose, Electrical LM-100A.
Cable 2998-401--	Cable Assembly, Power, Electrical LM-102A.
Cable 2998-501--	Lead, Electrical LM-101A.



1- Lamp, type MS25237-327
2- Fuse, type MS90078-12
3- Lamp, type 343024-SA2
4- Lamp, type 343125-SA2
5- Lamp, type MS25237-327
6- Fuse, type MS90078-5-1
7- Fuse, type MS90079-24-1
8- Lamp, type MS25235-311
9- Lamp, type MS25231-313
10- Lamp, type MS35237-327
11- Fuse, type F02B32V15A
12- Fuse, type F02A250V2A
13- Electron tube, 5814A
14- Electron tube, 5751
15- Electron tube, 5696
16- Lamp, type 2998-397 '
17- Lamp, type MS35478-305
18- Lamp, type MS25237-327
19- Fuse, type MS90078-14
20- Fuse, type MS90079-8
21- Electron tube, 5814A

Figure 7. Running spares.

Section III. MAINTENANCE KIT

8. Description of Maintenance Kit

(fig. 1, 2, and 3)

The maintenance kit includes the system analyzer (para 9), the system simulator (para 10), the vacuum regulator test set (para 11), and the analyzer accessories kit (para 12). The vacuum regulator test set is packed with, and is a part of, the system simulator.

9. Description of System Analyzer

(fig. 1)

The system analyzer consists of a carrying case (a below), an analyzer (b below), and a set of interconnection cables (c below). Power to operate the system analyzer is furnished either by the ACCS being tested or by the system simulator (para 10).

a. Carrying Case. The carrying case consists of a hinged bottom and a cover. Six snaplocks are provided to secure the cover to the hinged bottom when the carrying case is closed. During storage and transit, the interconnection cables (c below) are secured within the cover. During operation, the cover is removed and the analyzer (b below) remains in the hinged bottom carrying case.

b. Analyzer. The analyzer contains the meters, indicators, fuses, connectors, and operating controls. The analyzer can be operated in either the upright or horizontal position.

c. Interconnection Cables. Four interconnection cables are furnished with the system analyzer, as follows:

(1) *Cable 2996-304 (LM-105A).* Cable 2996-304 is a three-prong connector with a jumper wire connected across two pins. This connector mates with connector P3 of the AN/USD-1B drone right ejector cable to bypass the air-safety switch.

(2) Cable 2996-305 (LM-104A). Cable 2996-305 is a three-prong connector with a jumper wire connected across two pins. This connector mates with connector P5 of the L-19A aircraft right ejector and air switch cable to bypass the air-safety switch.

(3) *Cable 2996-308 (LM-107A).* Cable 2996-308 is a branched 14-conductor cable. Four of the conductors are shielded. Cable 2996-308 connects the system analyzer to the control box assembly of the KA-39A and to the system power cable. One end of the cable is terminated by a 37-prong female connector which mates with TEST CABLE connector J1 on the system analyzer. The other end of the cable is terminated by a 14-prong male connector which mates with J1001 on the ACCS control box, and a 14-prong female connector which mates P1001 of the system power cable.

(4) *Cable 2996-309 (LM-106A).* Cable 2996-309 is a 37-conductor cable. Nine of the conductors are shielded. Cable 2996-309 connects the system analyzer to the drone test cable. One end of the cable is terminated by a 37-prong female connector which mates with TEST CABLE connector J1 on the system analyzer. The other end of the cable is terminated by a 37-prong male connector which mates with the system test connector on the MQM-58A.

10. Description of System Simulator

(fig. 2)

The system simulator consists of a carrying case (below), a simulator (b below), and interconnection cables (c below). During operation, power is applied from a power source to the system simulator which then distributes the power to the system analyzer (para 9) and to the camera under test.

a. Carrying Case. The carrying case consists of a hinged bottom and a detachable cover. Six snaplocks are provided to secure the cover to the hinged bottom

when the carrying case is closed. During transit and storage, the vacuum regulator test set (para 11) and the interconnecting cables (c below) are secured within the cover of the carrying case. During operation, the cover is removed and the simulator (b below) remains in the hinged bottom of the carrying case.

b. Simulator. The simulator contains a vacuum gage, indicators, fuses, connectors, and operating controls, and can be operated in either the upright or horizontal position.

c. Interconnection Cables. Six interconnection cables are furnished with the system simulator, as follows:

(1) *Cable 2996-206 (LM-109A).* Cable 2996-206 is a branched five-conductor cable. Three of the conductors are shielded. Cable 2996-206 connects the system simulator to the T-11 or KC-1 camera. One end of the cable is terminated by a seven-prong male connector which mates with T-11 or KC-1 connector J703 on the system simulator. The other end of the cable is terminated by a two-prong female connector which mates with connector P202 on the T-11 or KC-1 camera, and a three-prong female connector which mates with connector P101 on the T-11 or KC-1 camera.

(2) *Cable 2996-207 (LA-172A).* Cable 2996-207 is a branched eight-conductor cable. All of the conductors are shielded. Cable 2996-207 connects the system simulator to the camera. One end of the cable is terminated by a 14-prong male connector which mates with connector J704 on the system simulator. The other end of the cable is terminated by a three-prong male connector which mates with connector J2 on the camera, and a nine-prong female connector which mates with connector J3 on the camera.

(3) *Cable 2996-208 (LA-173A).* Cable 2996-208 is a 12-conductor cable which connects the system simulator to the KA-30A camera. One end of the cable is terminated by a 17-prong male connector which mates with KA-30 connector J702 on the system simulator. The other end of the cable is terminated by a 17-prong female connector which mates with connector LA2A2P3 on the KA-30A camera.

(4) *Cable 2996-209 (LA-174A).* Cable 2996-209 is a 16-conductor cable. Four of the conductors are shielded. Cable 2996-209 connects the system simulator to the KA-30A camera. One end of the cable is terminated by a 26-prong male connector which mates with KA-30A connector J706 on the system simulator. The other end of the cable is terminated by a 26-prong female connector which mates with connector 1A2A2P2 on the KA-30A camera.

(5) *Cable 2996-254 (LA-175A).* Cable 2996-254 is a 28-conductor cable which connects the camera body of the KA-30A camera to the lens cone of the KA-30A camera. One end of the cable is terminated by a 34-prong male connector which mates with connector 1A2A2P4 on the lens cone of the KA-30A camera. The other end of the cable is terminated by a 34-prong female connector which mates with connector 1A1J4 on the camera body of the KA-30A camera.

(6) *Cable 2996-264 (LM-110A).* Cable 2996-264 is a three-conductor cable which connects the system simulator to the direct-current (dc) and alternating-current (ac) power sources. One end of the cable is terminated by a seven-prong female connector which mates with POWER IN connector J705 on the system simulator. The other end of the cable is terminated by three tinned leads for connection to the sources of power.

11. Description of Vacuum Regulator Test Set
(fig. 2)

The basic items that comprise the vacuum regulator test set are the vacuum gage and case assembly (a below) and the KA-30A and KA-39A platen covers (b below). During transit and storage, the vacuum gage and case assembly and platen covers are secured within the cover of the system simulator is a carrying case (para 10a). The vacuum regulator test set is housed and shipped in the carrying case of the system simulator (para 10).

a. Vacuum Gage and Case Assembly. One end of the vacuum gage assembly terminates in a direct reading vacuum gage. The other end of the vacuum gage and case assembly terminates in a threaded fitting. The threaded fitting is screwed into the platen cover to attach the vacuum gage and case assembly to the platen cover (b below). The vacuum gage is housed in a protective carrying case.

b. Platen covers. The platen covers are aluminum sheets with gaskets which are placed over the platen to seal the vacuum. A threaded hole in the center of each platen cover permits the vacuum to be measured by the vacuum gage and case assembly. The large and the small platen covers are used with the camera and the KA-30A camera, respectively.

12. Description of Analyzer Accessories Kit
(fig. 3)

The analyzer accessories kit consists of a carrying case (a below), light source components (b below), scanner exciter (c below), flash ejector testers (d below), and interconnection cables (e below).

a. Carrying Case. The carrying case consists of a hinged bottom and a flatboard-type detachable cover. Four snaplocks are provided to secure the cover to the hinged bottom when the carrying case is closed. During operation, the components of the analyzer accessories kit are removed from the bottom of the carrying case. During storage and transit, the components of the analyzer accessories kit are stored in the carrying case.

b. Light Source Components. The light source components consist of the light source, the light box adapter, and the spring assemblies.

(1) *Light source.* The light source contains three light assemblies and a photocell. The light source, controlled from the system analyzer (para 9), simulates a flash burst to test the flash detector in the ACCS.

(2) *Light box adapter.* The light box adapter is provided so that, when necessary, the light source can be attached to the aircraft containing the ACCS under test.

(3) *Spring assemblies.* The spring assemblies are provided so that the light source can be attached to the airframe of the AN/USD-1B or the MQM-58A drone containing the ACCS under test.

c. Scanner Exciter. The scanner exciter contains two lights which provide alternating light signals, controlled from the system analyzer (para 9), to test the response of the scanner in the ACCS under test. The scanner exciter is attached to the aircraft by an integral spring latch.

d. Flash Ejector Testers. Each flash ejector tester has two prong-type mounting connectors and is connected directly to a flash ejector of the ACCS under test. The flash ejectors contain lamps which flash when the flash-firing circuit of the ACCS is energized.

e. Interconnection Cables. Two interconnection cables are supplied with the analyzer accessories kit, as follows:

(1) *Cable 2996-306 (LM-115A).* Cable 2996-306 is a seven-conductor cable. One of the conductors is shielded. Cable 2996-306 connects the scanner exciter to the system analyzer. One end of the cable is terminated by an eight-prong male connector which mates With SCANNER EXCITER connector J3 on the system analyzer. The other end of the cable is terminated by an eight-prong female connector which mates with the connector on the scanner exciter.

(2) *Cable 2996-307 (LM-114A).* Cable 2996-307 is a seven-conductor cable. Four of the conductors are shielded. Cable 2996-207 connects the light source to the system analyzer. One end of the cable is terminated by a seven-prong male connector which mates with LIGHT SOURCE connector J4 on the system analyzer. The other end of the cable is terminated by a seven-prong female connector which mates with the connector on the light source.

Section IV. SYSTEM COMPONENTS TEST SET

13. Description of System Components Test Set

The system components test set (fig. 4) consists of the test panel (para 14) and minor components (para 15) housed in a carrying case. The test panel is shock mounted in the hinged bottom of the carrying case. The minor components are secured in a compartmented cushion behind a hinged door and a retaining cushion in the cover of the carrying case.

14. Description of Test Panel

(fig. 4)

The test panel includes an attached electronic components chassis (inside the case), a pulse MILLISECOND TIMER meter, a PULSE TIMER clock, test function control switches, power switches, indicators, fuses, and electrical receptacles for connection to power and to the unit under test. The test panel may be operated in a vertical or horizontal position.

15. Description of Minor Components

The minor components of the system components test set consist of a group of camera alignment and test equipments (a through e below), and a set of interconnection cables (f below).

a. Shutter Alignment Fixture. The shutter alignment fixture is an aluminum base with machined parts to hold and manually operate the camera shutter for adjustment and testing. Three posts elevate the shutter alignment fixture above the base plate to permit movement of the shutter time control or the DAY-NIGHT mode controls. Slots in the sides of the shutter alignment fixture mount and align the shutter. The shutter drive control is used to cock and trip the shutter. A shutter indicator arm and an index plate position and orient the shutter. A photocell adapter positioned above an aperture in the base of the shutter alignment fixture adapts the shutter tester (para 16) to check shutter time and efficiency.

b. Test Shutter. The test shutter consists of a fixed 1/100-second, single action, five-leaf mechanical shutter mounted in a cylindrical housing. Clear plastic disks above and below the shutter protect the shutter mechanism from dirt and foreign particles. A shutter trip plunger is used to trip the shutter manually. The test shutter is used with the light source of the shutter tester (para 16) to simulate photoflash bursts when testing the flash detector used in the camera control system. An electrical connector on the test shutter mates with the special connector on one branch of cable 2998237.

c. Cycle Time Gage. The cycle time gage is a clear plastic gage engraved with index marks for evaluating charts of the camera cam actions as measured by the Brush recorder. Use of the cycle time gage is covered in TM 11-6720-207-35.

d. Torque Fixture. The torque fixture is used for torque checks of the supply brake and the takeup clutch of the camera, and consists of a base plate and a torque wrench adapter. The base plate contains superimposed circular and rectangular recesses centered about a central clearance hole. Base plate gear racks engage the teeth of the takeup clutch drive gear and prevent movement during torque measurements. Those parts of the clutch that extend beyond the gear pass through the

clearance hole in the plate. The fixed plate of the supply brake is held stationary for torque checks by the rectangular recess. The four legs provide clearance for portions of the supply brake or takeup clutch that extend through the clearance hole. The torque wrench adapter has a square hole in one end to fit a torque wrench drive shaft, and in the other end a round hole with two notches to engage the keyed spool shaft of either the supply brake or takeup clutch. An adapter retaining clamp and thumbscrew secure the torque wrench adapter to the base plate for storage.

e. Open-End Wrenches. The offset open-end wrenches are 9/16-inch wrenches used to loosen the locknut and adjust the position of the clutch collar during supply brake and takeup clutch torque adjustment procedures.

f. Interconnection Cables. Eight interconnection cables are furnished with the system components test set, as follows:

(1) *Cable 2996-264(LM-110A).* Cable 2996-264 is a three-conductor cable which connects the test panel to the dc and ac power sources. One end of the cable is terminated by a seven-prong female connector which mates with POWER connector J1 on the test panel. The other end of the cable is terminated by three tinned leads for connection to the sources of power.

(2) *Cable 2998-233 (LA-225A).* Cable 2998-233 is a two-conductor shielded cable which connects the test panel timers for checking external equipment. Each end of the cable is terminated by a two-prong male connector color-coded gray, and by a one-prong (ground) male connector color-coded yellow.

(3) *Cable 2998-234 (LA-226A).* Cable 2998-234 is a nine-conductor cable which connects the test panel to the flash ejector connectors on the ACCS control box for the camera. One end of the cable is terminated by a 14-prong male connector which mates with CONTROL BOX connector J6 on the test panel. Two branches on the other end of the cable are terminated by a 14-prong male connector which mates with connector J1001, and an eight-prong male connector which mates with connector J1002 on the ACCS control box for the camera. The remaining single lead is terminated by an alligator-type clip for connection to the C (common) contact of the B-deck of RESET switch S1002 in the ACCS control box for the camera.

(4) *Cable 2998-235 (LA-227A).* Cable 2998-235 is a 22-conductor cable which connects the test panel to the input and output connectors on the ACCS control box for the camera. One end of the cable is terminated by a 37-prong male connector which mates with CONTROL BOX connector J13 on the test panel. The other end of the cable is terminated by a 17-prong female connector which mates with connector J1003 on the ACCS control box and a 17-prong male connector which mates with connector J1004 on the ACCS control box.

(5) *Cable 2998-236 (LA-228A).* Cable 2998-236 is a five-conductor cable which connects the test panel to the KA-39A camera magazine. A 10-prong male connector on one end of the cable mates with CAMERA connector J10 on the test panel. The other end of the cable is terminated by a nine-prong female connector which mates with POWER connector J1 on the camera magazine. Two remaining conductors of the cable terminate in insulated alligator-type clips.

(6) *Cable 2998-237 (LA-229A).* Cable 2998-237 is an eight conductor cable which connects the test panel to the flash detector used in the KA-30A ACCS. One end of the cable is terminated by a 14-prong male connector which mates with KA-30A FLASH DET connector J2 on the test panel. One branch of the cable is

terminated by an eight-prong female connector, which mates with connector J101 of the ACCS flash detector. The other branch is terminated by a two-prong female connector which mates with the electrical connector on the test shutter.

(7) *Cable 2998-238 (LA-230A).* Cable 2998-238 is a two-conductor shielded cable which connects the test panel to the flash detector used in the camera ACCS. One end of the cable is terminated by a 19-prong male connector which mates with AMPLIFIER KA-39A FLASH DET connector J7 on the test panel. The other end of the cable is terminated by a three-prong female connector which mates with connector P2 on the ACCS flash detector pendant cable.

(8) *Cable 2998-239 (LA-231A).* Cable 2998-239 is an eight-conductor cable. Two of the conductors are shielded. Cable 2998-239 connects the test panel to the amplifier and overrun assembly when the latter is removed from the camera magazine. One end of the cable is terminated by a 19-prong male connector which mates with AMPLIFIER KA-39A FLASH DET connector J7 on the test panel. The other end of the cable is terminated by a 15-prong female connector which mates with connector P1 on the camera.

Section V. SHUTTER TESTER AND TOOL KIT

16. Description of Shutter Tester

(fig. 5)

The shutter tester consists of a carrying case, a shutter tester panel (para 17), a photocell and adapter assembly (para 18), and five interconnection cables (para 19). The shutter tester panel is mounted in the hinged bottom of the carrying case. The photocell and adapter assembly and the interconnection cables are stored in the cover of the carrying case.

17. Description of Shutter Tester Panel

(fig. 5)

The shutter tester panel contains alight source and a meter calibrated in milliseconds. The control panel contains the indicators, operating controls, connectors, and light source. The shutter tester panel also contains a blower motor (not shown) for cooling the light source lamps, and an interlock switch mounted on the ventilation door. During operation, the cover of the carrying case is removed and the shutter tester panel remains in the hinged bottom of the carrying case.

18. Description of Photocell and Adapter Assembly

(fig. 5)

a. Photocell. The photocell is a light-sensitive detecting element. The photocell is used to detect the intensity of the light coming through the shutter mechanism of the lens cone being tested.

b. Adapter Assembly. The adapter assembly consists of an aluminum plate, a peripheral gasket, a central threaded adapter for attaching the photocell, and a shutter key. The adapter assembly is used to mount the photocell on the top of the lens cone being tested and to exclude surrounding light. The adapter assembly contains guide pins and camera-type markings (KA-30A, KA-39A and T-11 (KC-1)) to facilitate mounting it correctly on top of the lens cone. The shutter key is secured to the adapter assembly with a ball-type chain. The key is used to mechanically actuate a shutter mechanism of the type used in the camera lens cone.

19. Description of Interconnection Cables

(fig. 5)

Five interconnection cables are provided with the shutter tester.

a. Cable 2998-398 (LA-171A). Cable 2998-398 is a multiconductor cable used for connecting the shutter tester panel to the lens cone of the KA-30A camera. One end of the cable is terminated by a seven-prong male connector which mates with SHUTTER connector

J408 on the shutter tester panel. The other ends of the cable are terminated by two female connectors and one male connector for connection to the lens cone being tested.

b. Cable 2998-399 (LC-4A). Cable 2998-399 is a three-conductor cable used for connecting the shutter tester panel to the lens cone of the T-11 or KC-1 camera. One end of the cable is terminated by a seven-prong male connector which mates with SHUTTER connector J408 on the shutter tester panel. The other end of the cable is terminated by a three-prong female connector for connection to the lens cone being tested.

c. Cable 2998-400 (LM-100A). Cable 2998-400 is a two-conductor shielded cable used for connecting the shutter tester panel to the photocell and adapter assembly. One end of the cable is terminated by a three-prong male connector which mates with PHOTOCELL connector J401 on the shutter tester panel. The other end of the cable is terminated by a four-prong female connector which mates with the photocell connector on the photocell and adapter assembly.

d. Cable 2998-401(LM-102A). Cable 2998-401 is a four-conductor cable used for connecting the shutter tester panel to the dc and ac sources of power. One end of the cable is terminated by a four-prong female connector for connection of POWER connector J409 on the shutter tester panel. The other end of the cable is terminated by four tinned leads for connection to the sources of power.

e. Cable 2998-501 (LM-101A). Cable 2998-501 is a single-conductor cable used for bypassing the interlock of the T-11 or KC-1 camera from the lens cone to the camera body. Each end of the cable is terminated by a single-prong banana plug for connection to the banana jacks of the lens cone.

20. Description of Tool Kit
(fig. 6)

a. The IMC adjusting plate is a flat plate which provides an index detent hole for the camera altitude adjustment control detent pin which corresponds to a speed of 200 miles per hour at 5, 000 feet.

b. The spool support spacing fixture is a cylindrical gage with clearance provisions for mounting on the spool supports to measure and establish proper spacing.

c. The back focal length fixture is a parallel gage bar that contains three slots. The slots permit the use of a dial depth gage to measure the lens cone mating surface to the platen surface dimensions.

d. The carrying case consists of a hinged wooden case provided with fitted liners of cushioning material to accommodate the tools. A clasp secures the case cover when closed.

CHAPTER 2
SERVICE UPON RECEIPT OF EQUIPMENT

21. Unpacking
(fig. 8)

a. Packaging Data. When packed for shipment, components of the camera system test equipment are secured in their individual carrying cases. The carrying cases are packed in corrugated cartons and cushioned with filler material. The corrugated carton is closed and sealed with gummed tape. A typical corrugated carton and its contents is shown in figure 8. The dimensions and contents of the corrugated cartons containing the camera system test equipment are as follows:

Component	Carrying Case No.	Dimensions			Volume (cu ft)	Unit weight (lb)
		Height	Width	Depth		
System analyzer----------	1 of 3	21	25	21	6.4	70
System simulator [a] ----------	2 of 3	21	25	21	6.4	90
Analyzer accessories kit----------	3 of 3	21	25	21	6.4	55
System components test set ----------	1 of 1	19	24	20	5.2	78
Shutter tester ----------	1 of 1	30	26	20	6	64
Tool kit----------	1 of 1	3-½	13	10-½	0.276	9.5

[a] The vacuum regulator test set is packed with, and is a part of, the system simulator.

b. Removing Contents. Remove the equipment from the corrugated carton as follows:

(1) Cut the gummed tape that secures the top of the corrugated carton; fold back the top flaps and remove the carrying case containing the equipment.

(2) Cut and remove the lockwire from the carrying case latches and the relief valve. Turn the relief valve to the OPEN position to equalize the air pressure.

(3) Open the latches and remove the cover of the carrying case.

(4) Remove and open the package containing the technical manuals from the pocket on the hinged storage compartment door in the cover of the carrying case.

(5) Release the turnlock fasteners and open the hinged storage compartment door.

(6) Remove the retaining cushion, the minor components, and the spare parts.

22. Checking Unpacked Equipment

a. Inspect the equipment for damage that may have been incurred during shipment.

(1) Check all painted surfaces for scratches, nicks, dents, and fractures.

(2) Check to see that the pins on the front panel connectors are not bent or damaged.

(3) Check to see that the pins on the connectors of the associated cables are not bent or damaged.

b. If the equipment has been damaged, refer to paragraph 3b.

c. Check the equipment against the packing list. If no packing list accompanies the equipment, use paragraph 6 and report any overages or shortages on DD Form 6 (para 3b).

Note: **Shortages of minor assemblies or subassemblies (such as special tools or spares) that do not affect the proper functioning of the equipment should not prevent use of the end items of equipment.**

d. If the equipment has been used or reconditioned, see whether it has been changed by a modification work order (MWO); if modified, an MWO number will appear on the front panel, near the nomenclature plate. Check to see whether the MWO number and appropriate notations concerning the modification have been annotated in this manual.

Note: **Current MWO's applicable to the equipment are listed in DA Pamphlet 310-4.**

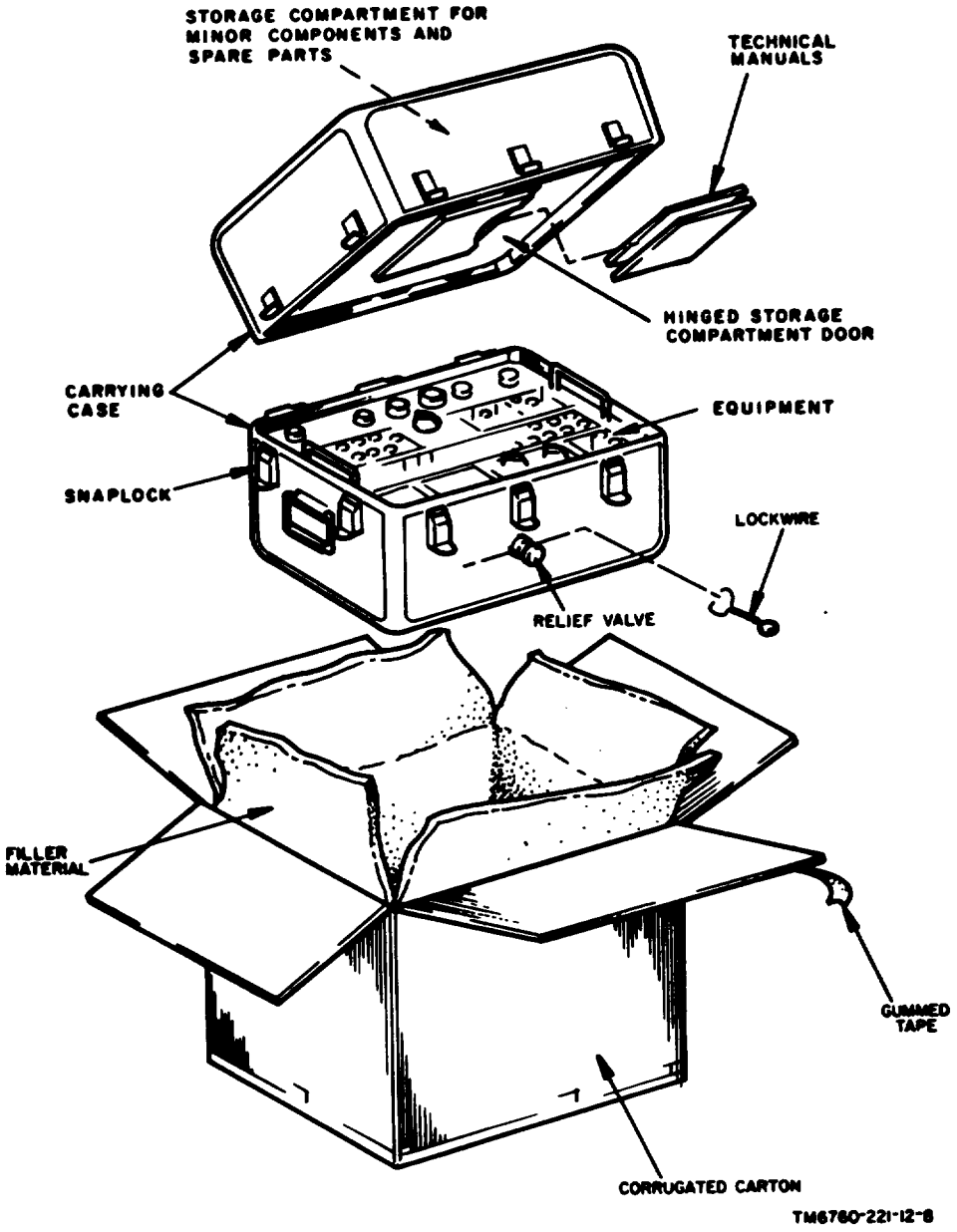


Figure 8. Typical packaging diagram.

23. Primary Power Connections

Two primary sources of power (28 volts dc and 115 volts, 400 cycles per second (cps)) are required for operation of the various components of the camera system test equipment. To connect the various components to the primary power sources, proceed as follows:

a. System Simulator. Connect cable 2996-264 (para 10c (6)) from POWER IN connector J705 on the system simulator (fig. 10) to the primary power sources as follows:

(1) Remove the carrying case cover from the equipment.

(2) Remove the cables from the carrying case cover.

(3) Set the panel POWER switch to OFF.

Warning: **Make sure that no voltage is present at the terminals of the primary power sources when making connections.**

(4) Connect the 27 VDC lead of the cable to the positive side of the 28-volt dc power source.

(5) Connect the 115V, 400CY, 1 PH lead of the cable to the ac output terminal (phase 1) of the 115-volt, 400-cps power source.

(6) Connect the DC GND lead of the cable to the ground (negative) side of the 28-volt dc power source.

(7) Connect the AC GND lead of the cable to the ground side of the 115-volt, 400-cps power source.

b. System Components Test Set. Connect cable 2996-264 (para 15f(1)) from POWER connector J1 on the system components test set (fig. 11) to the primary power source as follows:

(1) Perform the procedures given in a(1) through (5) above.

(2) Connect the ground side of the 28-volt dc power source to the ground side of the 115-volt, 400-cps power source.

(3) Connect the AC DC GRD lead of the cable to the ground side of the 28-volt dc power source.

c. Shutter Tester. Connect cable 2998401 (para 19d) from POWER connector J409 on the shutter tester (fig. 12) to the primary power sources (a(1) through (7) above).

24. System Analyzer Power Connection

During normal operation, the system analyzer receives its power from the ACCS under test (fig. 13, 14, and 15) or from the system simulator (fig. 16). However, to perform an operational test (para 56), connect primary power to the system analyzer as follows:

a. Remove the carrying case cover from the equipment.

b. Remove the cables from the carrying case cover.

c. Set the POWER switch (fig. 9) to OFF.

Warning: **Make sure that no voltage is present at the terminals of the primary power sources when making connections.**

d. Connect pin C of TEST CABLE connector J1 to a 115-volt, 400-cps (single-phase) power source.

e. Connect pin B of TEST CABLE connector J1 to the positive side of a 28-volt dc power source.

f. Connect pin A of TEST CABLE connector J1 to a ground point that is common to both power sources.

CHAPTER 3
OPERATING INSTRUCTIONS

Section I. CONTROLS, INDICATORS, CABLES, AND CONNECTORS

25. System Analyzer Controls, Indicators, Cables, and Connectors

The following charts list only those items used by operator and organizational maintenance personnel; items used by higher level maintenance personnel are covered in instruction for the appropriate maintenance level.

Note: **All indicator lamps are of the press-to-test type.**

a. Control and Indicators (fig. 9). The following chart lists the system analyzer controls and indicators.

Control or indicator	Function
Main panel section:	
Fuseholder lamps	Light when AC or DC fuse is blown.
FOCAL LENGTH switch	Six-position rotary switch:
	Position — *Function*
	1-1/2" — Sets up analyzer to check ACCS containing aerial camera with 1-1/2-inch lens cone.
	3" — Sets up analyzer to check ACCS containing aerial camera with 3-inch lens cone.
	6" — Sets up analyzer to check ACCS containing aerial camera with 6-inch lens cone.
	12" — Sets up analyzer to check ACCS containing aerial camera with 12-inch lens cone.
	18" — Sets up analyzer to check ACCS containing aerial camera with 18-inch lens cone.
	24" — Sets up analyzer to check ACCS containing aerial camera with 24-inch lens cone.
MASTER SELECTOR switch	Twenty-two-position rotary switch:
	Position — *Function*
	SCAN EXC CAL — Sets up analyzer to calibrate output of scanner exciter.
	LT LEVEL CAL — Sets up analyzer to calibrate light source.
	28 VDC SYS PWR — Sets up TEST CONDITIONS meter to check ACCS 28-vdc power.
	115 VAC 400 CY (PH A. PH B, or PH C) — Sets up TEST CONDITIONS meter to check 115-vac, 400-cps, three-phase ACCS power.
	SYS EXP (H or L) — Sets up TEST CONDITIONS meter to check high or low exposure output from ACCS.
	SYS FILM DR (H or L) — Sets up TEST CONDITIONS meter to check high or low film drive voltage from ACCS.
	EXP INPUT (H or L) — Sets up TEST CONDITIONS meter to check high or low input to ACCS exposure circuit.
	EXP DRIVE — Sets up TEST CONDITIONS meter to check ACCS exposure motor drive voltage.
	SCAN SIG (L or H) — Sets up TEST CONDITIONS meter to check ACCS scanner output.
	28 VDC SCAN — Sets up TEST CONDITIONS meter to check 28-vdc power from ACCS scanner converter to ACCS scanner.
	86 VDC SCAN — Sets up TEST CONDITIONS meter to check 86-vdc power from ACCS scanner converter to ACCS scanner.
	E V/H (H or L) — Sets up TEST CONDITIONS meter to check output of ACCS scanner converter.

Control or indicator	Function
	Position — *Function* MAN. E V/ H (H or L) — Sets up TEST CONDITIONS meter to check output of ACCS manual altitude and speed controls (if used). FILM DRIVE — Sets up TEST CONDITIONS meter to check film drive voltage from ACCS to serial camera.
LIGHT LEVEL CALIBRATE control	Rotary control; used to adjust light level (intensity) of output from light source.
SCAN EXC CALIBRATE control	Rotary control; used to adjust light level (intensity) output from scanner exciter.
TEST CONDITIONS meter	Indicates GO or NO-GO for various ACCS outputs as selected by MASTER SELECTOR switch.
CAMERA OPERATE indicator	Lights when shutter mechanism of KA-30A camera operates or when KA-39A camera is functioning (depending on which camera is being used with ACCS).
IMC OPERATE indicator	Lights when ACCS is applying IMC voltage to camera being tested.
FLASH DETECTOR PULSE indicator	Lights when ACCS flash detector senses a pulse of light (night mode only).
PULSE indicator	Lights when ACCS applies shutter operate pulse to camera (day mode) or when flash cartridge ejection pulse is received (night mode).
FLASH PULSE Indicator	Lights when simulated flash burst voltage is applied to ACCS.
TIMER section:	
Mode selector switch	Three-position rotary switch: *Position* — *Function* IMC — Sets up TIMER clock to time pulse output from camera. PULSE INTERVAL — Sets up TIMER clock to time pulse output from ACCS intervalometer. OVERRUN — Sets up TIMER clock to time ACCS night operation overrun circuit.
START control	Pushbutton switch; begins TIMER clock operation cycle when pressed.
RESET control	Pushbutton switch; resets TIMER clock to zero when pressed.
TIMER clock	Indicates elapsed interval of time in seconds and one-hundredths of a second (up to 60 seconds). Note: Two dials (one-hundredth-second increments and one-second increments are used. When clock is react, short hand will return to 60 and long hand will return to 100.
R/C SIMULATOR SECTION:	
KA-30A ARMING switch	Two-position toggle switch (located under switch guard): *Position* — *Function* UP — Sets up analyzer flash ejector control circuits. DOWN — Disarms analyzer flash ejector control circuits.
A-30 OPERATE switch	Two-position toggle switch: *Position* — *Function* ON — Applies operate power to ACCS, causing KA-30A camera to operate. OFF — Removes operate power from ACCS, stopping KA-30A camera operation.
KA-30A SALVO switch	Two-position, spring-loaded toggle switch: *Position* — *Function* Pressed down — Applies power to ACCS flash salvo circuits to simulate firing of all unused flash cartridges. Released — Removes power from ACCS flash salvo circuits.
POWER switch	Two-position toggle switch: *Position* — *Function* ON — Completes input power circuit from ACCS. OFF — Disconnects input power circuit from ACCS.

Control or indicator	Function
KA-39A OPERATE switch	Two-position toggle switch: *Position* — *Function* ON — Applies operate power to ACCS, causing camera to operate. OFF — Removes operate power from ACCS, stopping camera operation.
LIGHT SOURCE section:	
FLASH DETECTOR-LIGHT DETECTOR switch.	Two-position toggle switch: Position — Function FLASH DETECTOR — Sets up analyzer for flash detector test. LIGHT DETECTOR — Sets up analyzer for light detector test.
FLASH BURST switch	Spring-loaded, two-position toggle switch: *Position* — *Function* Pressed down — Applies pulse to ACCS flash ejection circuit. Released (up) — Disconnects single-pulse circuit from ACCS flash ejection circuits.

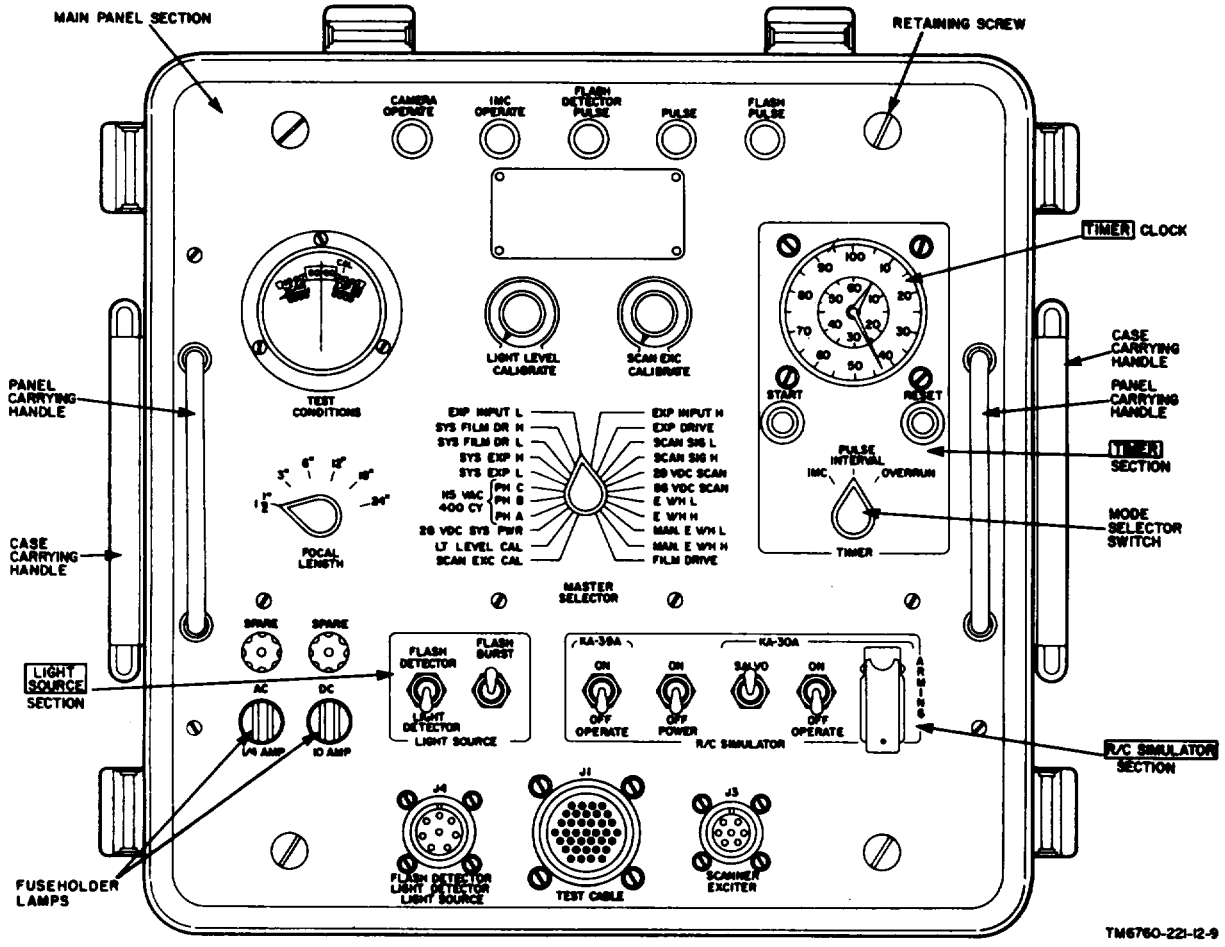


Figure 9. System analyzer controls and indicators.

b. Cables and Connectors. The following chart lists the system analyzer cables and connectors.

Cable or Connector	Function
FLASH DETECTOR-LIGHT DETECTOR-LIGHT SOURCE connector J4 (fig. 9).	Eight-pin female connector; provides for connection of light source to analyzer.
TEST CABLE connector J1.	Thirty-seven pin male connector; provides for connection of ACCS to system analyzer.
SCANNER EXCITER connector J3.	Seven-pin female connector; provides for connection of scanner exciter to system analyzer.
Cable 2996-304 (LM-105A) (fig. 1).	Connects to connector P3 of AN/USD-1B right ejector cable; bypasses air-safety switch.
Cable 2996-305 (LM-104A).	Connects to connector P5 of L-19A aircraft right ejector cable; by passes air-safety switch.
Cable 2996-308 (LM-107A).	Connects connector J1 on system analyzer to connector J1001 on ACCS control box and connector P1001 of system power cable.
Cable 2996-309 (LM-106A).	Connects connector J1 on system analyzer to system test connector on MQM-58A.

26. System Simulator Controls, Indicators, Cables, and Connectors

The following charts list only those items used by operator and organizational maintenance personnel; items used by higher level maintenance personnel are covered in the instructions for the appropriate maintenance level.

Note: All indicator lamps are of the press-to-test type.

a. Controls and Indicators (fig. 10). The following chart lists the system simulator controls and indicators:

Control or indicator	Function
T-11, KC-1, KA-30A VACUUM section:	
POWER switch	To-position toggle switch: *Position* — *Function* ON — Applies input power to VACUUM section. OFF — Disconnects input power from VACUUM section.
POWER indicator	Lights when input power is applied to VACUUM section.
REGULATOR control	Rotary control; used to regulate vacuum output.
SOURCE VACUUM gage	Indicates amount of vacuum (in inches of mercury) being drawn by vacuum pump.
KA-30A section:	
OPERATE switch	Three-position toggle itch: *Position* — *Function* ON (up) — Applies operate power to KA-30A camera under test. OFF (center) — Disconnect operate power from KA-30A camera under test. MOMENTARY ON (spring-loaded down) — Applies operate power to KA-30A camera until switch is released.
DC EXPOSURE control	Three-position (center OFF) switch: *Position* — *Function* INCREASE — Applies power to KA-30A camera dc exposure increase circuits. OFF — Disconnects power from KA-30A camera dc exposure circuits. DECREASE — Applies power to KA-30A camera dc exposure decrease circuits.
EXPOSURE SIGNAL switch	Seven-position rotary switch; used to select ac voltage for automatic exposure control circuit

Control or indicator	Function
MODE switch	Four-position rotary switch: *Position* — *Function* AUTO — Connects KA-30A camera for self-cycling or autocycle operation. PULSE — Connects KA-30A camera for PULSE operation. INC PULSE — Connects KA-30A camera for IMC PULSE operation. NIGHT — Connects KA-30A camera for NIGHT operation.
CAMERA COMMAND switch	Five-position rotary switch; used to select ac voltage for camera for IMC and interval between exposures.
INTER CAMERA SYNC indicator	Lights when shutter cycles, Indicating KA-30A camera has originated intercamera sync pulse.
NIGHT INTLK indicator	Lights when camera is set up for night mode of operation.
EXTRA PICTURE subsection:	
PICTURE indicator	Lights when extra picture circuit in KA-30A camera is cable of operation.
DRIVE indicator	Lights when film drive circuit in KA-30A camera is capable of operation for single picture operation.
INTLK indicator	Lights when extra picture circuit in KA-30A camera is incapable of operation.
KA-39A section:	
CYCLE switch	Three-position spring-loaded switch: *Position* — *Function* CYCLE — Applies strong pulse to flash cycle circuits of camera, causing camera to cycle. OFF — Disconnects flash cycle circuits from camera. NO CYCLE — Applies weak pulse to flash cycle circuits of camera, which is not strong enough to cycle camera.
FLASH PULSE indicator	Lights when camera cycles, indicating proper camera operation.
PANEL POWER section:	
POWER switch	Two-position toggle switch: *Position* — *Function* ON — Applies input power to all circuits except vacuum circuit. OFF — Disconnect input power.
AC indicator	Light when POWER switch is at ON to indicate ac power is applied.
DC indicator	Lights when POWER switch is at ON to indicate dc power is applied.
CAMERA DC 10A circuit breaker	Provides overload protection to dc circuit from power source.
CAMERA section:	
POWER switch	Two-position toggle switch: *Position* — *Function* ON — Applies power to aerial camera under test. OFF — Disconnects power from aerial camera under test.
OPERATE MODE switch	Three-position toggle switch: *Position* — *Function* RUNAWAY — Applies constant power to KA-39A, T-11, or KC-1 camera operate circuits to cause continuous recycling. OFF — Disconnects power from KA-39A, T11, or KC-1 camera operate circuits. SINGLE PULSE (spring-loaded) — Applies single pulse to KA-39A, T-11, or KC-1 camera operate circuits, causing one cycle of operation.
READY indicator	Lights when aerial camera under test is ready for operation.
OPERATE indicator	Lights when aerial camera under test is cycling.

b. Cables and Connectors. The following chart lists the system simulator cables and connectors:

Cable or Connector	Function
POWER IN connector J705 (fig. 10).	Seven-pin female connector; provides for connection of system simulator to power sources.
KA-39A connector J704.	Fourteen-pin female connector; provides for connection of system simulator to KA-39A camera.
T-11 and/or KC-1 connector J703.	Seven-pin female connector; provides for connection of system simulator to T-11 or KC-1 camera.
KA-30 connector J706	Twenty-six pin female connector; provides for connection of system simulator to connector 1A2AP2 on KA-30A camera.
KA-30 connector J702	Seventeen-female pin connector; provides for connection of system simulator to connector 1A2A2P2 on KA-30A camera.
TEST connector J701	Thirty-seven-pin female connector; provides for connection of system simulator to analyzer.
Cable 2996-206 (LM-109A) (fig. 2).	Connects connector J703 on system simulator to connectors P101 and P-202 on T-11 or KC-1 camera.
Cable 2996-207 (LA-172A).	Connects connector J704 on system simulator to connectors J2 and J3 on KA-39A camera.
Cable 2996-208 (LA-173A).	Connects connector J702 on system simulator to connector 1A2A2P3 on KA-30A camera.
Cable 2996-209 (LA-174A).	Connects connector J706 on system simulator to connector 1A2A2P2 on KA-30A camera.
Cable 2996-254 (LA-175A).	Connects connector 1A2A-2P4 on KA-30A camera lens cone to connector 1A1J4 on KA-30A camera.
Cable 2996-264 (LM-110A).	Connects connector J705 on system simulator to power sources.

27. System Components Test Set Controls, Indicators, Cables, and Connectors

The following charts list only those items used by operator and organizational maintenance personnel; items used by higher level maintenance personnel are covered in instructions for the appropriate maintenance level.

a. Controls and Indicators (fig. 11). The following chart lists the system components test set controls and indicators.

Control or indicator	Function
CAMERA TEST section:	
CAMERA POWER switch ----------	Two-position toggle switch: *Position* — *Function* ON — Applies power to operate camera. OFF — Removes power from camera.
MILLISECOND TIMER section:	
TIMER switch ----------	Two-position toggle switch: *Position* — *Function* INTERNAL — Removes pulses to be measured from EXTERNAL INPUT connectors. EXTERNAL — Permits MILLISECOND TIMER meter to measure time of externally injected pulses. Also routes pulses to be measured to EXTERNAL INPUT connectors for measurement by external instrument.
RESET switch ----------	Two-position, spring-loaded toggle switch: *Position* — *Function* Pressed up — Removes power from MILLISECOND TIMER meter measuring circuits, and resets meter to zero. Released — Applies power to MILLISECOND TIMER meter measuring circuits.

Control or indicator	Function
FUNCTION switch----------	Two-position rotary switch *Position* — *Function* WIDTH — Sets up MILLISECOND TIMER meter to measure width of pulse from source selected by MASTER switch. INTERVAL — Sets up MILLISECOND TIMER meter to measure interval between pulses from source selected by MASTER switch.
RANGE switch ----------	Five-position rotary switch sets up MILLISECOND TIMER meter for following ranges: *Position* — *Function* 3 — 0 to 3 milliseconds. 10 — 0 to 10 milliseconds. 30 — 0 to 30 milliseconds. 100 — 0 to 100 milliseconds. 300 — 0 to 300 milliseconds.
ZERO ADJUST control----------	Adjusts MILLISECOND TIMER meter to zero.
MILLISECOND TIMER meter ----------	Indicates time (in milliseconds) of selected function (WIDTH or INTERVAL).
PULSE TIMER section:	
INTERVAL switch ----------	Five-position rotary switch: *Position* — *Function* CLOCK, DIRECT — Sets up clock to measure duration of one internal or external dc signal volts (up to 60 seconds). OFF — Deenergizes clock circuits. 1 — Set up clock to measure interval of one pulse from external source. 5 — Sets up clock to measure interval of five pulses from external source. 10 — Sets up clock to measure interval of 10 pulses from external source.
RESET switch ----------	Two-position, spring-loaded toggle switch: *Position* — *Function* Pressed up — Resets interval-stepping switch circuit. Released — Sets up circuit for application of input pules.
TIMER switch----------	Two-position toggle switch: *Position* — *Function* INTERNAL — Sets up clock circuits to measure pulse times of camera. EXTERNAL — Sets up clock circuits to measure plume times from external sources.
KA-30A FLASH DETECTOR section:	
TEST switch ----------	Two-position toggle switch: *Position* — *Function* WIDTH — Sets up MILLISECOND TIMER meter to measure flash detector pulse width from KA-30A ACCS. INTERVAL — Sets up MILLISECOND TIMER meter to measure flash detector amplifier delay time of KA-30A ACCS.
OPERATE switch----------	Two-position toggle switch: *Position* — *Function* ON — Applies operate ground to cause KA-30A flash detector to provide output pulse. OFF — Removes operate ground from KA-30A flash detector.
FLASH indicator ----------	Lights when flash is detected.
CONTROL BOX section:	
PHOTO FLASHES FIRED indicators (1 through 20).	Light in sequence as signals from ACCS control box indicate that photoflash cartridges have been fired.
BREAKER TEST switch ----------	To-position toggle switch: *Position* — *Function* Pressed up — Applies overload to ACCS control box circuit

Control or indicator	Function
	Position — *Function* breaker and completes circuit to PULSE TIMER clock which measures circuit breaker opening time. Released — Removes overload condition and opens circuit to PULSE TIMER clock.
CONTROL POWER switch	Two-position toggle switch: *Position* — *Function* ON — Applies power to ACCS control box. OFF — Removes power from ACCS control box.
CONTROL POWER indicator	Lights when power is applied to ACCS control box.
ARM switch	Two-position toggle switch: *Position* — *Function* ON — Simulates closing of air-safety switch and applies power to CAMERA RUNNING Indicator in ACCS control box. OFF — Simulates opening of air-safety switch and removes power from CAMERA RUNNING indicator in ACCS control box.
SALVO RATE switch	Two-position toggle switch: *Position* — *Function* INTERVAL — Sets up ACCS control box circuits to measure interval of stepping switch pulses on MILLISECOND TIMER meter. WIDTH — Sets up ACCS control box circuits to measure width of stepping switch pulses on MILLISECOND TIMER meter.
PULSE switch	Pushbutton switch; manually energizes stepping switch in ACCS control box to step one position each time pulse switch is pressed.
AMPLIFIER, KA-39A FLASH DETECTOR, OVERRUN section:	
TEST switch	Two-position toggle switch: *Position* — *Function* CELL — Sets up circuits to measure pulse output of ACCS flash detector on MILLISECOND TIMER meter. AMPLIFIER — Sets up circuits to measure pulse output of amplifier in amplifier and overrun circuit of camera.
FLASH indicator	Lights when pulse output is being received from ACCS flash detector or camera amplifier and overrun circuit.
DETECTOR TEST switch	Three-position (center off) switch: *Position* — *Function* CYCLE — Simulates normal flash detector output pulse to test amplifier and overrun circuit of camera. OFF — Completes circuit to charge capacitor that develops simulated flash detector output signal. NO CYCLE — Simulates flash detector output pulse that is below normal level to test amplifier and overrun circuit of camera.
OVERRUN TEST switch	Spring-loaded toggle switch: *Position* — *Function* Pressed up — Applies power to overrun section of amplifier and overrun circuit of camera. Released — Removes power from amplifier and overrun circuit of camera, and starts PULSE TIMER clock to measure overrun time.
OVERRUN indicator	Lights for duration of overrun time of amplifier and overrun circuit of camera.

Control or indicator	Function
AMPLIFIER POWER switch	Two position toggle switch: *Position* — *Function* ON — Apply power to amplifier and overrun circuit of camera. OFF — Remove power from amplifier and overrun circuit of camera.
PANEL POWER section:	
POWER switch	Two-position toggle switch: *Position* — *Function* ON — Applies input power to all circuits of test set. OFF — Disconnects input power from test set.
AC indicator	Lights when POWER switch is ON to indicate dc power is applied.
DC indicator	Lights when POWER switch is ON to indicate dc power is applied.
READY indicator	Lights when test is warmed and ready for operation (within 20 to 60 seconds after POWER switch is activated).
MASTER switch	Four-position rotary switch: *Position* — *Function* AMPLIFIER — Sets up test panel to measure signals from camera amplifier. FLASH DETECTOR — Sets up test panel to measure signals from flash detector in KA-30A ACCS or KA-39A ACCS. CONTROL BOX — Sets up test panel to measure signals from ACCS control box. CAMERA — Sets up test panel to measure signals from camera, magazine assembly.

b. Cables and Connectors. The following chart lists the system components test set cables and connectors.

Cable or Connector	Function
POWER connector J1 (fig. 11).	Seven-pin male connector; provides for connecting system components test set panel to power sources.
KA-30A FLASH DET connector J2.	Fourteen-pin female connector; provides for connecting system components test set panel to KA-39A flash detector.
CONTROL BOX connector J6.	Fourteen-pin female connector; provides for connecting system components test set panel to ACCS control box.
AMPLIFIER KA-39A FLASH DET connector J7.	Nineteen-pin female connector; provides for connecting system components test set panel to KA-39A amplifier and overrun circuit.
CAMERA connector J10.	Ten-pin female connector; provide for connecting system components test set panel to KA-39A magazine assembly.
CONTROL BOX connector J13.	Thirty-seven-pin female connector; provides for connecting system components test set panel to ACCS control box.
CAMERA TEST section EXTERNAL RECORDER and GRD connectors.	Two banana-type female connectors; provide for routing signals from KA-39A through system component test set pane to external measuring equipment.
MILLISECOND TIMER section EXTERNAL INPUT START, STOP, and GRD connector.	Three banana-type female connector; provide for connection of external input signals to MILLSECOND TIMER meter circuits.
PULSE TIME section EXTERNAL INPUT and GRD connectors.	Two banana-type female connectors; provide for Connection of external input signals to PULSE TIMER clock circuits.
Cable 2996-264 (LM-110A) (Fig. 4).	Connects connector J1 on system components test set panel to power sources.
Cable 2998-233 (LA-225A).	Connects system components test set panel timers to equipment under test.
Cable 2998-234 (LA-226A).	Connect connector J6 on system components test set panel to connectors

Cable or Connector	Function
	J1001, J1002, and contact C of RESET switch on ACCS control bas.
Cable 2998-235 (LA-227A).	Connects connector J13 on system components test set panel to connector J1003 and J1004 on ACCS control box.
Cable 2998-236 (LA-228A).	Connect connector J10 on system components test set panel to connector J1 on KA-39A camera magazine.
Cable 2998-237 (LA-229A).	Connects connector J2 on system components test set panel to connector J101 on ACCS flash detector and electrical connector on test shutter.
Cable 998-238 (LA-230A).	Connects connector J7 on system components test set panel to connector P2 on ACCS flash detector pendant cable.
Cable 2998-239 (LA-231A).	Connects connector J7 on system components test set panel to connector P1 on camera.

28. Shutter Tester Controls, Indicators, Cables, and Connectors

The following charts list only those items used by operator and organizational maintenance personnel; items used by higher level maintenance personnel are covered in instructions for the appropriate maintenance level.

a. Controls and Indicators (fig. 12). The following chart lists the shutter tester controls and indicators.

Control or indicator	Function
PANEL POWER switch	Two-position toggle switch: *Position* — *Function* ON — Applies Input power to shutter tester. OFF — Disconnects input power from shutter tester.
READY indicator	Lights when shutter tester is ready for operation, within 20 to 60 seconds after POWER switch is set to ON.
RANGE (MILLISECONDS)	Five-potion rotary switch: *Position* — *Function* 3 — Sets up time meter for 0- to 3-millisecond range. 10 — Sets up time meter for 0- to 10-millisecond range. 30 — Sets up time meter for 0- to 30-millisecond range. 100 — Sets up time meter for 0- to 100-millisecond range. 300 — Sets up time meter for 0- to 300-millisecond range.
METER ZERO control	Rotary control; used to zero-adjust TIME meter.
Illumination control	Five position rotary switch: *Position* — *Function* OFF — Shuts off light source in shutter tester. LOW 1 — Turns on light source; sets light source at minimum intensity. 2, 3, or HIGH 4 — Progressive increase of light intensity.
PHOTOCELL CAL control	Rotary control; used to adjust input to shutter tester from photocell assembly.
FUNCTION switch	Four-position rotary switch: *Position* — *Function* CAL — Sets up shutter tester to permit calibration of amplifier gain. SPEED — Set up shutter tester to permit testing of effective shutter speed. EFFICIENCY — Sets up shutter tester to obtain comparative (A or B) meter indications to determine shutter efficiency.

Control or indicator	Function
KA-30 DIAPHRAGM switch	Three-position, spring loaded, toggle switch: *Position* — *Function* OPEN — Applies dc power to lens cone under test to open diaphragm. CLOSE — Applies dc power to lens cone under test to close diaphragm. Neutral (center) — Remove dc power from lens cone (diaphragm circuits) under test.
SHUTTER OPERATE switch	Spring-loaded pushbutton switch: *Position* — *Function* Pressed — Applies dc power to lens cone under test to trip shutter mechanism; applies trigger pulse to external oscilloscope (when used). Released — Applies dc power to lens cone under test to reset shutter mechanism.
SHUTTER POWER switch	Two-position toggle switch: *Position* — *Function* ON — Applies power to SHUTTER circuits and KA-30 DIAPHRAGM circuits in shutter tester. OFF — Remove power from SHUTTER circuits and KA-30 DIAPHRAGM circuits in shutter tester.
METER RESET switch	Pushbutton switch; resets TIMER meter to zero position when pressed.
TIME meter	Indicates amount of time that selected function (speed or efficiency) consumes in milliseconds.
READY Indicator	Lights when shutter tester is warmed up (within 20 to 60 seconds after PANEL POWER switch is actuated).
Interlock switch	Completes input to ILLUMINATION circuit when ventilation door is opened.

b. Cables and Connectors. The following chart lists the shutter tester cables and connectors.

Cable or Connector	Function
SCOPE (fig. 12) connectors GRD J404 and VERT J405.	Banana-type female connectors; provide for connection of shutter tester to vertical input of oscilloscope.
GRD and TRIGGER connectors J403 and J402.	Banana-type female connectors; provide for connection of shutter tester to trigger input of oscilloscope.
UNIVERSAL SHUTTER CONTACTS connectore J406 and J407.	Banana-type female connectors; provide for connection of shutter tester to external shutter under test.
PHOTOCELL connector J401.	Three-pin female connector; provides for connection of shutter tester to cable from photocell assembly.
SHUTTER CONNECTOR J408.	Seven-pin female connector; provides for connection of shutter tester to shutter cable of KA-30A or KC-1 camera.
POWER connector J409.	Four-pin male connector; provides for connection of shutter teeter to power sources.
Cable 2998-398 (LA-17A) (fig. 5).	Connects connector J408 on shutter teeter to KA-30A camera.
Cable 2998-399 (LC-4A).	Connect connector J408 on shutter tester to T-11 or KC-1 camera lens cone.
Cable 2998-400 (LM-100A).	Connects connector J401 on shutter teeter to photocell connector on photocell and adapter assembly.
Cable 2998-401 (LM-102A).	Connects connector J409 on shutter tester to power sources.
Cable 2998-501 (LM-101A).	Jumper cable for lens cone of T-11 or KC-1 camera; connects to banana connectors on lens cone to bypass interlock.

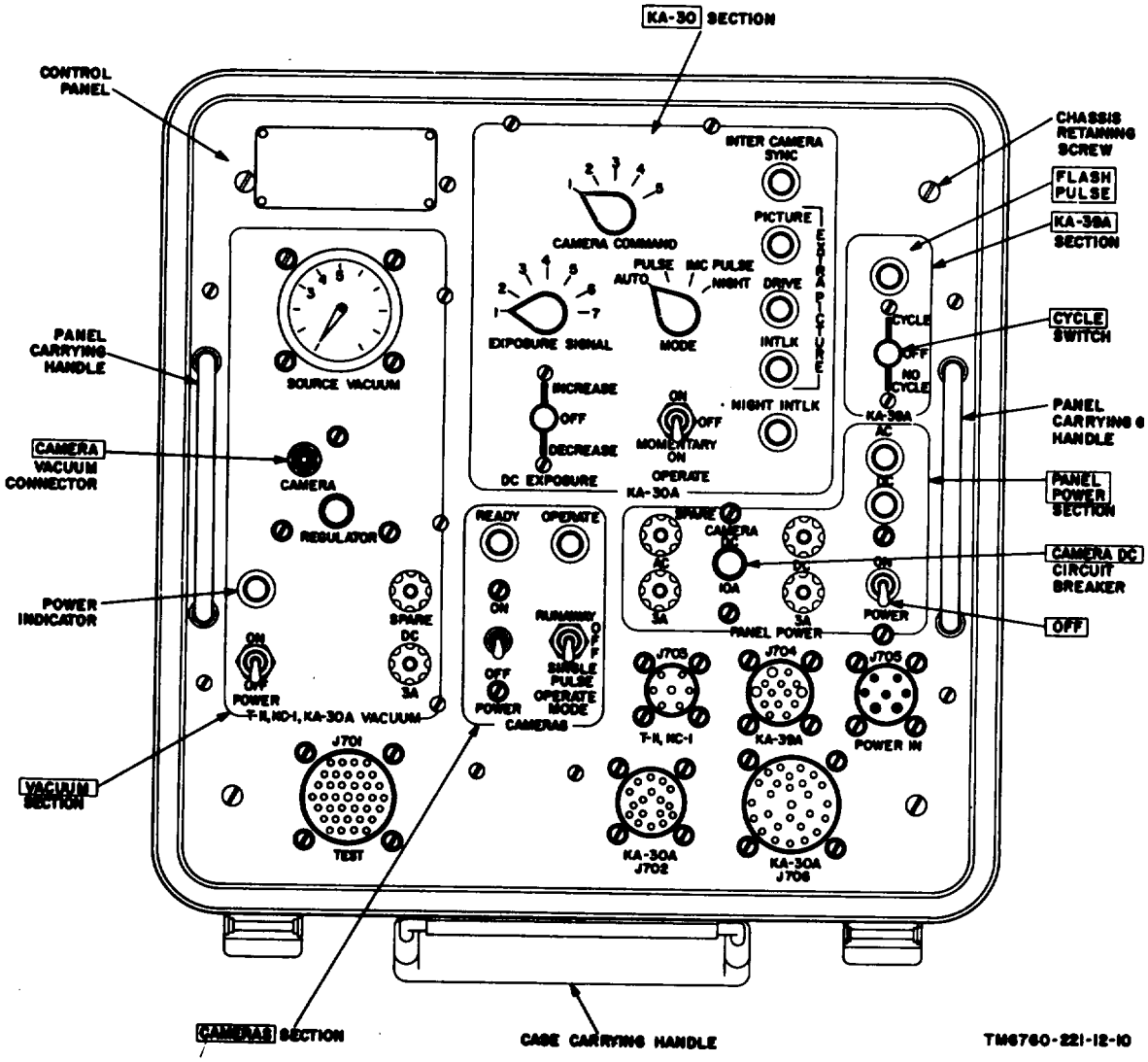


Figure 10. System simulator controls and indicators.

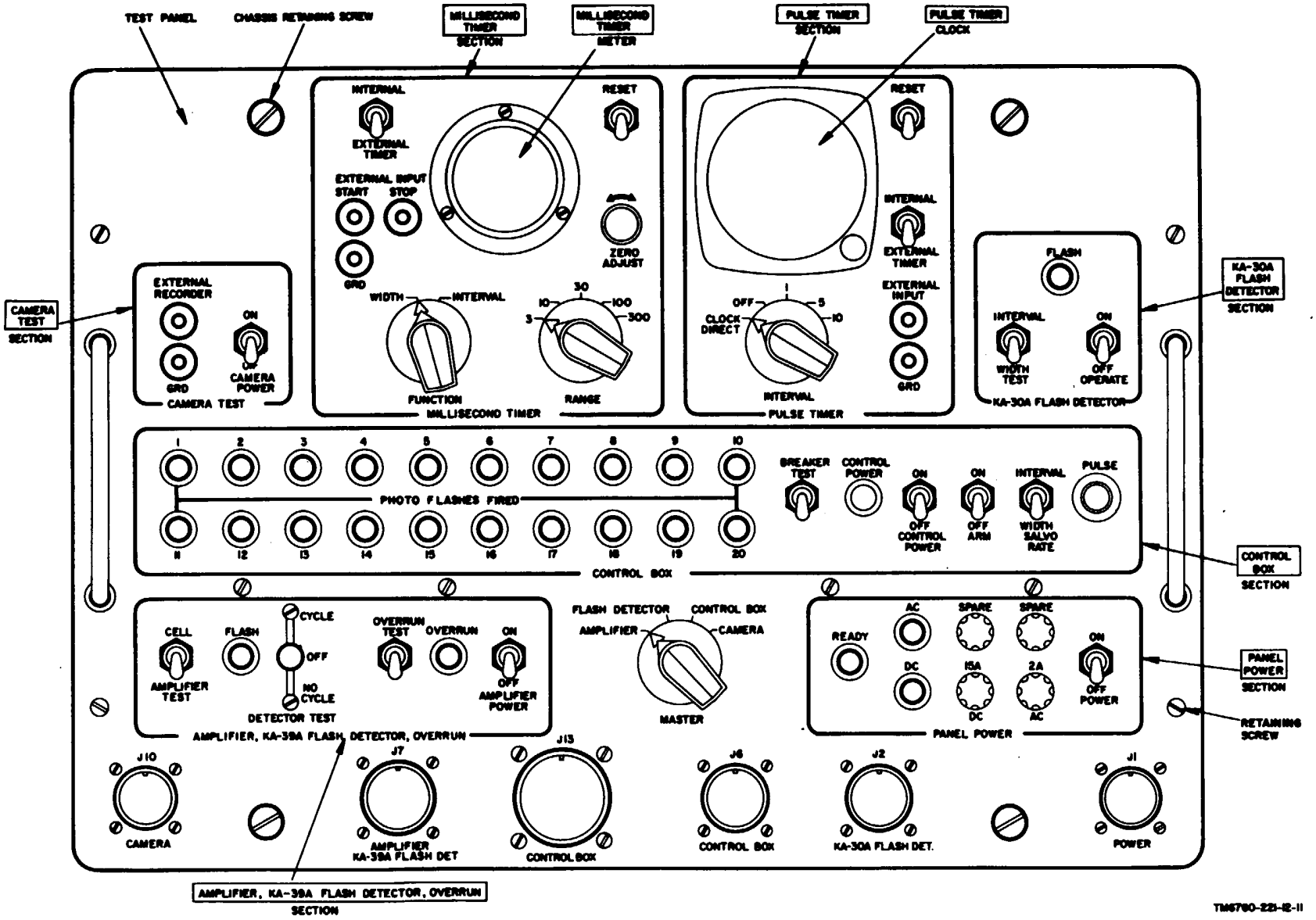


Figure 11. System components test set, controls and indicators.

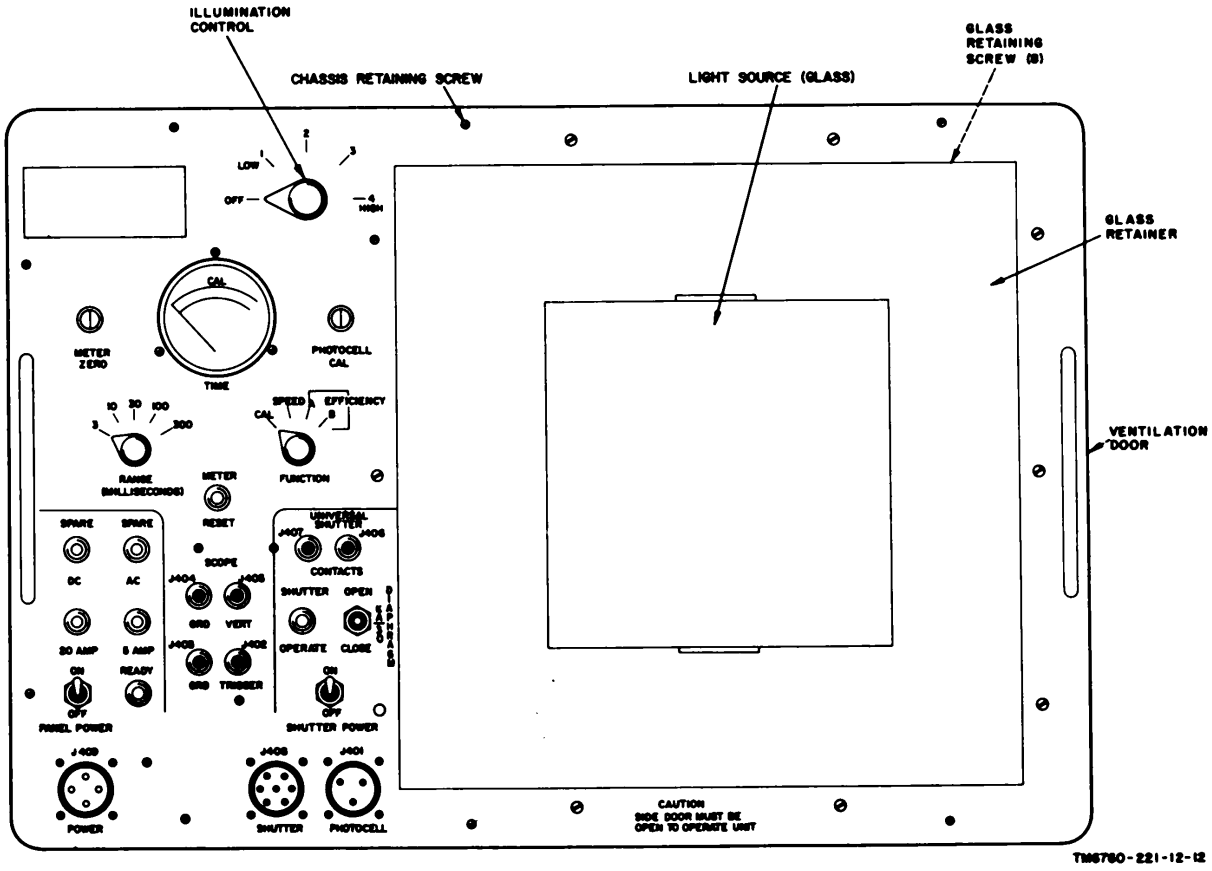


Figure 12. Shutter tester, controls and indicators.

Section II. OPERATION UNDER CONDITIONS

29. General

The camera system test equipment is used to test a complete ACCS (including camera for both day and night operation), a complete camera, and the individual assemblies of the camera. This manual describes the use of the camera system test equipment and is used in conjunction with the camera test procedures as described in the field and depot maintenance manual for camera, Still Picture KA-39A (TM 11-6720-207-35). The chart below indicates the tests that are performed, the component of the camera system test equipment used in performance of the test, and the paragraphs that contain the test procedure. In addition, use of the three special tools for the camera is described For additional information on the controls and connectors of the ACCS components or the camera, refer to the applicable publications listed in appendix I.

Note: **For proper operation, the system analyzer and the light source serial numbers must match. The system analyzer must be calibrated to its individual light source at the depot level of maintenance.**

Test procedure	Test equipment required	Applicable paragraph
ACCS and camera (day mode).	System analyzer----	31
ACCS and camera (night mode)	System analyzer, light source, and. flash ejector testers	32
Complete camera	System analyzer and system simulator.	33
Camera amplifier	System components test set.	34
Camera Over run circuit.	System components test set.	35
Camera control box	system components test set.	36
Flash detector----	System components test set and shutter tester.	37
Camera magazine	System components test set and Brush recorder, Mark II.	40
Camera lens cone	Shutter tester--------	41
Camera vacuum	Vacuum regulator test set.	43
Use of system components test Set PULSE TIMER clock to test external equipment.	System components test set.	44
Use of system components test Set MILLI-SECOND TIMER meter to test external equipment.	System components test set.	45

30. Initial Adjustment of System Components Test Set (fig. 11)

Before each use, adjust the MILLISECOND TIMER meter to zero as follows:

a. Set the RANGE switch to the desired range.

b. Connect the system components test set to the sources of power (para 23). Set the POWER switch in the PANEL POWER section to ON. The AC and DC indicators will light. After 20 to 60 seconds, the READY indicator should light.

c. Momentarily actuate the. RESET switch in the MILLISECOND TIMER Section to reset the meter.

d. If the meter does not return to zero (c above), turn the ZERO ADJUST control until it does.

31. Testing ACCS and Camera (Day Mode)

The following procedures are performed on the ACCS in the AN/USD-1B drone or the L-19A aircraft with the camera in the DAY mode of operation.

a. Connections (fig. 13).

(1) Disconnect connector P1001 of the ACCS system power cable from connector J1001 on the ACCS control box

(2) Connect cable 2996-308 to test cable connector J1 on the system analyzer, connector J1001 on the ACCS control box and connector P1001 on the ACCS system power cable.

b. Initial Control Settings.

(1) Set the controls of the camera (TM 11-6720-207-10) as follows:

(a) Set the shutter DAY-NIGHT mode control to DAY.

(b) Set the magazine altitude adjustment control to 1 (ALTITUDE FT X 1000) in the 200 MPH range.

(c) Set the shutter time control to 1/300.

(2) Set the controls on the system analyzer (fig. 9) as follows:

Control	Position
R/C SIMULATOR section:	
POWER switch	OFF
SALVO switch	Released (up)
KA-30A OPERATE switch	OFF
KA-39A OPERATE switch	OFF
KA-30A ARMING switch	Down
LIGHT SOURCE section:	
FLASH DETECTOR-LIGHT DETECTOR switch	LIGHT DETECTOR
FLASH BURST switch	Released (up)
TIMER section:	
Mode selector switch	PULSE INTERVAL
START control	Released (not pressed)
RESET control	Released (not pressed)
Main panel section:	
FOCAL LENGTH switch	1-1/2”
MASTER SELECTOR switch	28 VDC SYS PWR
LIGHT LEVEL CALIBRATE control	Extreme left (counterclockwise)
SCAN EXC CALIBRATE control	Extreme left (counter clockwise)

c. Test Procedure.

(1) Apply power to ACCS.

(2) Turn the POWER switch in the R/C SIMULATOR section to ON.

Note: **For prevention of possible error in TIMER clock readings, at least 3 minutes must elapse from the time the POWER switch is turned to ON((2) above)until the procedure in (10) below is performed.**

(3) Note the number indicated on the shutter cycle counter of the camera (TM 11-6720-207-10).

(4) Turn the KA-39A OPERATE switch in the R/C SIMULATOR section to ON. Allow the camera to operate for 2 cycles; then turn the KA-39A OPERATE switch to OFF. A camera cycle can be determined by listening to the click as the camera shutter operates.

(5) The number now indicated on the cycle counter of the camera (TM 11-6720-207-10) should be two more than that noted in (3) above.

(6) Set the DAY-NIGHT mode control on the camera to NIGHT.

(7) Set the shutter time control on the camera to 1/150.

(8) Press and hold the RESET control, in the TIMER section, until the TIMER clock indicates zero.

(9) Set the KA-39A OPERATE switch in the R/C SIMULATOR section to ON. The CAMERA OPERATE indicator lamp should light, and the TEST CONDITIONS meter should indicate in the GO (green) area of the meter dial. Walt at least 10 seconds before proceeding to (10) below.

(10) Press the START control, in the TIMER section.

Note: **The next pulse received from the ACCS will start the TIMER clock and cause the PULSE indicator lamp to light. The TIMER clock will stop after five pulses and should indicate an elapsed time of 10 to 12.2 seconds.**

d. Stopping Procedure.

(1) Set the KA-39A OPERATE switch in the R/C SIMULATOR section to OFF.

(2) Set the POWER switch in the R/C SIMULATOR section to OFF.

(3) Remove power from the ACCS.

(4) Disconnect cable 2996-308 (fig. 13) from the ACCS control box, the ACCS system power cable, and the system analyzer.

(5) Reconnect connector P1001 of the ACCS system power cable to connector J1001 on the ACCS control box.

32. Testing ACCS and Camera (Night Mode)

The following procedures are performed on the ACCS in the AN/USD-1B or the L19A aircraft with the camera in the night mode of operation:

a. *Connections* (fig. 14 and 15).

***Note*: When performing the following connection procedures in the AN/USD-IB, refer to figure 14. When performing the connection procedures on the ACCS in the L-19A aircraft, refer to figure 15.**

(1) Disconnect connector P1001 of the ACCS system power cable from connector J1001 on the ACCS control box.

(2) Disconnect connector P3 (fig. 14) or P5 (fig. 15) on the cable that is connected to the ACCS air-safety switch.

(3) Connect cable 2996-308 to connector J1 on the system analyzer, connector J1001 on the ACCS control box, and connector P1001 on the ACCS system power cable.

(4) Connect cable 2996-307 to connector J4 on the system analyzer and to the light source.

(5) Disconnect the ACCS air-safety switch cable from the ACCS air-safety switch; connect the appropriate cable (cable 2996-305 for the L-19A (fig. 15) or cable 2996-304 for the AN/USD-1B (fig. 14)) to the connector (P3 or P5) on the end of the ACCS air-safety switch cable.

(6) Using the adapter plate (fig. 3) attach the light source to the ACCS flash detector (AN/USD-1B (fig. 14) or L-19A aircraft (fig. 15)).

(7) Attach the flash ejector testers to the ACCS flash ejectors (two on the AN/USD-1B (fig. 14) or four on the L-19A aircraft (fig. 15)).

b. Initial Control Settings.

(1) Set the controls on the camera (TM 11-6720-207-10) as follows:

(a) Set the DAY-NIGHT mode control to NIGHT.

(b) Set the altitude adjustment control to 1 (ALTITUDE FT X 1000) in the 200 MPH range.

(2) Set the controls on the system analyzer (fig. 9) as follows:

Control	Position
R/C SIMULATOR section:	
POWER switch	OFF
SALVO switch	Released (up)
KA-30A OPERATE switch	OFF
KA-39A OPERATE switch	OFF
KA-30A ARMING switch	Down
LIGHT SOURCE section:	
FLASH DETECTOR-LIGHT DETECTOR switch	FLASH DETECTOR
FLASH BURST switch	Released (up)
TIMER section:	
Mode selector switch	Pulse INTERVAL
START control	Released (not pressed)
RESET control	Released (not pressed)
Main panel section:	
FOCAL LENGTH switch	1-1/2”
MASTER SELECTOR switch	28 VDC SYS PWR
LIGHT LEVEL CALIBRATE control	Extreme left (counterclockwise)
SCAN EXC CALIBRATE control	Extreme left (counterclockwise)

c. Test Procedure.

(1) Apply power to the ACCS.

(2) Set the POWER switch in the R/C SIMULATOR section to ON.

***Note*: For prevention of possible error in TIMER clock reading, at least 3 minutes must elapse from the time the POWER switch is turned to ON ((2) above) until the procedure in (5) below is performed.**

(3) Press and hold the RESET control in the TIMER section until the TIMER clock indicates zero.

(4) Set the KA-39A OPERATE switch in the R/C SIMULATOR section to ON. The CAMERA OPERATE indicator lamp should light, and the TEST CONDITIONS meter should indicate in the GO (green) area of the meter dial. Waft at least 10 seconds before proceeding to (5) below.

(5) Press the START control in the TIMER section.

***Note*: The next pulse received from the ACCS will start the TIMER clock and cause the PULSE indicator lamp to light. The TIMER clock will stop after five pulse; and should indicate an elapsed time of 10 to 12.2 seconds.**

(6) Observe that the five indicator lamps on each of the flash ejector testers flash, alternately and sequentially, indicating that each flash ejector in the ACCS is operating properly.

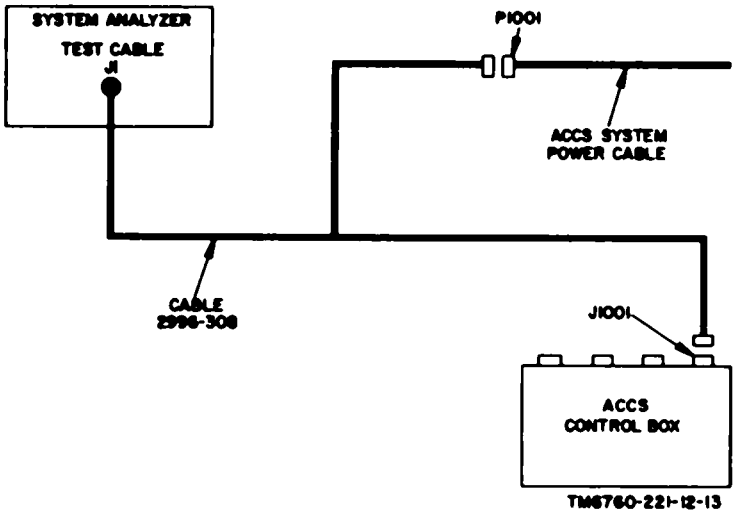


Figure 13. Connection diagram for testing ACCS (AN/USD-1B or L-19A) and camera in DAY mode of operation.

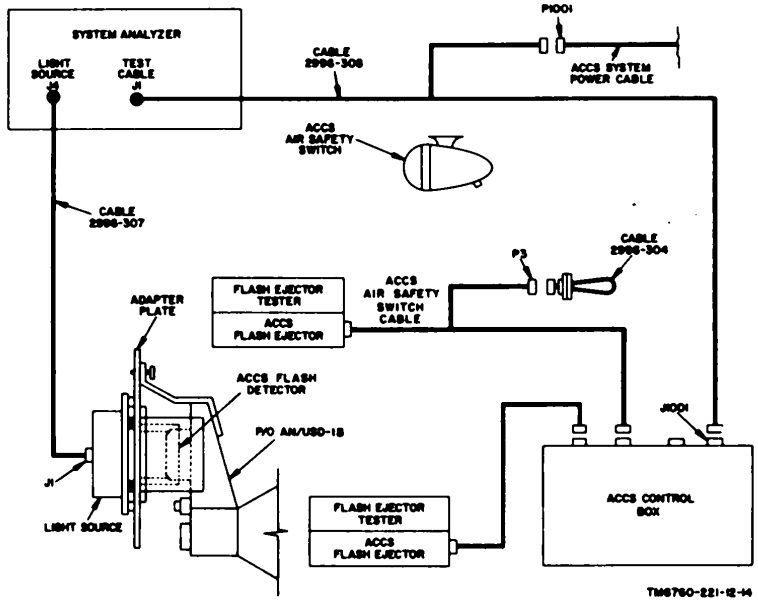


Figure 14. Connection diagram for testing ACCS (AN/USD-1B) and camera in night mode of operation.

Note: **If the camera is loaded with film, test only the firm five flash ejectors to conserve film. Test the remaining flash ejectors by following the procedures given in (7) and (8) below.**

(7) Lift the guard on the KA-30A ARMING Switch in the R/C SIMULATOR section; then press and hold the KA-30A ARMING switch

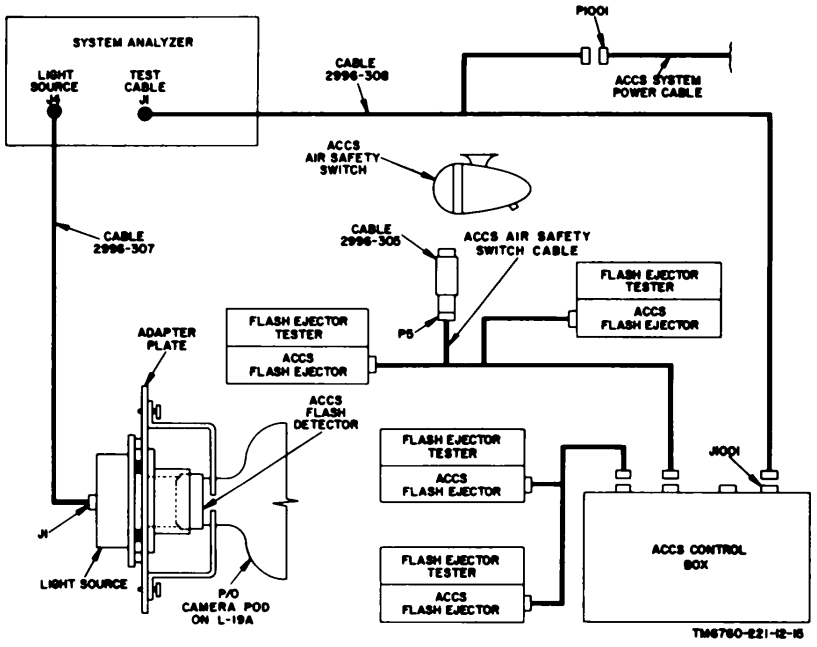


Figure 15. Connection diagram for test ACCS (L-19A aircraft) and camera in night mode of operation.

in the activated position while performing the procedures given in (8) below.

(8) Press and hold the KA-30A SALVO switch in the R/C SIMULATOR section. The indicator lamps on the remaining Hash ejector testers should flash in rapid order to indicate proper operation of the flash ejectors. Release the KA-30A SALVO switch and the KA-30A ARMING switch.

(9) Note the number on the cycle counter of the camera (TM 116720-207-10).

(10) Press downward and immediately release the FLASH BURST switch in the LIGHT SOURCE section of the system analyzer. The camera should recycle and the cycle counter on the camera should advance one number (TM 11-6720207-10).

(11) Press and hold the RESET switch on the ACCS control box until the RESET indicator on the ACCS control box lights.

(12) Set the code selector switch in the TIMER section of the system analyzer to OVERRUN.

(13) Press and hold the RESET control in the TIMER section until the TIMER CLOCK indicates zero. Walt at least 10 seconds before proceeding to (14) below.

(14) Set the KA-39A OPERATE switch in the R/C SIMULATOR section to OFF. The camera will continue to run until the TIMER clock stops; then all indicator lamps will be out and the camera will stop. The TIMER clock should indicate an elapsed time of 4 to 12 seconds.

(15) Press and hold the RESET switch on the ACCS control box until the

RESET indicator on the ACCS control box lights.

d. Stopping Procedure.

(1) Set the POWER switch in the R/C SIMULATOR section to OFF.

(2) Remove power from the ACCS.

(3) Disconnect cable 2996-307, cable 2996-308, the light source, and flash ejector testers from the ACCS and from the system analyzer (fig. 14 or 15).

(4) Reconnect connector P1001 of the ACCS system power cable to connector J1001 on the ACCS control box.

(5) Disconnect cable 2996-304 (fig. 14) or cable 2996-305 (fig. 15) from the connector (P3 or PS) on the end of the ACCS air-safety switch cable; reconnect the ACCS air-safety switch cable to the ACCS air-safety switch.

33. Testing Complete Camera

a. Connections and Initial Control Settings (fig. 16).

(1) Connect cable 2996-207 to connector J704 on the system simulator and to connectors J2 and J3 on the camera.

(2) Connect cable 2996-309 to connector J1 on the system simulator and connector J1 on the system analyzer.

(3) Set all POWER switches on the system simulator (fig. 10) and on the system analyzer (fig. 9) to OFF.

Warning: **Make sure that no out put voltage is present at the terminals of the power source until after the following connections are made.**

(4) Connect cable 2996-264 (fig. 16) to connector J705 on the system simulator and to the primary power source (para 23).

b. Test Procedure.

(1) Set the DAY-NIGHT mode control on the camera to DAY (TM 116720-207-10).

(2) Set the POWER switch in the PANEL POWER section of the system simulator (fig. 10) to ON.

Actuate the CAMERA DC circuit breaker. The AC and DC indicators should light.

(3) Set the POWER switch in the CAMERAS section to ON. The camera should begin operating; the OPERATE indicator of the system simulator and the CAMERA OPERATE indicator of the system analyzer should light.

(4) Set the POWER switch in the CAMERAS section to OFF. The camera should complete its cycle and stop.

(5) Set the DAY-NIGHT mode control on the camera to NIGHT (TM 116720-207-10).

(6) Set the POWER switch in the CAMERAS section of the system simulator to ON. The OPERATE indicator should light to indicate that the camera is ready for operation. The FLASH PULSE indicator in the KA-39A section of the system simulator and the PULSE indicator on the system analyzer should blink.

(7) Set the CYCLE switch in the KA-39A section to CYCLE.

Note: **This action simulates the flash from a photoflash cartridge being detected by the photocell of the camera. The camera should then recycle.**

(8) Momentarily set the CYCLE switch in the KA-39A section to NO CYCLE. When releasing the CYCLE switch, make sure that the switch does not move up into the CYCLE position and cause the camera to cycle and give an erroneous indication.

Note: **This action simulates the photocell receiving extraneous light other than the flash from a photoflash cartridge and the camera should not recycle.**

(9) Set the TIMER mode selector switch on the system analyzer (fig. 9) to PULSE INTERVAL.

(10) Set the altitude adjustment control on the camera to 1 (ALTITUDE FT X 1000) in the 200 MPH range (TM 11-6720-207-10). The OPERATE indicator in the CAMERAS section of the system simulator should remain on.

(11) Press and hold the RESET control

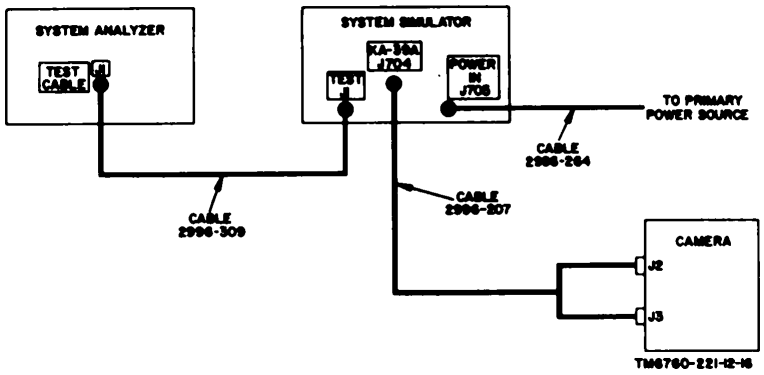


Figure 16. Connection diagram for testing complete camera.

in the TIMER section of the system analyzer until the TIMER clock indicates zero. Wait at least 10 seconds before proceeding to (12) below.

(12) Press the START control in the TIMER section of the system analyzer. The TIMER clock should indicate an elapsed time of 10 to 12.2 seconds.

Note: **When the timer clock stops counting, the camera shutter may trip.**

(13) Press and hold the RESET control in the TIMER section of the system analyzer (fig. 9) until the TIMER clock indicates zero.

(14) Set the mode selector switch in the TIMER section to OVERRUN. *Wait 10 seconds before proceeding to (15) below.*

(15) Set the POWER switch in the CAMERAS section of the system simulator (fig. 10) to OFF. The OPERATE indicator in the CAMERAS section should go out and the TIMER clock on the system analyzer (fig. 9) should start running. The TIMER clock should operate until it indicates from 5 to 12 seconds, the interval during which the overrun circuits were in operation.

c. Stopping Procedure.

(1) Set all POWER switches on the system simulator (fig. 10) and on the system analyzer (fig. 9) to OFF.

(2) Disconnect all cables from the camera, system simulator, and system analyzer.

34. Testing Camera Amplifier

a. Connections (fig. 17).

(1) Connect cable 2998-239 to connector J7 on the system components test set and to connector P1 on the amplifier and overrun circuit of the camera.

(2) Connect cable 2996-264 to connector J1 on the system components test set and to the primary power source (para 23).

b. Initial Contra[Settings (fig. 11).

(1) Set the TEST switch in the AMPLIFIER, KA-39A FLASH DETECTOR, OVERRUN section to AMPLIFIER, and the AMPLIFIER POWER switch to ON.

(2) Set the FUNCTION switch in the MILLISECOND TIMER section to WIDTH, and the RANGE switch to 300.

(3) Set the MASTER switch to AMPLIFIER.

c. Test Procedure (fig. 11).

(1) Set the POWER switch in the PANEL POWER Section to ON. The AC and DC indicators should light. After 20 to 60 seconds, the READY indicator should light.

(2) Set the DETECTOR TEST switch in the AMPLIFIER, KA-39A

FLASH DETECTOR, OVERRUN section to CYCLE, and release the switch. The FLASH indicator should flash.

(3) The elapsed time, as indicated on the MILLISECOND TIMER meter, should be approximately 120 milliseconds.

(4) Turn off all power and disconnect the test setup.

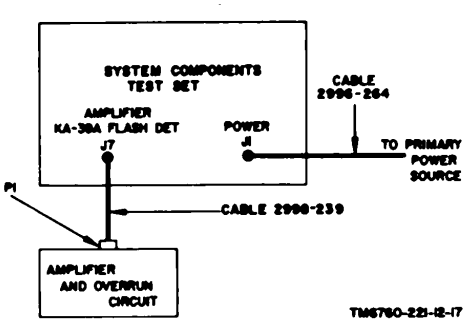


Figure 17. Connection diagram for testing camera amplifier and overrun circuit.

35. Testing Camera Overrun Circuit

a. Connections (fig. 17).

(1) Connect cable 2996-264 to connector J1 on the system components test set and to the primary power source (para 23).

(2) Connect cable 2998-239 to connector J7 on the system components test set and connector P1 on the amplifier and overrun circuit of the camera.

b. Initial Control Settings (fig. 11).

(1) Set the MASTER switch to AMPLIFIER.

(2) Set the TIMER switch in the PULSE TIMER section to INTERNAL, and the INTERVAL switch to CLOCK DIRECT.

(3) Set the AMPLIFIER POWER switch in the AMPLIFIER, KA-39A FLASH DETECTOR, OVERRUN section to ON.

c. Test Procedure (fig. 11).

(1) Set the POWER switch in the PANEL POWER section to ON. The AC and DC indicators should light. After 20 to 60 seconds, the READY indicator should light.

(2) Momentarily actuate the OVERRUN TEST switch in the AMPLIFIER, KA-39A FLASH DETECTOR, OVERRUN section. The OVERRUN indicator should light for the duration of the overrun circuit output pulse.

(3) The PULSE TIMER clock should indicate from 2 to 10 seconds. Turn off all power and disconnect the test setup.

36. Testing ACCS Control Box

a. Connections (fig. 18).

(1) Connect cable 2998-235 to connector J13 on the system components test set and connectors J1003 and J1004 on the ACCS control box.

(2) Connect cable 2998-234 to connector J6 on the system components test set and connectors J1001 and J1002 on the ACCS control box.

(3) Connect cable 2996-264 to connector J1 on the system components test set and to the primary power source (para 23).

b. Initial Control Settings (fig. 11).

(1) Set the FUNCTION switch in the MILLISECOND TIMER section to WIDTH, the TIMER switch to INTERNAL, and the RANGE switch to 100.

(2) Set the MASTER switch to CONTROL BOX.

(3) On the ACCS control box, set the POWER switch to OFF.

c. Test Procedure.

(1) Set the POWER switch in the PANEL POWER section to ON. The AC and DC indicators should light. After 20 to 60 seconds, the READY indicator should light.

(2) Set the 5 AMP CB switch on the ACCS control box to the on (depressed) position.

(3) Set the CONTROL POWER switch in the CONTROL BOX section to ON. The CONTROL POWER indicator should light.

(4) Set the POWER switch on the ACCS control box to ON.

(5) Set the ARM switch in the CONTROL BOX section to ON. Check

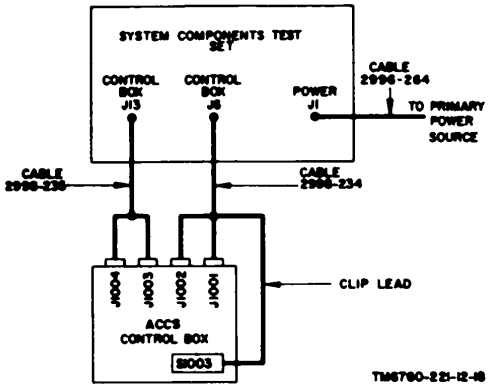


Figure 18. Connection diagram for testing ACCS control box.

to see that the CAMERA RUNNING indicator on the ACCS control box lights.

(6) Set the RESET switch on the ACCS control box to ON: hold the RESET switch in the ON position until the stepping switch advances to the reset position, as indicated by lighting of the RESET indicator. The stepping switch should stop at this point.

(7) Press and release the PULSE pushbutton in the CONTROL BOX section a total of 20 minutes. Check to see that the PHOTO FLASHES FIRED indicators light sequentially each time the PULSE pushbutton is pressed.

(8) Repeat the procedures given in (6) and (7) above to insure that all of the PHOTO FLASHES FIRED indicators light properly; then reset the ACCS control box stepping switch by again repeating the procedures ((6) above).

(9) Press the PULSE pushbutton in the CONTROL BOX section five times. Note that PHOTO FLASHES FIRED indicators 1 through 5 light sequentially.

(10) On the ACCS control box, briefly actuate the SALVO switch until PHOTO FLASHES FIRED indicators 6 through approximately 10 light sequentially. Release the SALVO switch; the stepping switch should stop operating. Actuate the SALVO switch again until the remaining PHOTO FLASHES FIRED indicators through 20 light sequentially.

(11) On the ACCS control box, set the POWER switch to OFF.

(12) Remove the nine screws that fasten the cover on the ACCS control box, and remove the cover.

(13) Connect the clip lead of cable 2998234 to the common terminal of section C of SALVO switch S1003 in the ACCS control box.

(14) On the ACCS control box, set the POWER switch to ON.

(15) Set the SALVO RATE switch in the CONTROL BOX section to WIDTH.

(16) Set the FUNCTION switch in the MILLISECOND TIMER section to WIDTH, the TIMER switch to INTERNAL, and the RANGE switch to 100. Actuate the RESET switch to reset the meter. If necessary, zero the meter using the ZERO ADJUST control.

(17) On the ACCS control box, momentarily actuate and release the SALVO switch. The MILLISECOND TIMER meter should indicate 60 milliseconds ±20 percent. Reset the MILLISECOND TIMER meter and repeat the test to insure that the reading is within the required tolerance.

(18) Set the FUNCTION switch in the MILLISECOND TIMER section to INTERVAL, and the RANGE switch to 300. Reset and zero the MILLISECOND TIMER meter.

(19) Set the SALVO RATE switch in the CONTROL BOX section to INTERVAL.

(20) On the ACCS control box, momentarily actuate and release the SALVO switch. The MILLISECOND TIMER meter should indicate from 110 to 200 milliseconds. Reset the MILLISECOND TIMER meter and repeat the test to insure that the meter reading is within the required tolerance.

(21) Set the TIMER switch in the PULSE TIMER section to INTERNAL, and the INTERVAL switch to CLOCK DIRECT. Reset the PULSE TIMER clock by use of the RESET switch.

(22) Set the BREAKER TEST switch in the CONTROL BOX section to the ON position; hold the BREAKER TEST switch in the ON position until the CONTROL POWER indicator in the CONTROL BOX section goes out to show that the circuit breaker in the ACCS control box has opened. The PULSE TIMER clock should indicate from 10 to 60 seconds.

(23) On the ACCS control box, set the POWER switch to OFF. Disconnect the clip lead of cable 2998234 and replace the cover on the ACCS control box.

(24) Turn off all power and disconnect the test setup.

37. Testing Flash Detector

a. Connections (fig. 19*).*

(1) Connect cable 2998-238 to connector J7 on the system components test set.

(2) Place the test shutter over the light source on the shutter tester.

(3) Position the flash detector on the test shutter.

(4) Connect the flash detector cable connector to the free connector on cable 2998-238.

(5) Connect the system components test set (cable 2996-264) and the shutter tester (cable 2998-401) to the primary power source (para 23).

b. Initial Control Settings.

(1) Set the power switch in the PANEL POWER section of the shutter tester (fig. 12) to ON.

(2) Set the ILLUMINATION control to 1.

(3) Set the MASTER switch (fig. 11) to AMPLIFIER.

(4) Set the AMPLIFIER TEST switch in the AMPLIFIER, KA-39A FLASH DETECTOR, OVERRUN section to CELL, and the AMPLIFIER POWER switch to OFF.

(5) Set the FUNCTION switch in the MILLISECOND TIMER section to WIDTH, and the RANGE switch to 300.

c. Test Procedure

(1) Set the system components test set (fig. 11) POWER switch to ON. The AC and DC indicators should light. After 20 to 60 seconds, the READY indicator should light.

(2) Set the AMPLIFIER POWER switch in the AMPLIFIER, KA-39A FLASH DETECTOR, OVERRUN section to ON.

(3) Operate the shutter test plunger on the test shutter. The FLASH indicator in the AMPLIFIER, KA-39A FLASH DETECTOR, OVERRUN section should light.

(4) The elapsed time, as indicated on the MILLISECOND TIMER meter, should be from 60 to 140 milliseconds.

(5) Turn off all power and disconnect the test setup.

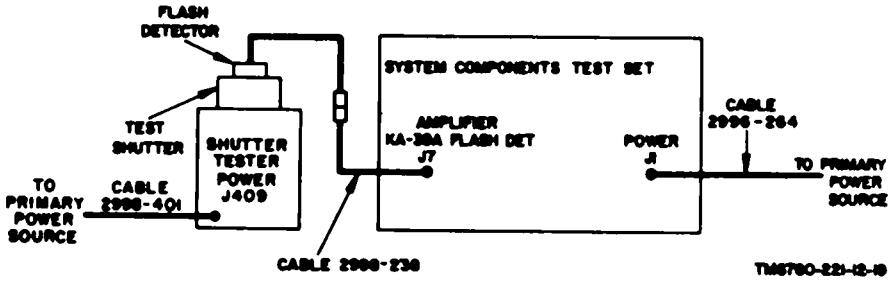


Figure 19. Connection diagram for testing flash detector.

38. Use of Shutter Alignment Fixture (fig. 20)

a. On the shutter alignment fixture, set the DAY-NIGHT mode control lever to NIGHT and the shutter time control lever to 1/150.

b. Set the DAY-NIGHT mode control and shutter time control on the camera as shown in TM 11-6720-207-10, figure 10.

c. Disconnect the pendant shutter cable from the shutter connector on the camera.

d. On the camera, loosen the two captive screws on the shutter assembly and remove the shutter assembly from the camera.

e. Insert the shutter assembly into the shutter alignment fixture; make sure that the edges of the shutter plate freely enter the grooves in the shutter alignment fixture. Slide the shutter assembly all the way into the shutter alignment fixture.

f. Operate the shutter assembly (para 76, TM 11-6720-207-35) by using the controls on the shutter alignment fixture.

***Note*: Make sure that the controls on the shutter alignment fixture are set as indicated in a above, before removing the shutter assembly from the shutter alignment fixture.**

39. Use of Torque Fixture

a. Checking Torque of Film Supply Clutch Assembly and Film Take up Clutch Assembly, installed in Magazine Assembly of Camera.

(1) Remove the magazine cover assembly and film spools from the camera (TM 11-6720-207-10).

(2) Remove the torque wrench adapter (fig. 21) from the adapter retaining clamp by loosening the thumbscrew, and install it on the square drive of the torque wrench (not shown).

(3) Slip the keyed end of the torque wrench adapter onto the keyed pivot of the film supply clutch assembly. Check for 20 to 30 inch ounces of torque in either direction.

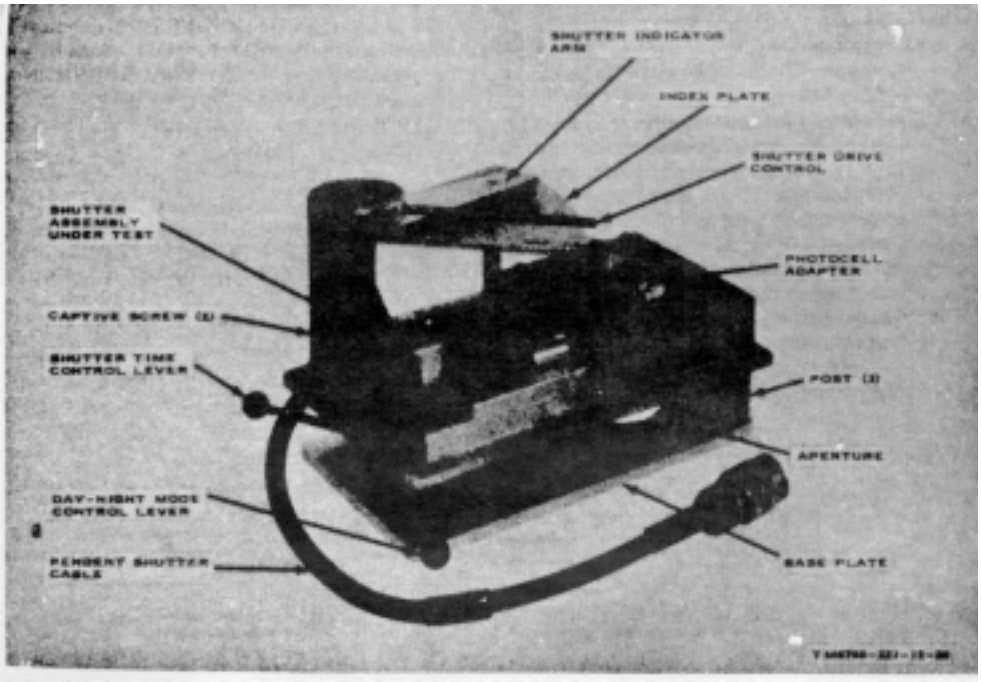


Figure 20. Use of shutter alignment fixture.

(4) Slip the keyed end of the torque wrench adapter onto the pivot drive of the film take up clutch assembly and check for 35 to 45 inch-ounces of torque in either direction.

b. Setting Torque of Film Supply Clutch Assembly and Film Take up Clutch Assembly. Before installing the clutch assemblies in the right-hand side plate assembly of the camera, set the torque values as follows:

(1) Install the clutch to be set into the recess between the gear racks of the torque fixture with the keyed pivot facing upward. Make sure the clutch is firmly seated.

(2) If a film supply clutch assembly is being set, slip the keyed end of the torque wrench adapter on to the keyed pivot and check the torque in either direction for 20 to 30 inch-ounces.

(3) If torque requires adjustment, use one open-end wrench (fig. 4) (CAI part No. 2998-506) to loosen the locknut on the clutch and use the second open-end wrench to adjust the clutch for the proper torque. When the torque is properly adjusted, firmly hold the wrench being used for adjusting while tightening the locknut with the other wrench.

(4) If a film take up clutch assembly is being set, follow the procedures given in (2) and (3) above to establish a torque of 35 to 45 inch ounces.

(5) Apply liquid staking to locknuts to secure the clutch torque setting.

40. Testing Camera Magazine

a. Connections (fig. 22).

(1) Connect cable 2998-236 to connector J10 on the system components test set and connector J3 on the camera magazine.

(2) Remove the cover from the camera magazine.

(3) Connect the black clip lead of cable 2998-236 to terminal 8 of terminal board TB1.

(4) Connect the red clip lead of cable 2998-236 to terminal 1 of terminal board TB1.

(5) Connect the Brush recorder, Mark II or equal, to the EXTERNAL RECORDER and GRD connectors in the CAMERA TEST section of the system components test set.

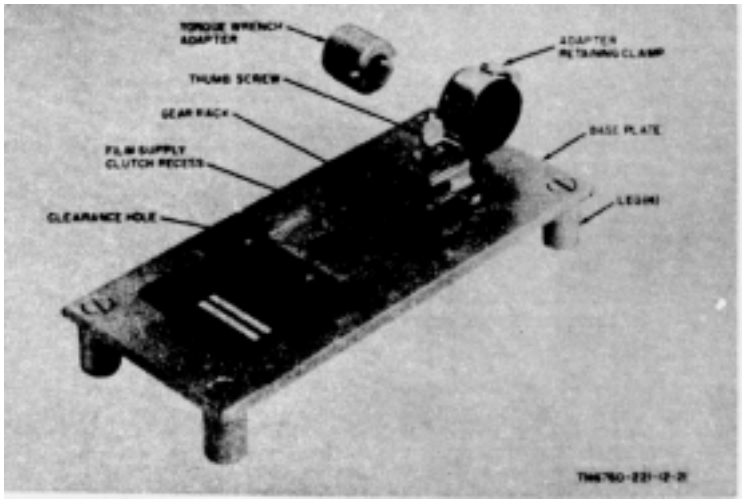


Figure 21. Use of torque fixture.

(6) Use cable 2996-264 and connect the system components test set to the primary power source (para 23).

b. Test Procedure

(1) Set the POWER switch in the PANEL POWER section of the system components test et (fig. 11) to ON. The AC and DC indicators should light. After 20 to 60 seconds, the READY indicator should light.

(2) Set the speed of the Brush recorder (fig. 22) to 125 millimeters (mm) per second.

(3) Set the CAMERA POWER switch in the CAMERA TEST section (fig. 11) to ON.

(4) The recording on the Brush recorder should be as shown in figure 23.

(5) Turn off all power and disconnect the test setup.

41. Testing Camera Lens Cone

Note: **For camera lens cone operation and adjustments, refer to TM 11-6720-207-10.**

a. Preliminary Procedure (fig. 24).

(1) Separate the camera lens cone from the magazine assembly; remove the dust covers, lens caps, and filters from the camera lens cone.

(2) Place the camera lens cone over the light source on the shutter tester.

(3) Set the photocell and adapter assembly on the camera lens cone as follows:

(a) Hold the photocell and adapter assembly so that the reinforcing cross brace faces upward.

(*b*) Place the photocell and adapter assembly on the camera lens cone so that the bent areas, marked KA-39A, rest on the plastic data strip of the camera lens cone; the straight edges of the photocell and adapter assembly that are marked KA-39A should rest on the side edges of the camera lens cone.

(4) Attach one end of cable 2998-400 to the photocell and adapter assembly.

(5) Connect the other end of cable 2998-400 to PHOTOCELL J401 connector on the shutter tester.

(6) Connect the shutter tester to the primary power source (para 23), using cable 2998-401.

b. Starting Procedure.

(1) Open the ventilation door (fig. 12)

(2) Place the shutter tester PANEL POWER switch to ON. The READY indicator will light within 40 to 60 seconds.

(3) Set the DAY-NIGHT mode control

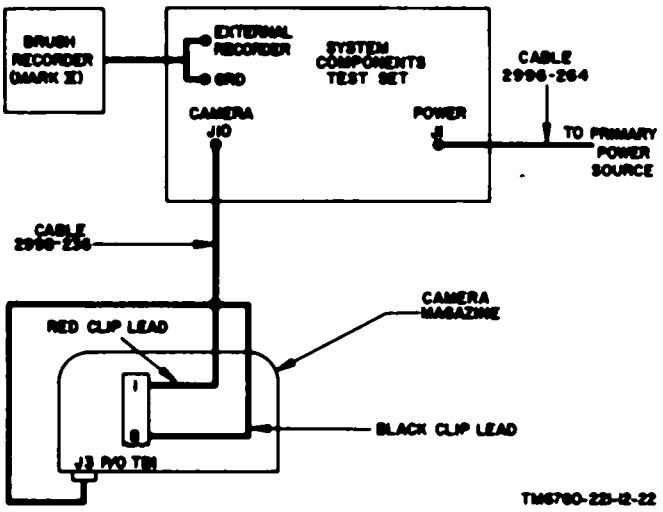


Figure 22. Connection diagram for testing camera magazine

on the camera lens cone to DAY. Adjust the camera lens cone for its slowest shutter speed.

(4) Set the SHUTTER POWER switch to ON.
(5) Set the FUNCTION switch to CAL.
(6) Set the PHOTOCELL CAL control to the extreme left.
(7) Set the ILLUMINATION switch to LOW 1.
(8) Press and release the METER RESET switch.
(9) Using the shutter key (attached to the photocell and adapter assembly), actuate the shutter assembly in the camera lens cone.
(10) Again actuate the shutter assembly and turn the PHOTOCELL CAL control to the right. Repeat this sequence until the TIME meter on the shutter tester indicates CAL.

Note: **If the range of the PHOTOCELL CAL control does not cause the TIME meter to indicate CAL, advance the ILLUMINATION switch one position and repeat the procedures given in (8), (9), and (10) above. Do not turn the ILLUMINATION a switch past the position at which the PHOTOCELL CAL control can make the TIME meter indicate CAL; excessive light will strike the surface of the light sensitive material in the photocell and adapter assembly and produce a nonlinear output during the teats.**

c. Testing Effective Shutter Speed.

(1) Set the shutter assembly of the camera lens cone to the speed setting at which it is to be tested.
(2) Refer to the following chart and turn the RANGE switch (fig. 12) on the shutter tester to the position that is related to the speed setting of the shutter.

Shutter speed setting	RANGE switch setting
1/400 to 1/1000	3
1/120 to 1/500	10
1/40 to 1/200	30
1/12 to 1/50	100
1/4 to 1/20	300

(3) Set the FUNCTION switch at SPEED.
(4) Momentarily press the METER RESET switch.
(5) Adjust the METER ZERO control until the TIME meter indicates ZERO.
(6) Using the shutter key, actuate the shutter assembly in the camera lens cone and read the TIME meter. The TIME meter will indicate the effective shutter speed in MILLISECONDS.

Note: **Repeat the procedures given in (4) and (6) above three times and average the resultant meter indications.**

(7) Convert the TIME meter indication ((6) above) to shutter speed (fig. 25) and compare it with the requirements contained in the camera manual (TM 11-6720-207-35).

d. Testing Shutter Efficiency.

(1) Set the FUNCTION switch (fig. 12) of the shutter tester at A EFFICIENCY.
(2) Perform the procedures given in c(1) and (2) above.
(3) Momentarily press the METER RESET switch. If necessary, adjust the METER ZERO control until the TIME meter indicates ZERO.
(4) Using the shutter key, actuate the shutter assembly in the camera lens cone; read and record the TIME meter indication.

Note: **Repeat the procedures given in (3) and (4) above three times and average the resultant meter indications.**

(5) Set the FUNCTION switch at B EFFICIENCY.

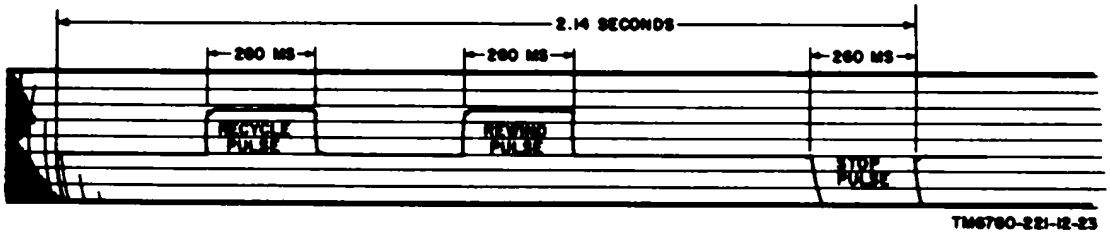


Figure 23. Typical brush recording.

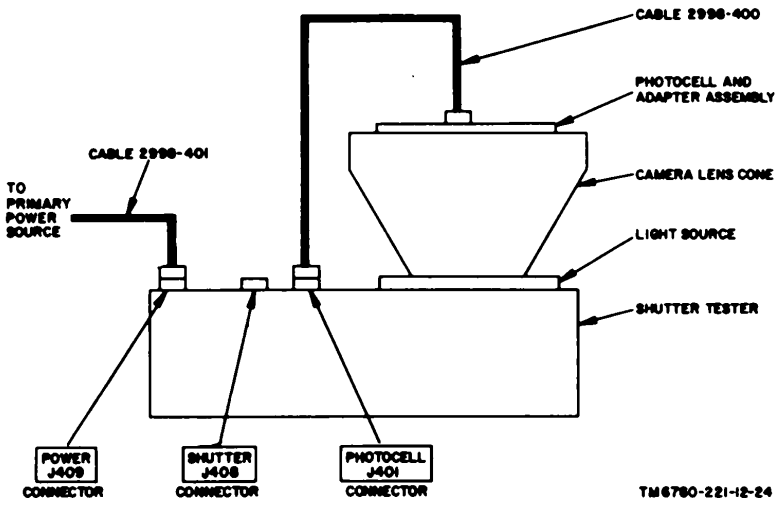


Figure 24. Connection diagram for testing camera lens cone.

(6) Momentarily press the METER RESET switch.

(7) Using the shutter key, actuate the shutter mechanism in the camera lens cone; read and record the TIME meter indication.

Note: **Repeat the procedures given in (6) and (7) above three times and average the resultant meter indications.**

(8) Shut down the shutter tester (e below) and, using the meter indications ((4) and (7) above), interpret the results of the shutter efficiency test (para 42).

e. Stopping Procedure.

(1) Set the PANEL POWER switch (fig. 12) of the shutter tester at OFF.

(2) Remove the photocell and adapter assembly (fig. 24) and cable 2998400 from the camera lens cone.

(3) Separate the photocell and adapter assembly from the detecting element of cable 2998-400.

(4) Disconnect cable 2998-400 from the shutter tester.

(5) Remove the camera lens cone from the shutter tester.

(6) Close the ventilation door (fig. 13).

42. Interpreting Shutter Efficiency Test Results

a. General. Shutter efficiency is the ratio of two time intervals. The first time interval is the measure of time from the moment the shutter is 10 percent open to the moment the shutter is within 10 percent of closing. This time interval is designated *A Efficiency*. The second time interval is the measure of time from the moment the shutter is 90 percent open to the moment the shutter is within 90 percent of closing. This time interval is designated *B Efficiency.*

b. Using Nomograph. Use the nomograph (fig. 26) to interpret the results of the shutter efficiency test (para 41d) as follows:

(1) Note the value of the A Efficiency reading on the nomograph.

(2) Note the value of the B Efficiency reading on the nomograph.

(3) Place a straightedge between the two points ((1) and (2) above) and read the shutter efficiency on the Shutter Efficiency % scale.

(4) Compare the shutter efficiency ((3) above) with the requirements contained in the camera manual (TM 11-6720-207-35).

43. Testing Platen Vacuum of Camera

To test the platen vacuum of the camera, using the vacuum regulator test set (part of system simulator), proceed as follows:

a. Prepare the camera for testing.

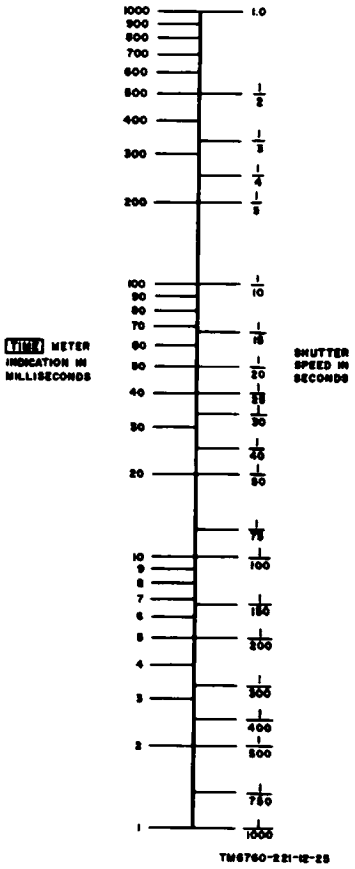


Figure 25. Time meter indication and shutter speed conversion chart.

b. Place the large platen cover on the threaded fitting on the rear of the vacuum gage assembly.

***Note*: The gasket on the platen cover must face away from the vacuum gage assembly.**

c. Place the large platen cover over the platen of the camera. Press the platen cover firmly against the platen to assure a vacuum seal.

d. Observe the reading on the vacuum gage assembly; it should indicate from 2.1 to 3 inches of water.

***Note:* If an Ineffective vacuum seal is suspected (as a result of a worn plated cover gasket, or be. cause the ends of the platen grooves are not completely covered by the platen cover), cut a 1/2-inch hole in the center of a two-foot length of 9-1/2-inch film stock. Thread this filmstrip into the camera magazine; position the film over the platen so that the hole in the center of the film is over the center of the platen. Place the large platen cover over the film on the platen; check to see that the vacuum gage assembly indicates 2.5 to 3 inches of water.**

44. Use of PULSE TIMER Clock of System Components Test Set to Test External Equipment (fig. 11)

a. Connections.

(1) Connect cable 2998-233 to the EXTERNAL connectors in the PULSE TIME section, with the red-coded terminal in the INPUT connector and the black-coded terminal in the GRD connector. The yellow tip jack connector of cable 2998-233 is not used in this application.

(2) Connect the other end of cable 2998-233 to the signal output connections of the equipment being tested.

(3) Connect the system components test set to the primary power source (para 23).

b. Initial Control Settings.

(1) Set the POWER Switch in the PANEL POWER section to OFF.

(2) Set the TIMER switch in the PULSE TIMER section to EXTERNAL, and the INTERVAL switch to the position (1, 5, 10) that corresponds to the duration of the pulse to be measured.

***Note:* CLOCK DIRECT position does not function with external pulses.**

c. Test Procedure.

(1) Set the POWER switch in the PANE L POWER section to ON. The AC and DC indicators should light. After 20 to 60 seconds, the READY indicator should light.

(2) Apply power to the equipment being tested.

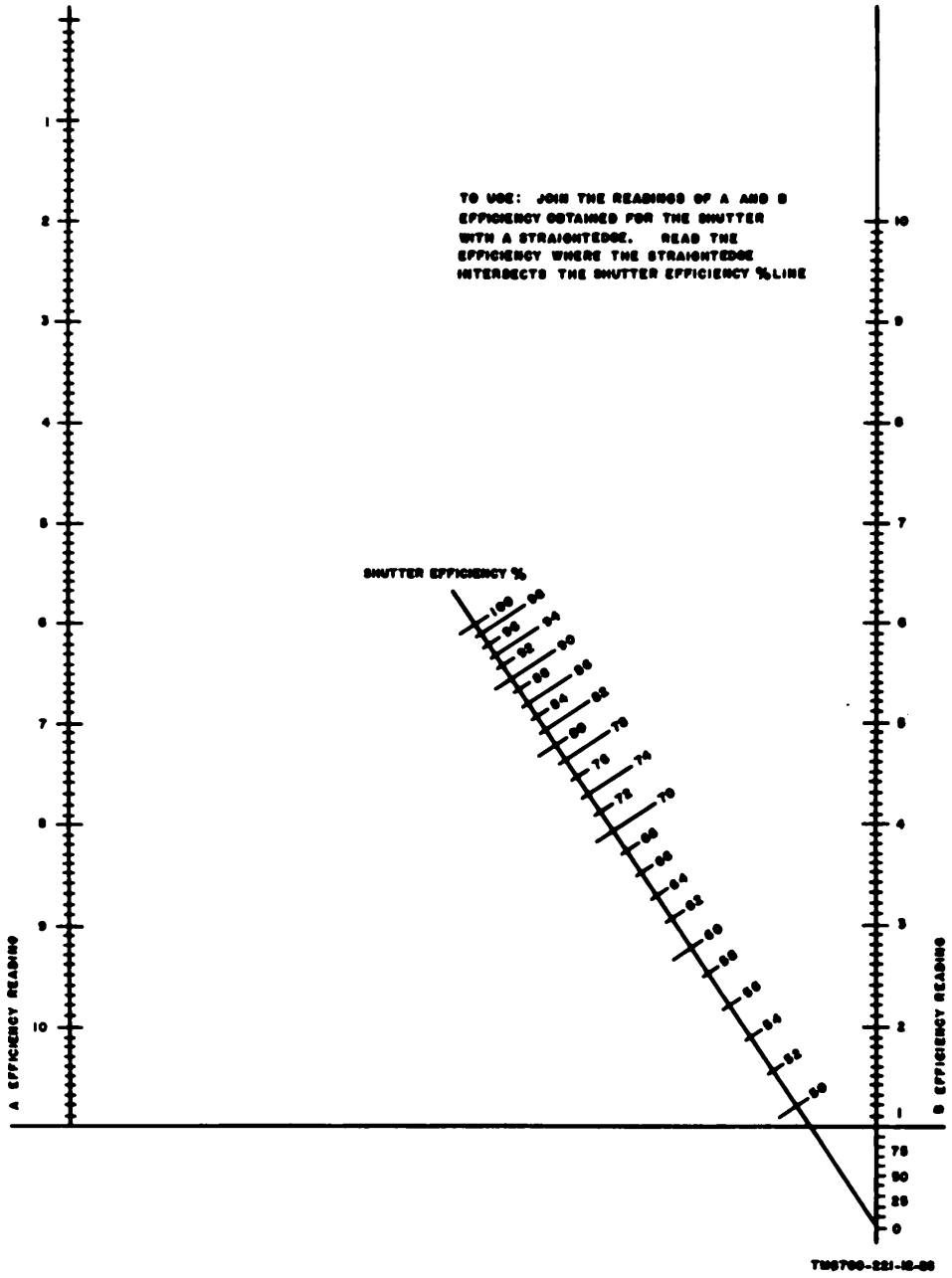


Figure 26. Shutter time and efficiency nomograph.

(3) Reset the PULSE TIMER clock by momentarily actuating the RESET switch.

(4) With the INTERVAL switch set in position 1, the PULSE TIMER clock indicates the elapsed time for one pulse interval, measured from the trailing edge of the first pulse following actuation of the RESET switch, to the trailing edge of the second pulse.

(5) With the INTERVAL switch set in position 5, the PULSE TIMER clock Indicates the elapsed time for five pulse intervals, measured from the trailing edge of the first pulse following actuation of the RESET switch, to the trailing edge of the sixth pulse To find the average pulse interval tie, divide the Indicated time on the PULSE TIMER clock by 5.

(6) With the INTERVAL switch set in position 10, the PULSE TIMER clock indicates the elapsed time for 10 pulse intervals, measured from the trailing edge of the first pulse following actuation of the RESET switch, to the trailing edge of the 11th pulse. To find the average pulse interval time, divide the indicated time on the PULSE TIMER clock by 10.

(7) Turn all power off and disconnect the test setup.

45. Use of MILLISECOND TIMER Meter of System Components Test Set to Test External Equipment (fig. 11)

a. Connections.

(1) Connect cable 2998-233 to the EXTERNAL INPUT connector, in the MILLISECOND TIMER section, with the red-coded terminal in the START connector and the black-coded terminal in the STOP connector. Connect the yellow tip Jack connector of cable 2998-233 to the GRD connector.

(2) Connect the other end of cable 2998-233 to the corresponding signal output connections of the equipment being tested.

(3) Connect the system components test set to the primary power source (para 23).

b. Initial Control Settings.

(1) Set the POWER switch in the PANEL POWER section to OFF.

(2) Set the TIMER switch in the MILLISECOND TIMER section to EXTERNAL, the FUNCTION switch to WIDTH or INTERVAL, as required, and the RANGE switch to the position (3, 10, 30, 100, 300) that corresponds to the duration of the signal to be measured.

Note: **With the RANGE switch in position 3 and the FUNCTION switch in WIDTH, MILLISECOND TIMER accuracy cannot be expected on readings of less than 1 millisecond.**

c. Test Procedure.

(1) Set the POWER switch in the PANEL POWER section to ON. The AC and DC indicators should light. After 20 to 60 seconds, the READY indicator should light..

(2) Reset the MILLISECOND TIMER meter by use of the RESET switch.

(3) if necessary, zero the timer with the ZERO ADJUST control.

(4) Apply power to the equipment being tested. The MILLISECOND TIMER meter indicates the elapsed time (width or interval) of the signal from the equipment being tested

(5) Turn off all power and disconnect the test setup.

46. Use of IMC Adjusting Plate (fig. 27)

a. Remove the magazine cover assembly from the camera base assembly (TM 116720-207-10).

b. Remove the altitude adjustment cover from the camera base assembly (fig. 28) by removing two panhead and two flathead

c. tall the IMC adjusting plate (fig. 27); use the two flathead screws that were removed (b above).

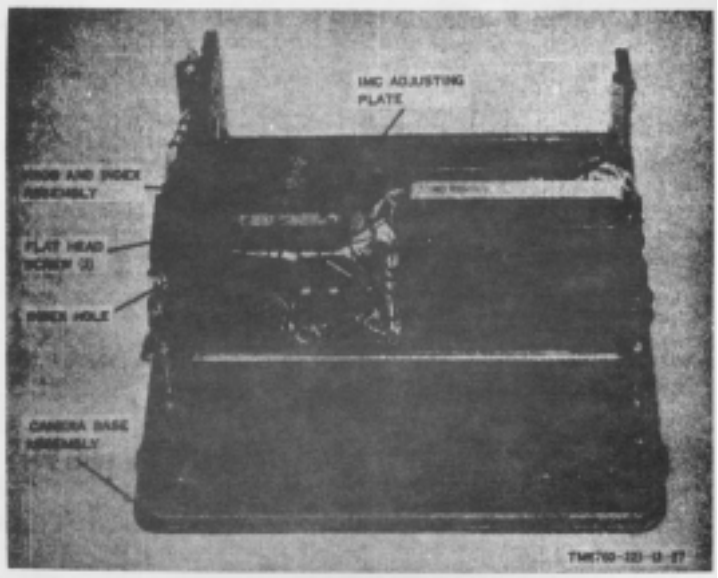


Figure 27. Use of IMC adjusting plate.

d. Move the knob and index assembly to the index hole in the IMC adjusting plate.

e. Check the adjustment of the IMC speed changer (para 42, TM 11-6720-207-35).

f. Remove the IMC adjusting plate and reinstall the altitude adjustment cover.

g. Reinstall the magazine cover assembly on the camera base assembly.

47. Use of Spool Support Spacing Fixture (fig. 28)

a. Remove the magazine cover assembly from the camera base assembly.

b. Remove the film spool from the camera base assembly.

c. Clean the spool support pivots and the spool support spacing fixture.

d. Insert the spool support spacing fixture in the camera base assembly in place of the film spool.

e. Check the distance between the inner face of the adjustment b u s h i n g and the shoulder of the keyed spool shaft (para 71*c,* TM 11-6720-207-35).

f. Remove the spool support spacing fixture from the camera base assembly; reinstall the film spool and magazine cover assembly.

48. Use of Back Focal Length Fixture (fig. 29)

a. Separate the camera lens cone from the magazine assembly.

b. Lay the magazine assembly (on the magazine cover assembly) on a clean flat surface so that the platen faces up.

c. Clean all surfaces of the black focal length fixture.

d. Place two 0.175-inch gage blocks on a surface plate (not shown) and lay the back focal length fixture across the gage blocks.

e. Place a dial depth gage (1/4-inch range) on the back focal length fixture with the gage tip contacting the surface plate. Zero the depth gage.

f. Clean the surface of the camera platen and the face of the mating surfaces.

g. Place the back focal length fixture

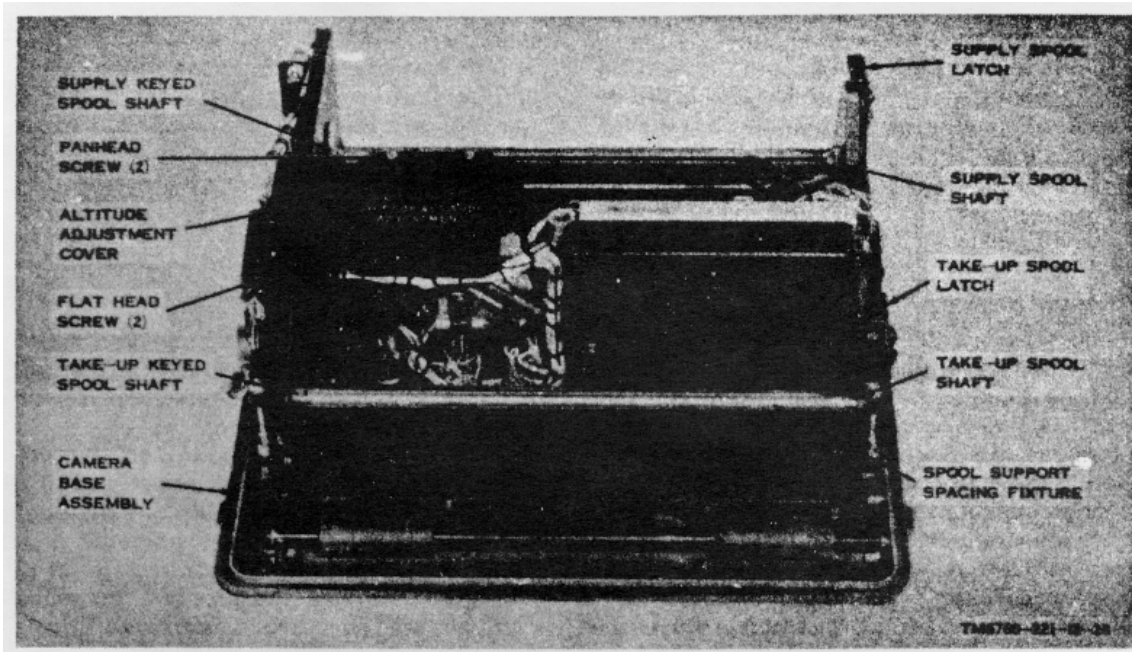


Figure 28. Use of spool support spacing fixture.

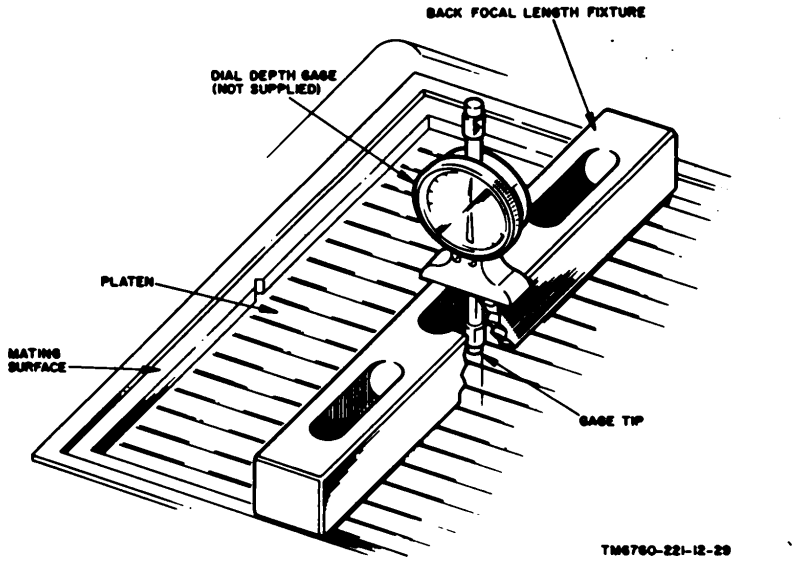


Figure 29. Use of back local length fixture.

across the film format opening so that it rests on the mating surface.

h. Place the dial depth gage through the center opening of the back focal length fixture so that the gage tip contacts a flat portion of the camera platen.

i. If the platen is out of alignment, align it (para 75, TM 11-6720-207-35).

j. Remove the back focal length fixture and the dial depth gage from the platen.

k. Reassemble the camera lens cone and the magazine assembly.

Section III. OPERATION UNDER UNUSUAL CONDITIONS

49. Operation at low Temperatures

Low temperatures have little effect on the camera system test equipment. It operates at temperatures as low as 0° F (-18° C), and may be stored in temperatures as low as -65' F (-54° C).

a. If the camera system test equipment is to be operated at low temperature, keep it in low-temperature storage when not in use. Store the equipment in the carrying cases and cover the cases with water repellent material. If possible, store the carrying cases at the temperature in which the equipment will be used. When the equipment is to be operated in a temperature higher than 30° F (16° C) above the storage temperature, proceed as follows:

(1) Transfer the equipment from the cold to the warm location and allow it to remain in the carrying cases, covered with water-repellent material, for hours.

(2) Before operating the equipment, use a lint-free cloth to remove any moisture that has condensed on the outer surfaces.

b. When the camera system test equipment is to be operated at freezing temperatures, follow the procedure below.

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

(2) Do not breathe directly on the equipment during cold weather operation.

50. Operation in Tropical and Desert Areas

When the camera system test equipment is used in areas of extreme heat and humidity, such as desert and tropical regions, observe the following precautions:

a. Desert Regions. In desert regions, clean the camera system test equipment (para 59) before each use. Store the equipment in the carrying cases when not in use.

b. Tropical Regions. In climates of high humidity, such as the tropics, inspect the camera system test equipment daily for fungus, mold, insects, and metallic corrosion. Remove all fouling immediately (para 59). The camera system test equipment is moistureproofed and fungiproofed. When not in use, store the camera system test equipment in the carrying cases with the original number of activated desiccant units and a humidity indicator.

51. Operation in Maritime or Rainy Areas

To prevent corrosion from salt-laden air and from rust caused by condensation of moisture when the camera system test equipment is stored, wipe all exposed metal surfaces with a soft, clean, lint-free cloth moistened with Lubricating Oil, General Purpose, Preservative (PL-Special) (MIL-L-644). When not in use, store the camera system test equipment as directed in paragraph 50.

CHAPTER 4

MAINTENANCE

Section I. GENERAL

52. Scope of Maintenance

The maintenance duties assigned to the repairman-user of the camera system test equipment are listed below together with a reference to the paragraphs covering the specific maintenance function. These duties do not require special tools or test equipment.

a. Daily preventive maintenance checks and services (para 56).

b. Weekly preventive maintenance checks and services (para 57).

c. Monthly preventive maintenance checks and services (para 58).

d. Cleaning (para 59).

e. Troubleshooting and repairs (para 62-69).

53. Tools, Materials, and Test Equipment Required for Maintenance

The following items are required for repairman-user maintenance of the camera system test equipment:

a. Cleaning Compound (FSN 7930-395-9542).

b. Lint-free cloth (FSN 8305-170-5062.).

c. Camel's -hair brush (FSN 8020-246-8806).

d. Hand blower (air syringe) (FSN 5120-254-4612).

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

f. Lens cleaner (FSN 6760-408-5175).

g. Tool Kit, Photographic Repairman TK-77/GF.

h. Multimeter AN/URM-105 (TM 11-6625-203-12).

I. Test Set, Electron Tube TV-7/U(TM 11-6625-274-12).

j. Dow Corning DC-4 (FSN 5970-221-5903).

k. Rubber tape (FSN 5970-240-0617).

l. Friction tape (FSN 5970-184-2003).

m. Lubricating Oil, General Purpose, Preservative Special (PL Special) (FSN 9150-185-0629).

Section II. PREVENTIVE MAINTENANCE INSTRUCTIONS

54. 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 56, 57, and 58 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. 56, 57, and 58) outline functions to be performed at specific intervals. These checks and services are to maintain electronic equipment in a combat serviceable condition; that is , in good general (physical) condition and in good operating condition. To assist the repairman-user in maintaining serviceability, the charts indicate what to check, how to check, and the normal conditions. The References column lists the areas that contain additional information. If the defect cannot be remedied by performing the corrective action indicated, higher level of 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.

55. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the camera system test equipment are required daily, weekly, and monthly.

a. Paragraph 56 specifies checks and services that must be accomplished daily and under the special conditions listed below.

(1) When the camera system test equipment is initially insulated.

(2) When the camera system test equipment is reinstalled after removal for any reason.

(3) Before each use of the camera system test equipment.

(4) At least once each week if the camera s y stem test equipment is maintained in a standby (ready for immediate use) condition.

b. Paragraphs 57 and 58 specify additional checks and services that must be performed on a weekly and monthly basis, respectively.

56. Daily Preventive Maintenance Checks and Services Chart

Seq No.	Item	Procedure	Reference
		GENERAL PHYSICAL CHECKS	
1	Exposed surfaces of carrying cases, Control panels, meter and clock windows, glass surface of shutter tester light box, analyzer accessories light source, and light box.	Clean by removing dirt and moisture from exposed surfaces.	Para 59.
2	Switches, knobs, jacks, and connectors.	Inspect for excessive looseness.	
3	Controls ----------	Check for proper mechanical action by placing each control in each of its possible settings. Inspect to see that action is positive, without binding or scraping. **Note: Replace setscrews in knobs that require frequent tightening.**	
4	Meters and clocks ----------	Check for sticking of pointers or hands.	
5	Control settings----------	Make sure that controls are correctly set for measuring appropriate characteristic.	
6	Windows of meters, clocks, shutter tester light box, analyzer accessories light source.	Inspect for broken glass.	
7	Indicating lamps----------	Inspect for burned-out lamps.	
8	Fuses ----------	Check to see that operating fuses and spare fuses are present and of proper value as marked on panels.	
9	Covers and latches----------	Inspect covers and latches on carrying case covers for tight closure.	
10	Carrying cases----------	Inspect to see that carry cases are not cracked or broken. Check inserts in carrying cases for damage and proper seating.	
11	Mounting hardware and retaining screws.	Check to see that all mounting hardware and retaining screws on panels and special fixtures are present and properly tightened.	
		OPERATION (SYSTEM ANALYZER)	
12	Preliminary----------	Connect system analyzer to primary power sources (para 24).	Fig. 9.
13	POWER switch (R/C SIMULATOR Section).	Set to ON.	
14	RESET control (TIMER section)----------	Momentarily press. Note that TIMER clock pinter is reset to zero position.	
15	CAMERA OPERATE and IMC OPERATE indicators.	Momentarily press each. Note that each indicator lights.	
16	FLASH DETECTOR PULSE indicator	Momentarily press. Not that indicator lights.	

Seq No.	Item	Procedure	Reference
		GENERAL PHYSICAL CHECKS	
17	PULSE and FLASH PULSE indicators	Momentarily press each. Note that each indicator lights.	
18	Stop ----------	Turn POWER switch (R/C SIMULATOR section) to OFF.	
		OPERATION (SYSTEM SIMULATOR)	
19	Preliminary----------	Connect system simulator to primary power Sources (para 23).	Fig. 10.
20	POWER switch (PANEL POWER Section).	Set to ON. Note that AC and DC indicators light.	
21	POWER switch (VACUUM section) -------	Set to ON. Note that: *a.* VACUUM power indicator lights. *b* VACUUM pump starts to operate.	
22	INTER CAMERA SYNC indicator (KA-30A section).	Momentarily press. Note that indicator lights.	
23	DRIVE and PICTURE indicators (KA-30A section).	Momentarily press each. Note that each indicator lights.	
24	INTLK indicator (KA-30A section) ----------	Momentarily pres. Note that indicator lights.	
25	NIGHT INTLK indicator (KA-30A section).	Momentarily press. Note that indicator lights.	
26	FLASH PULSE indicator (KA-39A section).	Momentarily press. Note that indicator lights	
27	READY indicator (CAMERAS section)	Momentarily press. Note that indicator lights.	
28	OPERATE indicator (CAMERAS section).	Momentarily press. Note that indicator lights.	
29	Stop----------	Turn POWER switches (VACUUM and PANEL POWER sections) to OFF.	
		OPERATION (SYSTEM COMPONENTS TEST SET)	
30	Preliminary----------	Connect system components test set to primary Power sources (para 23).	Fig. 11.
31	POWER switch (PANEL POWER section).	Set to ON. Note that AC and DC indicators light. After 40- to 60-second delay, READY indicator lights.	
32	FLASH indicator (KA-30A FLASH DETECTOR section).	Momentarily press. Note that indicator lights.	
33	PHOTO FLASHES FIRED indicators (CONTROL BOX section).	Momentarily press each indicator (1-20). Note that each indicator lights.	
34	CONTROL POWER indicator (CONTROL BOX section).	Momentarily press. Note that indicator lights.	
35	FLASH indicator (AMPLIFIER, KA-39A FLASH DETECTOR, OVERRUN section).	Momentarily press. Note that indicator lights.	
36	OVERRUN indicator (AMPLIFIER, KA-39A FLASH DETECTOR, OVERRUN section).	Momentarily press. Note that indicator lights.	
37	ZERO ADJUST control (MILLISECOND TIMER section).	Rotate. Note that needle on MILLISECOND TIMER meter moves around zero point. Adjust meter needle to zero.	
38	INTERVAL switch (PULSE TIMER section).	Set to CLOCK DIRECT. Note that PULSE TIMER clock can be heard running. Set INTERVAL switch to OFF.	
39	Stop----------	Turn POWER switch (PANEL POWER section) to OFF.	
		OPERATION (SHUTTER TESTER)	
40	Preliminary----------	Connect shutter tester to primary power sources (para 23).	Fig. 12.
41	PANEL POWER switch ----------	Open ventilation door. Set switch to ON; blower motor should operate. Note that, after 40-to 60-second delay, READY indicator lights.	
42	FUNCTION switch, METER RESET switch, and METER ZERO control.	Set FUNCTION switch to SPEED. Press and hold METER ZERO control. Note that TIME meter indicates zero.	

Seq No.	Item	Procedure	Reference
43	ILLUMINATION control----------	Set to OFF. Note that light box does not illuminate. Rotate (step-by-step) to HIGH 4 position. Note that light box illumination intensity increases.	
44	Stop----------	Turn PANEL POWER switch to OFF.	

57. Weekly Preventive Maintenance Checks and Services Chart

Seq No.	Item	Procedure	Reference
1	Cables, wiring and shock mounts ----------	Inspect for cuts, cracks, strain, fraying, or deterioration.	
2	Handles, latches, and hinges----------	Hand check handles, latches, and hinges for looseness.	
3	Exposed metal surfaces ----------	Inspect exposed metal surfaces of carrying Cases, panels, and fixtures for rust and corrosion.	**Para 60.**
4	Carrying case gaskets----------	Inspect gaskets on covers of carrying cases for worn or loose edges.	

58. Monthly Preventive Maintenance Checks and Services Chart

Seq No.	Item	Procedure	Reference
1	Pluckout items ----------	Inspect seating of readily accessible items of pluckout nature: fuses, connectors, lamps, tubes, and plug-in relays. Do not remove, rock, or twist to inspect; use only direct pressure to insure item is fully seated.	
2	Shock mounts ----------	Inspect shock mounts for cleanliness and tightness.	Para 59.
3	Relays and circuit breakers ----------	Inspect relays and circuit breakers for dirt, corrosion, and worn or burned contacts.	
4	Resistors and capacitors ----------	Inspect resistors and capacitors for cracks, blistering, or other detrimental defects.	
5	Bushings, gaskets, insulators, and sleeves	Inspect bushings, gaskets, insulators, and sleeves for cracks, chipping, or excessive wear.	
6	Jacks and connectors ----------	Inspect jacks and connectors for snug fit and good contact.	
7	Air filters----------	Inspect air filters for cleanliness	Para 59.
8	Variable capacitors----------	Inspect variable capacitors for dirt, corrosion, or deformed plates.	
9	Screw type terminals----------	Inspect screw type terminals of transformers, fixed capacitors, resistor, chokes, potentiometers, and rheostats for corr sion, dirt, and loose contacts.	
10	Interiors of chassis and carrying cases ---	Clean interior of chassis and carrying cases.	Para 59 And 60.
11	Motors----------	Inspect motors for brush wear, spring tension, arcing, and commutator wear.	
12	Terminal boards----------	Inspect terminal boards for loose connection, cracks, and breaks.	
13	Publications ----------	*a.* Check to see that pertinent publications are complete and usable (appx I). *b.* See that changes pertinent to equipment are on hand (DA Pam 310-4).	

Seq No.	Item	Procedure	Reference
14	Modification work orders----------	Check DA Pam 310-4 to determine if new applicable MWO's have been published. ALL URGENT MWO's must be applied immediately. ALL NORMAL MWO's must be scheduled.	
15	Completeness ----------	Check equipment to see that it is complete (para 6).	Appx III.

59. Cleaning

Inspect the exteriors of all components of the camera system test equipment. The exterior surfaces should be free of dust, dirt, grease, and fungus.

a. Remove dust and loose dirt with a clean soft cloth.

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

b. Remove grease, fungus, and ground-in dirt from the carrying cases and components; use a cloth dampened (not wet) with cleaning compound.

c. Remove dust or dirt from plugs and jacks with a brush.

Caution: **Do not press on the meter faces or shutter tester light box (glass) when the meters or shutter tester ht box may become damaged.**

d. Clean the front panels, meters shutter tester light box, and control knobs; use a soft clean cloth. If dirt is difficult to remove, dampen the cloth with water; mild soap may be used for more effective cleaning.

60. Touchup Painting Instructions

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 applicable cleaning and refinishing practices specified in TM 9-213.

61. Lubrication

The camera system test equipment does not require any lubrication. The commutator drive motor (CAI Part No. 2996-340) used in the system analyzer has Grease, aircraft and instrument, MIL-G-3278 applied to the motor bearings; Grease, aircraft, MIL-G-7118 has been applied to the motor gears. This item has been lubricated by the manufacturer and requires no further lubrication.

Section III. TROUBLESHOOTING AND REPAIRS

62. General Troubleshooting Information

Troubleshooting of the camera system test equipment is based upon the operational checks contained in the daily preventive maintenance checks and services chart (para 56) and upon malfunction reports. To troubleshoot the camera system test equipment, perform all functions starting with number 13 in the daily preventive maintenance checks and services chart (para 56) and proceed through the items until an abnormal condition or result is observed. When an abnormal condition or result is observed, note the item number and turn to the corresponding item number in the troubleshooting chart (para 63. Perform the checks and corrective actions indicated in the troubleshooting chart. If the corrective measures indicated do not result in correction of the trouble, a higher level of maintenance is required. If the troubles are indicated by malfunction reports while operating, check the tubes (para 68) and check continuity of the

cables if a cable (para 66) is suspected to be defective. Paragraphs 64 through 67 contain additional information and step-by-step instructions for performing equipment tests and adjustments to be used during the troubleshooting procedures.

63. Troubleshooting Chart

Item No.	Trouble symptom	Probable trouble	Checks and corrective measure
		SYSTEM ANALYZER	
13	AC or DC fuse bolder lamps light	*a* Defective AC fuse F2 or AC indicator lamp DS7 *b* Defective DC fuse F1 or AC indicator lamp DS6	*a* Replace fuse F2 or lamp DS7 (para 69). *b* Replace fuse F1 or lamp DS6.
14	TIMER clock pointer doe not reset to zero	Defective TIMER clock ----------	Higher level maintenance required.
15	CAMERA OPERATE and IMC OPERATE indicators do not	Defective indicator lamp D82 or DS1	Replace lamp DS2 or DS1 (para 69).
16	FLASH DETECTOR PULSE indicator does not light.	Defective indicator lamp DS4 ----------	Replace lamp DS4.
17	PULSE or FLASH PULSE indicator does not light.	Defective indicator lamp DS3 or DS5.	Replace lamp DS3 or DS5.
		SYSTEM SIMULATOR	
20	AC or DC indicator does not light	*a.* Defective AC fuse F702 or AC indicator lamp DS709 *b.* Defective DC fuse F703 or DC indicator lamp DS710	Replace fuse F702 or lamp DS709 (para 69). Replace fuse F703 or lamp DS710.
21	*a.* VACUUM power Indicator does not light *b.* VACUUM pump does not operate	*a.* Defective Indicator lamp DS711. *b.* Defective vacuum pump or motor B701	*a.* Replace lamp DS711 *b.* Higher level maintenance required.
22	INTER CAMERA SYNC indicator does not light.	Defective indicator lamp DS704	Replace lamp DS704 (para 69).
23	DRIVE Indicator or PICTURE indicator does not light	Defective indicator lamp DS705 or DS701.	Replace lamp DS705 or DS701.
24	INTLK indicator does not light	Defective Indicator lamp DS702	Replace lamp DS702.
25	NIGHT INTLK Indicator does not light.	Defective indicator lamp DS703	Replace Imp DS703.
26	FLASH PULSE indicator does not light.	Defective indicator lamp DS706	Replace lamp DS706.
27	READY indicator does not light	Defective indicator lamp DS708	Replace lamp DS708.
28	OPERATE indicator does not light.	Defective indicator lamp DS707	Replace lamp DS707.
		SYSTEM COMPONENTS TEST SET	
31	AC, DC, or READY indicator does not light.	*a.* Defective AC fuse F1 or AC indicator lamp DS2. *b.* Defective DC fuse F2 or DC indicator lamp DS3. *c.* Defective indicator lamp DS1	*a.* Replace fuse F1 or lamp DS2 (para 69). *b.* Replace fuse F2 or lamp DS3. *c.* Replace lamp DS1.
32	FLASH indicator does not light	Defective indicator lamp DS7 ----------	Replace lamp DS7.
33	All PHOTO FLASHES FIRED indicators do not light.	One or more defective indicator lamps (DS8 through DS27).	Replace defective lamp or lamps (DS8 through DS27).
34	CONTROL POWER indicator does not light.	Defective indicator lamp DS5 ----------	Replace lamp DS5.
35	FLASH indicator does not light	Defective indicator lamp DS7 ----------	Replace lamp DS7.
36	OVERRUN indicator does not light.	Defective indicator lamp DS6 ----------	Replace lamp DS6.
37	MILLISECOND TIMER meter does not move.	Defective MILLISECOND TIMER meter.	Higher level maintenance required.
38	PULSE TIMER clock cannot be heard running.	Defective PULSE TIMER clock ----------	Higher level maintenance required.
41	READY indicator does not light	Defective indicator lamp DS417----------	Replace lamp DS417(para 69).
42	TIME meter does not indicate zero.	Defective TIME meter----------	Higher level maintenance required.

Item No.	Trouble symptom	Probable trouble	Checks and corrective measure
43	Light box does not illuminate or illumination intensity does not vary.	*a.* Defective lamp or lamps in light box. *b.* Defective light box----------	*a.* Replace defective lamp or lamps (DS501 through DS516) (para 69). *b.* Higher level maintenance required.

64. Supplementary Troubleshooting Information

Paragraphs 65, 66, and 67 provide information which supplements the troubleshooting information in the troubleshooting chart (para 63). The troubleshooting chart plus the supplementary techniques present a systematic procedure for sectionalizing most troubles.

65. Visual Inspection

a. When a component of the camera system test equipment falls to perform properly, turn off the power and check the items listed below. Do not check any Item with the power on.

(1) Wrong settings of switches or controls.
(2) Power cable or other cables disconnected or poorly connected.
(3) Burned-out fuses (usually indicates some other fault).

b. Perform a visual inspection as follows:

(1) Equalize the air pressure by opening the air relief valve on the carrying case.
(2) Unsnap the carrying case latches; open and remove the cover of the carrying case.
(3) Remove the chassis from the hinged bottom of the carrying case by removing the chassis retaining screws and carefully lifting the chassis off the mountings in the hinged bottom of the carrying case.
(4) Check all parts and wiring for evidence of loose connections, shorted or fouled wires, defective insulation, and damaged components.
(5) Check for evidence of overheating.
(6) Make sure that all parts on the chassis are held firmly in place.
(7) Inspect all switch decks for firm, clean wiper-to-lug contacts.
(8) Check the seating of all subchassis connectors.
(9) On the shutter tester, check the connections to the ventilation door interlock switch. Check for positive action of the ventilation door.
(10) Check connections on all terminal boards.
(11) On the shutter tester, check the blower motor for signs of overheating. If the blower motor overheats, refer to higher level of maintenance for repair or replacement.
(12) Place the chassis in the hinged bottom of the carrying case; be careful not to strike any part of the chassis against the edge of the hinged bottom.
(13) Reinstall the chassis retaining screws and secure the chassis firmly in place. Reinstall the cover of the carrying case.

66. Sectionalizing Troubles to Interconnecting Cables

a. Defective interconnecting cables will be indicated:

(1) When it is apparent that power is not being applied to one of the test sets.
(2) When it is apparent that signals and voltages are not being interconnected between the test set being used and the equipment being tested.

b. Using Multimeter AN/URM-105, check the continuity of the suspected defective cable. Figures 30 through 34 are schematic diagrams of the interconnecting cables and should be used as a guide when

checking continuity. if an open circuit is indicated during continuity checking, repair the wiring.

67. Testing Vacuum Regulator Test Set (Part of System Simulator)

a. Connect the vacuum gage (fig. 2) to a vacuum source that is calibrated in inches of water.

b. Vary the vacuum source over the range of the vacuum gage (0 to 16 inches of water); compare the various readings of the vacuum source to the corresponding readings of the vacuum gage. The readings should coincide.

c. If the readings (b above) do not coincide, check to see that the meter on the vacuum gage reads zero. If the meter does not indicate zero, turn the glass clockwise and lift it off. Turn the knurled screw until the meter indicates zero. Replace the glass and repeat the procedures in b above. If the readings still do not coincide, replace the vacuum gage and case assembly.

68. Tube Testing and Replacement

When trouble occurs, check all cabling and connections (para 66) before removing any tubes. Try to isolate the trouble to an

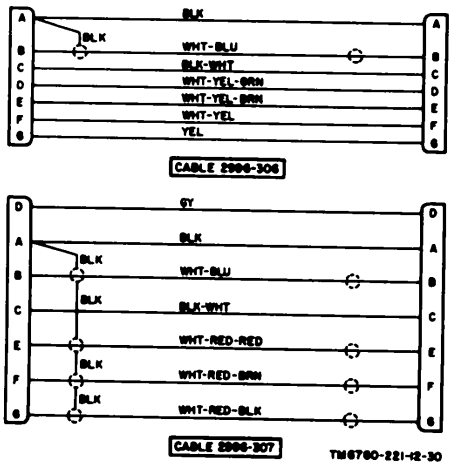


Figure 30. Analyzer accessories cables, schematic diagram.

assembly or stage. If tube failure is suspected, use the applicable procedure below to check the tubes.

***Caution*: Do not rook or rote a tube when removing it from a socket; pull it straight out with a tube puller, On the shutter tester (fig. 37), do not replace tubes V201, V202, V206, or V301; these tubes must be replaced by higher level maintenance personnel where recalibration can be accomplished.**

a. Use of Tube Tester. Remove and test one tube at a time. Discard a tube only if its defect is obvious or if the tube tester shows it to be defective. Do not discard a tube that tests at or near its minimum test limit on the tube tester.

b. Tube Substitution Method. Replace a suspected tube with a new tube. If the equipment still does not work, remove the new tube and put back the original tube. Repeat this procedure (c below) with each suspected tube until the defective tube is located.

c. Procedure.

(1) Loosen the chassis retaining screws located around the front panel of the test set that contains the suspected defective tube and slide out the panel-chassis assembly.

(2) On the system simulator (fig. 35), the tubes are located in individual packages on the chassis. To reach the tubes located in any subassembly, remove the cover of the subassembly. If difficulty is encountered in reaching the tubes of a particular subassembly, loosen the Dzus fasteners and slide latches and separate the subassembly from the panel. Remove the sides of a subassembly by loosening the four screws that hold the sides to the sides to the base of the subassembly.

***Note:* The intervalometer and the input operational amplifier subassemblies are hermetically sealed unite and are replaced by higher level maintenance personnel.**

(3) On the system components test set (fig. 36), turn the chassis face down to expose tubes V201 through V205.

To reach the V305 in the 150-volt regulator, remove the two retaining screws that secure the cover and pull the cover straight up.

(4) On the shutter tester (fig. 37), unplug the ventilation door interlock switch from the chassis. Place the chassis, with the control panel face down, on a flat surface. To check the power supply regulator tubes, remove the main chassis from the panel by loosening the six Dzus fasteners and then loosen the two Dzus fasteners that hold the suspected defective power supply regulator to the main chassis. After the tubes have been checked, secure the assemblies with their respective Dzus fasteners and re-connect the ventilation door inter- lock switch to the chassis.

69. Repairs and Adjustments

a. Replacement of Indicator Lamps.

(1) Turn the knurled cap of the indicator counterclockwise and remove it from the panel.

(2) Pull the defective indicator lamp out of the holder by grasping it at the base and

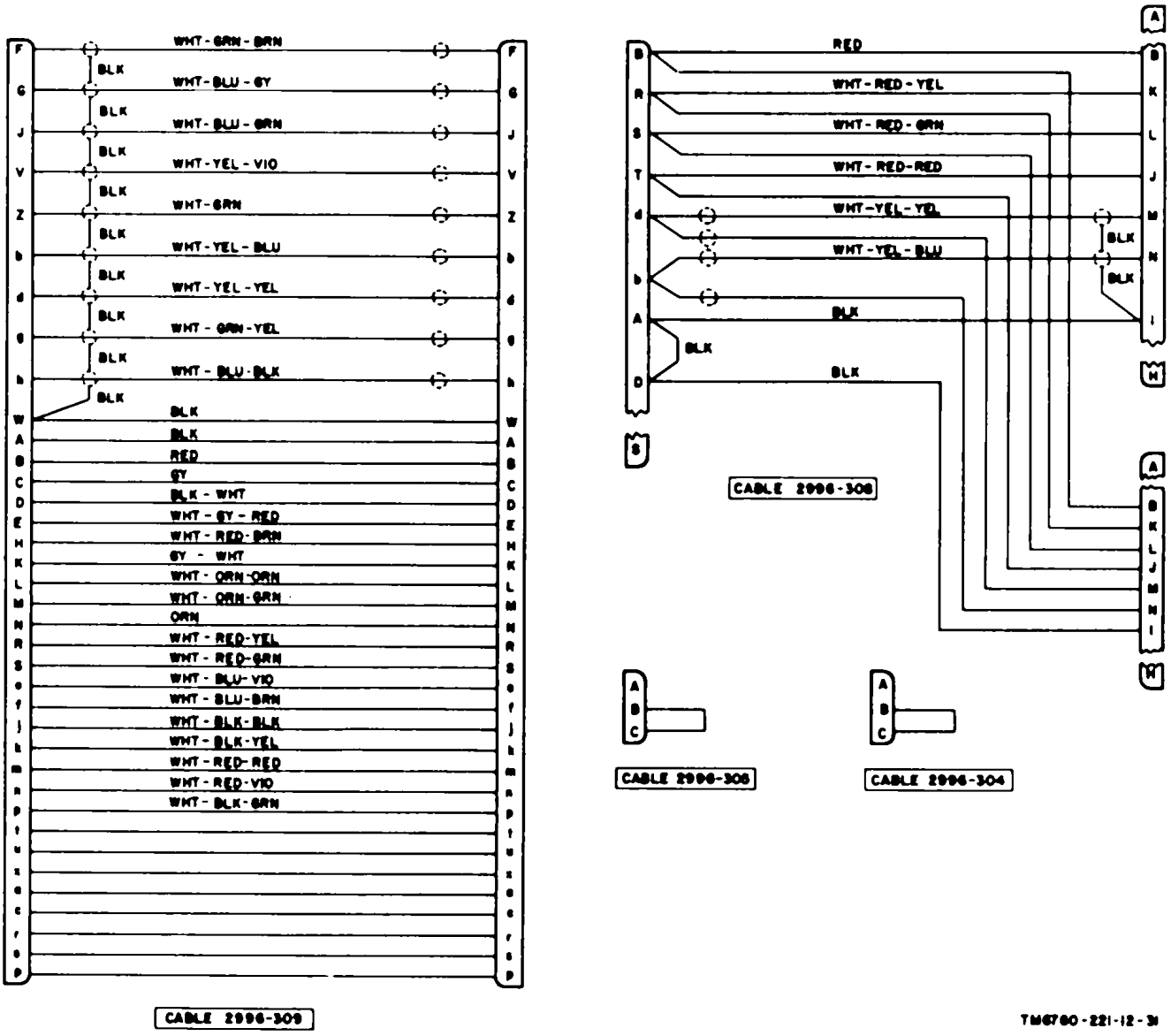


Figure 31. System analyzer cables, schematic diagram.

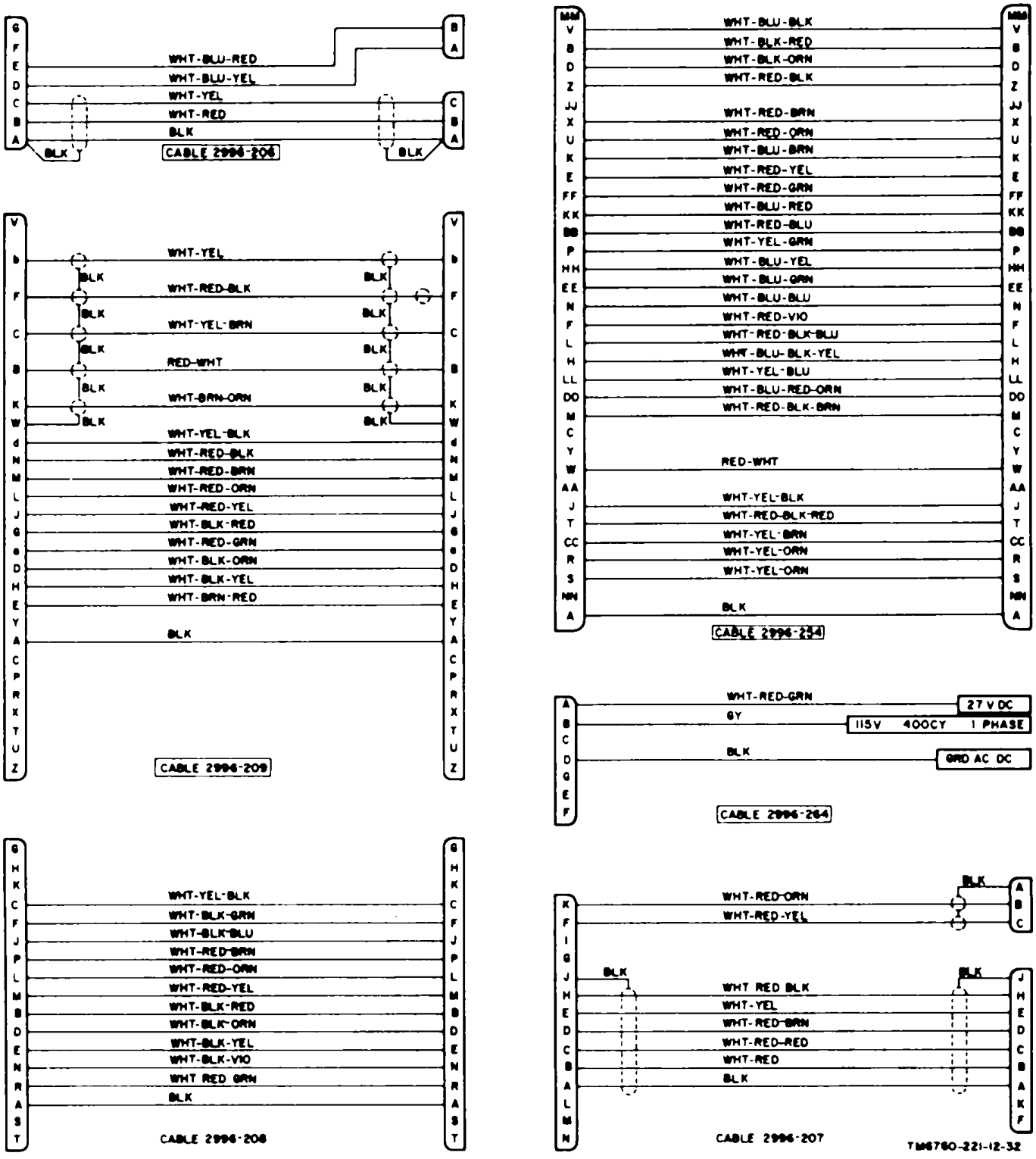


Figure 32. System simulator cables, schematic diagram.

pulling it from the holder.

(3) Insert a new lamp in the holder.

(4) Screw the knurled cap clockwise into the panel until it is firmly seated

b. Replacement of Fuses or Fuseholder Lamps. The fuseholder lamps contain both a fuse and a lamp. If the lamp is defective, replace the entire fuseholder cap; if the fuse is defective, replace only the fuse. Proceed as follows:

(1) Turn the fuseholder cap to the left and pull it out of the holder.

(2) Remove the fuse from the fuseholder cap.

(3) Place a new fuse in the fuseholder cap.

(4) Insert the fuseholder cap into the panel and secure it in place.

Note: **Spare fuses are contained in the associated fuseholders marked SPARE.If spare fuses are used, replace them at the first opportunity.**

c. Replacement of Lamps in Light Source (Parts of Analyzer Accessories Kit)

(1) Remove the cover of the light source (fig. 3) by releasing the two Dzus fasteners on the corners of the cover.

(2) Remove the defective lamp and replace it with a new one.

(3) Replace the cover on the light source and secure the two Dzus fasteners.

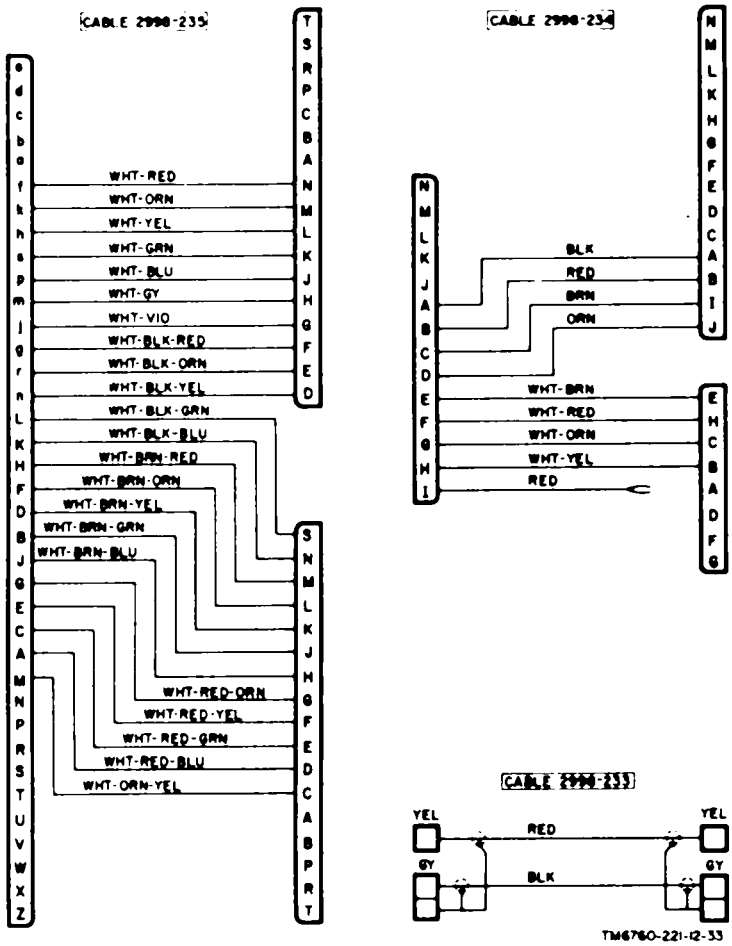


Figure 33. (1). System components test set cables, schematic diagram (part 1 of 2)

d. Replacement of Lamps in Flash Ejector Tester (Part of Analyzer Accessories Kit)

(1) Turn the cap to the left until it is free of the flash ejector tester (fig. 3) chassis.
(2) Remove the defective lamp from the cap and replace it with a new one.
(3) Screw the cap into the chassis until it is securely in place.

e. Replacement of Light Source Lamps on Shutter Tester.

(1) Remove the glass retainer screws (fig. 12).
(2) Lift the glass retainer and the glass from the front panel to expose the lamps (fig. 38).
(3) Replace the defective lamp or lamps.
(4) Place the glass and glass retainer in position on the front panel; secure the assembled parts with the glass retainer screws (fig. 12).

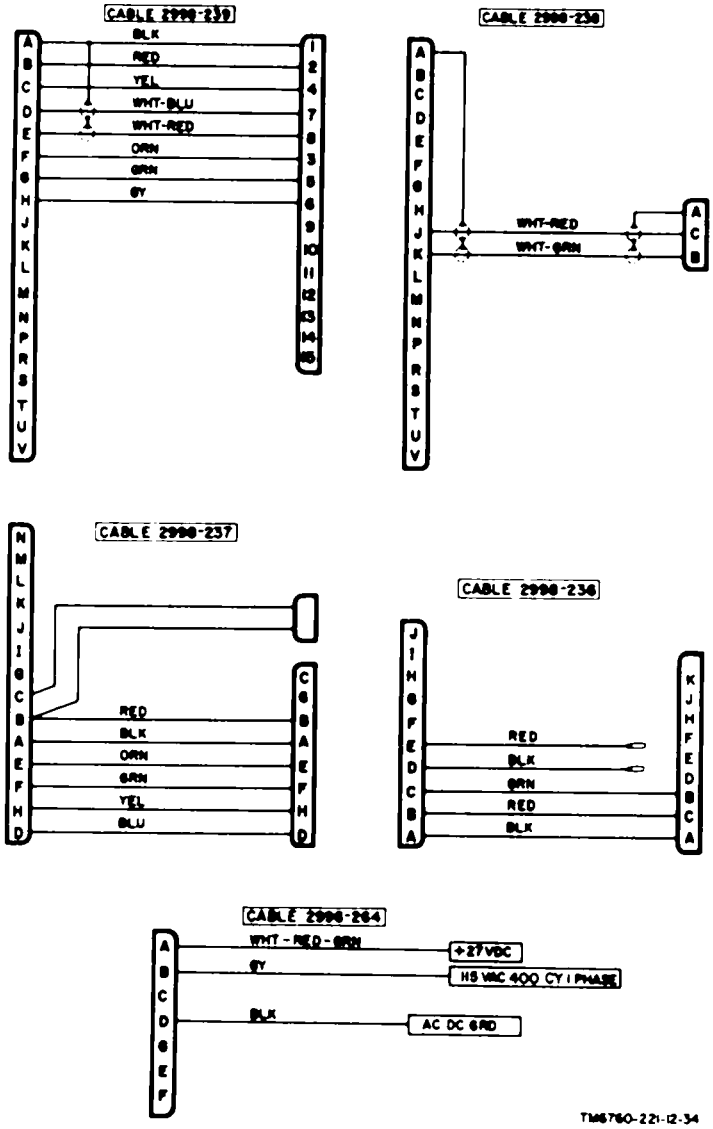


Figure 33 (2). System components test set cables, schematic diagram (part 2 of 2)

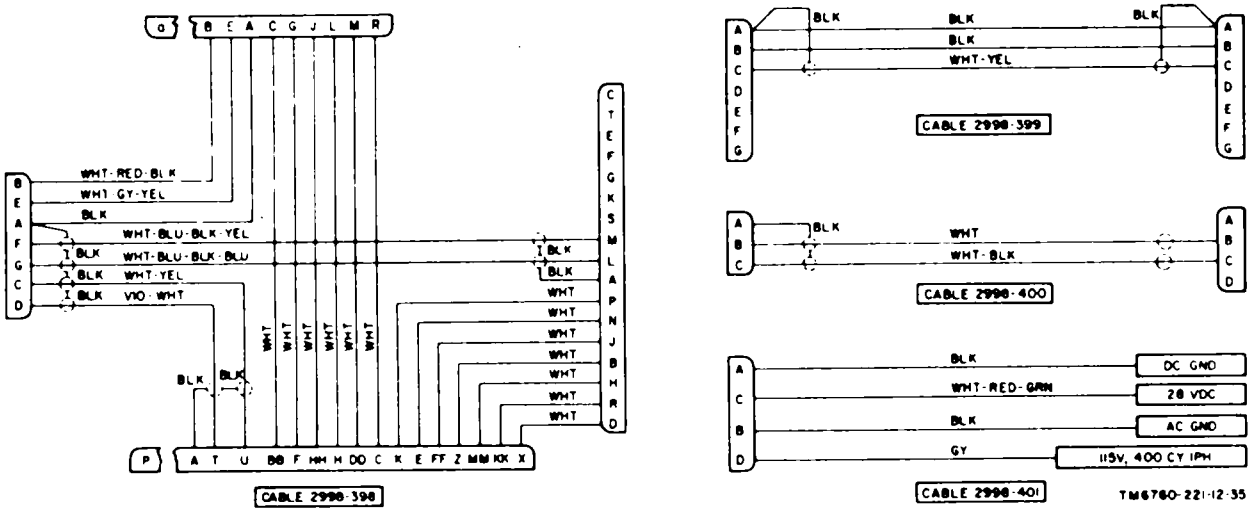


Figure 34. Shutter tester cables, schematic diagram.

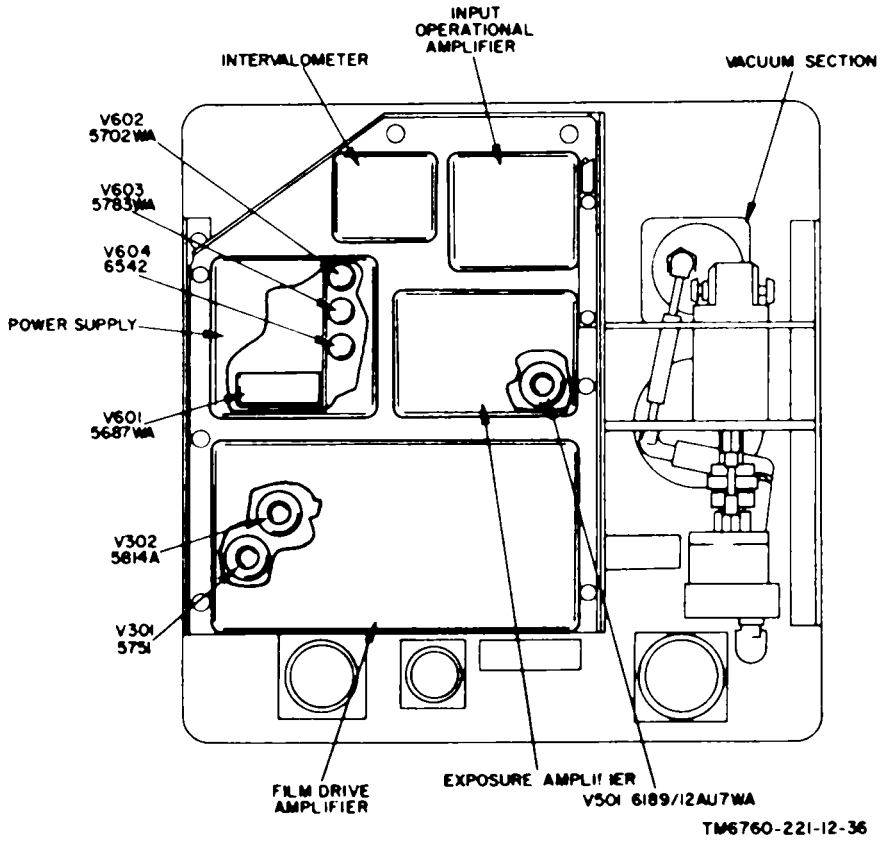


Figure 35. System simulator, subassembly and tube location diagram.

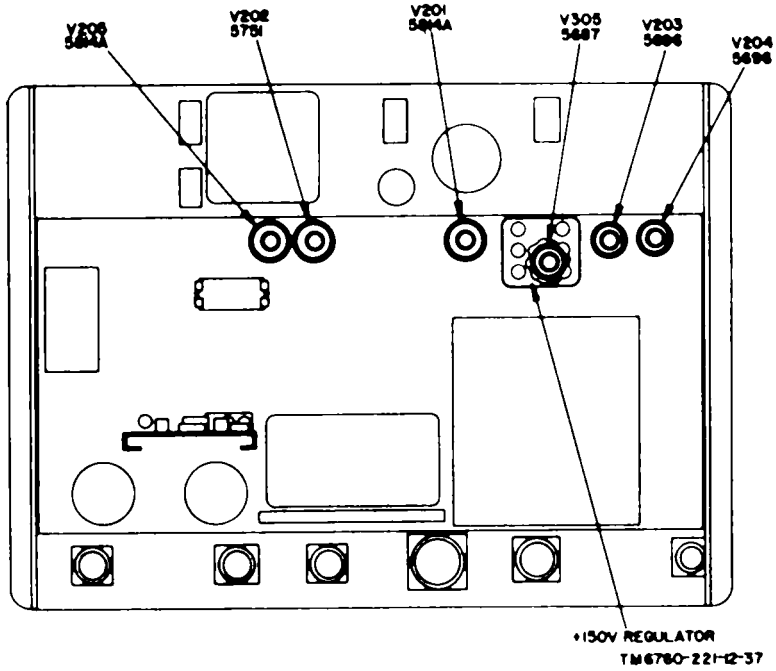


Figure 36. System components test set, tube location diagram.

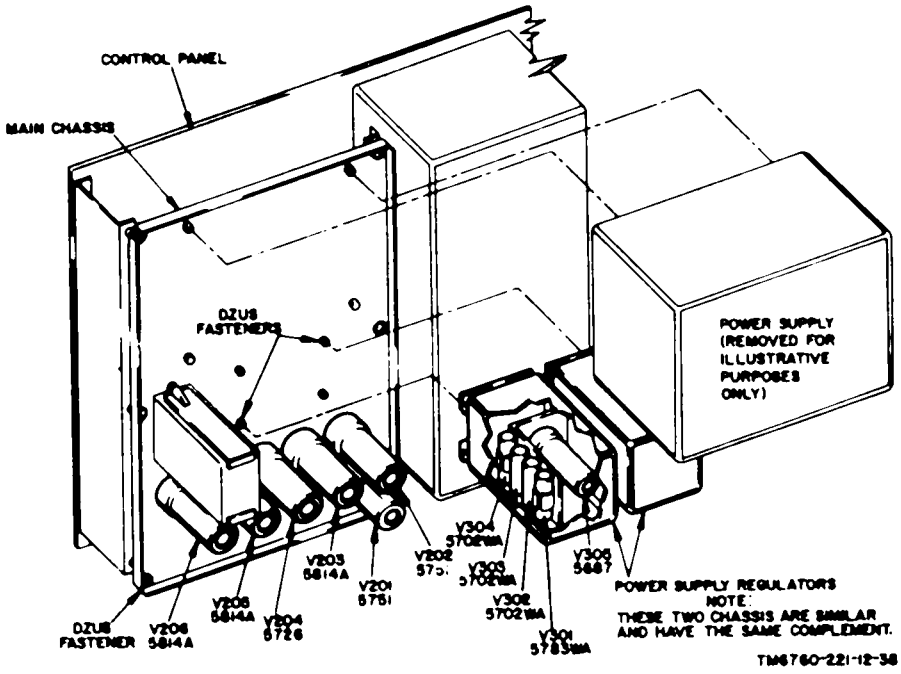


Figure 37. Shutter tester, tube location diagram.

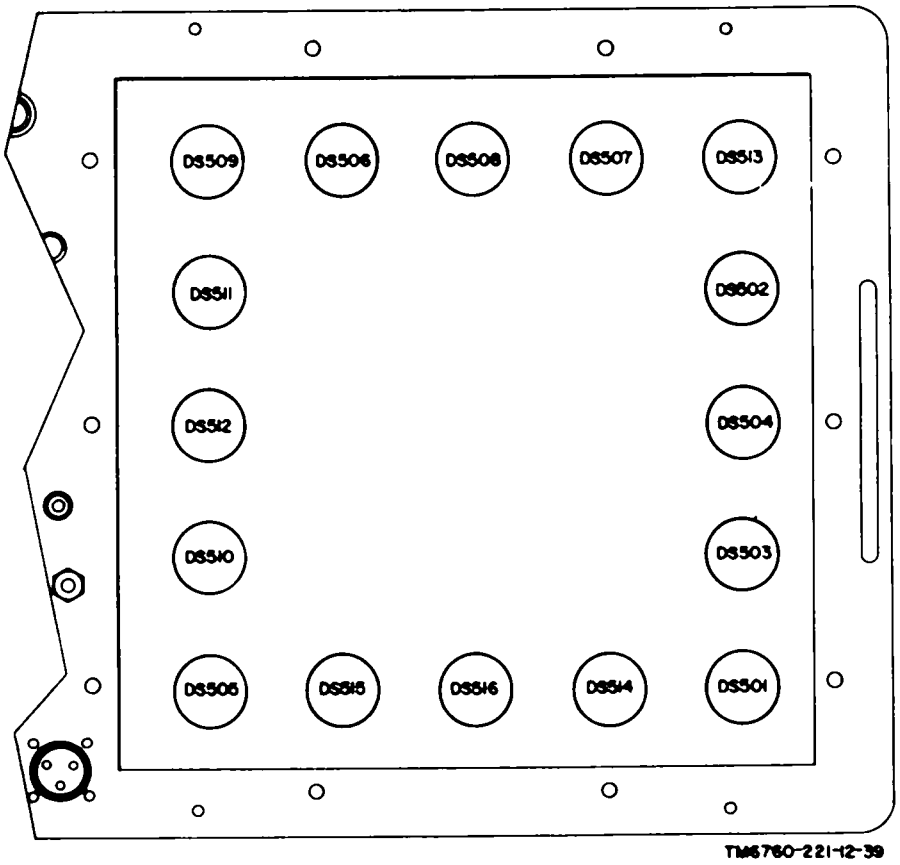


Figure 38. Shutter tester light source, lamps location diagram.

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

Section I. SHIPMENT AND LIMITED STORAGE

70. Disassembly of Equipment

To prepare the camera system test equipment for shipment or limited storage, proceed as follows:

a. Disconnect all cables from the components of the camera system test equipment.

b. Prepare the system components test set accessories as follows:

(1) Secure the torque wrench adapter in the adapter retaining clamp on the torque fixture, and place the torque fixture in its compartment.

(2) On the shutter fixture, set the shutter drive control in a position that places the control and the shutter indicator arm over the index plate. Position the DAY-NIGHT mode control to NIGHT, and the shutter time control to 1/150. Place the shutter fixture in its compartment.

c. Pack all cables and accessories into their proper locations in the appropriate carrying cases. If the camera system test equipment is to be stored for more than 24 hours (or is to be shipped) place activated desiccant units and humidity indicator cards in each carrying case.

d. Place the packaged manuals in the pockets on the storage compartment doors of the carrying cases.

e. Secure the covers on the hinged bottoms of the carrying cases.

f. Close the air-relief valve on each carrying case by turning it to the right until it is firmly seated.

g. Secure the relief valves and latches on the carrying cases with lockwire.

71. Repackaging for Shipment or Limited Storage

a. The exact procedure for repackaging depends on the material available and the conditions under which the camera system test equipment is to be shipped or stored. The information given in paragraph 21concerning the original packaging will also be helpful.

b. Package each component of the camera system test equipment by placing it within a wrap of filler material. Secure the wrap with gummed tape. Place the wrapped component in a corrugated carton or plywood shipping case. Seal the corrugated carton with gummed tape. If a plywood shipping case is used, close the case and nail it shut.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

72. Authority for Demolition

Use the demolition procedures given in paragraph 73 to prevent the enemy from using or salvaging the camera system test equipment. Demolition will be accomplished only upon the order of the commander.

73. Methods of Destruction

Any or all of the methods of destruction given below may be used. The time available will be the major determining factor for the methods to be used in most instances when destruction of the camera system test equipment is undertaken. The tactical situation also will determine in what manner the destruction order will be carried out. In most cases, it is preferable to demolish completely some portions of the camera system test equipment rather than partially to destroy all of it.

a. Smash. Smash the interior of the components of the camera system test equipment; use sledges, axes, hammers, crow bars, and any other heavy tools available.

(1) Remove the chassis and panel assemblies from the carrying cases and, with a heavy hammer or bar, smash as many as possible of the exposed parts of the chassis and panel assemblies.

(2) Use a heavy tool to smash the meters, knobs, switches, and dials.

b. Cut. Cut the cabling, cording, and wiring; use axes, handaxes, machetes, and similar tools. Cut the power cables and special-purpose cables; use a heavy axe or matchete. Cut all cords and cables in a number of places.

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

c. Burn. Burn as much of the camera system test equipment as is flammable; use gasoline, oil, flamethrowers, and similar tools. Burn the instruction literature first. Pour gasoline on the cut cables and internal wiring, and ignite it. Use incendiary grenades to complete the destruction of the equipment.

d. Explode. Use explosives to complete demolition or to cause maximum damage, before burning, when time does not permit complete demolition by other means. Powder charges, fragmentation grenades, or incendiary grenades may be used. Incendiary grenades usually are most effective if destruction of small parts and wiring is desired.

e. Dispose. Bury or scatter the destroyed parts, or throw them into nearby waterways. This is particularly important if a number of parts have not been completely destroyed.

APPENDIX I

REFERENCES

The following publications contain information applicable to the operation of the camera system test equipment.

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 4, 6, 7, 8, and 9), Supply Catalogs (type CL), Supply Bulletins, Lubrication Orders, and Modification Work Orders.
SB 38-100	Preservation, Packaging, and Packing Materials, Supplies, and Equipment Used by the Army.
TM 9-213	Painting Instructions for Field Use.
TM 11-5895-246-12	Operator and Organizational Maintenance Manual: Surveillance System, Airborne Drone AN/USD-1.
TM 11-5895-246-35	Field and Depot Maintenance Manual: Surveillance System, Airborne Drone AN/USD-1.
TM 11-6625-203-12	Operator and Organizational Maintenance, Multimeter AN/URM-105, including Multimeter ME-77/U.
TM 11-6625-219-12	Operator's and Organizational Maintenance Manual: Oscilloscope AN/USM-81.
TM 11-6625-274-12	Operator's and Organizational Maintenance Manual: Test Sets, Electron Tube TV-7/U, TV-7A/U, TV-7B/U, and TV-7D/U.
TM 11-6625-274-20P	Organizational Maintenance Repair Parts and Special Tools List: Test Sets, Electron Tube TV-7/U, TV-7A/U, TV-7B/U, and TV-7D/U.
TM 11-6720-207-10	Operator's Manual: Camera, Still Picture KA-39A.
TM 11-6720-207-20	Organizational Maintenance Manual: Camera, Still Picture KA-39A.
TM 11-6720-207-35	Field and Depot Maintenance Manual: Camera, Still Picture KA-39A.
TM 38-750	Army Equipment Record Procedures.
TM 55-1550-200-12	Operator's and Organizational Maintenance Manual: Surveillance Drone OA-2343/USD-1.
TM 55-1550-200-35	Field and Depot Maintenance Manual: Surveillance Drone OA-2343/USD-1.

APPENDIX II

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

1. General

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

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

(1) *Part or component*. This column shows only the nomenclature or standard 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, assemblies, or subassemblies) is listed in disassembly order or alphabetical order.

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

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

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

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

(d) Replace. To substitute service- able components, assemblies or subassemblies, for unserviceable components, assemblies, or subassemblies.

(e) 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.

(f) 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.

Note: **Operator's preventive maintenance duties (service and Inspect) are assigned to the repairman-user of the equipment. Organizational maintenance duties (test and replace) are assigned to the organizational repairman.**

(3) *Operator, organization, direct and general support, and depot.* The symbol X indicates the categories of maintenance responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Categories higher than those 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 column.

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

(1) *Part or component.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

(2) *Operator, organization, direct and general support, and depot.* The (†) symbol in these columns indicates the categories normally allocated the facility.

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

2. Maintenance by Using Organization

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

SECTION II. MAINTENANCE ALLOCATION CHART

PART OR COMPONENT	MAINTENANCE FUNCTION	ECHELON 1	2	3	4	5	TOOLS REQUIRED	REMARKS
SPECIAL TOOL AND TEST EQUIPMENT FOR CAMERA SYSTEM KA-39A (GROUPING PURPOSES ONLY)								
TEST SET, PHOTOORAPHIC SURVEILANCE SYSTEM	repair		X				10	
COMPONENTS LS-46A	overhaul						X	1, 2, 3, 4, 5, 6, 7, 8, 9
TEST SYSTEM PHOTOGRAPHIC SURVEILLANCE LS-34; LS-34A (GROUPING PURPOSES ONLY)								
ANALYZER, PHOTOGRAPHIC SURVEILLANCE	repair		X				10	
SYSTEM LS-35, LS-35A	overhaul							X 1, 2, 3, 4, 5, 6, 7, 8, 9
SIMULATOR CONTROL SYSTEM CAMERA LS-36	repair		X				10	
LS-36A	overhaul						X	1, 2, 3, 4, 5, 6, 7, 8, 9
SIMULATOR GROUP LM-97; LM-97A	repair		X				10	
	overhaul					X	1, 2, 3, 4, 5, 6, 7, 8, 9	
TESTING MACHINE, CAMERA SHUTTER SPEED	repair		X				10	
LS-33;LS-33A	overhaul						X	1, 2, 3, 4, 5, 6, 7.8, 9

SECTION III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

PART OR COMPONENT	ECHELON 1	2	3	4	5	TOOL CODE	REMARKS
SPECIAL TOOL & TEST EQUIP FOR KA-39A (continued)							
TEST SET, SURVEILLANCE SYSTEMS TEST EQUIPMENT CAI p/n 6344-100					*	1	PENDING PROCUREMENT
SIGNAL GENERATOR SG-298/U					†	2	
VOLTMETER ME-30A/U					†	3	
MULTIMETER TS-352/U					†	4	
OSCILLOSCOPE AN/USM-81					†	5	
VOLTMETER AN/PSM-3					†	6	
FREQUENCY METER AN/USM-26A					†	7	
VOLTMETER AN/USM-98					†	8	
TOOL EQUIPIMENT TK-21/G					†	9	
TOOL & TEST EQUIPMENT ASSIGNED TO ORGANIZATIONAL REPAIRMAN BY VIRTURE OF US ASSIGNED MISSION		†				10	

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

Section I. INTRODUCTION

1. Scope

This appendix lists basic issue items required by the crew/operator for installation, operation, and maintenance of Simulator Group LM-97 and LM-97A

2. General

This Basic Issue Items and tems 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 List - Section III. Not applicable.

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 (Item 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 Column 5. Identification of the usable on codes are as follows:

Code	*Used On*
1	LM-97
2	LM-97A

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
		6760-856-6672	CAI 2996-1200		CARRYING CASEPHOTO-GRAPHIC EQUIPMENT LM-98. (NOT INSTALLED) (NOT MOUNTED)	1	EA	1
		6760-062-2954	CAI 2996-451		CARRYING CASE. PHOTO-GRAPHIC EQUIPMENT LM-98A: (NOT INSTALLED) (NOT MOUNTED)	2	EA	1

By Order of Secretary of the Army:

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

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

Distribution:

To be distributed in accordance with DA Form 12-31 requirements for Field Maintenance, C-1A, USD-1 and OV-1 Aircraft.

*U.S. GOVERNMENT PRINTING OFFICE : 1986 O - 491-202 (20612)

TM 11-6760-221-12 TESTING MACHINE, CAMERA SHUTTER SPEED LS-33A; TEST SYSTEM, PHOTOGRAPHIC SURVEILLANCE LS-34A; TEST SET, PHOTOGRAPHIC SURVEILLANCE SYSTEM COMPONENTS LS-46A; AND TOOL KIT, CAMERA ALIGNMENT AND ADJUSTMENT LS-49A; AS USED FOR TESTING: CAMERA, STILL PICTURE KA-39A; CAMERA SET, STILL PICTURE KS-53 ( ); AND CAMERA SYSTEM, STILL PICTURE KS-54A-1964

TEAR ALONG PERFORATED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

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 NO: 021154-000