TM 11-6760-232-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL

MAINTENANCE MANUAL

INCLUDING REPAIR PARTS AND SPECIAL TOOLS LISTS

TEST SET,

PHOTOGRAPHIC FLASHER SYSTEM,

BENCH LS-69A

HEADQUARTERS, DEPARTMENT OF THE ARMY

FEBRUARY 1970

TM 11-6760-232-12
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CHANGE
No. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *10 May 1979*

Operator's and Organizational Maintenance Manual
TEST SET, PHOTOGRAPHIC FLASHER SYSTEM, BENCH, LS-59A
(NSN 6760-00-099-5662)

TM 11-6760-232-12, 16 February 1970, is changed as follows:
1. The title of this manual is changed to read as shown above.
2. A vertical bar opposite text indicates new or changed material.
3. Remove and insert pages as indicated below.

Remove	*Insert*
i and ii	i and ii
1-1 and 1-2	1-1 and 1-2
5-1 and 5-2	5-1
A-1	A-1
C-1 through C-4	C-1 through C-6
D-1 through D-8	None

4. File this change sheet in the front of the manual for reference purposes.

By Order of the Secretary of the Army:

BERNARD W. ROGERS
General, United States Army
Chief of Staff

Official:

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

Distribution:
To be distributed in accordance with DA Form 12-31, Direct and General Support Maintenance requirements for OV-1B/C and OV-1D/RV-1D Aircraft.

TM 11-6760-232-12
C 2

CHANGE NO. 2

HEADQUARTERS
DEPARTMEN OF THE ARMY
WASHINGTON, DC, 7 February 1974

Operator's and Organizational Maintenance Manual
Including Repair Parts and Special Tools Lists
TEST SET, PHOTOGRAPHIC FLASHER SYSTEM, BENCH LS-69A

TM 11-6760-232-12, 16 February 1970, is changed as follows:

1. Remove and insert pages as indicated in the page list below.

Remove pages	*Insert pages*
i and ii	i through iii
l-1 through 1-6	1-1 through 1-6 and 1-6.1 and l-6.2
2-1 and 2-2	2-1 and 2-2
3-5 through 3-8	3-5 through 3-8 and 3-8.1 through 3-8.3/(3-8.4 blank)
3-9 through 3-14	3-9 through 3-12, 3-12.1/(3-12.2 blank), 3-13 and 3-14
B-l through B-3	B-l and B-2
C-3 and C-4	C-3 and C-4
D-5 and D-6	D-5 and D-6

1. New or changed material is indicated by a vertical bar in the margin.
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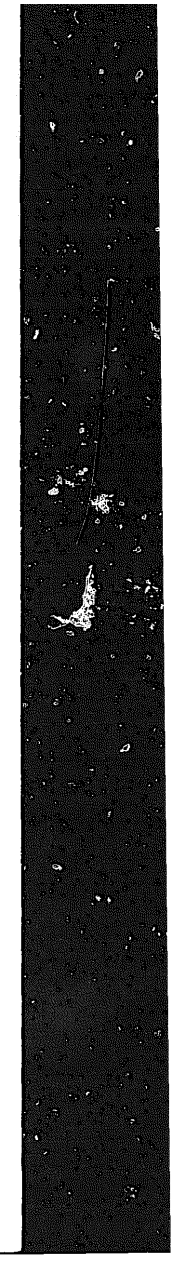

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TM 11-6760-232-12
C 1

CHANGE
NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., *16 December 1970*

Operator's and Organizational Maintenance Manual
Including Repair Parts and Special Tools Lists
TEST SET, PHOTOGRAPHIC FLASHER SYSTEM, BENCH LS-69A

TM 11-6760-232-12, 16 Febuary 1970, is changed as follows
1. Remove and insert pages as indicated in the page list below.

Remove	Insert
Delete Warning notice	Add Warning notice
3-1 and 3-2	3-1 and 3-2
3-9 through 3-14	3-9 through 3-14
3-15 and 3-16	3-15 and 3-16
3-17 and 3-18	3-17 and 3-18
3-19 and 3-20	3-19 and 3-20
3-21	3-21

2. New material is indicated by a vertical bar in the margin opposite the changed material.
3. File this change sheet in front of the publication for reference purposes.

WARNING

Voltages dangerous to life are present. Turn off all electronic flash system power before making coaxial connections.

WARNING

When performing pod assembly tests, place the black cloth (furnished with the LS-69A) over the three illuminator modules. Observe all warnings in the manual pertaining to high intensity flashes of the illuminator modules.

DO SOT PERFORM ANY TEST OS THE POD ASSEMBLY UNLESS THE ILLUMINATOR MODULES ARE COVERED.

DON'T TAKE CHANCES!

TECHNICAL MANUAL
NO. 11-6760-232-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 16 February 1970

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL
TEST SET, PHOTOGRAPHIC FLASHER SYSTEM, BENCH, LS-69A
(NSN 6760-00-999-5662)

REPORTING OF ERRORS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 directly to Commander, US Army Communications and Electronics Materiel Readiness Command, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703.

A reply will be furnished to you.

*This manual supersedes so much of TM 11-6760-232-15,26 June 1967, as pertains to operator and organizational maintenance.

LIST OF ILLUSTRATIONS

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1-1. Scope

This manual describes Test Set, Photographic Flasher System, Bench LS-69A (bench test set) (fig. 1-1), and provides instructions for installation, operation, and operator and organizational maintenance. It includes instructions for operation under usual and unusual conditions, cleaning and inspection of the equipment, and replacement of parts available to operator and organizational maintenance.

1-2. Indexes of Publication

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

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

1-3. Forms and Records

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

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58/NAVSUP1NST 4030.29/AFR 71-13/MCO P4030.29A and DLAR 4145.8.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUP1NST 4610.33B/AFM 75-18/MCO P4610.19C and DLAR 4500.15.

1-3.1 Description of Army Electronics Materiel

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

1-3.2 Preparation for Storage or Shipment

Refer to paragraphs 5-1 and 5-2 for procedures required for storage or shipment of the equipment.

1-3.3 Repeat Equipment Improvement Recommendations (EIR)

EIR's will be prepared using SF 368 (Reporting Quality Deficiencies). Instructions for preparing EIR's are provided in TM 38-750, the Army Maintenance Management System. EIR's should be mailed directly to Commander, US Army Communications and Electronics Materiel Readiness Command, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703. A reply will be furnished direct to you.

Figure 1-1. Test Panel, Test Set, Photographic Flasher System, Bench LS-69A.

Section II. DESCRIPTION AND DATA

1-4. Purpose and Use (Fig. 1-1)

a. ***Purpose.*** The bench test set is designed to check the operation of Flasher System, Photographic Aircraft LS-59A (electronic flash system) and its modules before installation in the Mohawk reconnaissance aircraft. Operational and functional tests performed by the bench test set simulate actual in-flight operation.

b. Use. The bench test provides the primary power, control voltages, and test signals required for operating and testing the electronic flash system and its modules. The indicators and meter of the bench test system, along with its associated external test equipment, monitor the responses of the electronic flash system to the test signals. Test data obtained from the bench test set indicate the operational status of the electronic flash system under test. Nonoperational status is indicated by incorrect test results. After the nature and extent of the malfunction is determined, the electronic flash system is disassembled and the defective module is removed. Functional and operational tests are then performed on the defective module and precise identification of the faulty component of subassembly is made. Upon completion of the trouble-shooting and repair procedures, the electronic flash system is reassembled and the complete system is tested by the bench test set.

1-5. Technical Characteristics

a. Primary Power Requirements.

Ac ..... 115v, 40 Hz, single phase, 3 amperes (test panel).
115v, 400 Hz, three phase, 10 amperes per phase (blower assembly).
Dc ..... 28v, 3 amperes (test panel).

b. Temperature Range.

Operating ..... -40° F (-40°) to +131° F (+55°C).
Storage ..... -85° F (-65°C) to +185° F (+85°C).

c. Output Signal Voltages.

Camera frame pulse ..... 28 volts dc amplitude, 130 milliseconds wide, one pulse every 1.25 seconds or one pulse per every 3.6 seconds.

E V/H control voltage ..... 0 to +47 volts dc, continuously variable.

High-voltage limit ..... 0 to +25 volts dc, continuously variable.

1-6. Components and Dimensions

Quantity	Item	Dimensions (in.) Height	Depth	Width	Weight (lb)	Figure No.
	Bench test case	15	16½	20	44	1-1
	Bench test set panel	8½	15¾	19¼		1-1
	Cable assembly W1, special purpose, electrical, branched, power input	72 lg				
	Cable assembly W2, special purpose, electrical, branchedlogic	36 lg				
	Cable assembly W3, special purpose, electrical, branched, voltage module	36 lg				
	Cable assembly W4. special purpose, electrical, Control panel	36 lg				
	Cable assembly W5, special purpose, electrical, system test	96 lg			2.1	
	Cable assembly W6, special purpose, electrical, module, pod	96 lg				
	Cable assembly W7, special purpose, electrical, photocell	96lg				
	Cable assembly W8, special purpose, electrical, system control	96 lg				
	Cable assembly W9, special purpose, electrical, power, rod	96 lg				
	Cable assembly W10, special purpose, electrical, power	72 lg				
	Hose and clamp assembly	36 lg	3 dia			
	Power limiter and blower case	16	12	18	45	1-2
	Power limiter and blower panel	9½	107/8	167/8		1-2
	Adapter, Test Set, LA-491A	4	8 1/4	7	4	1-3

1-6.1 Items Comprising an Operable Equipment

FSN	Qty	Nomenclature, *part* No., and *mfr code*
		NOTE
		The part number is followed by the applicable 5-digit Federal Supply code for manufacturers (FSCM) identified in SB 708-42 and used to identify manufacturer, distributor, or Government agency, etc.
6730-113-5726		Bench Test Panel Photographic Flasher System LM-197A. 7148-1300, 11871
		Case, Bench Test Set Panel, 7148-1205, 11871
6760-898-7281		Cable Assembly, Special Purpose, Electrical, LM-180A, 7148-1211, 11871
5995-999-4811		Cable Assembly, Special Purpose, Electrical, Branched LM-181A, 7148-1212, 11871
5995-999-4812		Cable Assembly, Special Purpose, Electrical, Branched LM-191A, 7148-1213, 11871
6760-937-3793		Cable Assembly, Special Purpose, Electrical LM-182A, 7148-1214, 11871
6760-937-3792		Cable Assembly, Special Purpose, Electrical LM-183, 7148-1215-1, 11871
6760-937-3791	1	Cable Assembly, Special Purpose, Electrical LM- 184A. 7148-1216, 11871
6760-841-9369	1	Cable Assembly, Special Purpose, Electrical LM-185A, 7148-1217, 11871
6760-841-9368	1	Cable Assembly, Special Purpose, Electrical LM-186A. 7148-1218, 11871
6760-116-7088	1	Power Limiter and Blower Assembly LM-187A, 71478-1400, 11871
	1	Panel and Component Assembly, 7148-1404, 11871
	1	Case, Power Limiter and Blower, 7148-1407, 11871
6760-840-9806	1	Hose and Clamp Assembly LM-188A, 7148-1408, 11871
6760-841-9367	1	Cable Assembly, Special Purpose, Electrical LM-189A, 7148-1430, 11871
6760-840-9802	1	Cable Assembly, Special Purpose, Electrical LM-190A, 7148-1431, 11871
6760-193-0004		Test Set, Adapter LA-491A

1-7. Common Names

common name	Item name
Aircraft	Army Models OV-1, OV-1A, and OV-1C Aircraft (Mohawk)
camera KA-30	Camera, Still Picture KA-30A or KA-30A (1)
camera KA-76	Camera, Still Picture KA-76A
Photo control system	Control System, Photographic Surveillance, Airborne LS-38A
Photo system	Photographic Surveillance System, Airborne KS-61A
Bench test set	Test Set, Photographic Flasher System, Bench LS-69A, consisting of:
Test panel	Bench test set panel
Combination case	Bench teat set case
Power cable W1	Cable assembly W1, special purpose, electrical, branched, power input
Logic cable W2	Cable assembly W2, special purpose electrical, branched, power input
Voltage module cable W3	Cable assembly W3, special purpose, electrical, branched voltage module
Control panel cable W4	Cable assembly W4, special purpose, electrical, control panel
System test cable W5	Cable assembly W5, special purpose, electrical, system test
Modulecable W6	Cable assembly W6, special purpose, electrical, module, pod
Photocell cable W7	Cable assembly W7, special purpose, electrical, photocell
System control cable W8	Cable assembly W8, special purpose, electrical, system control
Blower assembly	Power limiter and blower panel
Blower case	Power limiter and blower case
Hose assembly	Hose and clamp assembly
Pod power cable W9	Cable assembly W9, special purpose, electrical, power, pod
Blower power cable W10	Cable assembly W10, special purpose, electrical, power,
Safety glasses	Safety glasses, Fendall
Hook-on glasses	Safety glasses, hook-on, Fendall
Adapter	Adapter, Teat Set LA-491A
Electronic flash system	Flasher System, Photographic Aircraft LS-59A, consisting of:
Pilot's control panel	Control Box Assembly, LA-394A,
Pod assembly	Pod Assembly, Flasher, LS-388A, consisting of:
Turbine alternator	Turbine alternator Al
Power supply module	Power supply module A2
Rectifier assembly	Rectifier Assembly A2A1
Logic module	Logic module A2A2
Voltage control module	Voltage control module A2A3
Illuminator module A3	Illuminator module A3
Illuminator module A4	Illuminator module A4
Illuminator module A5	Illuminator module A5
Shutter tester	Testing Machine, Camera Shutter Speed LS-33A

1-8. Description of Major Units

a. Test Panel. The test panel (fig. 1-1) is a transistorized unit designed to test and troubleshoot the electronic flash system and its modules before installation in aircraft. All the controls, indicators, and connectors required to perform the functional and operational tests are mounted on the front of the test panel. The controls, indicators, and connectors of the test panel are divided into sections; each section is marked to indicate its use and the tests it performs. The MASTER test switch, used in conjunction with the sectionalized controls, indicators, and connectors, selects the mode of operation and the tests to be performed, permitting the operator to test and troubleshoot the complete electronic flash system or its modules. During testing, the electronic flash system or its modules are connected to the test panel through interconnecting cable assemblies through the connectors on its front panel. Primary alternating current and direct current (dc) power for the operation of the test panel are supplied through POWER connector J1. Signal data and synchronizing gers required for the operation of the test oscilloscope are provided through binding posts on test panel. Additional binding posts provide connection of an external test multimeter and shutter tester.

b. Power Limiter and Blower. The blower assembly (fig. 1-2) has two primary functions Provides forced-air cooling for the modules of pod assembly and the current-limiting resis of the blower assembly. Provides primary volt, 400-Hertz (Hz), three-phase power for operation of the power supply modules of pod assembly. During flight operation power requirements of the electronic flash tem are normally supplied by the turbine-a nator of the pod assembly. The turbine-altern:

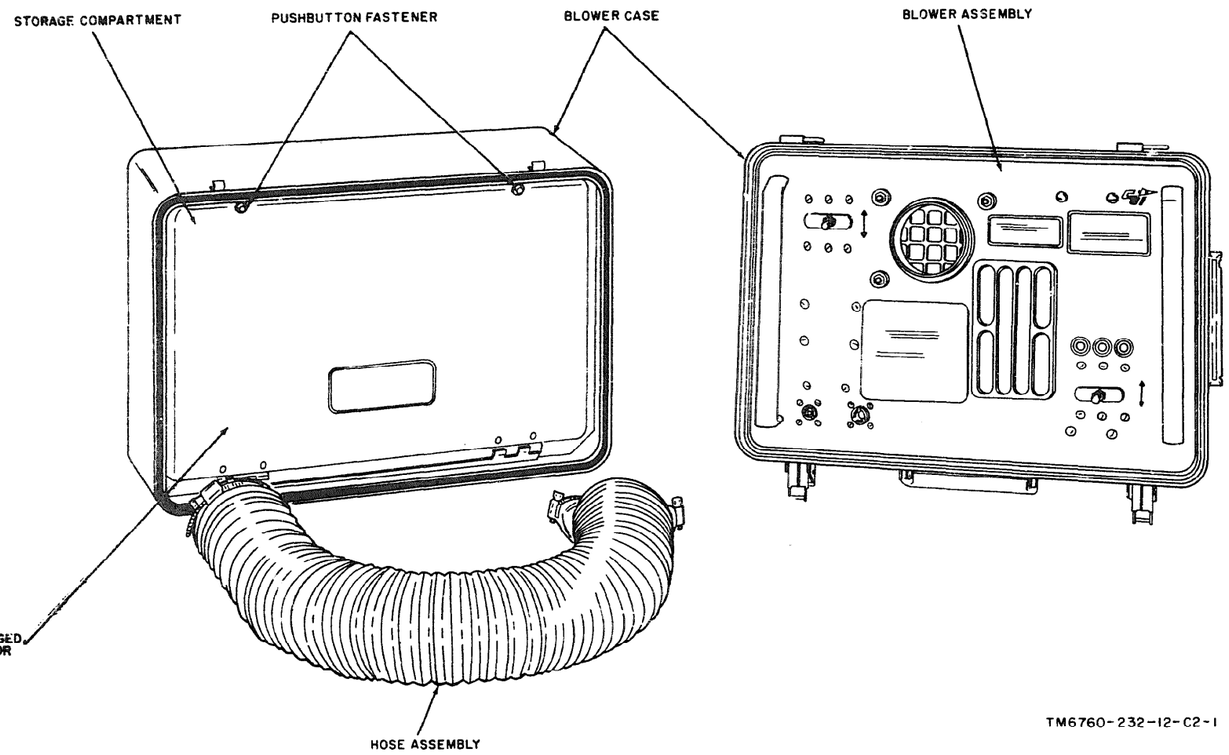


Figure 1-2. Power limiter and blower assembly.

however, is powered by a wind-driven, variable pitch propeller which requires a 160-knot wind for its operation. The blower assembly circuits permit bench power to be substituted for that generated by the turbine-alternator during flight. All the controls, indicators, and connectors required for the operation of the blower assembly are mounted on its front panel. Input power to the blower assembly is supplied through an input connector. Output power to the pod assembly is obtained through an output connector. Ac power is present at the output connector anytime power is applied. Applying power also automatically turns on the blower. Interlocking the blower to the POWER switch prevents the application of primary ac power to the pod assembly without cooling air also simultaneously being applied. The BLOWER switch applies power to the blower only. Cool air is carried to the pod assembly by the hose assembly which is connected between the EXHAUST vent of the blower assembly and the intake. vent of the pod assembly. An air filter in the input vent of the blower assembly cleans the air supplied to the pod assembly.

c. Adapter. The adapter (fig. 1-3) is an assembly of electronic components, connectors, controls, and indicators mounted in a rectangular metal box. It contains one branched cable assembly which has one nine-pin female connector P1 (A4J1 of LS-59) for connection to the pod assembly connector A2A4 J1, and one 11-pin female connector P2 (J3 of LS-59) for connection to the pod assembly connector J3. The adapter has one 11-prong male SYSTEM TEST connector J2 for connection to SYSTEM CONTROL connector J2 on LS-69A, and one 25-pin female connector for connection to rate limit/primary power disconnect module A2A4 (module A2A4) connector. The adapter has eight tip jack connectors, J5 thru J12, that permit monitoring of electrical voltages and signals in the adapter. The adapter also contains six switches and four indicator light assemblies which enable the testing of module A2A4 either removed from or installed in the pod assembly.

1-9 Description of Minor Assemblies

a. Combination Case. The two-part combination case (fig. 1-1) houses the test panel of the bench test set. The combination case is joined by two separable hinges along one side. Four snap latches secure the case cover to the case body. An air relief valve seals the combination case against humidity and dust, and permits equalization of the air pressure inside the case with that outside before the case is opened. The case cover has a storage compartment with a hinged door secured by three pushbutton fasteners. When not in use, the cables, the adapter, and accessories of the test panel are stored in the storage compartment of the case cover. The test panel is mounted in the case body. Two carrying handles on the case body permit hand-carrying the test panel.

b. Blower Case. The two-part blower case (fig. 1-2) houses the blower assembly of the bench test set. The blower case is joined by two separable hinges along one side. Two snap latches secure the case cover to the case body. An air relief valve seals the blower case against humidity and dust, and permits equalization of the air pressure inside the case with that outside before the case is opened. The case cover has a storage compartment with a hinged door secured by two pushbutton fasteners. When not in use, the cables and hose assembly of the blower assembly are stored in the storage compartment of the case cover. The blower assembly is mounted in the case body. Two carrying handles on the case body permit hand-carrying of the blower assembly.

c. Power Cable W1. Power cable W1 is a four-wire, three-connector, branched power cable assembly. It carries 115-volt, 400-Hz, single-phase input power to the test panel. One end of power cable W1 is terminated by a single nine-pin connector, which mates with POWER connector J1 of the test panel; the two five-pin connectors, on the branched end, mate with matching power jacks at the test bench power supply.

d. Logic Cable W2. Logic cable W2 is a 23-wire, three-connector, branched data cable assembly. It permits operational and functional testing of logic module A2A2 of the electronic flash system after it has been removed from the pod assembly. Logic cable W2 carries signal and control data between logic module A2A2 and the test panel. One end of logic cable W2 is terminated by a single 27-pin connector, which mates with connector J15 of the test panel. The two connectors, 11-pin P1 and 17-pin P3, on the branched end mate with plug-in jacks A2A2J1 and A2A2J2, respectively, of logic module A2A2.

e. Voltage Module Cable W3. Voltage module cable W3 is a 22-wire, three-connector, branched data cable assembly. It permits operational and functional testing of voltage control module A2A3

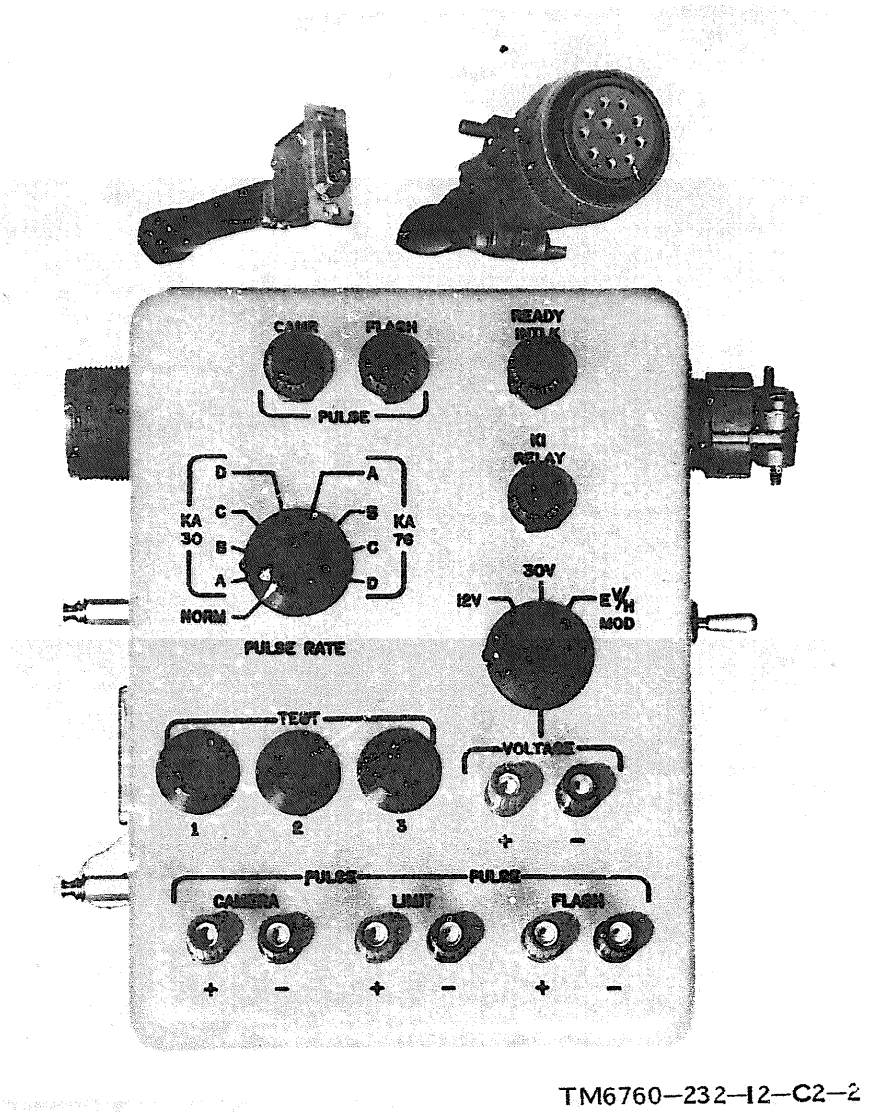


Figure 1-3. Adapter, Test Set, LA-491A.

of the electronic flash system after it has been removed from the pod assembly. Voltage module cable W3 carries signal and control data between voltage control module A2A3 and the test panel. One end of voltage module cable W3 is terminated by a single connector, which mates with connector J16 of the test panel; the two connectors, Z-pin P1 and 11-pin P3, on the branched end mate with plug-in jacks A2AJ1 and A2A3J2, respectively, of voltage control module A2A3.

f. Control Panel Cable W4. Control panel cable W4 is a seven-wire, two-connector, control voltage cable assembly. It permits operational and functional testing of the control box assembly of the electronic flash system. Control panel cable W4 carries ac and dc control voltages between the control box assembly and the test panel. One end of control panel cable W4 is terminated by 19-pin connector P2 which mates with test panel connector 517; the other end is terminated by

CHAPTER 2

INSTALLATION

2-1. Unpacking (fig. 2-1)

a. Packaging Data. When packed for shipment, the units of the bench test set are packaged in three corrugated shipping cartons. A typical shipping carton and its contents are shown in figure 2-1. The contents, dimensions, volume, and weights of the shipping cartons are:

Box No.	Contents	Dimensions (in.)	Volume (cu. ft.)	Weight (lb)
1 of 2	Test panel, Test Set, Photographic Flasher System, Bench LS-69A			
2 of 2	Power limiter and blower, Test Set, Photographic Flasher System. Bench LS-69A			

b. Removing Contents.

(1) Carefully cut the gummed tape at the top of the corrugated carton and fold back the flaps.

(2) Open the wrap of filler material and remove the test panel from its corrugated shipping carton.

(3) Cut and remove the lock wire from the PRESSURE EQUALIZER air relief valve. Rotate the air relief valve to OPEN.

(4) Unfasten the four snap latches. Lift the combination case top and slide it to the right to disengage the separable hinges.

(5) Open the hinged door in the case top by releasing the two pushbutton fasteners.

(6) Remove the waterproof package containing the instruction manuals from the storage compartment. Cut the tape that secures one side of the waterproof package and remove the instruction manuals.

(7) Remove the retaining cushion.

(8) Remove the components from their cutouts in the compartment cushion.

(9) Repeat the instructions in (1) through (8) above for the shipping carton that contains the blower assembly.

2-2. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on a DD Form 6 (para 1-3).

b. See that the equipment is complete as listed on the packing slip. If a packing slip is not available, check the equipment against the basic issue items list (app B) and paragraph 1-6.1. Report all discrepancies in accordance with TM 38-750. Shortage of a minor assembly or part that does not affect proper functioning of the equipment should not prevent use of the equipment.

c. If the equipment has been used or reconditioned, see whether it has been changed by a modification work order (MWO). If the equipment has been modified, the MWO number will appear on the front panel near the nomenclature plate. If modified, see that any operational instruction changes resulting from the modification have been entered in the equipment manual.

NOTE

Current MWO's applicable to the equipment are listed in DA Pam 310-7.

2-3. Seating of Fuses

CAUTION

Use only fuses of the correct value when replacing a fuse. Oversize fuses can result in damage to the equipment.

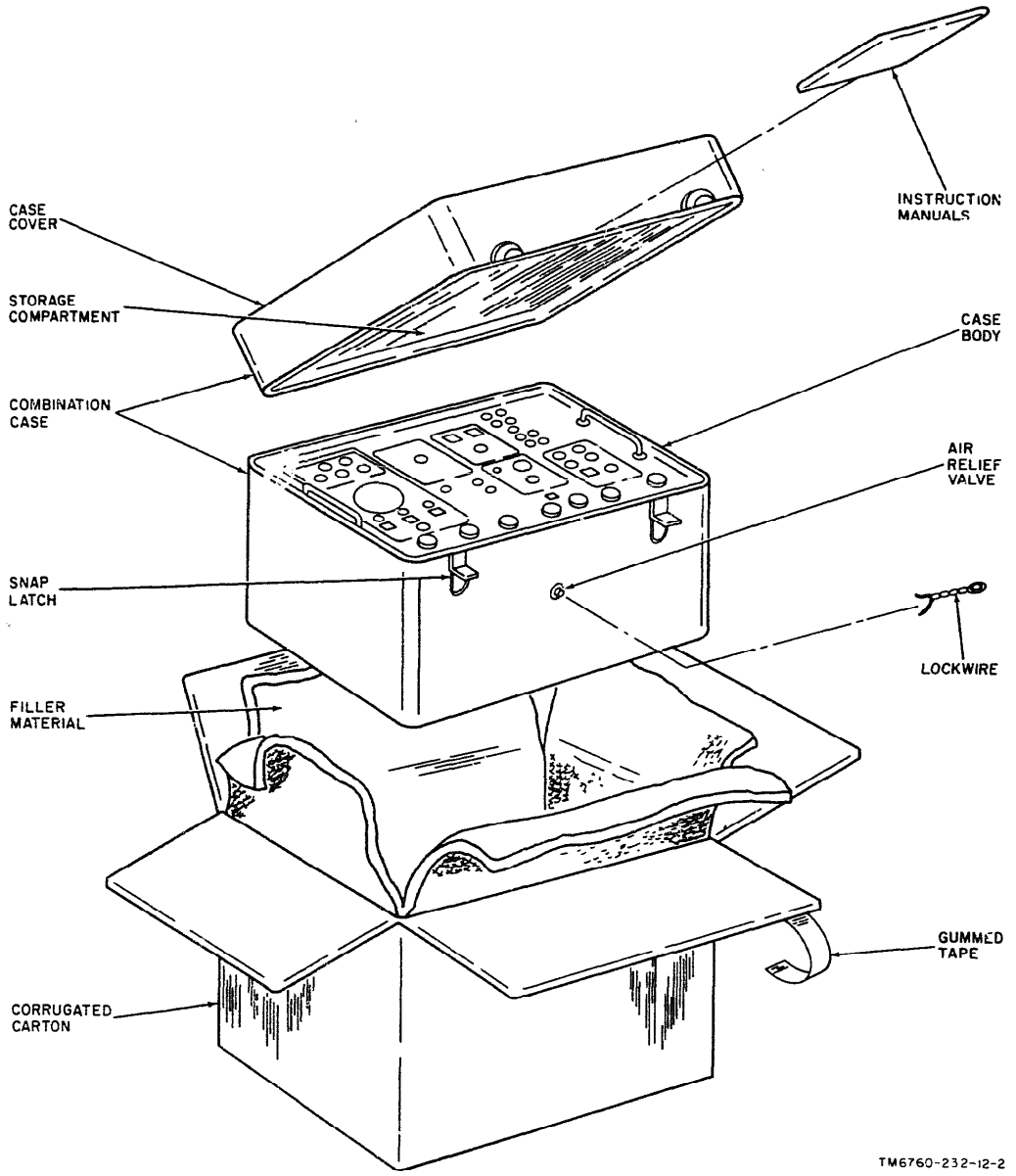


Figure 2-1. Typical packaging of test panel or blower assembly of bench test set.

The test panel of the bench test set is shipped with its fuses installed.

a. See that the 3-ampere, 115-volt fuses are installed in their fuseholders: one in the 3 AMP AC fuseholder, the other in the 3 AMP SPARE fuseholder.

b. See that the 3-ampere, 28-volt fuses are installed in their fuseholders: one in the 3 AMP DC fuseholder, the other in the 3 AMP SPARE fuseholder.

CHAPTER 3

OPERATING INSTRUCTIONS

Section I. OPERATOR'S CONTROLS INDICATORS, AND CONNECTORS

3-1. Test Panel Controls., Indicators, and Connectors (fig. 3-1)

a. Test Panel Controls and Indicators.

Control or indicator	Function
POWER section :	
Power switch	Two-position toggle switch :
	Position — ***Function***
	OFF — Disconnects input power to test panel.
	ON — Applies input power to test panel.
DC PWR indicator	Lights when power switch is set to ***ON,*** indicating that 28-volt dc power is applied to test panel.
AC PWR indicator	Lights when power switch is set to ON, indicating that 115-volt, 400-Hz, single-phase power is applied to test panel.
MASTER selector switch	Ten-position rotary switch which selects tests to be performed by test panel:
	Position — **Function**
	LOGIC — Presets test panel circuits to perform operational tests on logic module A2A2 of electronic flash system.
	Position — ***Function***
	E V/H (INTERNAL TEST) — Permits test panel circuits to check internally generated E V/H signal voltage.
	INTEGR AMP (INTERNAL TEST) — Permits test panel circuits to check operational status and calibration of test panel integrating amplifier A16.
	LAMP DRIVERS (INTERNAL TEST) — Permits test panel circuits to check operational status of test panel lamp driver assemblies and indicators.
	LAMPS (INTERNAL TEST) — Permits test panel circuits to check operational status of test panel indicator lamps.
SYSTEM section :	
SYSTEM TEST switch	Nine-position rotary switch which permits test panel circuits to perform operational test on Pod Assembly LS-388A of electronic flash system when MASTER selector switch is set to SYSTEM.
	Position — ***Function***
	VOLTAGE CONTROL — Presets test panel circuits to perform operational tests on voltage control module A2A3 of electronic flash system.
	MODULE — Presets test panel circuits to perform operational tests on illuminator module A3, A4, or A5 of electronic flash system.
	CONTROL PANEL — Presets test panel circuits to perform operational tests on Control Box Assembly LS-394A of electronic flash system.
	SYSTEM — Presets test panel circuits to perform operational tests on Pod Assembly LS-388A of electronic flash system.
	+30 VDC (INTERNAL TEST) — Permits test panel circuits to check internally generated and regulated +30-volt dc power.
	SYNC — Presets test panel circuits to check synchronization of camera shutter and flash of the electronic flash system.

Control or indicator	Function
OPR MODE	Presets test panel circuits to check overall operation of Pod Assembly LS-388A of electronic flash system.
MOD 1 (LIGHT **OUTP**UT)	Presets test panel circuits to check light level output of illuminator module 1 (A3) of electronic flash system.
MOD 2 (LIGHT OUTPUT)	Presets test panel circuits to check light level output of illuminator module 2 (A4) of electronic flash system.
MOD 3 (LIGHT OUTPUT)	Presets test panel circuits to check light level output of illuminator module 3 (A5) of electronic flash system.
HV LIMIT (POWER SUPPLY)	Presets test panel circuits to check disabling of blocking **oscillator** of voltage control module A2A3.
PH A GATE (POWER SUPPLY)	Presets test panel circuits to check phase A gate **common** circuit of power supply module AZ.
PH B GATE (POWER SUPPLY)	Presets **test** panel circuits to check phase B gate common circuit of power supply module A2.
PH C GATE (POWER SUPPLY)	Presets lest panel circuits to check phase C gate **common** circuit of power supply module A2.
FLASH 1 indicator	When lighted during system test, indicates generation of flash pulse 1-A3 of flash pulse 2-A3 by illuminator module A3. When lighted during module test, indicates generation of flash pulse A by illuminator module A3, A4, or A5.
LOGIC 1 indicator	When lighted during system test, indicates generation of flash trigger A3 by logic module A2A2. When lighted during LOGIC test, indicates generation of trigger pulse 1 by logic module A2A2.
FLASH 2 indicator	When lighted during system test, indicates generation of flash pulse 1-A4 or flash pulse 2-A4 by illuminator module A4. When lighted during module test, indicates generation of flash pulse B by illuminator module A3, A4, or A5.
LOGIC 2 indicator	When lighted during system test, indicates generation of flash trigger A4 by logic module A2A2. When lighted during logic test, indicates generation of trigger pulse 2 by logic module A2A2.
FLASH 3 indicator	When lighted during system test, indicates generation of **flash pulse 1-A5 or flash** pulse 2-A5 by illuminator module AS.
LOGIC 3 indicator	When lighted during system test, indicates generation of flash trigger A5, by logic module A2A2. When lighted during logic test. indicates generation of trigger pulse 3 by logic module A2A2.
INTERLOCK indicator	When not lighted, indicates pod assembly interlock circuit is **complete** and operating normally. When lighted, indicates pod assembly interlock circuit is **incomplete** and operating abnormally.
+350 VDC indicator	When lighted, indicates +350-volt dc voltage doubler circuit of pod **assembly is** functioning properly.
GATE CONT indicator	When fighted, indicates output of blocking oscillator of voltage control module A2A3.
RESET switch	Pushbutton switch which. when depressed, resets light energy meter to zero level.
Light energy meter	Indicates relative light energy level detected by photocells of illuminator modules A3, A4, and A5.
POWER SUPPLY section :	This section operates in conjunction with the GATE positions of system TEST switch.
+ GATE FAIL indicator	When lighted, indicates malfunction of +gate silicon control rectifier circuits of power supply module A2.
-GATE FAIL indicator	When lighted, indicates malfunction of -gate silicon control rectifier circuits of power supply module A2.
HV LIMIT FAIL switch-indicator (PRESS TO REST).	When lighted, indicates failure of over-voltage circuit of pod assembly. When pressed, pushbutton switch resets indicator control circuit of test panel.
HV LIMIT TEST switch	When pressed, applies ground to control circuits of voltage control module A2A3 to test pod assembly overvoltage circuit.
GATE CONT DISABLE indicator.	When lighted, indicates blocking oscillator of voltage control module A2A3 is disabled.

Control or indicator		Function
	OPR MODE	Presets test panel circuits to check overall operation of Pod Assembly LS-388A of electronic flash system.
	MOD 1 (LIGHT OUTPUT)	Presets test panel circuits to check light level output of illuminator module 1 (A3) of electronic flash system.
	MOD 2 (LIGHT OUTPUT)	Presets test panel circuits to check light level output of illuminator module 2 (A4) of electronic flash system.
	MOD 3 (LIGHT OUTPUT)	Presets test panel circuits to check light level output of illuminator module 3 (A5) of electronic flash system.
	HV LIMIT (POWER SUPPLY)	Presets test panel circuits to check disabling of blocking oscillator of voltage control module A2A3.
	PH A GATE (POWER SUPPLY)	Presets test panel circuits to check phase A gate common circuit of power supply module A2.
	PH B GATE (POWER SUPPLY)	Presets test panel circuits to check phase B gate common circuit of power supply module A2.
	PH C GATE (POWER SUPPLY)	Presets test panel circuits to check phase C gate common circuit of power supply module A2.
FLASH 1 indicator		When lighted during system test, indicates generation of flash pulse 1-A3 of flash pulse 2-A3 by illuminator module A3. When lighted during module test, indicates generation of flash pulse A by illuminator module A3, A4, or A5.
LOGIC 1 indicator _		When lighted during system test, indicates generation of flash trigger A3 by logic module A2A2. When lighted during LOGIC test, indicates generation of trigger pulse 1 by logic module A2A2.
FLASH 2 indicator		When lighted during system test, indicates generation of flash pulse 1-A4 or flash pulse 2-A4 by illuminator module A4. When lighted during module test, indicates generation of flash pulse B by illuminator module A3, A4, or A5.
LOGIC 2 indicator		When lighted during system test, indicates generation of flash trigger A4 by logic module A2A2. When lighted during logic test, indicates generation of trigger pulse 2 by logic module A2A2.
FLASH 3 indicator		When lighted during system test, indicates generation of flash pulse 1-A5 or flash pulse 2-A5 by illuminator module A5.
LOGIC 3 indicator		When lighted during system test, indicates generation of flash trigger A5 by logic module A2A2. When lighted during logic test. indicates generation of trigger pulse 3 by logic module A2A2.
INTERLOCK indicator		When not lighted, indicates pod assembly interlock circuit is complete and operating normally. When lighted, indicates pod assembly interlock circuit is incomplete and operating abnormally.
+350 VDC indicator		When lighted, indicates +350-volt dc voltage doubler circuit of pod assembly is functioning properly.
GATE CONT indicator		When lighted, indicates malfunction of blocking oscillator of voltage control module A2A3.
R E S E T s w i t c h		Pushbutton switch which, when depressed, resets light energy meter to zero level.
Light energy meter		Indicates relative light energy level detected by photocells of illuminator modules A3, A4, and A5.
POWER SUPPLY section :		This section operates in conjunction with the GATE positions of system TEST switch.
+GATE FAIL indicator		When lighted, indicates malfunction of i-gate silicon control rectifier circuits of power supply module A2.
-GATE FAIL indicator		When lighted, indicates malfunction of -gate silicon control rectifier circuits of power supply module A2.
HV LIMIT FAIL switch-indicator (PRESS TO REST).		When lighted, indicates failure of over-voltage circuit of pod assembly. When pressed, pushbutton switch resets indicator control circuit of test panel.
HV LIMIT TEST switch		When pressed, applies ground to control circuits of voltage control module A2A3 to test pod assembly overvoltage circuit.
GATE CONT DISABLE indicator.		When lighted, indicates blocking oscillator of voltage control module A2A3 is disabled.

Control or indicator	Function
LOGIC 1 indicator	When lighted, indicates generation of flash trigger A5 output pulse by logic module.
LOGIC 2 indicator	When lighted, indicates generation of flash trigger A4 output pulse by logic module.
LOGIC 3 indicator	When lighted, indicates generation of flash trigger A3 output pulse by logic module.
INPUT indicator	When lighted, indicates generation of simulated camera frame pulse by input pulse generator of test panel.
LOGIC A indicator	Indicates logic state of output signal generated by register A of logic module. When A signal is in 1 state, A indicator is not lighted. When A signal is in 0 state, A indicator is lighted.
LOGIC B indicator	Indicates logic state of output signal generated by register B of logic module. When B signal is in 1 state, B indicatcr is not lighted. When B signal is in 0 state, A indicator is lighted,
LOGIC Q1 indicator	Indicates logic state of Q1 signal generated by logic module. When Q1 signal is in 1 state, Q1 indicator is not lighted. When Q1 signal is in 0 state, Q1 indicator is lighted.
LOGIC Q2 indicator	Indicates logic state of Q2 signal generated by logic module. When Q2 signal is in 1 state, Q2 indicator is not lighted. When Q2 signal is in 0 state, Q2 indicator is lighted.
PRESS TO SHIFT switch	When LOGIC TEST switch is in the SHIFT position, this pushbutton switch applies control voltage to logic circuits of logic assembly which causes shift to occur.
VOLTAGE CONTROL section	This section permits the test panel circuits to perform operational tests on voltage control module A2A3 when the MASTER selector switch is set to the VOLTAGE CONTROL position.
VOLTAGE CONTROL TEST switch	Twelve-position rotary switch which selects test to be performed on voltage control module under test.

Position	Function
PH A (+GATE CONT)	Presets test panel circuits to check positive silicon control rectifier phase A control gate generated by blocking oscillator Q1 of voltage control module A2A3.
PH B (+GATE CONT)	Presets test panel circuits to check positive silicon control rectifier phase B control gate generated by blocking oscillator Q1 of voltage control module A2A3.
PH C (+GATE CONT)	Presets test panel circuits to check positive silicon control rectifier phase C control gate generated by blocking oscillator Q1 of voltage control module A2A3.
PH A (-GATE CONT)	Presets test panel circuits to check negative silicon control rectifier phase A control gate generated by blocking oscillator Q1 of voltage control module A2A3.
PH B (-GATE CONT)	Presets test panel circuits to check negative silicon control rectifier phase B control gate generated by blocking oscillator Q1 of voltage control module A2A3.
PH C (-GATE CONT)	Presets test panel circuits to check negative silicon control rectifier phase C control gate generated by blocking oscillator Q1 of voltage control module A2A3.
HV LIMIT 1	Presets test panel circuits to check operation of overvoltage control circuit for illuminator module A3. If hv limit is exceeded, this circuit disables blocking oscillator Q1.
HV LIMIT 2	Presets test panel circuits to check operation of overvoltage control circuit for illuminator module A4. If hv limit is exceeded, this circuit disables blocking oscillator Q1.
HV LIMIT 3	Presets test panel circuits to check operation of overvoltage control circuits for illuminator module A5. If hv limit is exceeded, this circuit disables blocking oscillator Q1.
+5.6 VDC	Presets test panel circuits to check +5.6-volt dc Zener power supply of voltage control module.

Control or indicator	Function
+20 VDC	Presets test panel circuits to check +20-volt dc Zener power supply of voltage control module.
GATE CONT DISABLE	When used in conjunction with GATE CONTROL DISABLE switch, presets test panel circuits to check operation of blocking oscillator control circuits of voltage control module A2A3.
HV TEST control	Continuously variable potentiometer, output of which simulates overvoltage control signals developed by hv limit circuits of power supply module A2.
GATE CONT DISABLE switch	When depressed, applies ground to over-voltage control circuits of voltage control module A2A3 disabling blocking oscillator Q1.
CONTROL PANEL section :	This section permits test panel to check operation of Electronic Flash System Control Box Assembly LA-394A when MASTER selector switch is set to the CONTROL PANEL.
AC indicator	When lighted, indicate 115-volt, 400-cps, single-phase ac circuit of pilot's control panel is functioning normally.
DC indicator	When lighted, indicate +28-volt dc control circuit of pilot's control panel is functioning normally.
E V/H control	Continuously variable potentiometer, output of which simulates E V/H control signal generated by aircraft's control system.
Camera pulse switch	Two-positions toggle switch :
Position	Function
KA-30	Selects delayed camera frame pulse from KA-30 camera for synchronization of control circuits of logic module A2A2.
KA-76	Selects nondelayed camera frame pulse from KA-76 camera for synchronization of control circuits of logic module A2A2.
INPUT PULSE indicator	When lighted, indicates generation of simulated camera frame pulse by input pulse generator of test panel.* The pulse may be either manually or automatically initiated.
PRESS FOR MANUAL switch __	When depressed, causes input pulse generator of test panel to generate a single simulated camera frame pulse.

b. Test Panel Connectors.

Connector	Function
POWER J1	Provides for connection of test panel to primary 115-volt, 400-Hz, single ac and +28-volt dc primary power sources.
SYSTEM CONTROL J2	Provides for connection of test panel to. the pilot's control box, through system control cable W8.
SYSTEM TEST J3	Provides for connection of test panel to pod assembly through system test cable W5, and adapter;
PHOTOCELL J13	Provides for connection of test panel light energy meter circuit to illuminator module photocell through photocell cable W7.
MODULE J14	Provides for connection of test panel to an illuminator module under test through module cable W6.
LOGIC CKT BOARD	Provides for connection of test panel to a logic module under test through logic cable W2.
OVER VOLTAGE CKT BOARD	Provides for connection of test panel to a voltage control module under test through voltage module cable W3.
CONTROL PANEL J17	Provides for connection of test panel to a pilot's control panel under test through control panel cable W4.
MULTR +, - binding posts	Provides for connection of external test multimeter to test panel.
SHTR SYNC + , - binding posts	Provide for connection of shutter tester to test panel.
OSCILLOSCOPE section:	The binding posts of this section permit an external dual-channel test oscilloscope to be connected to test panel.
CHAN A binding posts	Provide for connection of CHAN A input probe between signal source VERT and ground GRD.
CHAN B binding posts	Provide for connection of CHAN B input probe between signal source VERT and ground GRD.
TRIGGER binding post	Provides for connection of a synchronizing trigger from test panel for test oscilloscope.

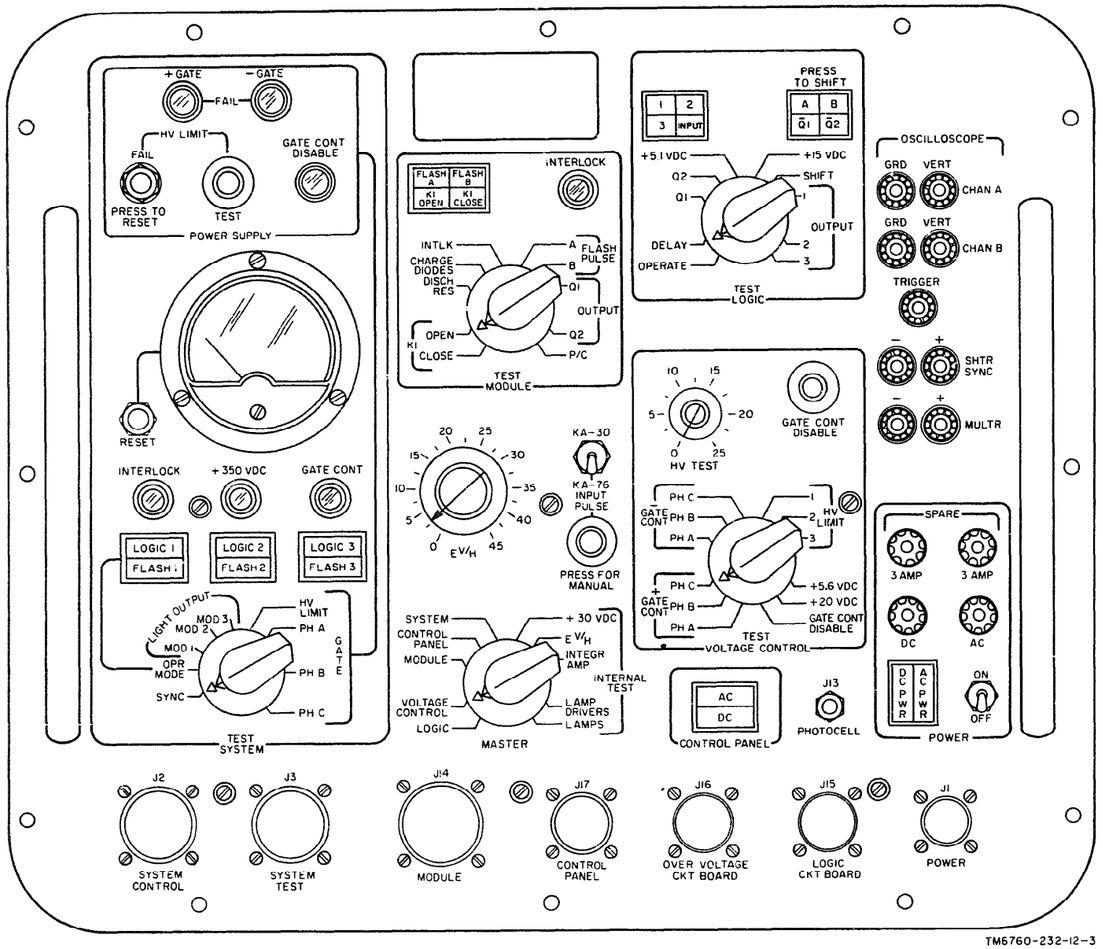


Figure 3-1. Test panel controls, indicators, and connectors.

3-2. Blower Assembly Controls, Indicators, and Connectors

T e x t

Control, indicator, or connector	Function
POWER circuit breaker	Two-position circuit breaker : Position: ON — Applies 115-volt ac, 400-Hz, 3-phase power to OUTPUT connector J2 and blower circuits of blower assembly. Position: OFF — Disconnects to input power to blower assembly.
PH A indicator	When lighted, indicates application of primary 115-volt ac, 400-Hz, phase A power to OUTPUT connector J2 and blower,
PH B indicator	When lighted, indicates application of primary 115-volt ac, 400-Hz, phase B power to OUTPUT connector J2 and blower.
PH C indicator	When lighted, indicates application of primary 115-volt ac, 400-Hz, phase C power to OUTPUT connector J2 and blower.
BLOWER circuit breaker	Two-position circuit breaker : Position: ON — Applies 115-volt ac, 400-Hz, 3-phase power to blower circuits of blower assembly. Position: OFF — Disconnects power to blower circuits.
INPUT connector J1	Provides for connection of blower assembly to primary 115-volt, 400-Hz, three-phase power source.
OUTPUT connector J2	Provides for connection of blower assembly of electronic flasher system through pod power cable W9.
Air EXHAUST vent	Orifice used as a supply for forced air which cools pod assembly during bench tests. This cool air is carried to pod assembly by hose assembly which clamps to air EXHAUST vent.

3-2.1 Adapter Controls, Indicators, and Connectors (fig. 3-2.1)

Control, indicator, or connector	Function
READY/INTLK switch	Three position toggle switch: Position: K1 — Applies +28-volts dc to relay A2A4K1 in module A2A4 to test the relay contacts. Position: READY — Applies +28-volts dc to relay A2A4K1 in module A2A4 to test the relay contacts. Position: OFF — Removes +28-volts dc from contacts of relay A2A4K1 in module A2A4.
VOLTAGE switch	Three position rotary switch: Position: 12V — Applies +12 volts dc from the pod assembly through P1, or from module A2A4 under test to VOLTAGE tip jack J11 for monitoring. Position: 30V — Applies +30 volts dc from the pod assembly through connector P1 or from module A2A4 under test to VOLTAGE tip jack J11 for monitoring.

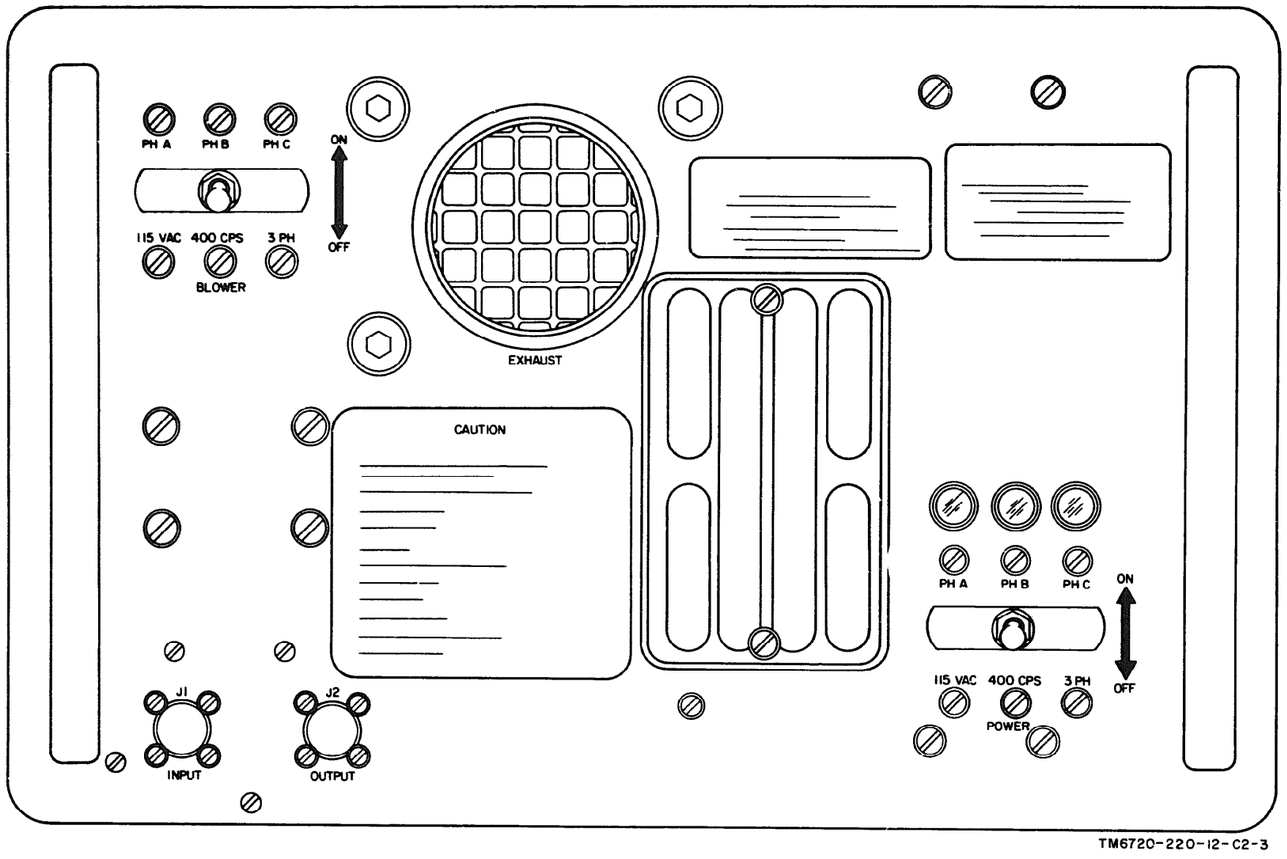
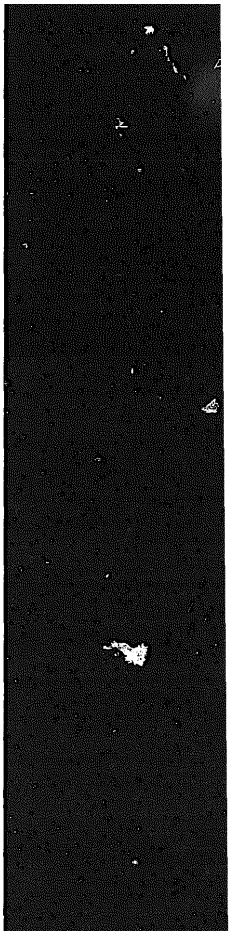


Figure 3-2. Power limiter and blower assembly. controls, indicators, and connectors.

Control, indicator, or connector		Function
	E V/H	Applies E V/H voltage from adapter PCB A1 to tip jack J11 for monitoring.
TEST 1 switch		Pushbutton DPDT switch when depressed, removes 115-volts ac power from phase A winding of Transformer in module A2A4 under test. Also, it applies 115-volts ac power through connector P1 to power disconnect circuit of the pod assembly.
TEST 2 switch		Pushbutton DPST switch when depressed, removes 115-volts ac from phase B winding of transformer in module A2A4 under test.
TEST 3 switch		Pushbutton DPST switch when depressed, removes 115-volts ac from phase C winding of transformer in module A2A4 under test.
PULSE RATE switch		Nine position rotary switch:
	Position	Function
	NORM	Applies ground to circuits of adapter PCB A causing pulse rate emitter to be inoperative.
	KA30A	Applies a pulse rate with a 1,000 ±100 ms pulse interval thru connector J1 to module A2A4 or thru connector P2 to the pod assembly.
	KA30B	Applies a pulse rate with a 400 ±40 ms pulse interval thru connector J1 to module A2A4, or thru connector P2 to the pod assembly.
	KA30C	Applies a pulse rate with a 285 ±30 ms pulse interval thru connector J1 to module A2A4, or thru connector P2 to the pod assembly.
	KA30D	Applies a pulse rate with a 166 ±17 ms pulse interval thru connector J1 to module A2A4 or thru connector P2 to the pod assembly.
	KA76A	Applies a pulse rate with a 1,000 ±100 ms pulse interval thru connector J1 to module A2A4 or thru connector P2 to the pod assembly.
	KA76 B	Applies a pulse rate with a 400 ±40 ms pulse interval thru connector J1 to module A2A4, or thru connector P2 to the pod assembly.
	KA76 C	Applies a pulse rate with a 285 ±30 ms pulse interval thru connector J1 to module A2A4, or thru connector P2 to the pod assembly.



Control, indicator, or connector	Function
KA76 D	Applies a pulse rate with a 166 ±17 ms pulse interval thru connector J1 to module A2A4, or thru connector P2 to the pod assembly.
PULSE section:	
CAMR indicator	When lighted, indicates generation of a camera pulse from the test panel or from the adapter circuits.
FLASH indicator	When lighted, indicates generation of a flash pulse from module A2A4.
READY INTLK indicator	When lighted, indicates the interlock circuit of module A2A4 (in the pod assembly) is closed, or when module A2A4 is tested seperately with READY/INTLK switch S1 in the K1 position, indicates an operational interlock circuit in module A2A4.
K1 RELAY indicator	When lighted with READY/INTLK switch S1 set to K1, indicates operational A2A4K1 relay contacts in module A2A4.
Pendant connector P1 (A4J1 of LS-59)	Provides for connection between the adapter and the pod assembly.
Pendant connector P2 (J3 of LS-59)	Provides for connection between module A2A4 in the pod assembly and the adapter.
SYSTEM TEST connector J1	Provides for connection between the adapter and connector J2 of the test panel.
Connector J1	Provides for connection between the adapter and module A2A4 when module A2A4 is removed from the pod assembly.
+ and - Binding Post connectors, VOLTAGE section	Provides for connection of external multimeter to the adapter.
CAMERA + and - binding post connectors, PULSE section	Provides for connection of external oscilloscope to the adapter.
LIMIT + and - binding post connectors, PULSE section	Provides for connection of external oscilloscope to the adapter.
FLASH + and - binding post connectors, PULSE section	Provides for connection of external oscilloscope to the adapter.

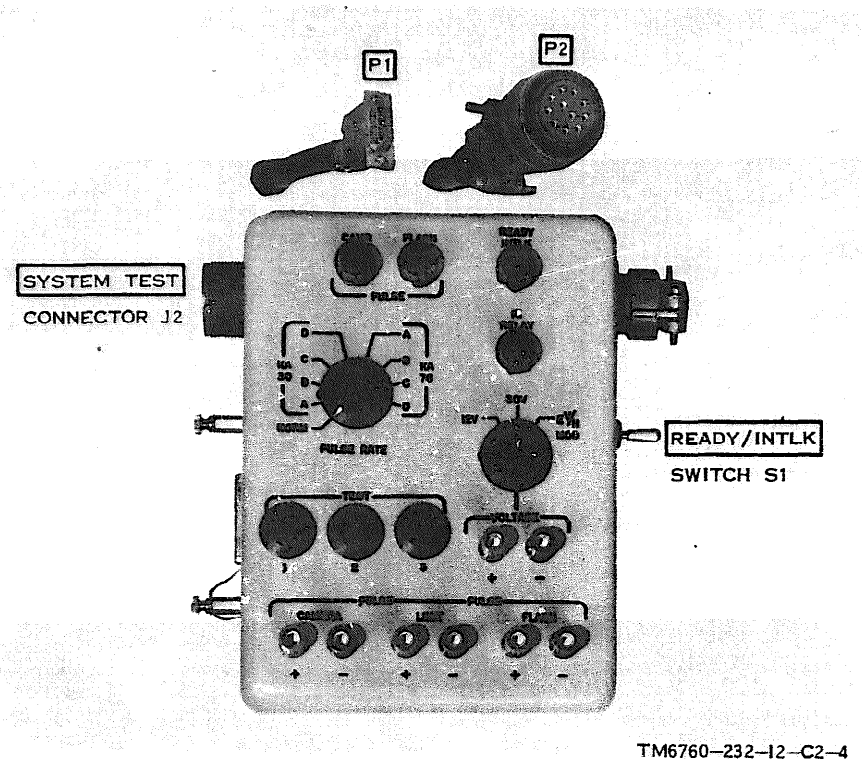


Figure 3-2.1. Adapter controls, indicators and connectors.

Section II. OPERATION UNDER USUAL CONDITIONS

3-3. Types of Operation

The bench test set performs operational checks and troubleshoots the electronic flash system before its installation in the aircraft. It is also capable of testing and troubleshooting the major assemblies and modules of the electronic flash system. The bench test set is also used to synchronize the logic circuits of the electronic flash system with the camera frame pulses from the KA-30 or KA-76 camera. Synchronization insures that the logic circuits of the electronic flash system fire the flash tubes precisely when the camera shutter is fully open. The synchronization procedure is performed with the camera and electronic flash system to be installed in the aircraft, since timing is different for any given pair of components.

NOTE

For information on the electronic flash system controls, indicators, connectors, and test requirements, refer to TM 11-6760-228-12 for Flasher System, Photographic Aircraft LS-59A. Refer to TM 11-6720-208-12 for information on Cameras, Still Picture KA-30A and KA-30A2, and to TM 11-6720-236-12 for Camera, Still Picture KA-76A. For information on the shutter tester, refer to TM 11-6760-221-12.

3-4. Initial Setup of Bench Test Set

a. Preliminary Control Settings. Preliminary control settings must be performed to prevent damage to the electronic flash system, its modules, or the bench test set. This action prevents component damage, and also readies the bench test set and component under test for application of ac and dc power. To prepare the equipment for testing, perform the following procedure in the exact order given:

(1) Remove all power to pod assembly and bench test set.

(2) Check to see that pod assembly is installed in test cradle so that light flashes from window do not flash into eyes of nearby personnel.

(3) Connect bench test set and electronic flash system or modules as indicated in applicable paragraph for test to be performed.

(4) Before performing each test. preset all

bench test set controls as indicated in (a) and (b) below.

(a) Test panel control settings.

Control name	Setting
Power switch	OFF
MASTER selector switch	LOGIC
SYSTEM TEST switch	SYNC
MODULE TEST switch	K1 CLOSE
E V/H control	0 (fully counterclockwise)
Camera pulse switch	KA-30 or KA-76, as applicable for camera being tested
Logis TEST switch	OPERATE
VOLTAGE CONTROL TEST switch	PH A (+ GATE CONT)
HV TEST control	0 (fully counterclockwise)

(b) Blower assembly control settings.

Control name	Setting
POWER circuit breaker	OFF
BLOWER circuit breaker	OFF

b. Internal Test (fig. 3-3).

(1) Preset test panel controls as indicated in a above.

(2) Connect external power source and external test equipment as shown in figure 3-3.

CAUTION

Before performing any step in this procedure that requires the use of the external multimeter, be certain that the multimeter is correctly adjusted to measure the desired quantity (volts ac, volts dc, or ohms).

(3) Set multimeter controls to indicate + 50 volts dc.

(4) Set oscilloscope for vertical sensitivity of 50 mv /cm and horizontal sweep speed of 1 usec/cm.

(5) Set POWER panel power switch to ON and observe the following:

(a) AC PWR and DC PWR, and INTERLOCK indicators light.

(b) INPUT PULSE indicator flashes approximately once every 3.6 seconds.

NOTE

The INPUT PULSE indicator should flash at 3.6-second rate for all subsequent tests unless otherwise noted.

(c) INPUT PULSE indicator flashes approximately once every 3.6 seconds.

(6) Set MASTER selector switch to +30 VDC (INTERNAL TEST) and check to see that multimeter indicates +30 volts dc ±2.5. Observe oscilloscope and check to see that ripple waveform on channel A is 50 (mv) maximum peak to peak.

(7) Set MASTER selector switch to E V/H (INTERNAL TEST) and check to see that multimeter indicates +47 volts dc ±3. Observe oscilloscope and check to see that ripple waveform on channel A is 20 mv maximum peak to peak.

(8) Set MASTER selector switch to INTEGR AMP (INTERNAL TEST). Check to see that peak value indicated on light energy meter is 8 and meter is pulsed approximately once every 3.6 seconds.

NOTE

Depress SYSTEM RESET switch to reset light energy meter to zero.

(9) Set MASTER selector switch to LAMP DRIVERS (INTERNAL TEST) and observe that LOGIC 1, FLASH 1, LOGIC 2, FLASH 2, LOGIC 3 and FLASH 3 indicators flash approximately once every 3.6 seconds.

(10) Set MASTER selector switch to LAMPS (INTERNAL TEST) and observe that all test panel indicators light.

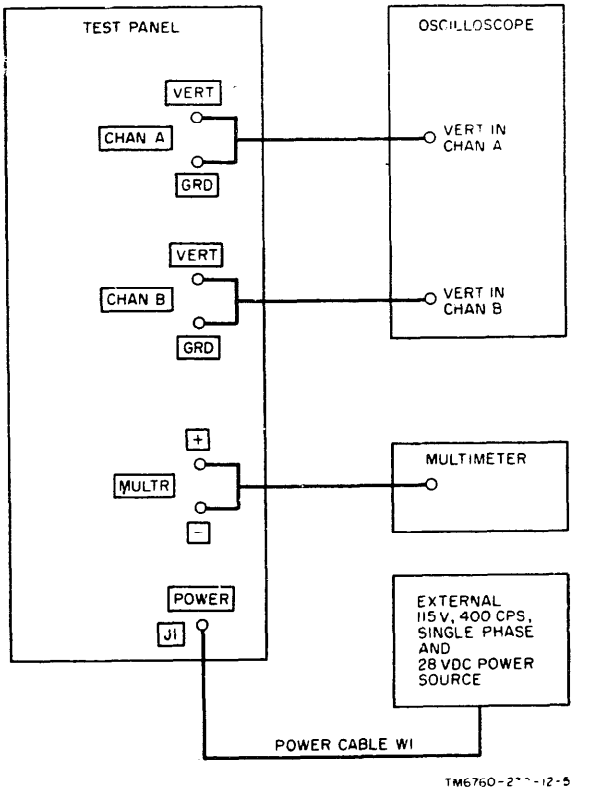


Figure 3-3. Test panel setup for internal test..

(11) Reset test panel controls to positions indicated in a above.

3-5. Pod Assembly test (fig. 3-4)

NOTE

The control box assembly is tested as a separate unit, as described in paragraph 3-6. Continuity checks on the cable assemblies that interconnect the pod assembly and the control box assembly may be performed using appropriate cabling diagrams.

WARNING

The high intensity flashes from the illuminator modules are dangerous and will cause temporary or permanent blindness if the eyes are exposed to the flashes unprotected. Before proceeding with the following instructions. place the black cloth (fur--nished with LS-69A) over the three illuminator modules. Fasten the black cloth to the pod assembly with masking tape or other suitable fastener. DO SOT REMOVE THE BLACK CLOTH FROM THE POD ASSEMBLY WHILE THE TEST IS IN PROGRESS.

a. Perform test panel internal test procedure given in paragraph 3-4b.

b. Remove KA-30A lens cone dust covers, caps, and filters; place lens cone over shutter tester light source.

c. Connect equipment for pod assembly test as shown in figure 3-4.

d. Set shutter test ILLUMINATION control to LOW 1.

e. Set shutter tester RANGE switch to 100.

f. Set shutter tester FUNCTION switch to EFFICIENCY A.

g. Set shutter tester PANEL POWER switch to OS.

h. Set shutter tester SHUTTER POWER switch to ON.

i. Hold camera lens cone KA30 DIAPHRAGM switch at OPEN until diaphragm is at slowest shutter speed.

j. Set blower assembly POWER and BLOWER circuit breakers to OS. Observe that blower motor is operative and that PHA, PHB, and PH C indicator lamps light

k. Set adapter PULSE RATE switch to NORM.

l. Set adapter READY/INTLK switch to OFF.

m. Set adapter VOLTAGE switch to 12V.

n. Set POWER panel power switch to ON, MASTER selector switch to SYSTEM. and SYSTEM TEST switch to SYN, KA-30 - KA-76 switch to KA-30 (does not check in KA-30 position) and observe that:

(1) AC PWR and DC PWR indicators light.

(2) Adapter K1 RELAY indicator lights.

(3) GATE CONT indicator lights.

o. Press and release- shutter tester SHUTTER OPERATE switch. On oscilloscope, observe flash pulse on channel A and 20-usec camera frame pulse on channel B. Check to see that flash occurs at approximate center of 20-usec camera frame pulse.

CAUTION

Do not flash the electronic flash system faster than approximately 1 flash every 3 seconds. Do not operate the electronic flash system for more than 5 minutes maximum without allowing a 5-minute cooling period with the blower operating. This is necessary to insure that the power-limiting resistors of the blower assembly do not overheat.

p. Disconnect camera lens cone and shutter tester.

NOTE

Unless otherwise indicated, all controls, indicators, and connectors referred to in the following steps are located on the test panel.

WARNING

Check the covering over the illuminator modules. Pod assembly flashes automatically when SYSTEM TEST switch is set to OPR MODE.

q. Set MASTER selector switch to SYSTEM.

r. Set SYSTEM TEST switch to OPR MODE. Check to see that HV LIMIT FAIL. + GATE FAIL, and - GATE FAIL indicators do not light. If indicators light, a malfunction is indicated, so immediately remove all power.

CAUTION

Do not attempt to flash the illuminator modules any faster than at the rate of one flash approximately every 3 seconds, as automatically triggered by

the test panel. Allow the electronic flash system to operate a maximum of 5 minutes, and then cool for a minimum of 5 minutes with the blower operating.

s. Set E V/H control fully counterclockwise (0). Observe the following:

(1) All three illuminator modules and FLASH 1, FLASH 2, and FLASH 3 indicators flash simultaneously once every 3.6 seconds.

(2) +350 VDC indicator and GATE CONT indicator light and then extinguish prior to illuminator module firing.

(3) GATE CONT DISABLE indicator lights momentarily during illuminator module firing.

(4) Adapter CAMR PULSE and FLASH PULSE indicators light momentarily once each time a trigger pulse is received from the test panel.

(5) INPUT PULSE indicator flashes once every 3.6 seconds.

(6) LOGIC 1, 2 and 3 indicators light during each flash.

NOTE

When performing the steps in t through v below, oscilloscope channel A waveform (oscillator feedback pulse) appears only when an illuminator module fires. Channel B waveform (blocking oscillator gate pulses) should appear only when the illuminator module high-voltage capacitors are charging.

t. Rotate E V/H control slowly clockwise until pairs of illuminator modules fire simultaneously. Observe the following:

(1) Multimeter indicates +12 volts dc ±1.

(2) LOGIC 1, 2, and 3 and FLASH 1, 2, and 3 indicators flash in pairs.

(3) GATE CONT DISABLE indicator lights momentarily during illuminator module firing.

u. Rotate E V/H control slowly clockwise until illuminator modules fire sequentially. Observe the following:

(1) Multimeter indicates +22.5 volts dc ±2.

(2) LOGIC and FLASH indicators flash in a sequential 1, 2, 3 pattern.

(3) GATE CONT DISABLE indicator lights momentarily during illuminator module firing.

(4) GATE CONT indicator lights during charge periods.

v. Rotate E V/H control slowly clockwise to 30, then counterclockwise until pairs of illuminator modules fire simultaneously. Observe the following:

(1) Multimeter indicates between +13 and +19 volts dc.

(2) LOGIC 1, 2, and 3 and FLASH 1, 2, and 3 indicators flash in pairs.

(3) GATE CONT DISABLE indicator lights momentarily during illuminator module firing.

w. Rotate E V/H control slowly counterclockwise until all illuminator modules flash simultaneously. Observe the following:

(1) Multimeter indicates between +6 and +10 volts dc.

(2) LOGIC 1, 2, and 3 and FLASH 1, 2, and 3 indicators flash simultaneously.

(3) GATE CONT DISABLE indicator lights momentarily during illuminator module firing.

x. Turn off all power. Allow sufficient time for illuminator module storage capacitors to discharge before proceeding to y below.

y. Connect photocell cable W7 between PHOTOCELL connector J13 and pod assembly connector J10.

CAUTION

Allow the electronic flash system to operate a maximum' of 5 minutes, and then cool for a minimum of 5 minutes with the blower operating.

z. Set SYSTEM TEST switch to LIGHT OUTPUT MOD 1 and turn on all power. Observe the following:

(1) LOGIC 1 and FLASH 1 indicators flash once each second.

(2) Eight energy meter indicates a minimum of 7 after two or more flashes.

(3) Multimeter indicates +325 volts dc ±50 before each illuminator module A3 flash.

(4) GATE CONT indicator lights while illuminator module storage capacitors are charging, then extinguishes before each flash.

(5) GATE CONT DISABLE indicator lights momentarily following each flash.

aa. Turn off all power. Allow sufficient time for illuminator module storage capacitors to discharge before proceeding to ab below.

ab. Connect photocell cable W7 between PHO-

TOCELL connector J13 and pod assembly connector J9.

CAUTION

Allow the electronic flash system to operate a maximum of 5 minutes and then cool for a minimum of 5 minutes with blower operating.

ac. Set System Test switch to LIGHT OUTPUT MOD 2 and turn on all power. Observe the following:

(1) LOGIC 2 and FLASH 2 indicators flash once each second.

(2) Light energy meter indicates a minimum of 7 after two or more flashes.

(3) Multimeter indicates +28 volts dc before each illuminator module A4 flash.

(4) GATE CONT indicator lights while illuminator module storage capacitors are charging, then extinguishes before each flash.

(5) GATE CONT DISABLE indicator lights momentarily following each flash.

ad. Turn off all power. Allow sufficient time for illuminator module storage capacitors to discharge before proceeding to ae below.

ae. Connect photocell cable W7 between PHOTOCELL connector J13 and pod assembly connector J8.

CAUTION

Allow the electronic flash system to operate a maximum of 5 minutes and then cool for a minimum of 5 minutes with blower operating.

af. Set SYSTEM TEST switch to LIGHT OUTPUT MOD 3 and turn on all power. Observe the following:

(1) LOGIC 3 and FLASH 3 indicators flash once each second.

(2) Light energy meter indicates a minimum of 7 after two or more flashes.

(3) Multimeter indicates 115 volts ac before each illuminator module A5 flash.

(4) GATE CONT indicator lights while illuminator module storage capacitors are charging, then extinguishes before each flash.

(5) GATE CONT DISABLE indicator lights momentarily following each flash.

ag. Turn off all power. Allow sufficient time for illuminator module storage capacitors to discharge before proceeding to ah below.

ah. Disconnect photocell cable W7.

ai. First make observations indicated in (1), (2), and (3) below; set SYSTEM TEST switch to HV LIMIT, then depress the hold HV LIMIT TEST switch. Observe that:

(1) GATE CONT indicator lights while the illuminator module capacitors are- charged (oscilloscope waveform A) and extinguishes when voltage across capacitors stabilizes. At this point, observe that GATE CONT indicator extinguishes and multimeter indicates + 14 volts dc + 1.0. Note that this indication shows that voltage control circuits have lost control and high voltage has risen to point of energizing overvoltage protection circuit.

(2) If overvoltage protection circuit is normal, no further indications occur.

(3) If overvoltage protection circuit is defective, high voltage continues to rise until HV LIMIT FAIL indicator lights. If HV LIMIT FAIL indicator lights, release HV LIMIT TEST switch immediately.

aj. Release HV LIMIT TEST switch and turn off all power for a minimum of 5 minutes.

ak. Repeat ai and aj above twice; then leave power on and proceed to al below.

al. Set SYSTEM TEST switch to GATE PH A. Observe the following:

(1) GATE CONT indicator lights and then extinguishes.

(2) + GATE FAIL and - GATE FAIL indicators do not light.

CAUTION

Allow the electronic flash system to operate a maximum of 5 minutes and then cool for a minimum of 5 minutes with blower operating.

am. Momentarily press PRESS FOR MANUAL switch. After a 3-second wait, again press PRESS FOR MANUAL switch and repeat test. Observe the following:

(1) All illuminator modules of pod assembly flash.

(2) ALL LOGIC 1, 2, and 3 and FLASH 1, 2, and 3 indicators flash.

(3) GATE CONT indicator lights and then extinguishes. Check to see that period when GATE CONT indicator is lighted, oscilloscope channel A waveform does not exceed 5 volts peak at 400 Hz.

(4) When GATE CONT indicator extinguishes, multimeter indicates +12.5 volts dc.

(5) At time of flash, oscilloscope channel B displays trigger pulse applied to illuminator module A3. Check to see that trigger pulse has width of 250 ±150) microseconds and amplitude of 4 volts minimum.

(6) Adapter CAMR PULSE and FLASH PULSE indicators light momentarily.

an. Set SYSTEM TEST switch to GATE PH

Observe the following:

(1) GATE CONT indicator lights and then extinguishes.

(2) + GATE FAIL and - GATE FAIL indicators do not light.

CAUTION

Allow the electronic flash system to operate a maximum of 5 minutes and then cool for a minimum of 5 minutes with blower operating.

ao. Momentarily press PRESS FOR MANUAL switch. After a 3-second wait, again press PRESS FOR MANUAL switch and repeat test. Observe the following:

(1) All illuminator modules of pod assembly flash.

(2) All LOGIC 1, 2, and 3 and FLASH 1, 2, and 3 indicators flash.

(3) GATE CONT indicator lights and then extinguishes. Check to see that during period when GATE CONT indicator is lighted, oscilloscope channel A waveform does not exceed 5 volts peak at 400 Hz.

(4) When GATE CONT indicator extinguishes, multimeter indicates +12.5 volts dc.

(5) At time of flash, oscilloscope channel B displays trigger pulse applied to illuminator module A4. Check to see that trigger pulse has width of 250 ±150 microseconds and amplitude of 4 volts minimum.

ap. Set SYSTEM TEST switch to GATE PH C. Observe the following:

(1) GATE CONT indicator lights and then extinguishes.

(2) + GATE FAIL and - GATE FAIL indicators do not light.

CAUTION

Allow electronic flash system to operate a maximum of 5 minutes and then cool for a minimum of 5 minutes with blower operating.

aq. Momentarily press PRESS FOR MANUAL switch. After a 3-second wait, again press PRESS FOR MANUAL switch and repeat test. Observe the following:

(1) All illuminator modules of the pod assembly flash.

(2) All LOGIC 1, 2, and 3 and FLASH 1, 2, and 3 indicators flash.

(3) GATE CONT indicator SYSTEM lights and then extinguishes. Check to see that during period when GATE CONT indicator is lighted, oscilloscope channel A waveform does not exceed 5 volts peak at 400 Hz.

(4) When GATE CONT indicator extinguishes, multimeter indicates + 12.5 volts dc.

(5) At the time of flash, oscilloscope channel B displays trigger pulse applied to illuminator module A5. Check to see that trigger pulse has width of 250 ±150 microseconds and amplitude of 4 volts minimum.

ar. Turn off all power. Allow sufficient time for illuminator module storage capacitors to discharge and then disconnect all equipment.

3-6. Control Box Assembly Test (fig. 3-5)

a. Perform test panel internal test procedure given in paragraph 3-4b.

b. Connect test equipment for control box assembly test as shown in figure 3-5.

c. Set control box assembly POWER switch to OFF.

d. Set test panel MASTER selector switch to CONTROL PANEL.

e. Set POWER panel power switch to OS. Observe that the control box assembly panel Illuminating indicator lights.

f. Set control box assembly POWER switch to ON. Observe the following:

(1) Control box assembly POWER indicator lights.

(2) POWER panel AC indicator lights.

(3) POWER panel DC indicator lights.

g. Set POWER panel power switch to OFF and disconnect equipment.

3-7. Illuminator Module A3, A4, or A5 Test (fig. 3-6)

a. Perform test panel internal test procedure given in paragraph 3-4b.

b. Remove illuminator module A3, A4, or A5 from pod' assembly and connect for illuminator module test as shown in figure 3-6.

NOTE

For this test, disable illuminator module interlock switch by pulling the pin actuator out to maximum position. At completion of test, return actuator pin to normal position.

c. Set test panel MASTER selector switch to MODULE.

d. Set MODULE TEST switch to K1 CLOSE.

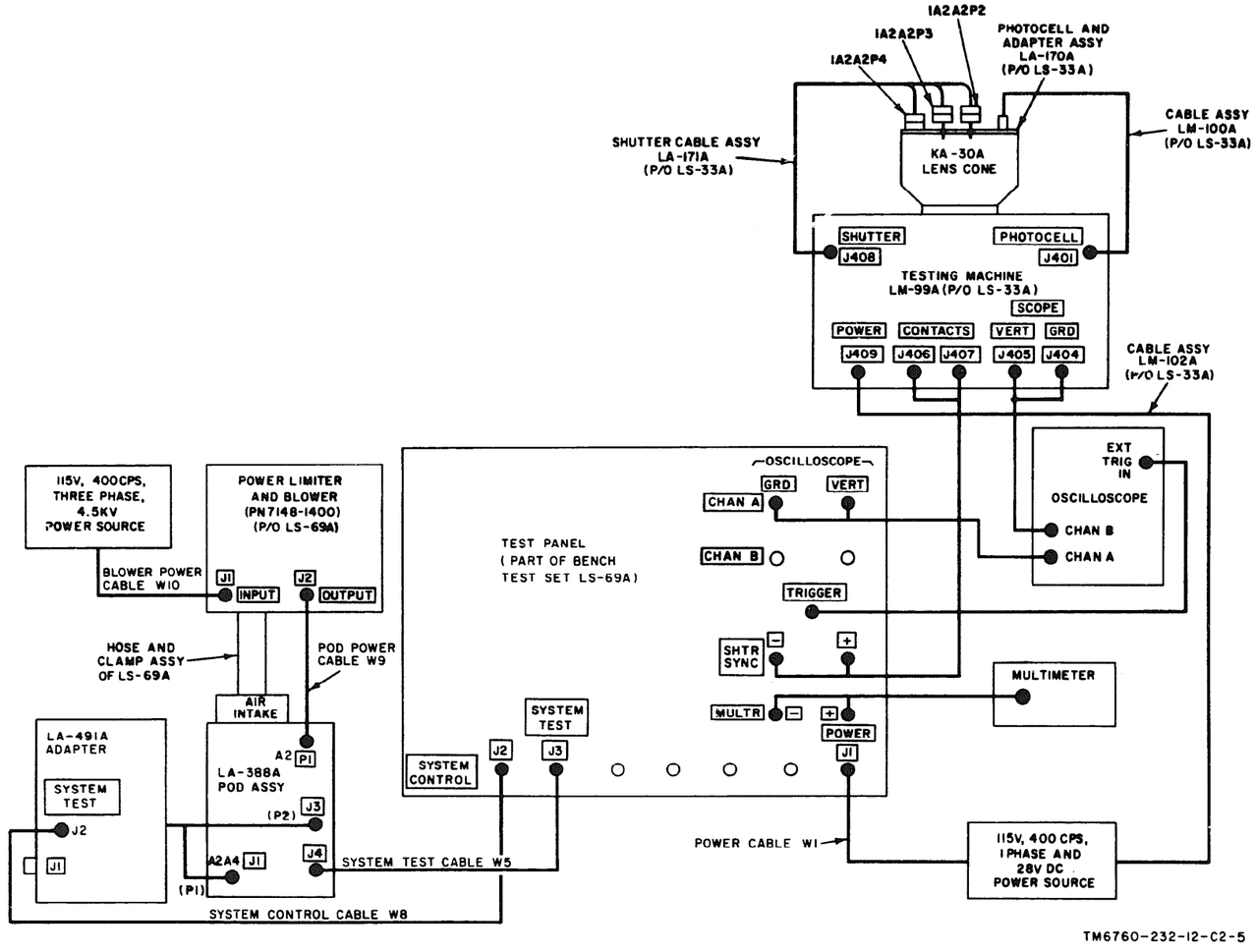


Figure 3-4. Pod assembly test, interconnection diagram.

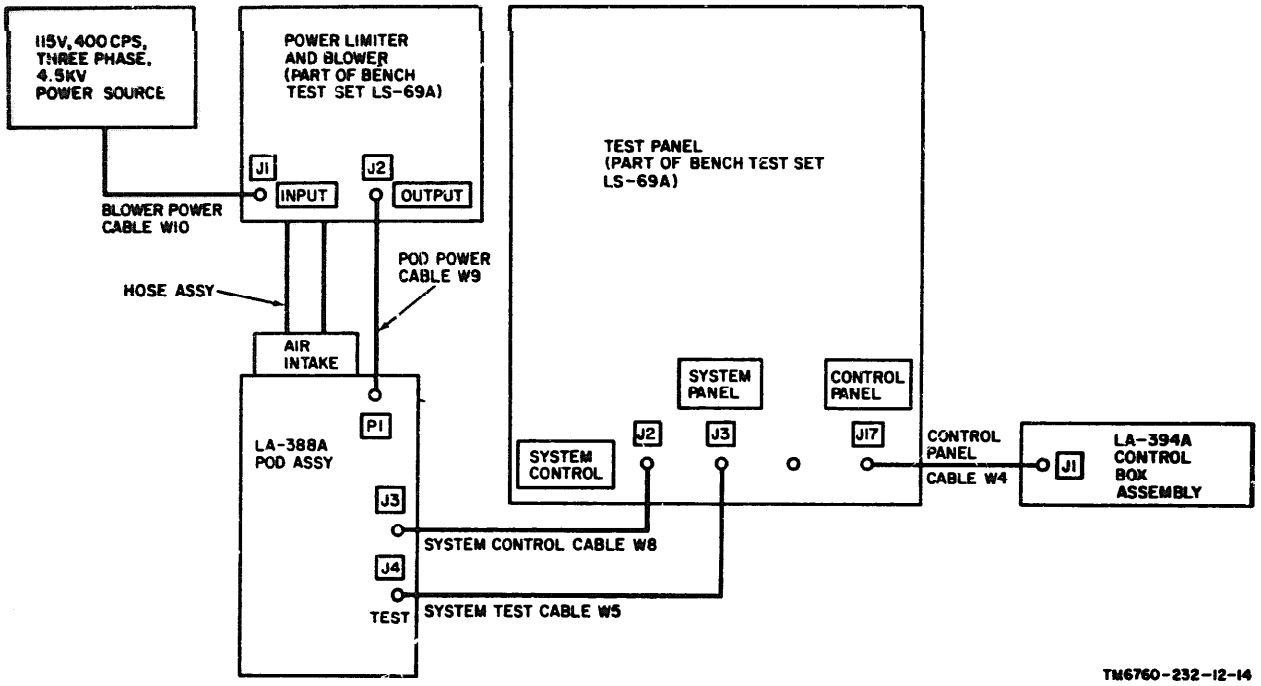


Figure 3-5. Control box assembly test, interconnection diagram.

NOTE

Unless otherwise indicated, controls and indicators referred to in the following steps are located in the MODULE section of the test panel.

e. Set POWER panel power switch to OS. Observe that K1 CLOSE indicator lights. Ignore all other indications.

f. Set TEST switch to K1 OPEN. Observe the following:

(1) Kl OPEN indicator lights.

(2) K1 CLOSE indicator extinguishes.

CAUTION

Before performing any step in this test that requires use of external multimeter, be certain that multimeter is correctly adjusted to measure desired quantity (volts ac, volts dc, or ohms).

g. Set TEST switch to DISCH RES. Observe the following:

(1) Multimeter indicates + 10 volts ± 1 .

(2) Kl OPEN indicator is lighted.

h. Set TEST switch to CHARGE DIOIDES. Observe the following:

(1) Multimeter indicates 0 volt dc.

(2) Kl OPEN indicator is lighted.

i. Set TEST switch to INTLK. Observe that INTERLOCK indicator lights.

j. Set TEST switch to FLASH PULSE A. Observe the following.

(1) FLASH PULSE A and FLASH PULSE B indicators flash one every second.

(2) INPUT PULSE indicator flashes once every second.

(3) Oscilloscope channel A waveform (flash pulse A) is a -300 volts in amplitude and 25±10 milliseconds wide; channel A waveform appears once every second (fig. 3-5.1).

k. Set TEST switch to FLASH PULSE B. Observe the following:

(1) FLASH PULSE A and FLASH PULSE B indicators flash once every second.

(2) INPUT PULSE indicator flashes once every second.

(3) Oscilloscope channel A waveform flash pulse B) is -300 volts in amplitude and 25±10 milliseconds wide: channel A waveform appears once every second (fig. 3-5.1).

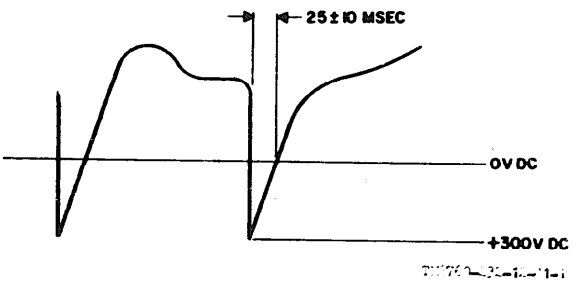


Figure 3-5.1. Channel A waveform flash pulse A or B.

l. Set LOGIC TEST switch to OUTPUT Q1. Observe the following:

(1) Channel A waveform is +28 volts peak, 250 ± 100 microseconds wide, and occurs every 3.6 seconds.

(2) Multimeter indicates pulsating voltage less than +5 volts dc between pulses.

m. Set TEST switch to OUTPUT Q2. Observe the following:

(1) Channel A waveform is -28 volts peak, and occurs every 3.6 seconds.

(2) Multimeter indicates +28 volts dc between INPUT PULSE indicator flashes.

n. Set test oscilloscope controls for an ac input signal.

o. Set TEST switch to P/C. Position high-intensity light source in front of illuminator module reflector and move light around. Observe negative-going waveform of varying amplitude on channel A as light source is moved over photocell mounted on reflector.

p. Set POWER panel power switch to OFF. Allow sufficient time for illuminator module storage capacitors to discharge and disconnect equipment.

3-8. Voltage Control Module A2A3 Test (fig. 3-7)

a. Perform test panel internal test procedure given in paragraph 3-4*b*.

b. Remove voltage control module A2A3 from pod assembly and connect for voltage control module test as shown in figure 3-7.

c. Set test panel MASTER selector switch to VOLTAGE CONTROL.

d. Set VOLTAGE CONTROL TEST switch to + GATE.

NOTE

Unless otherwise indicated, controls and indicators referred to in the following

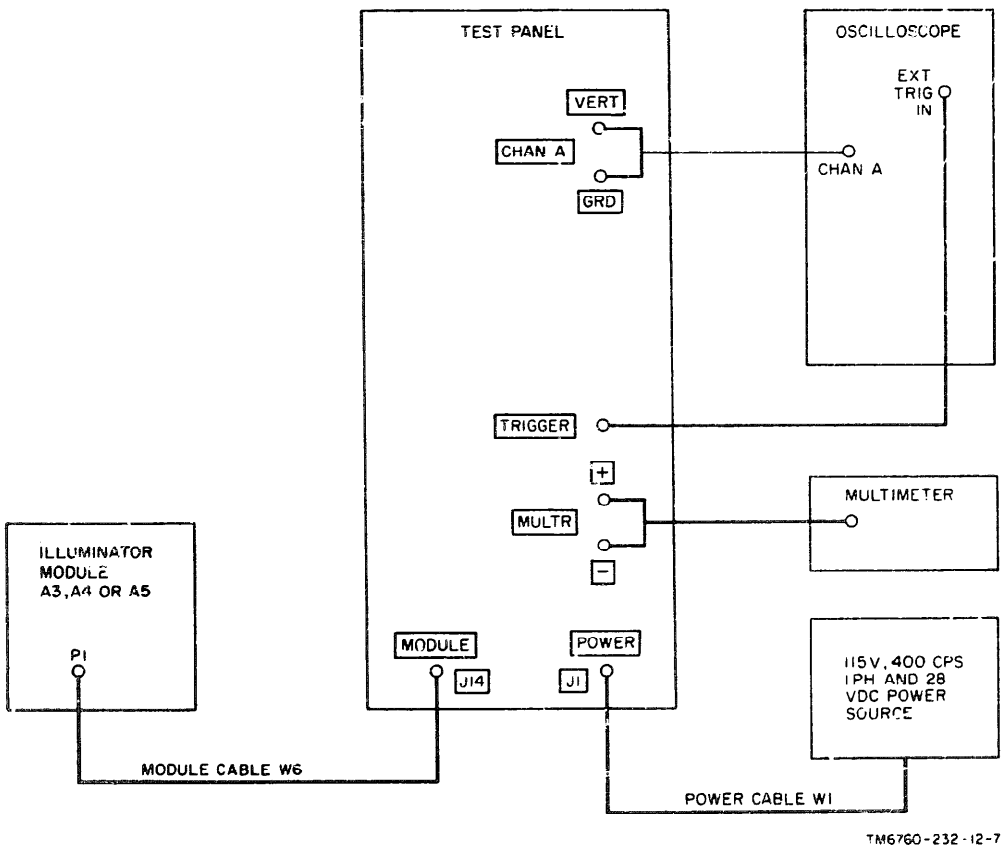


Figure 3-6. Illuminator module A3, A4, or A5 test interconnection diagram.

are located in the VOLTAGE CONTROL section of the test panel.

e. Set POWER panel power switch to ON. Observe the following:

(1) GATE CONT indicator of SYSTEM section lights and remains on.

(2) Oscilloscope channel A waveform has the following characteristics:

(*a*) Pulse amplitude: 470 millivolts minimum.

(*b*) Pulse width: 6 to 14 microseconds.

(*c*) Pulse repetition rate: 18 to 22 KC.

f. Set TEST switch to + GATE CONT PH B. Refer to *e* above for results.

g. Set TEST switch to + GATE CONT PH C. Refer to *e* above for results.

h. Set TEST switch to − GATE CONT PH A. Refer to e above for results except pulse amplitude is 1.5 volts minimum.

i. Set TEST switch to − GATE CONT PH B. Refer to *e* above for results.

j. Set TEST switch to − GATE CONT PH C. Refer to *e* above for results.

k. Set TEST switch to HV LIMIT 1. Observe that GATE CONT indicator of SYSTEM section lights.

l. Rotate HV TEST control clockwise until GATE CONT indicator of SYSTEM section extinguishes. Observe that multimeter indicates +12.5 volts dc.

m. Rotate HV TEST control fully counterclockwise to 0.

n. Set TEST switch to HV LIMIT 2. Observe that GATE CONT indicator of SYSTEM section lights.

o. Rotate HV TEST control clockwise until GATE CONT indicator of SYSTEM section extinguishes. Observe that multimeter indicates +12.5 volts dc.

p. Rotate HV TEST control fully counterclockwise to 0.

q. Set TEST switch to HV LIMIT 3. Observe that GATE CONT indicator of SYSTEM section lights.

r. Rotate HV TEST control clockwise until GATE CONT indicator of SYSTEM section extinguishes. Observe that multimeter indicates +12.5 volts dc.

s. Rotate HV TEST control fully counterclockwise to 0.

t. Set TEST switch to +5.6 VDC. Observe the following:

(1) Multimeter indicates between +5.3 and +5.9 volts dc.

(2) Oscilloscope channel A waveform has less than 1 volt peak-to-peak noise.

u. Set TEST switch to +20 VDC. Observe the following:

(1) Multimeter indicates between +19 and +21 volts dc.

(2) Oscilloscope channel A waveform has less than 1 volt peak-to-peak noise.

v. Set TEST switch to GATE CONT DISABLE.

w. Press GATE CONT DISABLE switch. Observe the following:

(1) 5-volt amplitude pulse of 15 to 40 milliseconds duration is displayed on channel B of test oscilloscope.

(2) GATE CONT DISABLE indicator of POWER SUPPLY section flashes each time the GATE CONT DISABLE pushbutton is pressed.

(3) Check output on Channel A to see that blanking occurs during the 15 to 40 millisecond pulse.

x. Set power switch to OFF and disconnect equipment.

3-9 Logic Module A2A2 Test (Fig. 3-3)

a. Perform test panel internal test procedure given in paragraph 3-4*b*.

b. Remove logic module A2A2 from pod assembly and connect for logic module test as shown in figure 3-8.

c. Set test panel MASTER selector switch to LOGIC, and KA-30-KA-76 switch to KA-30.

d. Set test panel E V H control fully counterclockwise to 0.

e. Set LOGIC TEST switch to OPERATE.

NOTE

Unless otherwise noted, controls and indicators referred to in the following steps are located in the LOGIC section of the test panel.

f. Set POWER panel power switch to ON. Observe the following:

(1) $\overline{Q}$ and $\overline{Q}2$ indicators do *not* light.

(2) INPUT indicator flashes approximately once every 3.6 seconds.

(3) With each flash of INPUT indicator, A and B indicators flash in sequence, AB, A, none.

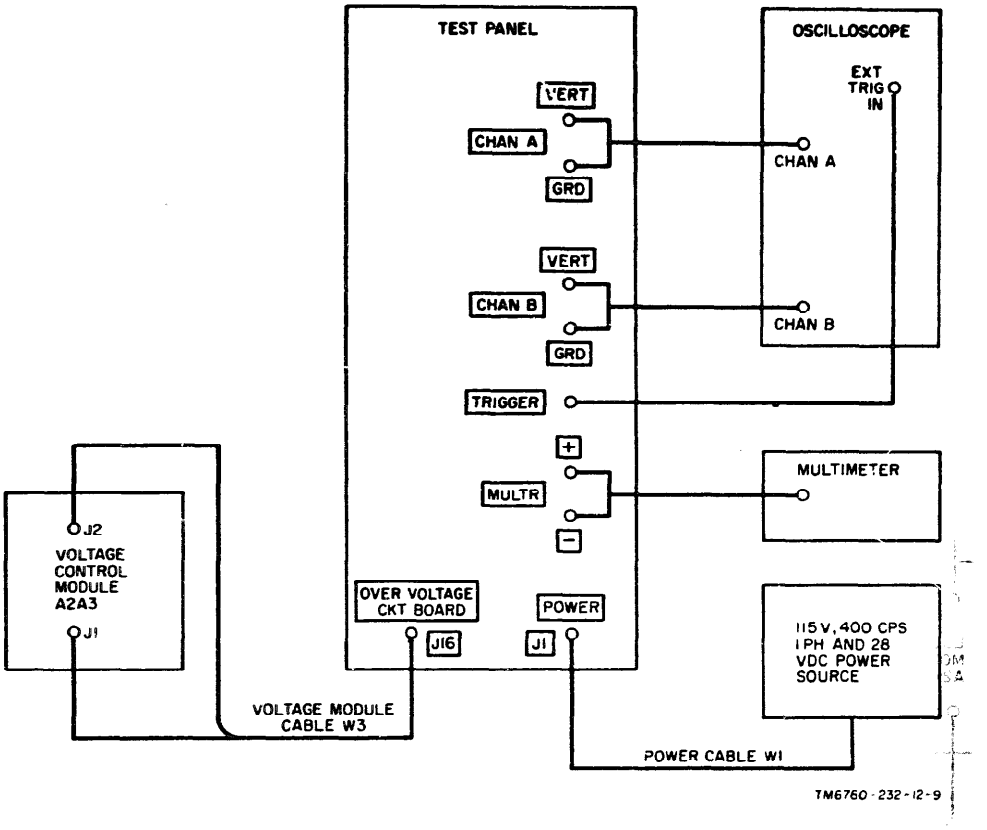


Figure 3-7. Voltage control module A2A3 test, interconnection diagram.

(4) **LOGIC 1, 2, and 3 indicators light simultaneously with each flash of INPUT indicator.**

CAUTION

Before performing any step in the test requiring the use of the external multimeter, be certain that the multimeter is correctly adjusted to measure the desired quantity (volts ac, volts dc, or ohms).

g. Rotate test panel E V/H control slowly clockwise until Q1 indicator lights. Observe the following:

(1) Multimeter indicates +12 ±1 volts dc.

(2) INPUT indicator flashes approximately once every 3.6 seconds.

(3) With each flash of INPUT indicator, **A and B indicators flash in sequence AB, A, none.**

(4) LOGIC 1, 2, and 3 indicators light in **pairs and in sequence (1 and 2, 2 and 3, 3 and 1) with each FLASH of INPUT indicator.**

h. Rotate test panel E V/H **control slowly clockwise until Q1 and Q2 indicators light. Observe the** following:

(1) Multimeter indicates +22.5 volts **dc** ±2.

(2) INPUT indicator flashes **approximately once every 3.6 seconds.**

(3) With each flash of INPUT indicator, ***A*** and B indicators flash in sequence AB, **A, none.**

(4) LOGIC 1, 2, and 3 indicators flash singly **and in sequence with** INPUT indicator **flashes.**

i. Set multimeter range to 50 volts dc.

j. Rotate test panel E V/H control slowly clockwise to 30 and then slowly counterclockwise until Q2 indicator extinguishes. Observe **the fol**lowing:

(1) Multimeter indicates +16 volts dc ±3.

(2) INPUT indicator flashes approximately once every 3.6 seconds.

(3) LOGIC 1, 2, and 3 indicators light **in** pairs and in sequence (1 and 2, 2 and 3, 3 **and 1) with each flash of INPUT indicator.**

k. Continue rotating test panel **E V/H control**

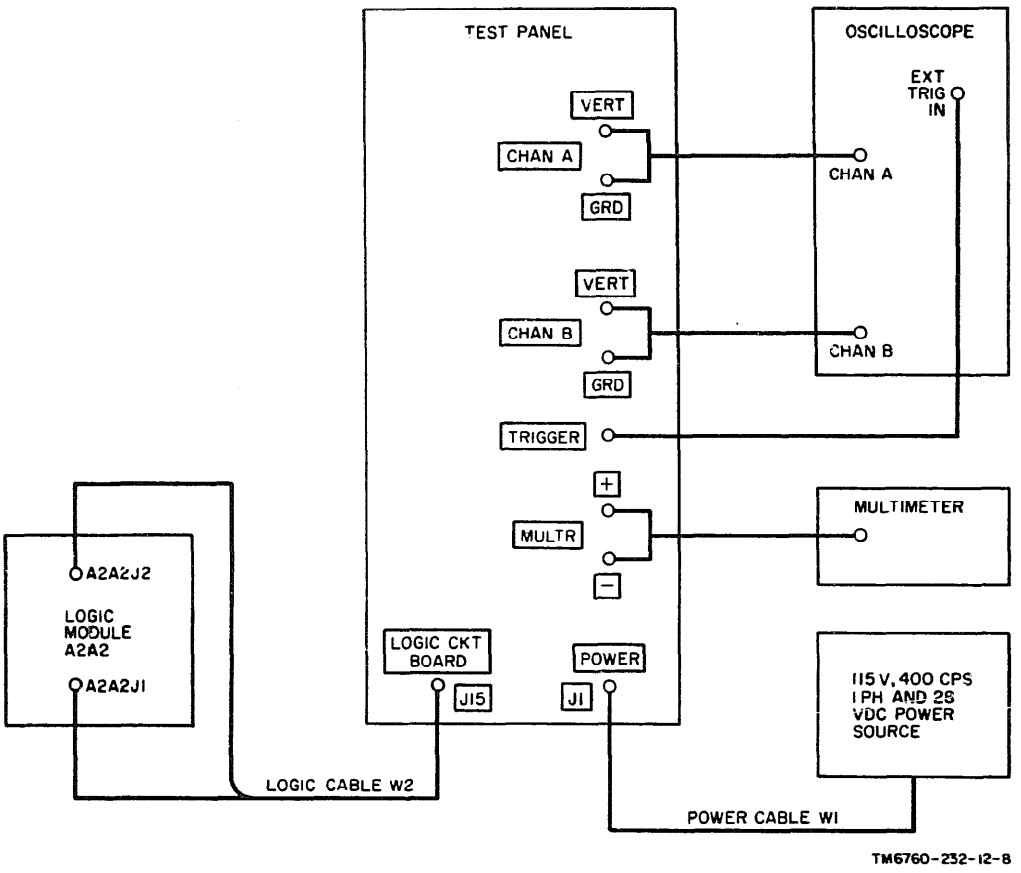


Figure 3-8. Logic module A2A2 test, interconnection diagram.

slowly counterclockwise until Q1 indicator extinguishes. Observe the following:

(1) Multimeter indicates + 8 volts dc ± 2.

(2) INPUT indicator flashes approximately once every 3.6 seconds.

(3) LOGIC 1, 2, and 3 indicators light simultaneously with each flash of INPUT indicator.

l. Rotate test panel E V/H control fully counterclockwise to 0. Observe waveforms shown ir figure 3-9.

NOTE

The pulse width of trigger pulse T is determined by delay adjustment A2A2- R2. Trigger pulse T leading edge is always coincident with trailing edge of trigger pulse T.

m. Set LOGIC TEST switch to DELAY. Observe waveforms shown in figure 3-10.

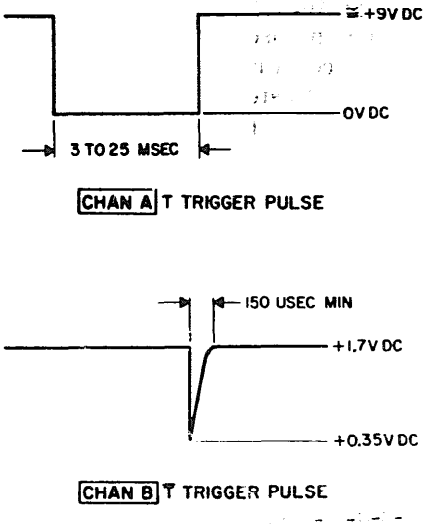


Figure 3-9. Trigger pulse T and T waveforms

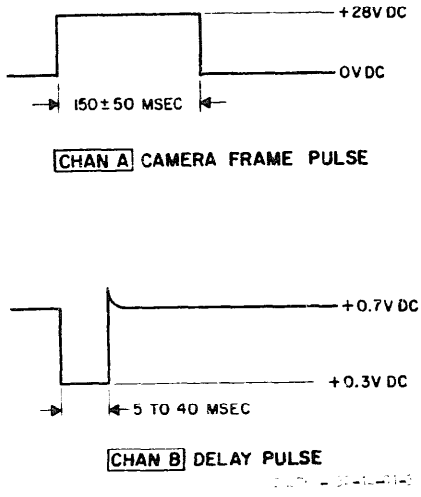


Figure 3-10. Camera frame pulse and delay pulse waveforms.

NOTE

The pulse width of the delay pulse is determined by delay adjustment A2A2-R2. Leading edge of delay pulse is always coincident with leading edge of camera frame pulse.

n. Set LOGIC TEST switch to Q1.

o. Rotate test panel E V/H control clockwise until Q1 indicator lights. Check to see that multimeter indicates +3.4 volts dc ± 0.3.

p. Set LOGIC TEST switch to Q2.

q. Rotate test panel E V/H control clockwise until Q2 indicator lights. Check to see that multimeter indicates +3.4 volts dc ± 0.3.

r. Set LOGIC TEST switch to +5.1 VDC. Observe the following:

(1) Multimeter indicates +5.1 volts dc ± 0.4.

(2) Oscilloscope channel A waveform has less than 250 millivolts peak to peak noise.

s. Set LOGIC TEST switch to +15 VDC. Observe the following:

(1) Multimeter indicates +15 volts dc ± 12.

(2) Oscilloscope channel A waveform has less than 250 millivolts peak to peak noise.

t. Set LOGIC TEST switch to SHIFT.

(1) Only one of LOGIC 1, 2, or 3 indicator lights; indicator A or B or both or neither is lighted; Q1 and Q2 are lighted.

(2) Oscilloscope channel A waveform has an amplitude of approximately +9 volts dc.

(3) Oscilloscope channel B waveform has an amplitude of approximately 300 millivolts dc.

v. Press and hold PRESS TO SHIFT switch. Observe the following:

(1) Oscilloscope channel A waveform has an amplitude of less than 500 millivolts dc.

(2) Oscilloscope channel B waveform has an amplitude of approximately +1 volt dc.

w. Release PRESS TO SHIFT switch. Observe that the next LOGIC 1, 2, or 3 indicator lights. (If indicator 1 lighted in step *u* above then indicator 2 lights; if indicator 2 lighted, then indicator 3 lights.)

x. Set LOGIC TEST switch to OUTPUT 1.

y. Rotate test panel E V/H control fully counterclockwise. Observe the following:

(1) INPUT indicator flashes approximately once every 3.6 seconds.

(2) LOGIC 1, 2, and 3 indicators flash simultaneously and synchronously with INPUT indicator flashes.

(3) Oscilloscope displays waveforms shown in figure 3-11.

z. Set LOGIC TEST switch to OUTPUT 2.

aa. Rotate test panel E V/H control fully counterclockwise. Observe the following:

(1) INPUT indicator flashes approximately once every 3.6 seconds.

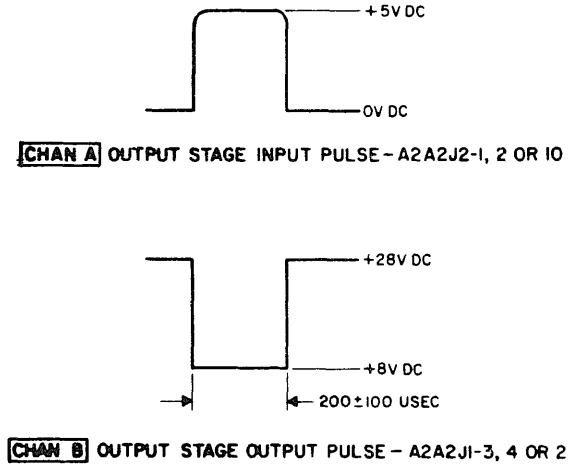


Figure 3-11. Logic module A2A2 output stage input-output waveforms

(2) LOGIC 1, 2, and 3 indicators flash simultaneously and synchronously with INPUT indicator flashes.

(3) Oscilloscope displays waveforms shown in figure 3-11.

ab. Set LOGIC TEST switch to OUTPUT 3.

ac. Rotate test panel E V/H control fully counterclockwise. Observe the following:

(1) INPUT indicator flashes approximately once every 3.6 seconds.

(2) LOGIC 1, 2, and 3 indicators flash simultaneously and synchronously with INPUT indicator flashes.

(3) Oscilloscope displays waveforms shown in figure 3-11.

ad. Set LOGIC TEST switch to OPERATE.

(1) Set KA-30-KA-76 to KA-76.

(2) Remove test connector from logic board.

(3) LOGIC INPUT indicator flashes each time INPUT PULSE indicator flashes.

LOGIC 1, 2, and 3 indicators flash each time INPUT PULSE indicator flashes.

(5) Slowly rotate E V/H control until LOGIC 1, 2, and 3 indicators illuminate in pairs 1 and 2, 2 and 3, and 3 and 1. Multimeter indicates 12 volts dc ± 1.

(6) Continue slowly rotating the E Y/H control until LOGIC 1, 2. and 3 indicators illuminate sequentially 1, 2, 3, 1, 2, etc. Multimeter indicates 22.5 volts dc ± 2.

ae. Set test panel switch to OFF and disconnect equipment.

Section III. OPERATION UNDER UNUSUAL CONDITIONS

3-10. Operation in Arctic Areas

a. Low temperatures have little effect on the bench test set. It operates at temperatures as low as -40°F (-40°C) and may be stored at temperatures as low as -8.5°F (-65°C).

b. Equipment operated at low temperatures should be kept in low temperature storage when not in use The equipment should be covered with water-repellent material and stored in an outdoor shelter. When stored equipment is to be used in a much warmer temperature perform following steps before attempting to operate the equipment.

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

NOTE

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

(2) Before operating bench test set, use line-free cloth to remove condensation from outer surfaces.

3-11. Operation in Tropical and Desert Areas

When the bench test set is used under conditions of extreme heat and humidity, such as in desert and tropical regions, observe the following precautions:

a. Desert Regions. Clean bench test set (para 4-7) before using in desert regions. Store the bench test set in the combination case when not in use.

b. Tropical Regions. In climates of high humidity, such as in the tropics. inspect bench, test set daily for traces of fungus. mold, mites;. and metallic corrosion. If required, clean bench test set immediately. Store bench test set in combination case when not in use; place required number of activated desiccant units and a humidity indicator inside combination case.

To prevent corrosion from salt-laden air or salt-water spray and rusting from condensation or moisture when bench test set is stored, wipe all exposed metal surfaces with soft cloth moistened with lubricating, general purpose, oil. Check condition of equipment before and after each use; clean all parts that are accessible without disassembling any major component. When storing bench test set, pack it in combination case and cover combination case with water-repellent material.

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CHAPTER 4

MAINTENANCE INSTRUCTIONS

WARNING

Dangerous voltage exists in this equipment. Observe safety regulations

Section I. OPERATOR'S MAINTENANCE

4-1. Scope of Operator's Maintenance

The maintenance duties assigned to the operator of the bench test set are listed below together with a list of the paragraphs covering the specific maintenance function. The duties assigned do not require any special tools or test equipment other than those issued with the equipment.

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

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

c. Cleaning exterior of bench test set (para 4-7).

4-2. Materials Required for Operator's Maintenance

a. Trichloroethane.

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).

4-3. Operator's Preventive Maintenance

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

a. Systematic Cure. The procedures given in paragraphs 4-5, 4-6, and 4-7 cover routine systematic care and cleaning essential to proper upkeep and operation of the equipment.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and services charts (para 4-5 and 4-6) outline functions to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in combat-serviceable condition; that is, in good general (physical) condition and good operating condition. To assist operators in maintaining combat serviceability, the charts indicate what to check, how to check, and the normal conditions. The Reference column lists the illustrations, paragraphs, or manuals that contain detailed repair or replacement procedures. If the defect cannot be remedied by performing the corrective action indicated, higher category of maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

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

a. Daily. Preventive maintenance checks and services of the equipment are required daily while the equipment is in use. Paragraph 4-5 specifies the checks and services that must be accomplished each day.

b. Weekly. The maintenance functions indicated in the weekly preventive maintenance checks and services chart (para 4-6) should be performed once each week. Equipment in limited storage (which requires service before operation) does not require weekly maintenance.

4-5. Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	Reference
1	Exposed surfaces	Clean exterior surfaces of bench test set and accessories.	Para 4-7.
2	**Switches and knobs**	Check for proper mechanical action by placing each switch in each possible position. Check to see that action is positive, without binding or scraping. Tighten loose knobs.	
3	**Cover**	Inspect cover on combination and blower cases for tight closure.	
4	**Combination case or blower case**	Check to be sure that combination or blower cases is not cracked or broken. Inspect inserts for damage and proper seating.	
5	**Mounting hardware and retaining screws.**	Check to be sure that all mounting hardware and retaining screws on bench test set and accessories are secure.	
6	**Operation**	During operation be alert for any unusual signs or conditions.	Para 3-4 through 3-8.

4-6. Weekly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	Reference
1	End item of equipment	Inspect equipment for completeness.	Para 1-6
2	Cables	Inspect cable for breaks, cuts, kinks, strain, fraying and deterioration.	
3	Fuses and connectors	Inspect fuses; check connectors, snug fit and good contact.	
4	Test panel indicators	Check to see that indicators of test panel are set as indicated in paragraph 34b. Note. POWER panel AC PWR and DC PWR indicators light when power switch is set to ON.	Para 3-4b
5	Blower assembly indicators	Using blower power cable W10, connect blower assembly to ac power source; set Power circuit to ON. Check to see that PH A, PH B, and PH C indicators light.	

4-7. Cleaning Exterior of Bench Test Set

inspect the exterior of the bench test set. The exterior surfaces should be free of dust, dirt, grease, and fungus.

a. Remove dust and loose dirt from combination case and test panel with a clean, soft. lint-free cloth.

WARNING

The fumes of trichloroethane are toxic. Provide adequate ventilation. DO NOT use near an open flame. Trichloroethane is not flammable, but exposure of the fumes to an open flame converts the fumes to highly toxic, dangerous gases.

b. Remove grease, fungus, and ground-in dirt with cloth dampened (not soaked) with trichloroethane; dry thoroughly.

c. Remove dust or dirt from connectors with brush.

d. Clean cables with cloth slightly dampened with trichlorethane; dry thoroughly with clean cloth.

e. Clean safety and hook-on glasses with soft clean cloth. If dirt is difficult to remove, dampen cloth with water; mild soap may be used for more effective cleaning.

Section II. ORGANIZATIONAL MAINTENANCE

4-8. Scope of Organizational Maintenance

The maintenance duties assigned to organizational maintenance personnel of the bench test set are listed below, together with a reference to the paragraphs covering the specific maintenance functions.

a. Monthly preventive maintenance checks and services (para 4-12).

b. Quarterly preventive maintenance checks and services (para 4-14).

c. Cleaning interior of bench test set (para 4-15).

d. Touchup painting (para 4-16).

e. Troubleshooting (para 4-17 through 4-20).

f. Replacement of indicator lamps (para 4-20).

4-9. Materials and Test Equipment Required for Organizational Maintenance

In addition to the materials required for operator's maintenance (para 4-2), the following items are required for organizational maintenance.

a. sandpaper No. 000 (FSN 5350-235-0136).

b. Multimeter AN/USM-210.

c. Tool Kit, Photographic Repair TK-77/GF.

d. Tool Kit Photographic Repair TK-109/GF.

4-10. Organizational Preventive Maintenance

a. Organizational preventive maintenance is the systematic care, inspection, and servicing of equipment in order to maintain it in serviceable condition, prevent breakdowns, and insure maximum operational capability. Preventive maintenance is the responsibility of all levels of maintenance concerned with the equipment and includes inspection, testing, and repair or replacement of parts, subassemblies, or units that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance checks and services of the equipment at the organizational category are made monthly and quarterly at the same time as the daily (para 4-5) and weekly (para 4-6) checks and services unless otherwise directed by the commanding officer.

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

4-11. Monthly Maintenance

The maintenance functions indicated in the monthly preventive maintenance checks and services chart (para 4-12) are to be performed. A month is defined as 30 calendar days of 8-hour-per-day operation. If the equipment is operated 16 hours a day, the monthly preventive maintenance checks and services should be performed at 15-day intervals. Adjustment of the maintenance interval must be made to compensate for any unusual operating conditions. Equipment in limited storage (which requires service before operation) does not require monthly preventive maintenance.

4-12. Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	Reference
1	Handles, latches, and hinges	Check handles, latches, and hinges for looseness	None.
2	Gasket	Check combination case gasket for worn or loose edges.	
3	Connectors	Inspect connectors for damage such as bent pins and dented or deformed casing.	

4-13. Quarterly Maintenance

Quarterly preventive maintenance checks and services on the equipment are required. Periodic daily (para 4-5), weekly (para 4-6) and monthly (para 4-12) checks and services constitute a part of the quarterly preventive maintenance checks and services and must be performed concurrently. All deficiencies or shortcomings should be recorded in accordance with the requirements of TM 38-750.

4-14. Quarterly Preventive Maintenance Checks and Services Chart

Sequence NO.	Item to be inspected	Procedure	Reference
1	Pluckout items	Inspect seating of readily accessible items of pluckout nature such as connectors, lamps, plug-in relays. Do not twist to inspect; use only direct pressure to ensure item is fully seated.	
2	Resistors and capacitors	Inspect resistors and capacitors for cracks, blistering. or other defects.	

Sequence No.	Item to be inspected	Procedure	Reference
3	Interior of chassis and combination case.	Clean interior of chassis and combination case	Para 4-15.
4	Terminal boards	Inspect terminal boards for loose connections, cracks, and breaks,	
5	Publications	Check to see that all publications are current and complete.	DA Pam 310-4.
6	Modifications	Check DA Pam 310-7 to determine whether new applicable MWO's have been published. All URGENT MWO's must be applied immediately. ALL NORMAL MWO's must be scheduled.	TM 38-750 and DA Pam 310-7.
7	Preservation	Check all surfaces for evidence of fungus. Remove rust and corrosion; touchup paint bare spots.	Para 4-16.

4-15. Cleaning Interior of Test Panel and Blower Assembly

Inspect the interior areas of the test panel and blower assembly. The interior surfaces should be free of dust, dirt, grease, and fungus.

Q. Remove dust and loose dirt with clean, soft cloth.

WARNING

The fumes of trichloroethane are toxic. Provide adequate ventilation. DO NOT use near an open flame. Trichloroethane is not flammable, but exposure of the fumes to an open flame converts the flames to highly toxic, dangerous gases.

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

c. Remove dust or dirt from plug-in components, circuit boards, and terminal boards.

4-16. Touchup Painting Instructions

Remove rust and corrosion from metal surfaces by lightly sanding with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion. Refer to the applicable cleaning and refinishing practices specified in TB 746-10.

4-17. General Troubleshooting Information

Troubling this equipment is based upon the checks contained in the daily and weekly preventive maintenance checks and services charts, and upon malfunction reports from an operator using the equipment to test the electronic flash system. Troubleshooting is limited to checking the front panel indicator lamps (press-to-test), the fuses, and the continuity of the cables. The checks and corrective actions indicated in the daily and weekly preventive maintenance checks and services charts (para 4-5 and 4-6) should be performed. If the corrective measures indicated do not result in correction of the trouble, higher category of maintenance is required. If the troubles are indicated by malfunction reports while operating, the visual inspection (para 4-18) and continuity check of the cable (para 4-19) (if a cable is suspect) should be performed. Paragraph 4-20 contains additional information and step-by-step instructions for replacement of the indicator lamps.

4-18. Visual Inspection

a. When equipment fails to perform properly, turn off power and check following items. DO not check any item with power on.

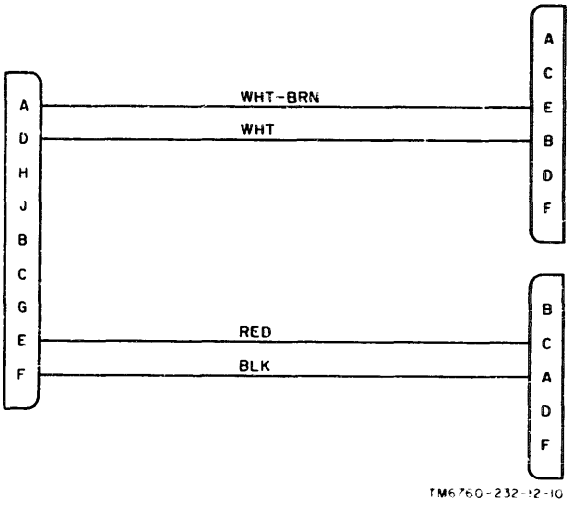

Figure 4-1. Power cable W1, wiring diagram.

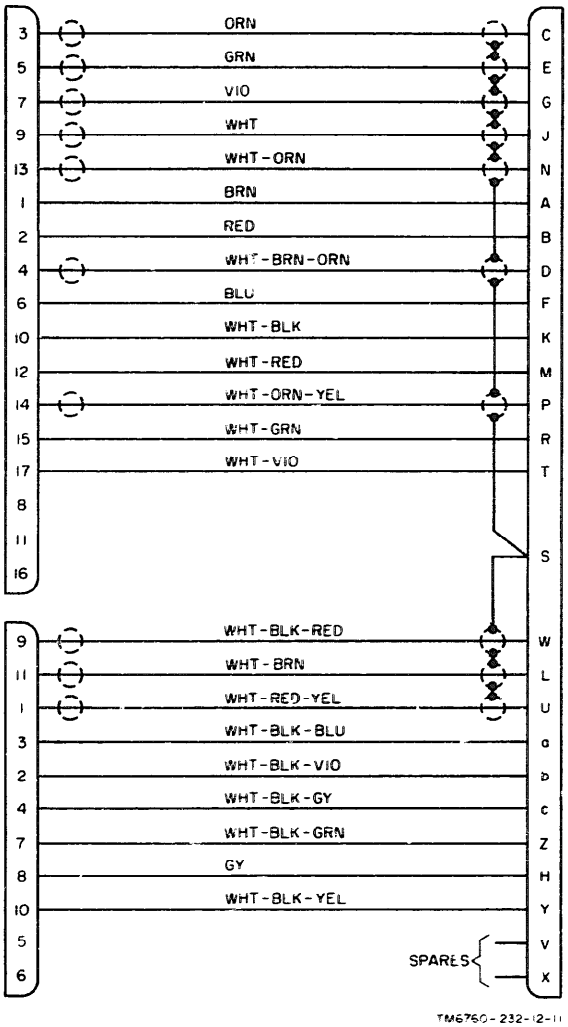

Figure 4-2. Logic cable W2, wiring diagram.

(1) Wrong setting of switches or controls.

(2) Power on other cables disconnected or poorly connected.

b. Perform visual inspection of the equipment as follows:

(1) Check all parts and wiring for loose connections, shorted or fouled wires, defective insulation, and damaged components.

(2) Check for evidence of overheating.

(3) Make sure that all parts on chassis are held firmly in place.

(4) Inspect switches for clean wiper-to-lug contacts.

(5) Check seating of all subchassis connectors.

(6) Check components on all terminal boards.

4-19. Sectionalizing Troubles to Bench Test Set Cables

Defective bench test set cables W1 through W10 are indicated when it is apparent that power is not being applied to the test panel or when it is apparent that test signals and control voltages

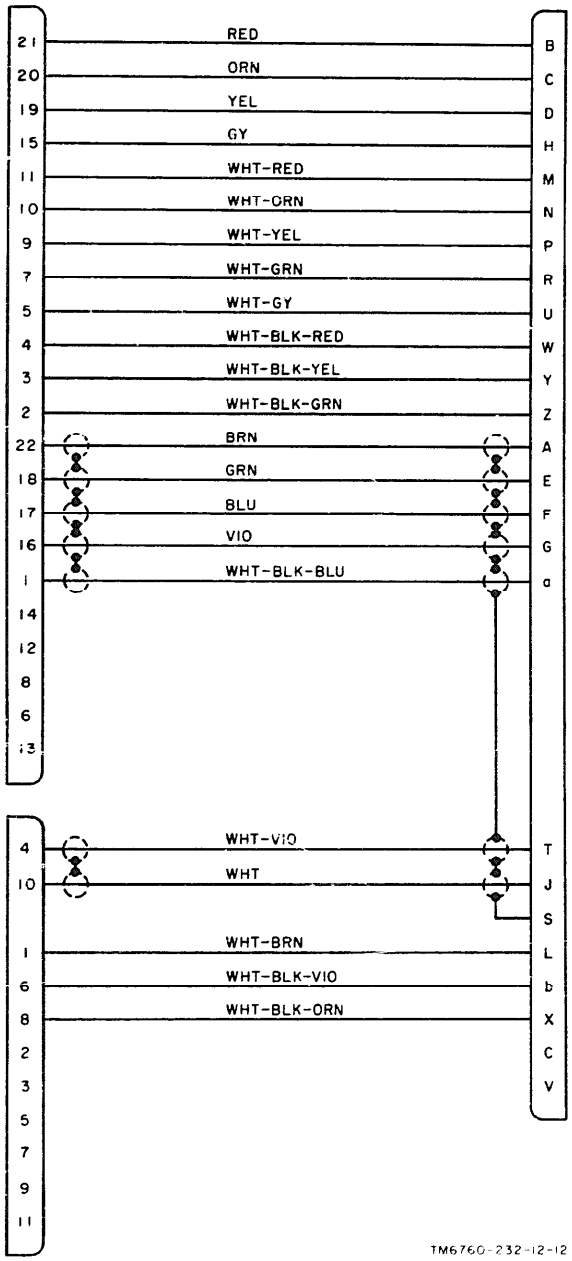

Figure 4-3. Voltage module cable W3, wiring diagram.

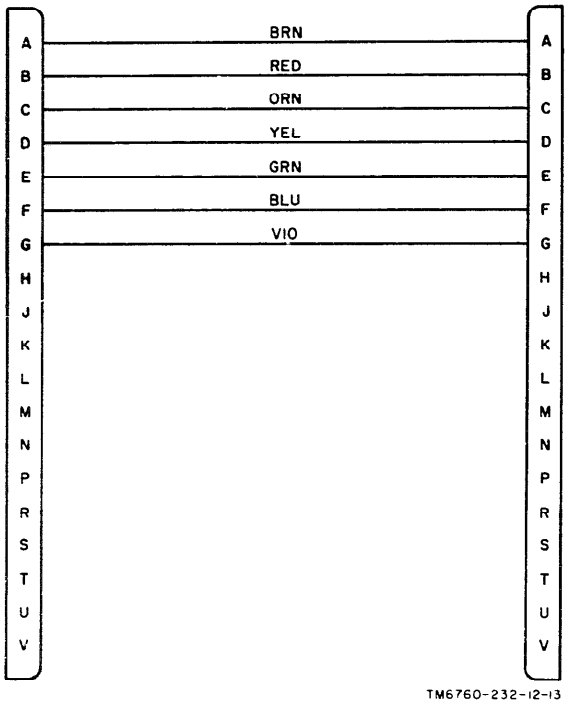

Figure 4-4. Control panel cable W4, wiring diagram.

are not flowing between the bench test set being used and the equipment being tested. The continuity of the suspected defective cable should be checked with the multimeter. Figures 4-1 through 4-10 are wiring diagrams of test set cables W1 through W10 and should be used as a guide when checking continuity. If an open or shorted circuit is indicated during continuity checking, the wiring is defective.

4-20. Replacement of indicator Lamps

a. Turn knurled cap of indicator counterclockwise and remove cap from test panel.

b. Pull defective indicator lamp out of holder by grasping lamp at base and pulling from holder.

c. Insert new lamp in holder.

d. Screw knurled cap clockwise into the test panel until cap is firmly seated.

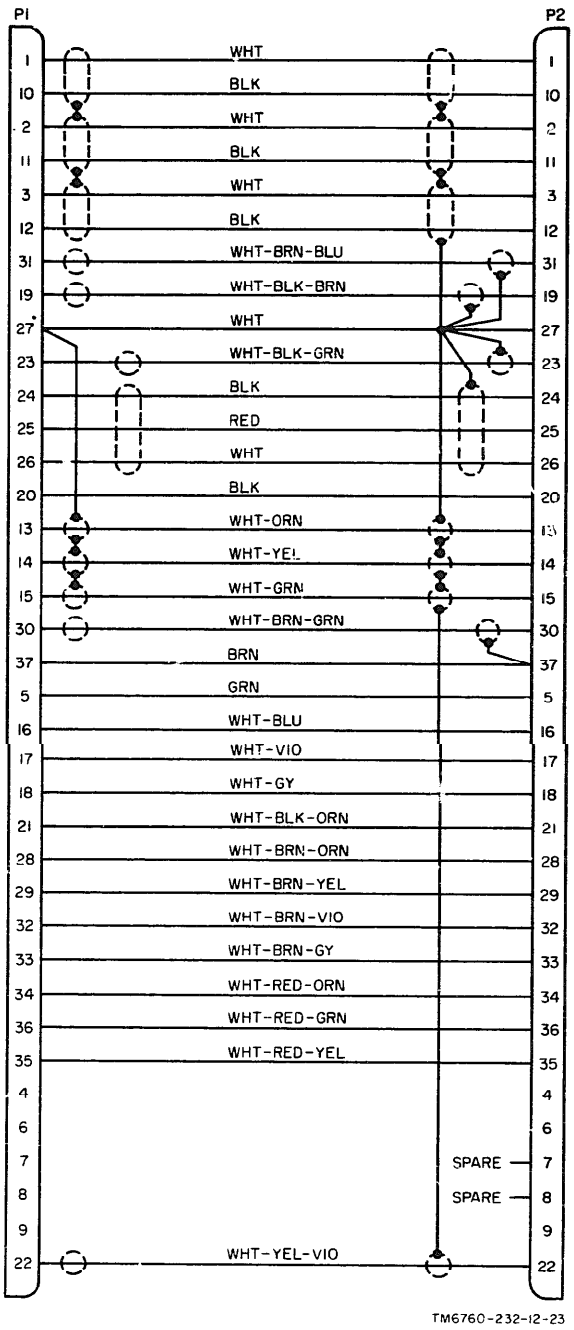

Figure 4-5. System test cable W5, wiring diagram.

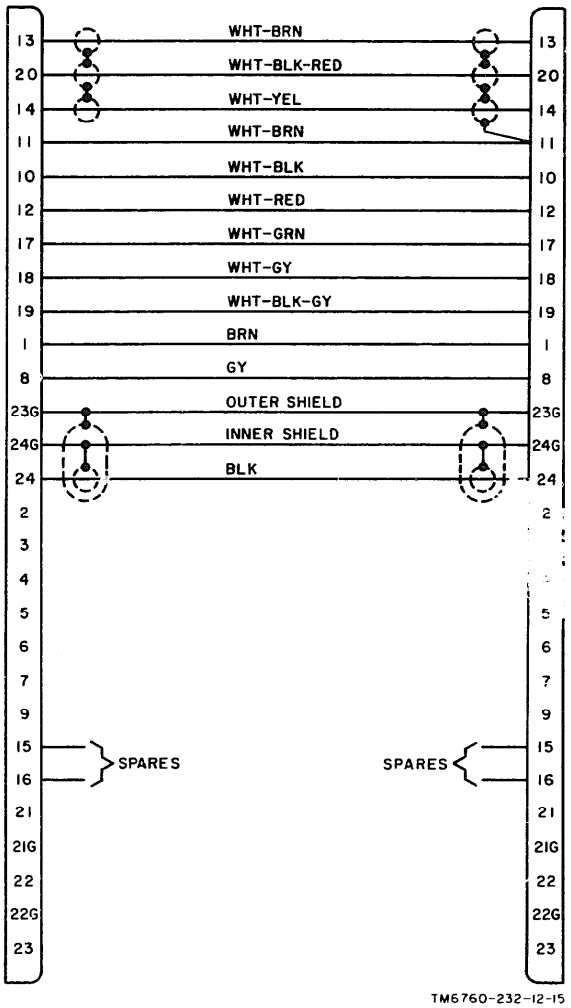

Figure 4-6. Module cable W6, wiring diagram.

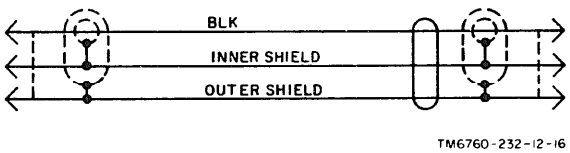

Figure 4-7. Photocell cable W7, wiring diagram.

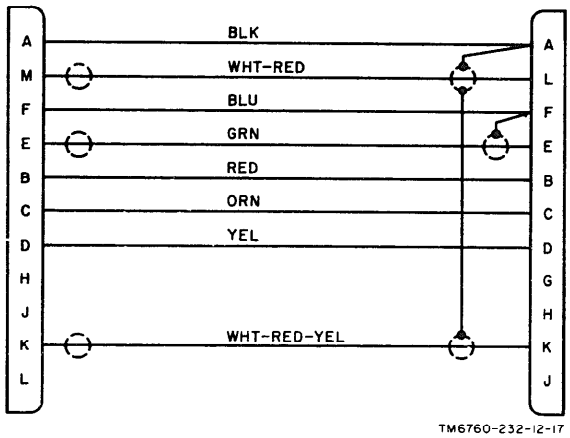

Figure 4-8. System control cable W8, wiring diagram.

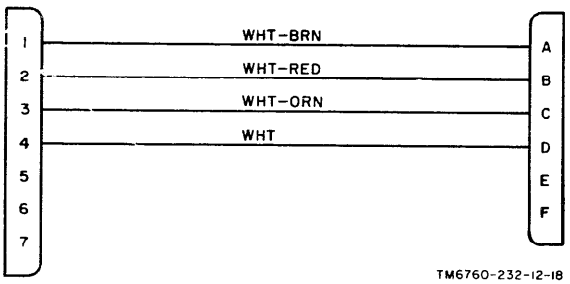

Figure 4-9. Pod power cable W9, wiring diagram.

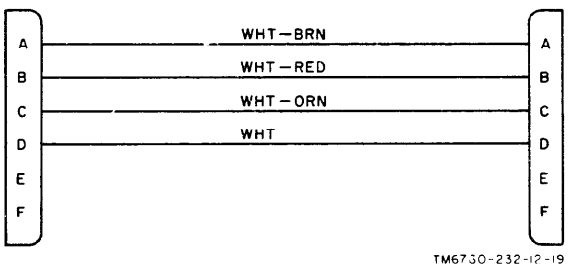

Figure 4-10. Blower power cable W10, wiring diagram.

CHAPTER 5
SHIPMENT AND LIMITED STORAGE

5-1. Disassembly of Bench Test Set

Prepare the bench test set for shipment or limited storage as follows:

a. Disconnect all cables from test set panel and blower assembly.

b. Pack all cables and accessories in proper' locations in combination case. If equipment is to be stored for more than 24 hours or is to be shipped, place activated desiccant units and humidity indicator cards in combination case and blower case.

c. Place instruction manuals in storage compartment within lid of combination case.

d. Secure cover on combination and blower cases.

e. Close air relief valve on combination and blower cases by turning valve to the right until it is firmly seated.

f. Lockwire air relief valve and latches on combination and blower cases.

5-2. Repackaging for Shipment or Limited Storage

The exact procedure for repackaging depends on the material available and the conditions under which the equipment is to be shipped or stored. The information concerning the original packaging (para 2-1) will also be helpful. Repackage as follows:

a. Package test panel and blower assembly by cushioning all surfaces with pads or filler material.

b. Place cushioned test panel and blower assembly within a wrap of corrugated cardboard and secure wrap with gummed tape.

5-3. AND 5-4. Deleted

APPENDIX A
REFERENCES

The following publications contain information applicable to the operation and maintenance of the test set.

AR 55-38	Reporting of Transportation Discrepancies in Shipments.
AR 700-58	Packaging Improvement Report.
DA Pam 310-4	Index of Technical Publications: Technical Manuals Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	US Army Equipment Index of Modification Work Orders.
SB 11-573	Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment.
TB SIG 222	Solder and Soldering.
TB 43-0118	Field Instructions for Painting and Preserving Electronics Command Equipment Including Camouflage Pattern Painting of Electrical Equipment Shelters.
TM 11-6625-203-12	Operator and Organizational Maintenance: Multimeter AN/URM-105 and AN/URM-105C Including Multimeter ME-77/U and ME-77C/U.
TM 11-6625-535-15	Organizational, Direct Support, General Support, and Depot Maintenance Manual: Oscilloscope AN/USM-140A.
TM 11-6720-208-12	Operator's and Organizational Maintenance Manual: Cameras, Still Picture KA-30A and KA-30A2; Lens Cone Group LA-136A; and Lens Cones, Aerial Camera LA-132A and LA-133A.
TM 11-6760-221-12	Operator and Organizational Maintenance Manual: 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.
TM 11-6760-228-12	Operator's and Organizational Maintenance Manual: Flasher System, Photographic Aircraft LS-59A (NSN 6760-00-910-3802).
TM 11-6760-232-24P	Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools): Test Set, Photographic Flasher System, Flight Line, LS-70A (NSN 6780-00-999-4373).
TM 11-6780-220-12	Operator's and Organizational Maintenance Manual (Including Organizational Repair Parts and Special Tools Lists): Test Set, Photographic Flasher System, Flight Line LS-70A
TM 11-6780-220-35	DS, GS and Depot Maintenance Manual Including Repair Parts and Special Tools Lists Test Set, Photographic Flasher System, Flight Line LS-70A.
TM 38-750	The Army Maintenance Management System (TAMMS).

APPENDIX B

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

Section I. INTRODUCTION

B-1. Scope

This appendix lists only basic issue items required by the crew/operator for installation, operation, and maintenance of Test Set, Photographic Flasher System, Bench LS-69A.

B-2. General

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

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

b. Items Troop Installed or Authorized List-Section III Not applicable.

B-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.

SECTION II, BASIC ISSUE ITEMS LIST

(1) ILLUSTRATION (A) FIG. NO.	(1) ILLUSTRATION (B) ITEM NO.	(2) FEDERAL STOCK NUMBER	(3) PART NUMBER	(4) FSCM	(5) DESCRIPTION USABLE ON CODE	(6) UNIT OF MEAS	(7) QTY FURN WITH EQUIP
		6760-832-5915	870	00236	GLASSES, SAFETY	EA	1
		6760-840-9803	1448	00236	GLASSES, SAFETY, HOOK-ON	EA	1

SECTION II. BASIC ISSUE ITEMS

(1) SMR CODE	(2) FEDERAL STOCK NUMBER	(3) DESCRIPTION Reference Number & Mfr Code / USABLE ON CODE	(4) UNIT OF MEAS	(5) QTY INC IN UNIT	(6) QTY FURN WITH EQUIP	(7) ILLUSTRATIONS (a) FIG. NO.	(7) ILLUSTRATIONS (b) ITEM NO. OR REFERENCE DESIGNATION
G-O-S	6760-999-5662	TEST SET, PHOTOGRAPHIC FLASHER SYSTEM, BENCH LS-69A: Used to produce the required voltages and simulated signals and monitor various control voltages and signals necessary to insure the proper operation of the complete Flasher System, Photographic Aircraft LS-59 or to test the operational status of various modules and assemblies of the system prior to installation on an Aircraft; 7148-1200; (11871) (This item is nonexpendable)	ea			1-1	
		TM 11-6760-232-12 Requisition through pinpoint account number if assigned; otherwise through nearest Adjutant General facility. A quantity of one technical manual is packed with each LS-69 equipment. Where a valid need exists, additional copies may be requisitioned and kept on hand.	ea	1	1		
G-O-S	6730-113-5726	BENCH TEST PANEL PHOTOGRAPHIC FLASHER SYSTEM LM-179A: 7148-1300; (11871)	ea	1	1	1-1	
G-O-S		CASE, BENCH TEST SET PANEL: 7148-1205; (11871)	ea	1	1	1-1	
P-O	5920-290-1517	FUSE, CARTRIDGE: FO2A250V3A; (81349)	ea	2	5		
P-O-R	6760-898-7281	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL LM-180A: 7148-1211; (11871)	ea	1	1	4-1	W1
P-O-R	5995-999-4811	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL, BRANCHED LM-181A: 7148-1212; (11871)	ea	1	1	4-2	W2
P-O-R	5995-999-4812	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL, BRANCHED LM-191A: 7148-1213; (11871)	ea	1	1	4-3	W3
P-O-R	6760-937-3793	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL LM-182A: 7148-1214; (11871)	ea	1	1	4-4	W4
P-O-R	6760-937-3792	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL LM-183: 7148-1215-1; (11871)	ea	1	1	4-5	W5
P-O-R	6760-937-3791	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL LM-184A: 7148-1216; (11871)	ea	1	1	4-6	W6
P-O-R	6760-841-9369	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL LM-185A: 7148-1217; (11871)	ea	1	1	4-7	W7
P-O-R	6760-841-9368	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL, LM-186A: 7148-1218; (11871)	ea	1	1	4-8	W8
P-O	6760-832-5915	GLASSES, SAFETY: 870; (00236)	ea	1	1		
P-O	6760-840-9803	GLASSES, SAFETY, HOOK-ON: 1448; (00236)	ea	1	1		
C-O-R	6760-116-7088	POWER LIMITER AND BLOWER ASSEMBLY LM-187A: 7148-1400; (11871)	ea	1	1		
A-F-R		PANEL AND COMPONENT ASSEMBLY: 7148-1404; (11871)	ea	1	1		
G-O		CASE, POWER LIMITER AND BLOWER: 7148-1407; (11871)	ea	1	1		
P-O-R	6760-840-9806	HOSE AND CLAMP ASSEMBLY LM-188A: 7148-1408; (11871)	ea	1	1		
P-O-R	6760-841-9367	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL LM-189A: 7148-1430; (11871)	ea	1	1	4-10	W10
P-O-R	6760-840-9802	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL LM-190A: 7148-1431; (11871)	ea	1	1	4-9	W9
		NO ACCESSORIES, TOOLS, OR TEST EQUIPMENT ARE TO BE ISSUED WITH THIS EQUIPMENT					
		NO BASIC ISSUE ITEMS ARE MOUNTED IN OR ON THE EQUIPMENT					

APPENDIX C
MAINTENANCE ALLOCATION

Section I. INTRODUCTION

C-1 General

This appendix provides a summary of the maintenance operations for the LS-69A. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

C-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

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

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

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

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

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

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

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

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

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

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

C-3. Column Entries

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

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

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

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "work time" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "work time"

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

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

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

f. Column 6, Remarks. Column 6 contains an alphabetic code which leads to the remark in section IV, Remarks, which is pertinent to the item opposite the particular code.

C-4. Tool and Test Equipment Requirements (Sec III).

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

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

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

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

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5-digit) in parentheses.

C-5. Remarks (Sec IV).

a. Reference Code. This code refers to the appropriate item in section II, column 6.

b. Remarks. This column provides the required explanatory information necessary to clarify items appearing in section II.

SECTION II MAINTENANCE ALLOCATION CHART
FOR
TEST SET, PHOTOGRAPHIC FLASHER SYSTEM, BENCH LS-69A

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
00	TEST SET, PHOTOGRAPHIC FLASHER SYSTEM, BENCH LS-69A	INSPECT	0.3						A
		TEST	0.3						B
		TEST		0.5				2	C
		TEST			1.0			1,2 5 thru 9	
		TEST				4.0		1,2 5 thru 9	
		SERVICE	0.5					3,4	D
		SERVICE		0.5				3,4	D
		ADJUST			1.0			1,2 7 thru 9	E
		REPLACE		0.3				3,4	G
		REPAIR		0.5				3,4	F
		REPAIR			1.0			1 thru 9	
		REPAIR				1.0		1 thru 9	
		REPAIR					1.5	1 thru 9	
		OVERHAUL					40.0		
01	BENCH TEST PANEL LM-179A (A1)	TEST		1.0				2	
		TEST			1.0			1,2 5 thru 9	
		REPLACE		0.2				3,4	G
		REPAIR		0.3				3,4	F
		REPAIR			1.0			3,4	
		REPAIR				1.0		3,4	G
0101	PANEL BENCH TEST SET (A1A1)	TEST		1.0				2	
		TEST			1.0			1,2 5 thru 9	
		REPLACE			0.5			3,4	H
		REPAIR		0.3				3,4	F
		REPAIR			1.0			3,4	
		REPAIR				1.0		3,4	J
010101	CHASSIS AND COMPONENT ASSEMBLY (A1A1A13)	TEST			0.5			1,2,5	
		REPLACE			24.0			3,4	H
		REPAIR			1.0			3,4	
010102	CHASSIS AND COMPONENT ASSEMBLY (A1A1A14)	TEST			0.5			1,2,5	
		REPLACE			24.0			3,4	H
		REPAIR			1.0			3,4	
		REPAIR				1.0		3,4	J
01010201	ELECTRONIC COMPONENT ASSEMBLY (A1A1A14A10)	TEST			1.0			1,2,5	
		REPLACE			0.5			3,4	
		REPAIR			2.0			3,4	
01010202	ELECTRONIC COMPONENT ASSEMBLY (A1A1A14A11), (A1A1A14A13), (A1A1A14A15)	TEST			1.0			1,2,5	
		REPLACE			0.5			3,4	
		REPAIR			2.0			3,4	
0102	ADAPTER, TEST SET LA-491A (A1A2)	TEST		0.5				2	B
		TEST			1.0			1,2,5	
		TEST				2.0		1,2,5	
		REPLACE				0.5		1,2,5	
		REPAIR				1.0		3,4	
		REPAIR					1.0	3,4	J
010201	PRINTED CIRCUIT BOARD, TEST SET (A1A2A3)	REPLACE				0.5		3,4	
		TEST					1.0		
		REPAIR					4.0	3,4	
0103	CASE, BENCH TEST SET PANEL (A1MP1)	REPLACE		0.5				3,4	G
		REBUILD					1.0		J
0104	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL LM-180A (A1W1)	REPLACE		0.5				3,4	
		REPAIR			0.8			3,4	
		REPAIR					0.8	3,4	J
0105	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL LM-181A (A1W2)	REPLACE		0.5				3,4	
		REPAIR			0.8			3,4	
		REPAIR					0.8	3,4	J
0106	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL LM-191A (A1W3)	REPLACE		0.5				3,4	
		REPAIR			0.8			3,4	
		REPAIR					0.8	3,4	J

SECTION II MAINTENANCE ALLOCATION CHART
FOR
TEST SET, PHOTOGRAPHIC FLASHER SYSTEM, BENCH LS-69A (CONTINUED)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
0107	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL LM-182A (A1W4)	REPLACE		0.5				3,4	
		REPAIR			0.8			3,4	
		REPAIR					0.8	3,4	J
0108	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL LM-183A (A1W5)	REPLACE		0.5				3,4	
		REPAIR			0.8			3,4	
		REPAIR					0.8	3,4	J
0109	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL LM-184A (A1W6)	REPLACE		0.5				3,4	
		REPAIR			0.8			3,4	
		REPAIR					0.8	3,4	J
0110	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL LM-185A (A1W7)	REPLACE		0.5				3,4	
		REPAIR			0.8			3,4	
		REPAIR					0.8	3,4	J
0111	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL LM-186A (A1W8)	REPLACE		0.5				3,4	
		REPAIR			0.8			3,4	
		REPAIR					0.8	3,4	J
02	POWER LIMITTER AND BLOWER ASSEMBLY LM-187A (A2)	TEST	0.5						B
		TEST		0.5				2	C
		TEST			1.0			1,2,5	
		REPLACE		0.5				3,4	
		REPAIR		0.5				3,4	F
		REPAIR			1.0			3,4	
		REPAIR				4.0		3,4	J
		REPAIR					9.0	3,4	J
0201	PANEL AND COMPONENT ASSEMBLY (A2A1)	TEST		1.0				2	
		TEST			1.0			1,2 5 thru 9	
		REPLACE			24.0			3,4	H
		REPAIR		0.5				3,4	F
		REPAIR			1.0			3,4	
		REPAIR				1.0		3,4	J
		REPAIR					1.0		J
020101	CHASSIS AND COMPONENT ASSEMBLY (A2A1A2)	TEST			0.5			1,2,5	
		REPLACE			24.0			3,4	H
		REPAIR			1.0			3,4	
		REPAIR				1.0		3,4	J
0202	HOSE AND CLAMP ASSEMBLY (A2A2)	REPLACE		0.5				3,4	
		REPAIR			0.8			3,4	
		REPAIR					0.8	3,4	J
0203	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL LM-190A (A2W9)	REPLACE		0.5				3,4	
		REPAIR			0.8			3,4	
		REPAIR					0.8	3,4	J
0204	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL LM-189A (A2W10)	REPLACE		0.5				3,4	
		REPAIR			0.8			3,4	
		REPAIR					0.8	3,4	J

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
TEST SET, PHOTOGRAPHIC FLASHER SYSTEM, BENCH LS-69A

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	F,H,D	OSCILLOSCOPE AN/USM-140	6625-00987-6603	
2	O,F,H,D	MULTIMETER AN/USM-210	6625-00-019-0815	
3	O,F,H,D	TOOL KIT TK-77/GF	5180-752-9068	
4	O,F,H,D	TOOL KIT TK-109/GF	5180-00-9653	
5	F,H,D	TRANSISTOR TEST SET TS-1836C/U	6625-00-159-2263	
6	F,H,D	AMMETER ME-65A/U	6625-00-985-5251	
7	F,H,D	PULSE GENERATOR, TEKTRONIX 161	6625-00-714-4637	
8	F,H,D	WAVEFORM GENERATOR, TEKTRONIX 162	6625-00-712-4981	
9	F,H,D	POWER SUPPLY PP-6898/U	6625-00-792-4612	

SECTION IV. REMARKS

REFERENCE CODE	REMARKS
A	VISUAL INSPECTION.
B	OPERATIONAL TESTS.
C	CONTINUITY TESTS.
D	PERIODIC PREVENTIVE MAINTENANCE.
E	PULSE GENERATOR PULSE RATE, INTEGRATING AMPLIFIER RESISTOR RG, LIGHT ENERGY METER, RESISTOR R31.
F	BY REPLACEMENT OF KNOBS, LAMPS, FUSES, CABLE ASSEMBLIES, ETC.
G	INITIAL ISSUE ITEM.
H	NOT STOCKED. WHEN REPLACLMENT IS REQUIRED ITEM WILL BE ASSEMBLED.
J	INCLUDES FABRICATION OF PARTS AS REQUIRED.

By Order of the Secretary of the Army:

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

official :
KENNETH G. WICKHAM,
Major General, United States Army,
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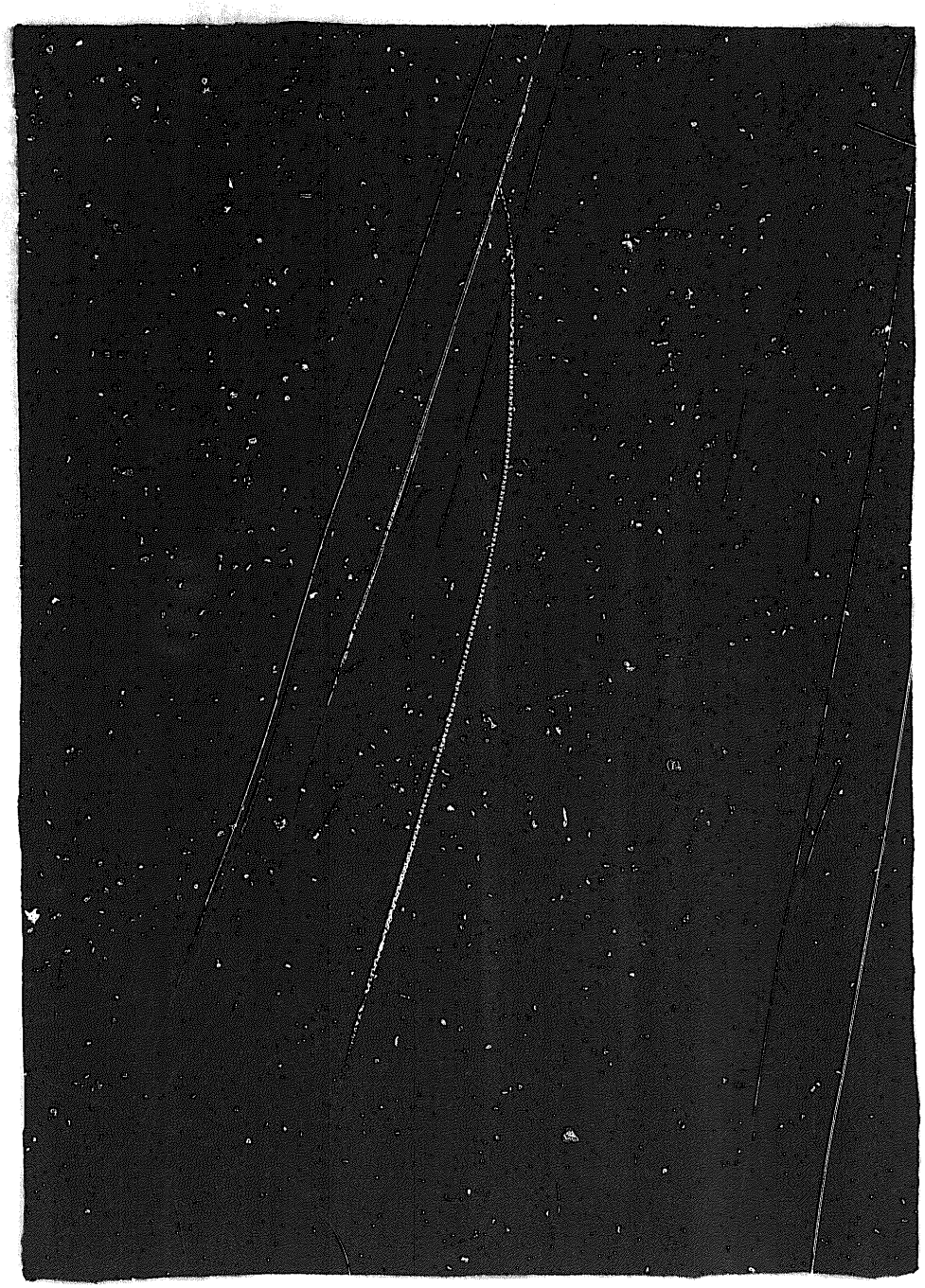

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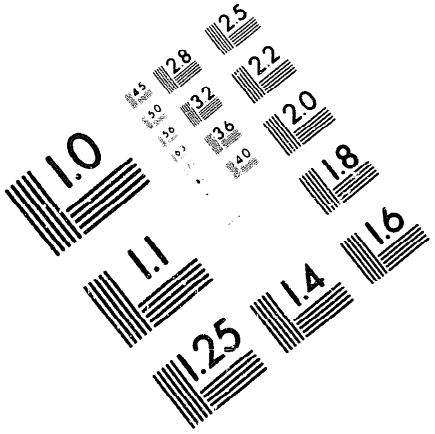

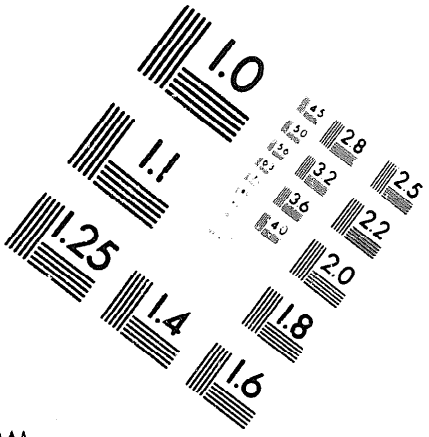

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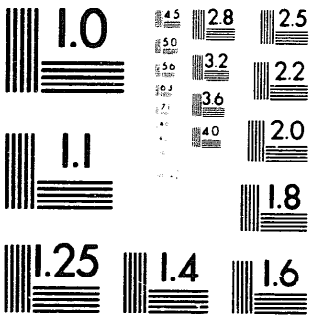

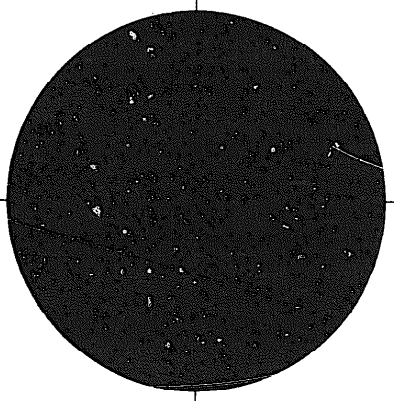

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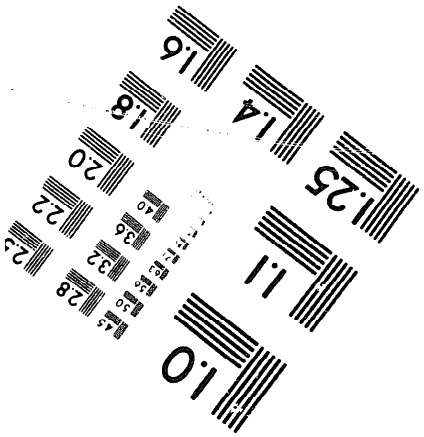

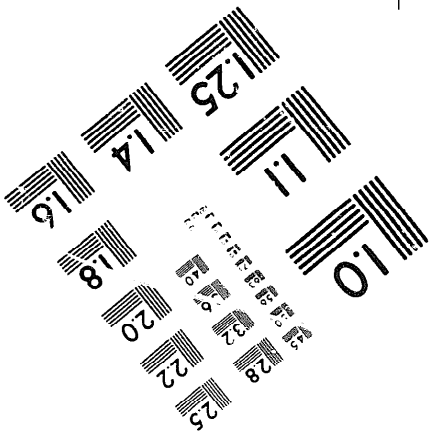

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