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WAR DEPARTMENT TECHNICAL MANUAL

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TEST UNIT I-236

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WAR DEPARTMENT 17 JANUARY 1945

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WAR DEPARTMENT,
WASHINGTON 25, D. C., 17 January, 1945.

TM 11-2056, Test Unit I-236, is published for the information and guidance of all concened.

[A. G. 300.7 (1 Nov 44).]

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(For explanation of symbols see FM 21-6).

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TECHNICAL MANUAL

TEST UNITS I–236 AND I–236–A

CHANGES No. 1

DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *9 June 1949*

TM 11–2056, 17 January 1945, is changed as follows:

The title of the manual is changed to read—TEST UNITS I–236 AND I–236–A.

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PART ONE
INTRODUCTION

Note (added). Test Unit I–236–A is identical in physical appearance, operation, and maintenance to Test Unit I–236. Wherever Test Unit I–236 appears in the manual, with the exception of figures 5 and 12, add I–236–A.

---

4. Description of Major Components

Test Unit I–236 **or I–236–A** is composed of one major unit, and is housed in a steel case with a hinged cover and convenient carrying handle (fig. 2). The complete unit * * * approximately 2 pounds. The only other components are two flexible test leads equipped with pin-tip plugs and test prods (fig. 3). **On Test Unit I–236 the test leads are 4 feet long, while those on Test Unit I–236–A are 2½ feet long.** There is a space * * * a similar manner.

Figure 4. Test Unit I–236 **or I-236-A,** *packing of test leads and power cord.*

8. Use of Test Unit I–236 and I–236–A to Differentiate Between A–C and D–C Voltages

The equipment to * * * for this test.

* * * * * * *

d. If neither plate * * * the test prods.

Note. Rescinded.

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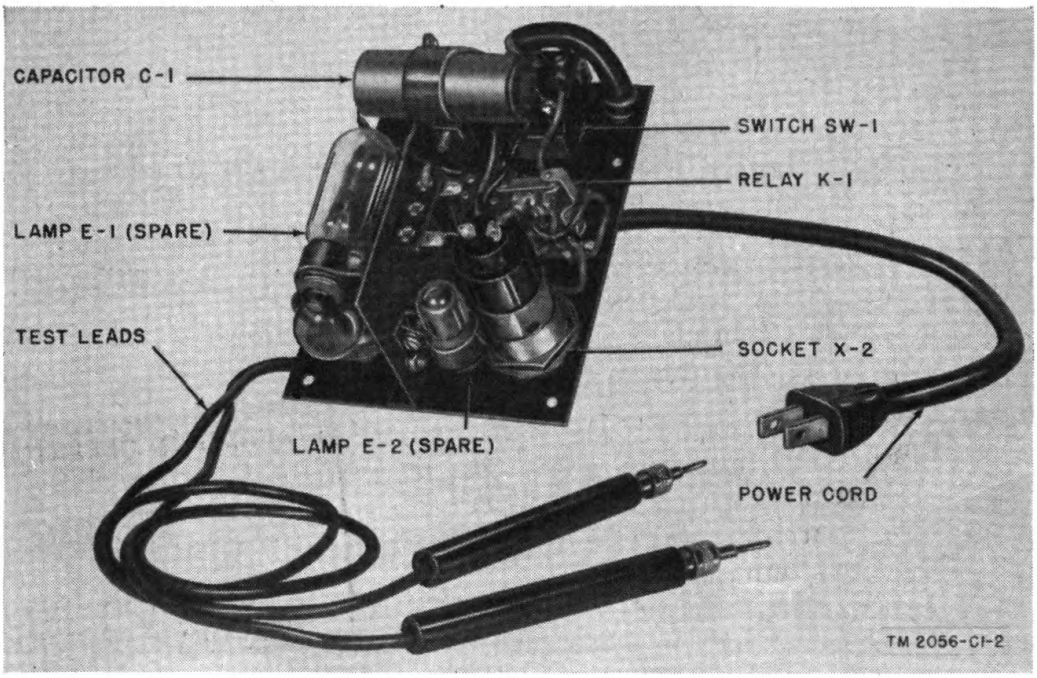


Figure 5.1 (Added.) *Test Unit I–236–A, under side of panel with case removed, showing mounting of neon lamps.*

18.1 (Added.) Weatherproofing

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

b. Tropical Maintenance.

(1) *General.* A special moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection. This treatment is fully explained in TB SIG 13, Moistureproofing and Fungiproofing Signal Corps Equipment, and TB SIG 72, Tropical Maintenance of Ground Signal Equipment.

(2) *Test Unit I–236 and I–236–A.* Remove the neon and Mazda lamps (both those in use and the spares), the test leads, and the power cord. Clean the unit and remove rust and corrosion. Mask the relay and switch contacts, the lamp sockets, terminals, and the openings around the toggle switches. Thoroughly dry the equipment. Apply moistureproofing and fungiproofing varnish with a spray gun or brush. When the varnish is thoroughly dry, carefully scrape or burnish any contacts or terminals which have particles of masking tape adhering to them or which have been coated with

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lacquer. Replace the components that have been removed and check the equipment to be sure that it is operating properly. Mark the equipment with the date of treatment, for example: MFP 15 Feb 49.

c. WINTER MAINTENANCE.

(1) *General.* Special precautions necessary to prevent poor performance or total operational failure of equipment in extremely low temperatures are fully explained in TB SIG 66, Winter Maintenance of Signal Equipment.

(2) *Test Unit I–236 and I–236–A.* The test unit will perform satisfactorily in low temperatures provided precautions are taken to prevent equipment failure. House and use the test set in a heated shelter or building whenever possible. On the march, protect the equipment from the wind by wrapping it in blankets. Perform PM (preventive maintenance) routines more frequently to keep the equipment as moisture-free as possible.

d. DESERT MAINTENANCE.

(1) *General.* Special precautions necessary to prevent equipment failure in areas subject to extremely high temperatures, low humidity, and excessive sand and dust are fully explained in TB SIG 75, Desert Maintenance of Ground Signal Equipment.

(2) *Test Unit I–236 and I–236–A.* Special dust-proofing treatment is not necessary for the test unit. Take precautions to prevent dirt, dust, sand, and other foreign matter from filtering into the equipment. Keep the cover in place when the test set is not in use and, if possible, keep the set in a tight cabinet or drawer or cover the equipment with canvas or other material when it is not to be used immediately. Perform PM routines frequently to keep the equipment clean.

20. General

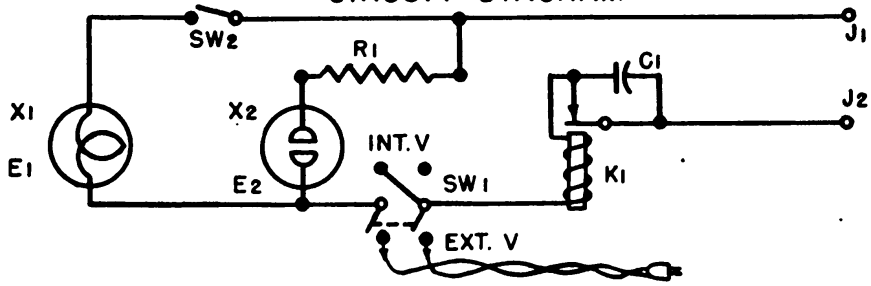
a. Test Unit I–236 **or I–236–A** consists of an ordinary test lamp equipped with switching and protective features to increase its usefulness. The test unit * * * and d-c voltages.

Note (added). The relay in Test Units I–236 and I–236–A will act as a circuit breaker and thus protect the Mazda lamp in case the test prods are applied to a portion of a circuit having an abnormally high difference of potential.

* * * * * * *

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TEST UNIT I-236-A
CIRCUIT DIAGRAM



FOR USE OF CIRCUITS IN FIGS. 2 TO 4 INCL. SEE TM 11-2056

FIG. 2

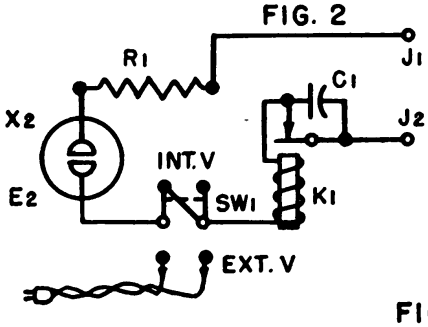


FIG. 3

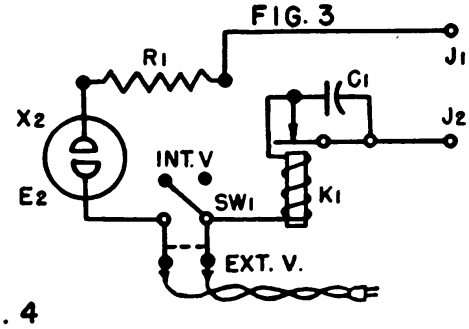
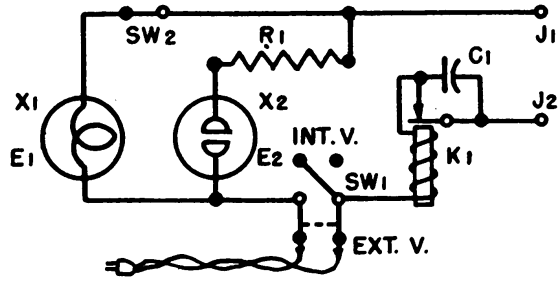


FIG. 4



APPARATUS LEGEND

REF SYM	S.C. TYPE NO. OR DWG. NO.	DESCRIPTION	JAN. SPEC. OR MANUFACTURER *	JAN OR MFR'S TYPE NO.	QUAN
C_1		CAPACITOR, FIXED,	CORNELL DUBILIER CO.	CP25AIEF504K	1
E_1		LAMP, MAZDA, 15W, 115V,	GENERAL ELECTRIC CO.	15T 7N	1
E_2		LAMP, NEON, 25W, 115V,	GENERAL ELECTRIC CO.	T4½ D.C. BAY	1
J_1-J_2		CONNECTOR,	AMERICAN PHENOLIC COR.	78-IP	2
K_1		RELAY.	ALLIED CONTROL CO. INC.	AR3D32	1
R_1		RESISTOR,	JAN R-11 AMEND .1	RC30AF303J	1
SW_1		SWITCH, TOGGLE, DPDT	JAN S-23	ST23N	1
SW_2		SWITCH, TOGGLE, SPST	JAN S-23	ST13A	1
X_1		LAMPHOLDER	NOMA ELECTRIC CO.	1-915	1
X_2		LIGHT, INDICATOR	DIAL LIGHT OF AMERICA	9200-D.C.	1

* MANUFACTURER INDICATED OR EQUAL AND INTERCHANGEABLE WITH ITEM SPECIFIED

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Figure 12.1 (Added.) *Test Unit I-236-A, circuit label.*

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21. Circuit Used to Differentiate Between A–C and D–C Voltages

* * * * * * *

b. Test Unit I–236 **or I–236–A** is connected so that the neon lamp E_2 is used to test a live circuit connected at jacks J_1 and J_2 through the test leads. If the voltage * * * plates of neon lamp E_2. Capacitor C_1 is * * * the neon lamp.

22. Circuit Used to Test Fuses and Capacitors

* * * * * * *

b. The voltage for * * * capacitor under test. **Resistor** R_1 and capacitor C_1 have the same functions as described in paragraph 21*b*.

25. Voltohmmeter Tests

* * * * * * *

b. Using the voltohmmeter * * * the relay coil. The resistance should measure between **30 and 32** ohms.

Section XI. IDENTIFICATION TABLE OF PARTS

Note (added). The fact that an item appears in this technical manual is not sufficient basis for requisitioning the part. Requisitions must cite an authorized basis, such as T/O&E, T/E, T/A, T/BA, SIG 6, SIG 7 & 8, SIG 7–8–10, SIG 10, list of allowances of expendable material, or another authorized supply basis. The Department of the Army Supply Catalog pamphlet applicable to the equipment covered in this technical manual is listed in paragraph 29.

29. (Superseded) Maintenance Parts for Test Units I–236 and I–236–A

The following information was compiled on 28 October 1948. The appropriate pamphlet of the Department of the Army Supply Catalog is *Organizational Maintenance Allowances, and Field and Base Maintenance Stockage Guide SIG 7 & 8–I–236*. For an index of available catalog pamphlets, see the latest issue of Department of the Army Supply Catalog SIG 1.

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29.1 (Added.) Identification Table of Parts for Test Units I–236 and I–236–A

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	TEST SET, teletypewriter: Sig C Test Unit I–236, I–236–A; steel case, OD finish; operates from 115–120 v ac or dc; differentiates between a-c and d-c voltages in following ranges: dc, 90 and 130 v ac, 55 and 130 v; 5 13/32" lg x 3 7/8" h x 4 3/32" wd overall; Sig C dwg SC-D-12759.	Testing unit for checking continuity of circuits and for differentiating between a-c and d-c voltages.	3F4470–236
	BOARD, terminal: bakelite; 1 1/8" lg x 3/8" wd x 3/32" thk overall; Cinch part/dwg #152.0.	Mounting for resistor	2Z9402.37
	CABLE, power: 2 #18 AWG stranded cond; 5,000 v working; Alpha Wire part/dwg #1951.	To connect test set to power supply when testing circuits requiring power from an external source.	1B3018–2.18
C–1	CAPACITOR, fixed: paper dielectric; 500,000 mmf +10%; 600 vdcw; 2 3/16" lg x 1 1/16" diam; JAN type CP28A1EF504K.	D-C test circuit	3DA500–604
	CLAMP: cable; 3/4" lg x 5/16" wd overall; Cinch part/dwg #292–S.	Clamp for test leads	2Z2643.66
J–1, J–2	CONNECTOR: single round female contact; for 0.080" phone tip; 3/4" lg x 3/8" diam body; Amphenol #78–7P.	Pin jack	2Z5581–12
	CONNECTOR, single round male cont: black phenolic handle; 1" lg x 5/16" diam; Birnbach #412.	Pin tip on test lead	2Z3021–58
	CONNECTOR, male cont: 2 spring type parallel blades; Allied Elec Prod #105–F.	Power cord	2Z3022–41

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	GROMMET: rubber; fits 7/16" hole; hole 0.25" ID x 1.16" wd groove, 3/16" wd x 5/8" diam overall; Atlan India Rub #AH931-4-7.	Power cord bushing	2Z8495.5
E-2	LAMP, glow: 115 v, 25 w; T-4½ clear; double cont bayonet base; GE part/dwg #NE-48.	Alone, used to determine type of voltage and to check fuses and capacitors. With incandescent lamp, used to check continuity of circuits.	2Z5889-3
E-1	LAMP, incandescent: 115 v, 15 w; intermediate screw base; GE part/dwg #15T7N.	In conjunction with neon lamp, used to test continuity of circuits.	6Z6820-2
X-1	LAMP HOLDER: intermediate screw base; 250 v, 1.25 w; 1 5/16" lg x 1" diam overall; octagonal; Rodale #318.	For incandescent lamp	6Z8359-5
	LENS, indicator light: clear; 1" diam smooth lens; holder 1⅛" OD, ⅜" shank with OD, anodized lusterless finish; Dialco part/dwg #910-JSH.	For incandescent lamp	2Z8359-5
X-2	LIGHT, indicator: 1" diam clear lens; T-4½ bulb, double cont bayonet base; 2⅞" lg x 1⅛" diam overall; Dialco part/dwg #9200 DC.	For neon lamp	2Z5991-25
	PROD, test: 3" lg solderless tip prod; Birnbach part/dwg #410 special.	Makes contact with terminals of the circuit or part to be tested so that there will be a continuous circuit through the test unit.	3F3705-4
K-1	RELAY, armature: SPDT, normally closed; contact rating 12 v dc, 5 amp; single winding, 31 v, 6 amp; 1⅝" lg x 1 5/16" wd x 1 3/16" h; Allied Cont part/dwg #AR-3D32.	Acts as circuit breaker	2Z7585-106
R-1	RESISTOR, fixed: carbon; 30,000 ohms ±5%; 1 w; 0.750" lg x 0.280" diam; JAN type RC30BF303J.	Resistance for neon pilot lamp	3RC30BF303J

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29.1 (Added.) Identification Table of Parts for Test Units I–236 and I–236–A

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	RING, retainer: ring clamp for ¼″ diam cable; Belden part/dwg #SP–308.	Strain relief for service cable	2Z2643.39
SW–1	SWITCH, toggle: DPDT; 125 v, 5 amp—250 v, 2 amp resistive load; 1 $^{3}/_{32}$″ lg x $^{23}/_{32}$″ wd x $^{23}/_{32}$″ d; JAN type ST23N.	INT V and EXT V circuits	3Z9863–23N
SW–2	SWITCH, toggle: SPST; 125 v, 5 amp—250 v, 2 amp resistive load; 1 $^{3}/_{32}$″ lg x $^{23}/_{32}$″ wd x $^{23}/_{32}$″ d; JAN type ST13A.	Neon and incandescent lamp circuits	3Z9863–13A
	WIRE, electrical: single cond; #20 AWG stranded cond; #20 AWG stranded cord 0.140″ OD; Buna S insulation; 10,000 v break-down test; Alpha Wire part/dwg #1635.	Test leads	1B820.177

[AG 300.7 (31 Mar 49)]

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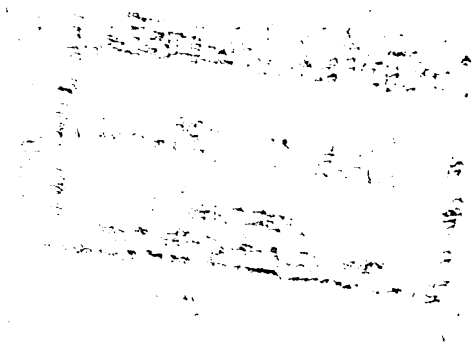
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DESTRUCTION NOTICE

WHY — To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN — When ordered by your commander.

HOW — 1. Smash — Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.

2. Cut — Use axes, handaxes, machetes.

3. Burn — Use gasoline, kerosene, oil, flame throwers, incendiary grenades.

4. Explosives — Use firearms, grenades, TNT.

5. Disposal — Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

WHAT — 1. Smash — Entire unit.

2. Cut — As many wires and cables as time permits.

3. Burn — Technical manuals and circuit label.

4. Bury or scatter — All of the above pieces after destroying their usefulness.

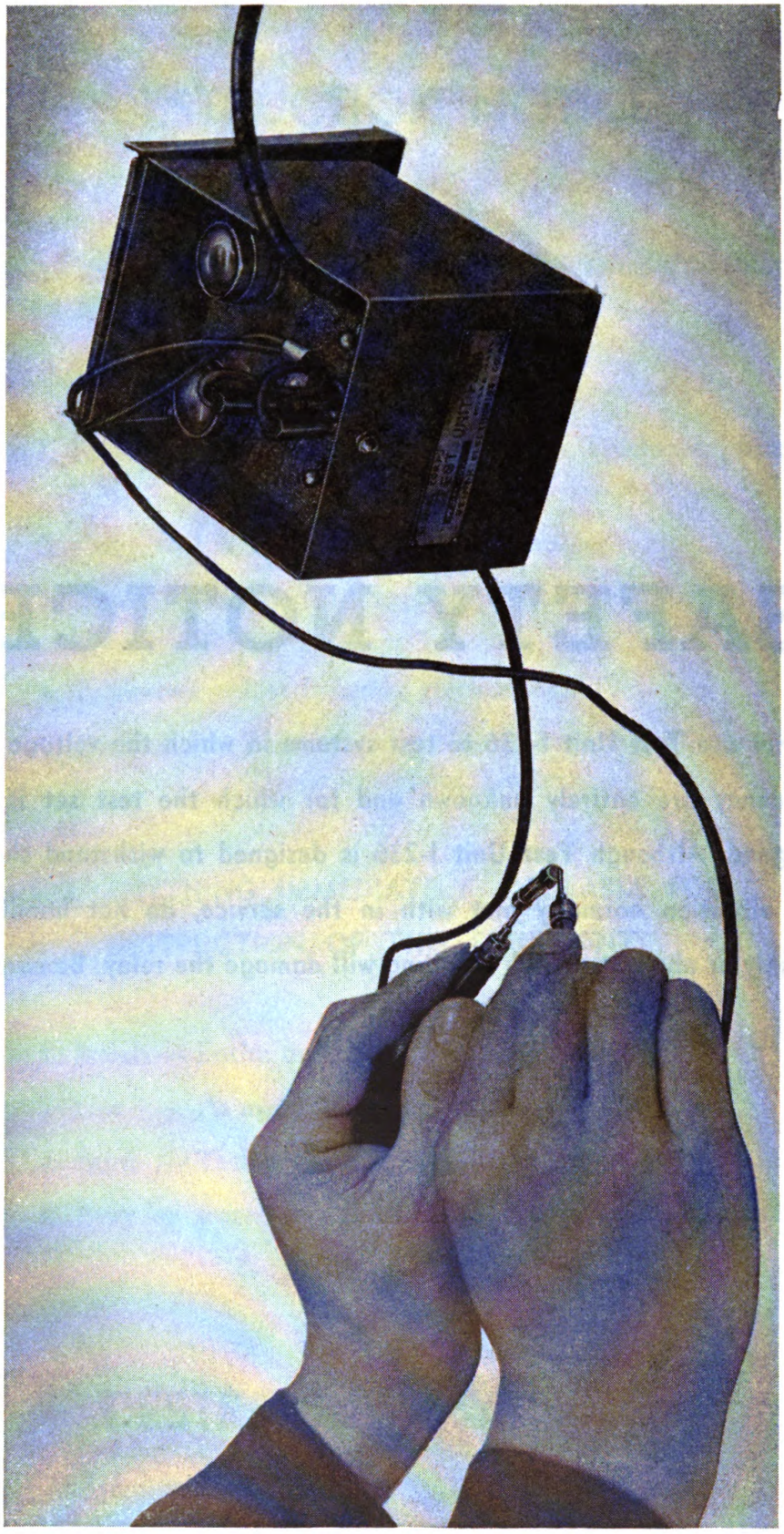
DESTROY EVERYTHING

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SAFETY NOTICE

Do not use Test Unit I-236 to test systems in which the voltage and frequency are entirely unknown and for which the test set is not designed. Although Test Unit I-236 is designed to withstand shocks and vibration normally met with in the service, do not handle it roughly or abuse it. Rough handling will damage the relay. Be careful.

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TL 50539-S

Figure 1. Test Unit I-236 in use.

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PART ONE
INTRODUCTION

SECTION I
DESCRIPTION OF TEST UNIT I-236

1. GENERAL.

Test Unit I-236 is a portable, self-contained test instrument designed primarily for use in testing teletypewriter equipment. This unit replaces the multimeter formerly supplied as a component of Tool Equipment TE-50-A. Test Unit I-236 is used to check continuity of circuits, to differentiate between a-c and d-c voltages, to check fuses, and to test capacitors (fig. 1).

2. APPLICATION.

Test Unit I-236 may be used for checking circuits, fuses, and capacitors found in teletypewriter equipment such as printers, perforators, reperforators, transmitter-distributors, rectifiers, power units, and other related equipment. Tests are made by observing the reaction of either or both of two lamps when Test Unit I-236 is connected to a circuit, fuse, or capacitor under test.

3. TECHNICAL CHARACTERISTICS OF TEST UNIT I-236.

a. Power input: 115 to 130 volts, ac or dc. (Alternate power supply from live circuits of equipment under test.)

b. Range for fuse tests: fuses with current-carrying capacity of 2 milliamperes and higher.

c. Starting voltage of neon lamp: 55 volts ac, 90 volts dc.

4. DESCRIPTION OF MAJOR COMPONENTS.

Test Unit I-236 is composed of one major unit, and is housed in a steel case with a hinged cover and convenient carrying handle (fig. 2). The complete unit is 3¾ inches high by 3¾ inches wide by 5½ inches deep and weighs approximately 2 pounds. The only other components are two 4-foot flexible test leads equipped with pin-tip plugs and test prods (fig. 3). There is space between the panel and the cover of Test Unit I-236 in which the

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test leads and the power cord may be stowed when not in use (fig. 4). Two 15-watt, 115-volt, clear Mazda lamps (one installed, one spare) and two ¼-watt, 115-volt, neon lamps (one installed, one spare) are furnished with Test Unit I-236. The panel to which all of the parts are attached may be removed for servicing by loosening four screws on the face of the panel. Spare neon and Mazda lamps may be reached in a similar manner.

5. PACKAGING.

Test Unit I-236 is supplied only as a component of Tool Equipment TE-50-A and is not packaged separately. The test unit occupies a space in Case CS-78 which was formerly used for the multimeter.



Figure 2. Test Unit I-236, exterior view with cover closed.

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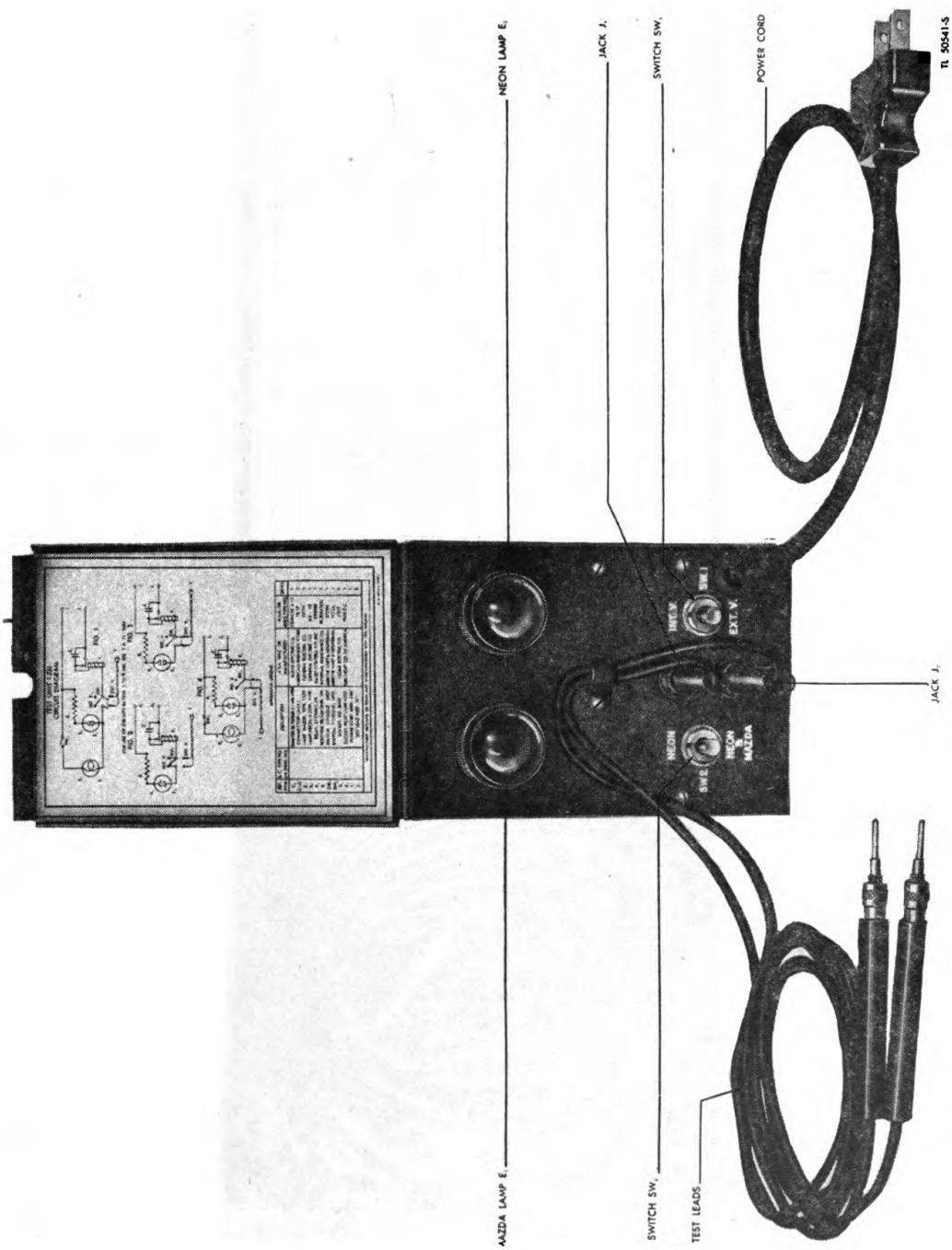
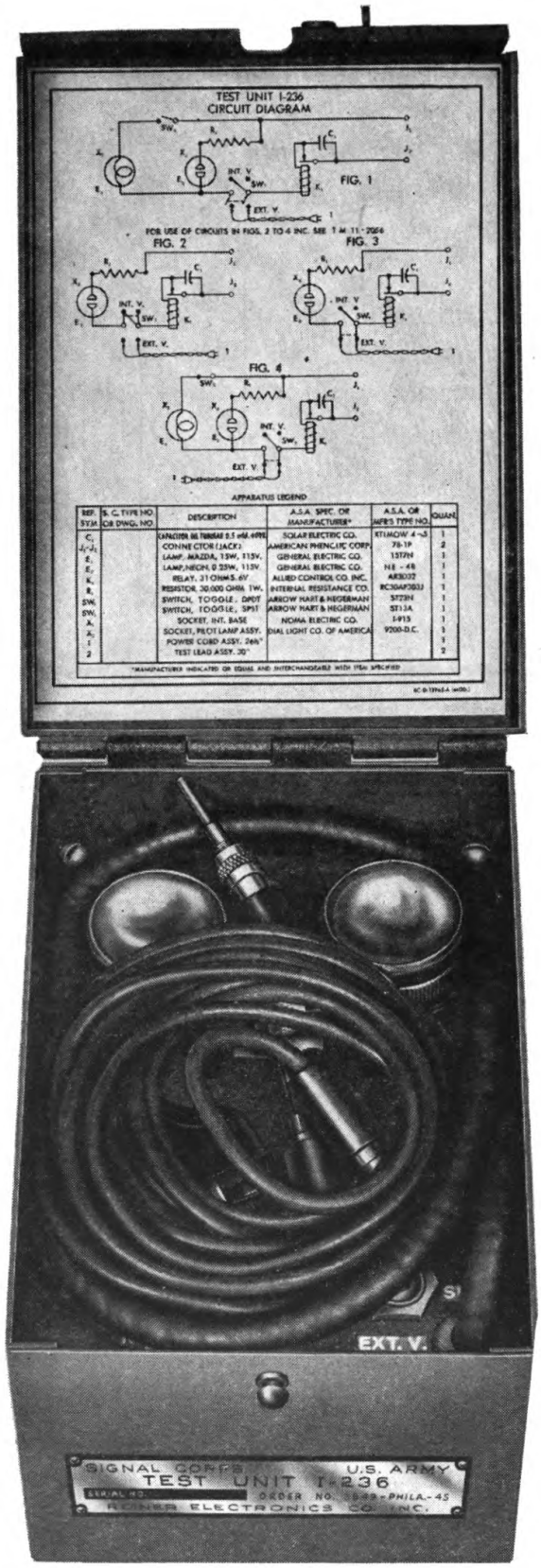


Figure 3. Test Unit I-236, front view with cover open.

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TL 50542-S.

Figure 4. Test Unit I-236, packing of test leads and power cord between cover and panel.

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SECTION II
INSTALLATION AND ASSEMBLY OF TEST UNIT I-236

6. UNPACKING AND CHECKING.

Remove Test Unit I-236 from Case CS-78 and place in a convenient location where the unit can be inspected for possible damage. Carefully inspect the lamps for breakage and other parts for damage which may have occurred during shipment. Check to make certain that the lamps are properly seated in their sockets.

> **CAUTION:** If Test Unit I-236 has received moistureproofing and fungiproofing treatment, **do not remove** any of the protective coating.

7. ASSEMBLY AND CONNECTIONS.

Insert the tips of the test leads into the jacks located on the front panel of Test Unit I-236. The prods at the other ends of the test leads will be used at the terminals of the circuit or the part to be tested, to provide a continuous circuit through the test unit as described in part two. For tests of circuits requiring power from an external source, connect the power cord of Test Unit I-236 to a 115- to 130-volt, a-c or d-c power supply.

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PART TWO
OPERATING INSTRUCTIONS

NOTE: For information on destroying the equipment to prevent enemy use, refer to the destruction notice at the front of the manual.

SECTION III
OPERATION

8. USE OF TEST UNIT I-236 TO DIFFERENTIATE BETWEEN A-C AND D-C VOLTAGES.

The equipment to be tested must be properly connected to furnish its own power for this test.

a. Move switch SW2 to NEON and switch SW1 to INT V. **To prevent possible damage to the circuit or equipment under test, do not move switch SW2 to NEON & MAZDA during this test.**

NOTE: The power cord of Test Unit I-236 may remain connected into a source of a-c or d-c voltage since the power cord is disconnected from the circuit of Test Unit I-236 when switch SW1 is in the INT V position.

b. Apply the prods of the test leads to the cicuit under test.

c. If both plates of the neon lamp light, the voltage of the circuit under test is ac. If only one plate of the neon lamp lights, the voltage is dc.

d. If neither plate of the neon lamp lights, there is either no voltage present in the circuit under test or the voltage is not high enough to light the neon lamp. The neon lamp will not light on voltages below 55 volts ac or below 90 volts dc. Try another portion of the same circuit having a higher potential difference between the test prods.

NOTE: The relay in Test Unit I-236 will act as a circuit breaker and protect the neon lamp in case the test prods are applied to a portion of a circuit having an abnormally high difference of potential.

9. USE OF TEST UNIT I-236 TO TEST FUSES.

a. Remove the fuse to be tested from the circuit in which it is used.

b. Check to make certain that the power cord of Test Unit I-236 is properly connected into a source of a-c or d-c voltage as described in paragraph **7.**

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c. Move switch SW2 to NEON and switch SW1 to EXT V.

d. Apply prods of the test leads to the fuse to be tested.

e. If there is a continuous (closed) circuit through the fuse, the neon lamp will light. As the neon lamp draws only 2 milliamperes of current at 120 volts, it is possible to use Test Unit I-236 for checking fuses with a low current carrying capacity.

> **CAUTION:** Always keep switch SW2 in the NEON position when testing fuses. Otherwise, Test Unit I-236 itself will burn out fuses having a current carrying capacity under approximately 100 milliamperes.

10. USE OF TEST UNIT I-236 TO TEST CAPACITORS.

The following steps outline the procedure to be followed in testing capacitors for leaks, shorts, or grounds.

a. Disconnect the capacitor to be tested from the circuit in which it is used.

b. Plug the power cord of Test Unit I-236 into a 115- to 130-volt source of **direct current.** A source of alternating current cannot be used to test capacitors.

c. Move switch SW2 to NEON and switch SW1 to EXT V.

d. Apply the prods of the test leads to the two sides of the capacitor. In testing dry electrolytic capacitors it may be necessary to reverse the test leads to correct the polarity. Incorrect polarity will be indicated by steady glow of the neon lamp. If after reversing the test leads, the glow of the neon lamp is still steady, the capacitor is shorted (subpar. **f** below).

e. If the capacitor is in good condition, a series of small flashes will at first appear on the neon lamp. The flashes will cease when the capacitor is fully charged, the length of time required depending upon the capacitance of the capacitor being tested, and the neon lamp will cease to glow.

f. If the capacitor is shorted, a continuous glow will appear on the neon lamp. In the case of dry electrolytic capacitors, this glow (if the capacitor is shorted) will still appear even after the test leads have been reversed to correct polarity.

g. If there is leakage in the capacitor, a continuous series of flashes will appear on the neon lamp, the duration of the flashes depending upon the amount of leakage present in the capacitor.

h. A grounded, metal-cased capacitor will cause a continuous glow in the

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neon lamp when one of the test leads is placed on the metal case and the other lead on either of the two terminals of the capacitor.

11. USE OF TEST UNIT I-236 TO CHECK CONTINUITY OF CIRCUITS.

a. Disconnect the equipment under test from its own source of power.

b. Check to make certain that the power cord of Test Unit I-236 is properly connected into a source of a-c or d-c voltage as described in paragraph **7.**

c. Move switch SW2 to NEON & MAZDA and switch SW1 to EXT V.

d. Apply the prods of the test leads to the circuit under test.

e. A continuous circuit will light the Mazda and the neon lamps.

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PART THREE
PREVENTIVE MAINTENANCE

SECTION IV
PREVENTIVE MAINTENANCE TECHNIQUES

12. MEANING OF PREVENTIVE MAINTENANCE.

Preventive maintenance is a systematic series of operations performed at regular intervals on equipment, when turned off, to eliminate major break-downs and unwanted interruptions in service, and to keep the equipment operating at top efficiency. To understand what is meant by preventive maintenance, it is necessary to distinguish between preventive maintenance, trouble shooting, and repair. The prime function of preventive maintenance is the prevention of break-downs and, therefore, the need for repair. On the other hand, the prime function of trouble shooting and repair is the location and correction of **existing** defects. The importance of preventive maintenance cannot be overemphasized. The entire system of communications depends upon the readiness and operating efficiency of each item of equipment when it is needed. In a similar manner, the test equipment by which this condition of readiness in communications equipment is realized must be kept in excellent operating condition at all times.

NOTE: The operations in sections IV and V are considered first and second echelon (organization operators and repairmen) maintenance. Some operations in section IX are considered higher echelon maintenance.

13. DESCRIPTION OF PREVENTIVE MAINTENANCE TECHNIQUES.

a. General. Most of the electrical parts used in Test Unit I-236 require routine preventive maintenance. Those requiring maintenance differ in the amount and kind required. Because hit-or-miss maintenance techniques cannot be applied, definite and specific instructions are needed. This section of the manual contains these specific instructions and serves as a guide for personnel assigned to perform the six basic maintenance operations, namely: Feel, Inspect, Tighten, Clean, Adjust, and Lubricate. Throughout this manual the lettering system for the six operations will be as follows:

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F — Feel.
I — Inspect.
T — Tighten.
C — Clean.
A — Adjust.
L — Lubricate.

The first two operations establish the need for the other four. The selection of operations is based on a general knowledge of field needs. For example, the dust encountered on dirt roads during cross-country travel filters into the equipment no matter how much care is taken to prevent it. Rapid changes in weather (such as heavy rain followed by blistering heat), excessive dampness, snow, and ice tend to cause corrosion of exposed surfaces and parts. Without frequent inspections and the necessary performance of tightening, cleaning, and lubricating operations, equipment becomes undependable and subject to break-down when it is most needed.

b. Feel. The feel operation is used to determine if electrical connections, components, etc., are overheated. Feeling indicates the existence of defects requiring correction. The maintenance man must become familiar with the normal operating temperatures in order to recognize signs of overheating.

> **NOTE:** It is important that the feel operation be performed as soon as possible after shut-down and always before any other maintenance is done.

c. Inspect. Inspection is the most important operation in the preventive maintenance program. A careless observer will overlook the evidence of minor trouble. Although these defects may not interfere with the performance of the equipment, valuable time and effort can be saved if they are corrected before they lead to major break-downs. Make every effort to become thoroughly familiar with the indications of normal functioning, in order to be able to recognize the signs of a defective set. Inspection consists of carefully observing all parts of the equipment, noticing their color, placement, state of cleanliness, etc. Inspect for the following conditions:

(1) Overheating, as indicated by discoloration, blistering, or bulging of the parts or surface of the container; leakage of insulating compounds; and oxidation of metal contact surfaces.

(2) Placement, by observing that all leads and cabling are in their original positions.

(3) Cleanliness, by carefully examining all recesses in the unit for accumulation of dust, especially between connecting terminals. Parts, connections, and joints should be free of dust, corrosion, and other foreign matter. In tropical and high-humidity locations, look for fungus growth and mildew.

(4) Tightness, by testing any connection or mounting which appears to be loose.

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d. Tighten, Clean, and Adjust. These operations are self-explanatory. Specific procedures to be followed in performing them are given wherever necessary throughout part three.

> **CAUTION:** Screws, bolts, and nuts should not be tightened carelessly. Fittings tightened beyond the pressure for which they are designed will be damaged or broken.

e. Lubricate. Lubrication refers to the application of grease or oil to the bearings of motors or other rotating machinery. It may also mean the application of a light oil to door hinges or other sliding surfaces on the equipment.

SECTION V
ITEMIZED PREVENTIVE MAINTENANCE

14. INTRODUCTION.

The general technique involved and the application of the FITCAL operations in performing preventive maintenance on individual parts are discussed in this section. All work is to be performed with the power removed from the equipment. After preventive maintenance has been performed, the equipment should be put into operation and checked for satisfactory performance.

15. COMMON MATERIALS NEEDED.

The following materials will be needed in performing preventive maintenance. The hand tools required may be obtained from Tool Equipment TE-50-A of which Test Unit I-236 is a component.

Common hand tools.
Clean, lint-free cloths.
#0000 sandpaper.
Relay burnishing tool.
Solvent, Dry Cleaning, Federal Spec No. P-S-661a.

> **NOTE:** Leaded gasoline will not be used as a cleaning fluid for any purpose. Solvent, Dry Cleaning, Federal Spec No. P-S-661a, is available as a cleaning fluid through established supply channels. Oil, Fuel, Diesel, U. S. Army Spec No. 2-102B, may be used for cleaning purposes when dry-cleaning solvent (SD) is not at hand. Since unleaded gasoline is available in limited quantities, and only in certain localities, it should be used for cleaning purposes only when no other agent is available. Carbon tetrachloride, or fire-extinguishing liquid (carbon tetrachloride base), will be used, if necessary, **only on contact parts of electronic equipment.**

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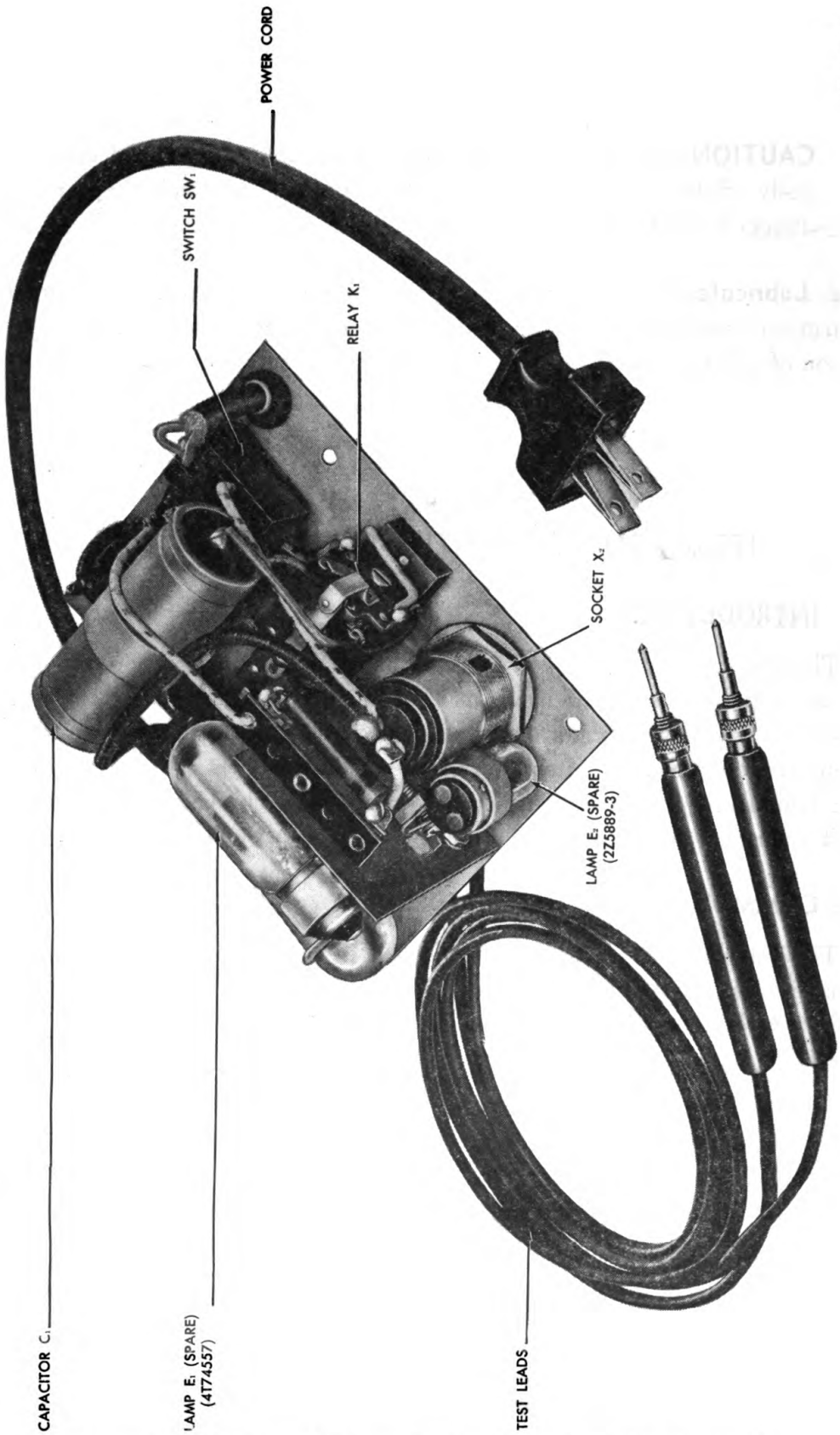


Figure 5. Test Unit I-236, underside of panel with case removed, showing mounting of neon lamps.

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16. EXTERIOR OF TEST UNIT I-236.

a. Inspect (I).

(1) Carefully examine the case and front panel for broken or damaged places, chipped paint, dirt, dust, rust, corrosion, and loose or missing screws.

(2) Inspect the lamp lenses for dirt, dust, lint, and for cracked places.

(3) Inspect switches SW1 and SW2 for looseness of mounting.

(4) Inspect the power cord and the test leads for poor insulation, for cracks, and for evidences of dry rot.

b. Tighten (T).

(1) Tighten all loose screws with a screwdriver of the proper size.

(2) If lamp lenses are loose, remove the panel and tighten them.

(3) If switches SW1 and SW2 are loose, remove the panel from the case, and while holding the switches in place behind the panel, tighten the rings which fasten the switches to the panel.

c. Clean (C).

(1) Using a soft, clean, lint-free cloth, wipe off all dirt and dust from the panel and the case. If necessary, use dry-cleaning solvent (SD) to remove grease and oil.

(2) Clean the lamp lenses with a soft, clean, lint-free cloth.

(3) Wipe off the power cord and the test leads with a soft cloth. Cut away frayed strands on the insulation. If the wire is exposed, wrap it with friction tape.

17. COMPONENTS OF TEST UNIT I-236 (figs. 5 and 6).

Take out the four corner screws from the front panel, and remove the panel from the case. Remove the test leads from the jacks on the front panel.

a. Inspect (I).

(1) Inspect all wiring for dirt, dust, fraying, defective insulation, cracks, and dry rot. Check to see if all connections are tight.

(2) Carefully examine all parts for loose or missing screws, nuts, and bolts.

(3) Inspect lamps E_1 and E_2 to see if they are clean and properly seated in sockets X_1 and X_2. Check to see if the spare lamps are clean and tight in their holders.

(4) Inspect sockets X_1 and X_2 for signs of rust and corrosion.

(5) Inspect capacitor C_1 and resistor R_1 for dirt, dust, and mildew.

(6) Inspect relay K_1 for dirt, dust, rust, and corrosion. Carefully examine the contacts for signs of pitting.

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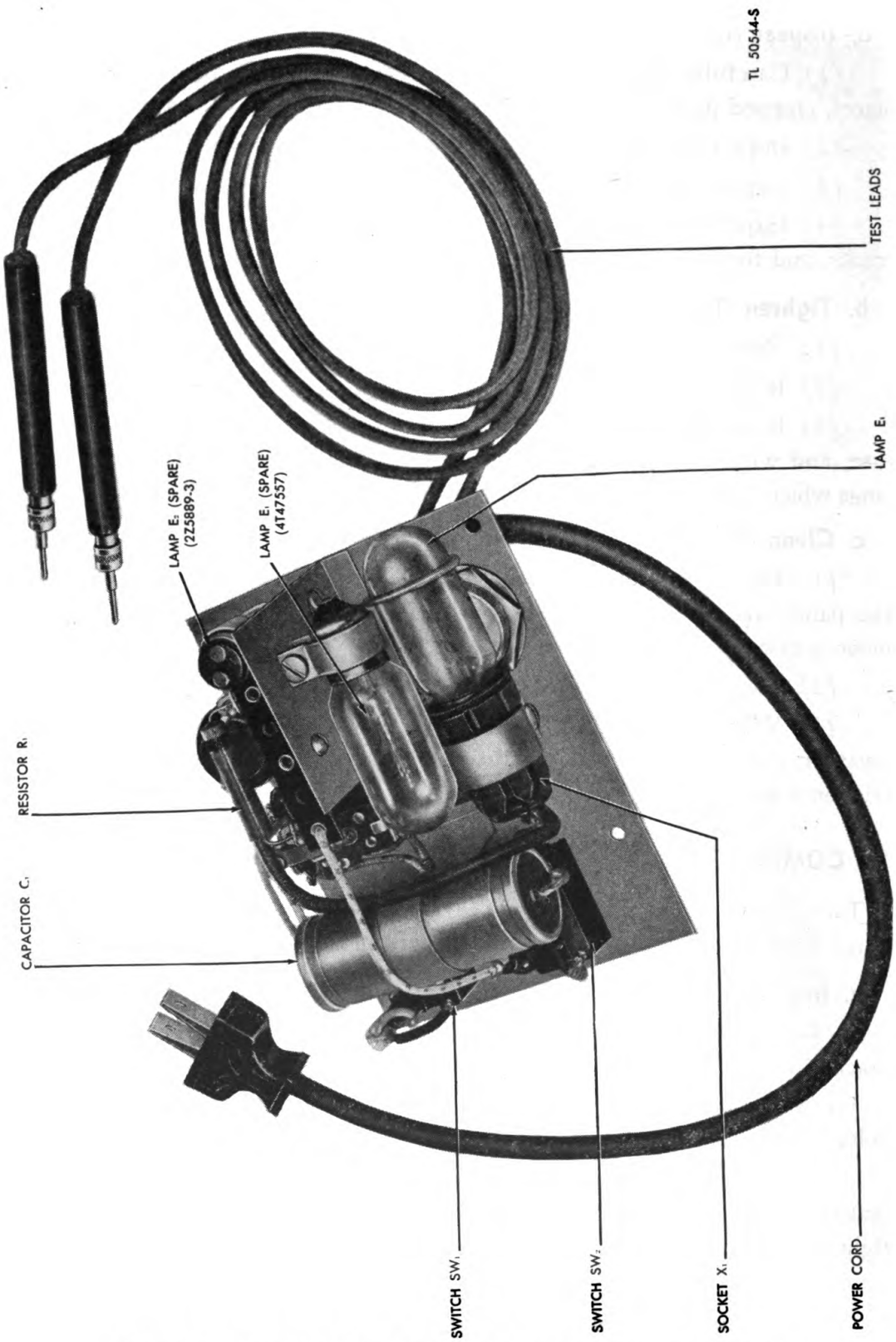


Figure 6. Test Unit I-236, underside of panel with case removed, showing mounting of Mazda lamps.

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b. Tighten (T). Tighten all screws, nuts, bolts, and connections found to be loose. Make certain that connections are clean and free from corrosion before tightening.

c. Clean (C).

(1) Clean all wiring with a dry cloth or small bristle brush. Cut away frayed strands on the insulation.

(2) Clean the lamps with a soft cloth. If necessary use dry-cleaning solvent (SD).

(3) Clean any corrosion from the lamp bases and sockets with #0000 sandpaper.

(4) Clean capacitor C_1 and resistor R_1 with a dry cloth or soft brush.

CAUTION: Do not use dry-cleaning solvent (SD) to clean the capacitor and resistor.

(5) Clean relay K_1 with a cloth or soft brush. Give special attention to cleaning away mildew or fungus, if found on the relay coil. Clean the relay contacts with a relay burnishing tool as described in paragraph **19.**

d. Adjust (A). If necessary, adjust relay contacts so that they will meet properly.

18. PREVENTIVE MAINTENANCE CHECK LIST.

The following check list is a summary of the preventive maintenance to be performed on Test Unit I-236. The suggested time intervals shown on the check list may be varied at any time by the local commander. However, for best performance of the equipment, it is recommended that the operations be performed at least as frequently as called for in the check list. The echelon column indicates which operations are considered first echelon maintenance and which operations are considered second echelon maintenance.

Item No.	*Operation*	*Item description*	*When performed*					*Echelon*
			Daily	*Wkly*	*Month*	*Six months*	*Yrly*	
1	ITC	Exterior of Test Unit I-236 (par. 16).			x			1
2	ITCA	Components of Test Unit I-236 (par. 17).				x		1 & 2

F Feel I Inspect T Tighten C Clean A Adjust L Lubricate

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SECTION VI
SPECIAL INSTRUCTIONS

19. USE OF BURNISHER.

Relay contacts are accessible when the panel is removed. To clean these contacts, insert the blade of the burnishing tool between them, press the contacts together tightly, and draw out the burnishing tool. Repeat this operation until the contacts are clean. Do not use a back-and-forth motion, because it may cause unevenness in the contact surface and may cause the thin blade of the burnishing tool to be damaged by bending.

CAUTION: The blade of the burnishing tool must be kept clean. Do not touch or rub the blade with the fingers. Wipe the blade with a clean cloth before using blade on contacts and wipe it frequently with a clean cloth moistened with dry-cleaning solvent (SD).

SECTION VII
LUBRICATION

NOTE: Lubrication of Test Unit I-236 is not required.

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PART FOUR
AUXILIARY EQUIPMENT

(NOT USED)

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PART FIVE
REPAIR INSTRUCTIONS

NOTE: Failure or unsatisfactory performance of equipment used by Army Ground Forces and Army Service Forces will be reported on W.D., A.G.O. Form No. 468 (Unsatisfactory Equipment Report). For particulars see paragraph 28. If Form No. 468 is not available, see TM 38-250. Failure or unsatisfactory performance of equipment used by Army Air Forces will be reported on Army Air Forces Form No. 54 (unsatisfactory report).

SECTION VIII
THEORY OF EQUIPMENT

20. GENERAL.

a. Test Unit I-236 consists of an ordinary test lamp equipped with switching and protective features to increase its usefulness. The test unit provides means of switching the Mazda test lamp so that it may be used to test live circuits supplied with current by Test Unit I-236 from a separate power source. Provision is made so that a neon lamp may be used for testing capacitors, low-current capacity fuses, and also for differentiating between a-c and d-c voltages.

b. The basic circuit of Test Unit I-236 is shown in figure 7. From this basic circuit, three distinct circuits may be obtained by various settings of switches SW1 and SW2 as explained in paragraphs **21**, **22** and **23**.

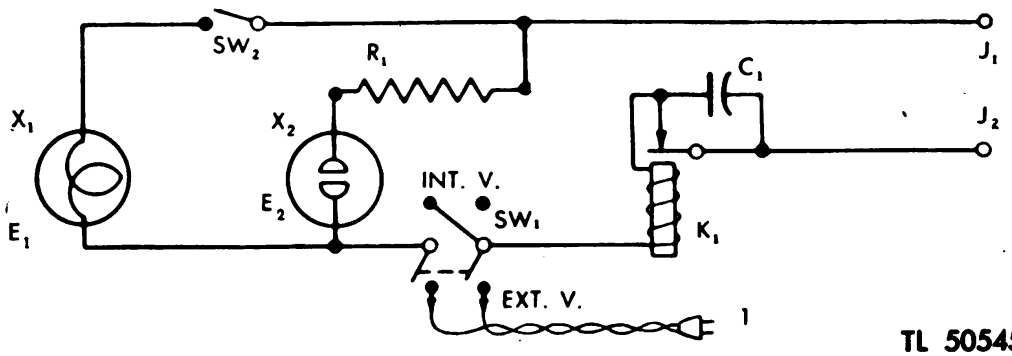


Figure 7. Test Unit I-236, schematic diagram of basic circuit.

21. CIRCUIT USED TO DIFFERENTIATE BETWEEN A-C AND D-C VOLTAGES.

a. Figure 8 shows the portion of the basic circuit used to differentiate between a-c and d-c voltages present in equipment under test. Switch SW2 is set at NEON and switch SW1 at INT V.

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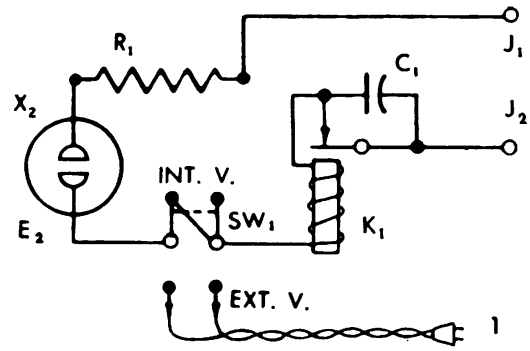


Figure 8. Circuit of Test Unit I-236 used to differentiate between a-c and d-c voltages.

b. Test Unit I-236 is connected so that the neon lamp E_2 is used to test a live circuit connected at jacks J_1 and J_2 through the test leads. If the voltage applied across the jacks exceeds the rated striking voltage of the neon lamp (55 volts ac, 90 volts dc), the neon lamp will light. The current passes through relay K_1 which is normally closed. Since the neon lamp will pass current in only one direction, d-c voltage applied at the jacks will light only one plate of neon lamp E_2. The constantly reversing polarity of alternating current will light both plates of neon lamp E_2. A voltage higher than that for which the test unit is designed will operate relay K_1 and open the circuit to protect the neon lamp from damage. Capacitor C_1 is provided to dissipate arcing at the relay contacts. Resistor R_1 (30,000 ohms) is in series with the neon lamp and acts as a current-limiting resistor to protect the neon lamp.

22. CIRCUIT USED TO TEST FUSES AND CAPACITORS.

a. Figure 9 shows the portion of the basic circuit used to test fuses and capacitors. Switch SW2 is set at NEON and switch SW1 at EXT V.

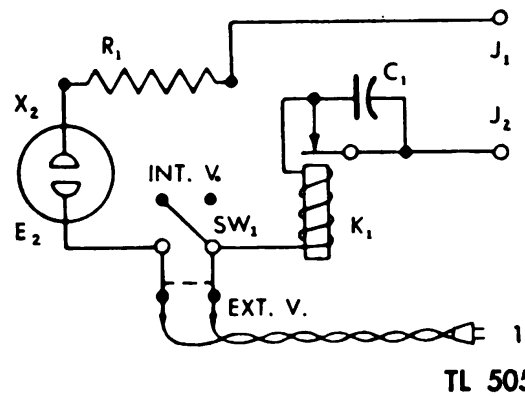


Figure 9. Circuit of Test Unit I-236 used to test fuses and capacitors.

b. The voltage for these tests is supplied by Test Unit I-236 from an a-c or d-c source. A continuous path through a fuse connected to Test Unit

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I-236 through the test leads will close the circuit of Test Unit I-236 and light the neon lamp. When a capacitor is connected to Test Unit I-236 through the test leads, steady glow of the neon lamp indicates a shorted capacitor as described in paragraph **10**. A good capacitor will cause the neon lamp to flash intermittently with a frequency dependent upon the capacitance of the capacitor under test. Relay K_1, resistor R_1, and capacitor C_1 have the same functions as described in paragraph **21b**.

23. CIRCUIT USED TO CHECK CONTINUITY OF CIRCUITS.

a. Figure 10 shows the portion of the basic circuit used to check continuity of circuits. Switch SW2 is set at NEON & MAZDA and switch SW1 at EXT V.

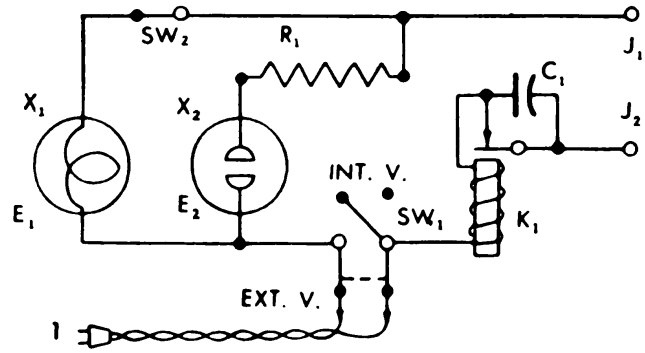


Figure 10. Circuit of Test Unit I-236 used to check continuity of circuits.

b. The voltage for these tests is supplied by Test Unit I-236 from an a-c or d-c source. A continuous circuit in the equipment under test will light both the Mazda and neon lamps. Either of the two lamps may be used to indicate continuity. However, switch SW2 should be kept in the NEON & MAZDA position.

SECTION IX
TROUBLE-SHOOTING PROCEDURES

24. TEST PROCEDURE.

a. Step 1. Plug the power cord of Test Unit I-236 into a 115- to 130-volt a-c or d-c receptacle. Insert the tips of the test leads into the jacks on the front panel of Test Unit I-236. Move switch SW1 to EXT V and short-circuit the test leads.

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Normal Indication
(1) With switch SW2 in NEON position, one or both plates of the neon lamp should light, depending upon the source of voltage (ac or dc) to which the test unit is connected. The Mazda lamp should **not** light.
(2) With switch SW2 in NEON & MAZDA position both lamps should light.
(3) With switch SW1 in INT V position both lamps should be extinguished.

Abnormal Indication	*Probable cause of trouble*
(1) Neon lamp does not light.	(1) Defective neon lamp. Defective switch SW1. Dirty relay contacts. Defective resistor R_1.
Both lamps light.	Defective switch SW2.
(2) Mazda lamp does not light.	(2) Defective Mazda lamp. Defective switch SW2.
(3) Lamps continue to glow.	(3) Defective switch SW1.

b. Step 2. Disconnect the power cord from the voltage source and insert the prods of the test leads into the same receptacle. Move switch SW2 to NEON & MAZDA and switch SW1 to INT V.

Normal Indication
Both lamps should light.

Abnormal Indication	*Probable cause of trouble*
Lamps do not light.	Defective switch SW1. Defective lamps.

25. VOLTOHMMETER TESTS.

a. If the operating tests described in paragraph **24** fail to localize the trouble, check for open or shorted wiring or connections using Test Set TS-26/TSM or other voltohmmeter.

b. Using the voltohmmeter, measure the resistance of the relay coil. The resistance should measure between 12 and 16 ohms.

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WAR DEPARTMENT

UNSATISFACTORY EQUIPMENT REPORT

FOR (Technical service) Signal Corps — DATE: 15 Jan. 45

FROM (Organization) 584 Sig Repair Co. APO 204 (Station) — MATÉRIEL (SIGN) New York City (Technical service)

TO (Next superior headquarters) Signal Officer, Ninth Army

COMPLETE MAJOR ITEM

NOMENCLATURE: Test Unit I-236 — TYPE:

MODEL: — MANUFACTURER: Reiner Electronics

U. S. A. REG. NO.: Order No. 3549-Phila-45 — SERIAL NO.: 217 — DATE RECEIVED: 20 Dec. 44

EQUIPMENT WITH WHICH USED (IF APPLICABLE):

NOMENCLATURE OF DEFECTIVE COMPONENT

PART NO: SigC stock No. 3Z9863-23N — TYPE: Switch, toggle; DPDT.

MANUFACTURER: Arrow Hart & Hegerman — DATE INSTALLED: 23 Dec. 44

LENGTH OF SERVICE

DATE OF INITIAL TROUBLE: 29 Dec. 44

TOTAL PERIOD OF OPERATION BEFORE FAILURE (FILL IN WHERE APPLICABLE)

TOTAL	YEARS	MONTHS	DAYS	YEARS	MONTHS	DAYS	HOURS	MILES	ROUNDS
TIME INSTALLED			1	—	—		20		

DESCRIPTION OF TROUBLE AND PROBABLE CAUSE

GIVE TYPE OF FAILURE: MECHANICAL, ELECTRICAL, WORKMANSHIP, MATERIAL, DESIGN

Switch shorts out because of humid operating conditions

UNUSUAL SERVICE CONDITIONS

GIVE BRIEF DESCRIPTION

Operation in tropics

TRAINING OR SKILL OF USING PERSONNEL (CHECK ONE): POOR — FAIR — GOOD ✓

DESCRIPTION OF ANY REMEDIAL ACTION TAKEN

Moistureproofing and fungiproofing treatment applied 3 Jan. 45

RECOMMENDATIONS

Substitution of switch designed for tropical operation.

1ST IND.

OFFICE — STATION — DATE

TO CHIEF (Technical service) Signal Officer, Washington 25, DC

NAME — STATION — RANK

ORIGINATING OFFICER

SIGNATURE: George H. Coleman

NAME: GEORGE H. COLEMAN

RANK AND TITLE: Capt. Sig C

ORGANIZATION: 584 Sig Repair Co.

INSTRUCTIONS

1. It is imperative that the Chief of Technical Service concerned be advised at the earliest practical moment of any constructional, design, or operational defect in materiel. This form is designed to facilitate such reports and to provide a uniform method of submitting the required data.
2. This form will be used for reporting manufacturing, design or operational defects in materiel with a view to improving and correcting such defects, and for use in recommending modifications of materiel.
3. This form will not be used for reporting failures, isolated maternal defects or malfunctions of materiel resulting from fair wear-and-tear or accidental damage nor for the replacement, repair, or the issue of parts and equipment. It does not replace currently authorized operational or performance records.
4. Reports of malfunctions and accidents involving ammunition will continue to be submitted as directed in the manner described in AR 750-10 (Change No. 3).
5. It will not be practicable or desirable in all cases to fill all blank spaces of the report. However, the report should be as complete as possible in order to expedite necessary corrective action. Additional pertinent information not provided for in the blank spaces should be submitted as inclosures to the form. Photographs, sketches or other illustrative material are highly desirable.
6. When cases arise where it is necessary to communicate with a chief of service in order to assure safety to personnel, more expeditious means of communication are authorized. This form should be used to confirm reports made by more expeditious means.
7. This form will be made out by using or service organizations and forwarded in duplicate through command channels to the chief of technical service. The office of the chief of technical service receiving the report will forward an information copy to the Commanding General, Army Ground Forces or Army Air Forces, whichever is applicable, and to the Commanding General, Army Service Forces.
8. Necessity for using this form will be determined by the using or service troops.

W. D., A. G. O. Form No. 468
1 December 1943

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TL50549-S

Figure 11. W.D., A.G.O: Form No. 468 with sample entries.

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SECTION X
REPAIRS

26. GENERAL REPAIR.

Since all parts are easily accessible, no trouble should be experienced in removing or replacing any defective parts or circuit elements in Test Unit I-236. Save time and trouble by making a thorough electrical check of any part that appears to be defective **before** removing it from the equipment. Be careful when replacing parts to make certain that they are tightly fastened in place and that all soldered joints are secure. Correct placement of parts is shown in figures 5 and 6.

27. PAINTING AND REFINISHING.

When painted finishes have been badly scarred or damaged, rust and corrosion can be prevented by touching up bared surfaces as follows:

a. Use #00 or #000 sandpaper to clean the surface down to the bare metal. Obtain a bright smooth finish.

> **CAUTION:** The use of steel wool, although permitting rapid removal of rust, is not recommended. Minute particles of steel wool frequently sift into the equipment and cause harmful shorting or grounding of circuits.

b. Remove rust by cleaning corroded metal with dry-cleaning solvent. In severe cases it may be necessary to use dry-cleaning solvent to soften the rust, and sandpaper to complete the preparation for painting.

c. Using a small brush, apply paint to the bared surfaces. Paint used will be authorized consistent with existing regulations.

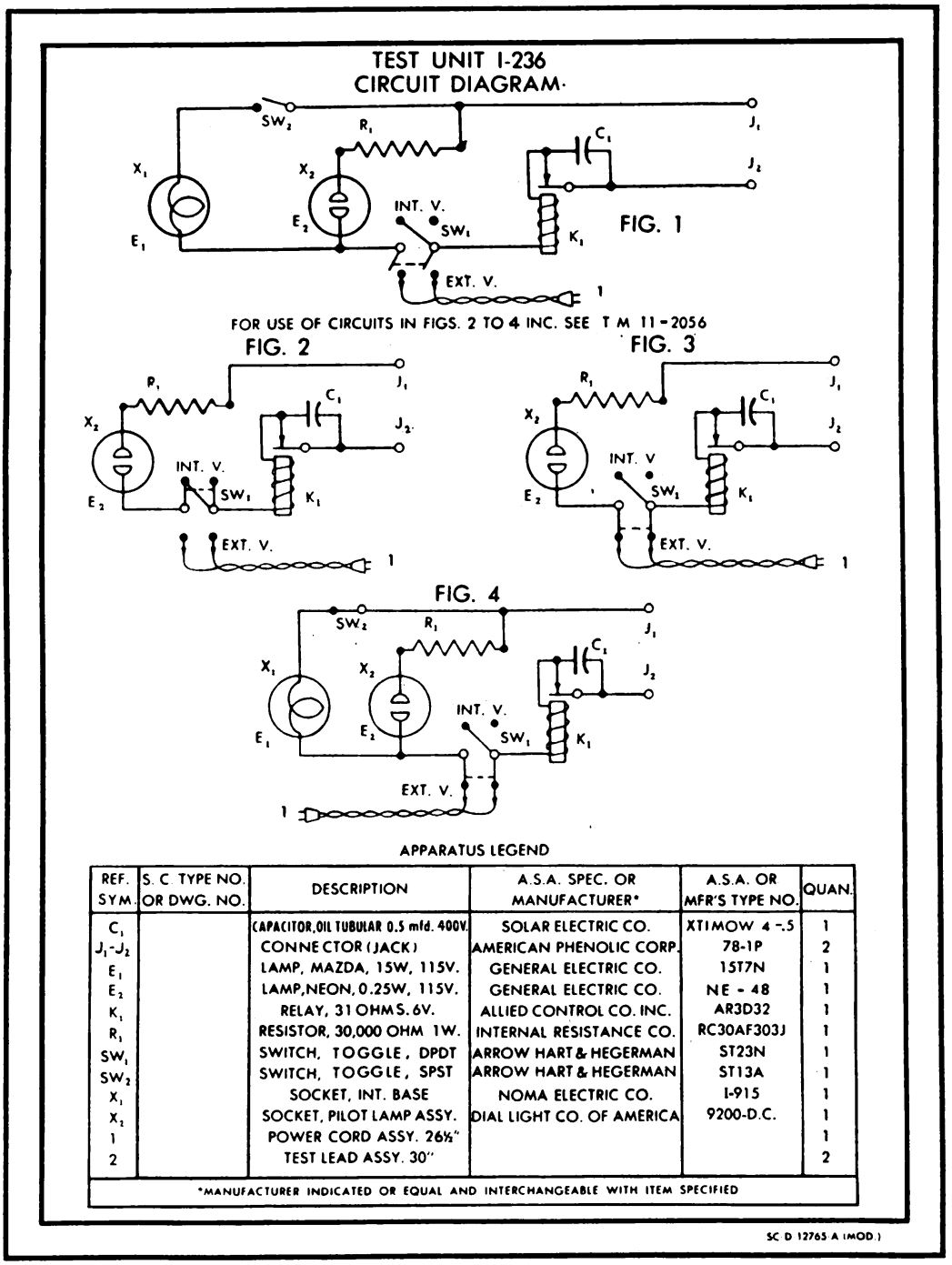
28. UNSATISFACTORY EQUIPMENT REPORT.

a. When trouble in equipment used by Army Ground Forces or Army Service Forces occurs more often than repair personnel feel is normal, War Department Unsatisfactory Equipment Report, W.D., A.G.O. Form No. 468 (fig. 11), should be filled out and forwarded through channels to the Office of the Chief Signal Officer, Washington 25, D. C. Refer to TM 38-250 for complete instructions on the handling of this report.

b. When trouble in equipment used by Army Air Forces occurs more often than repair personnel feel is normal, Army Air Forces Form No. 54 should be filled out and forwarded through channels.

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APPARATUS LEGEND

REF. SYM.	S. C TYPE NO. OR DWG. NO.	DESCRIPTION	A.S.A. SPEC. OR MANUFACTURER*	A.S.A. OR MFR'S TYPE NO.	QUAN.
C_1		CAPACITOR, OIL TUBULAR 0.5 mfd. 400V.	SOLAR ELECTRIC CO.	XTIMOW 4 -.5	1
J_1-J_2		CONNECTOR (JACK)	AMERICAN PHENOLIC CORP.	78-1P	2
E_1		LAMP, MAZDA, 15W, 115V.	GENERAL ELECTRIC CO.	15T7N	1
E_2		LAMP, NEON, 0.25W, 115V.	GENERAL ELECTRIC CO.	NE - 48	1
K_1		RELAY, 31 OHMS. 6V.	ALLIED CONTROL CO. INC.	AR3D32	1
R_1		RESISTOR, 30,000 OHM 1W.	INTERNAL RESISTANCE CO.	RC30AF303J	1
SW_1		SWITCH, TOGGLE, DPDT	ARROW HART & HEGERMAN	ST23N	1
SW_2		SWITCH, TOGGLE, SPST	ARROW HART & HEGERMAN	ST13A	1
X_1		SOCKET, INT. BASE	NOMA ELECTRIC CO.	I-915	1
X_2		SOCKET, PILOT LAMP ASSY.	DIAL LIGHT CO. OF AMERICA	9200-D.C.	1
1		POWER CORD ASSY. 26½"			1
2		TEST LEAD ASSY. 30"			2

*MANUFACTURER INDICATED OR EQUAL AND INTERCHANGEABLE WITH ITEM SPECIFIED

TL 50550-S

Figure 12. Facsimile of circuit label for Test Unit I-236.

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APPENDIX

SECTION XI
MAINTENANCE PARTS LIST

29. MAINTENANCE PARTS LIST FOR TEST UNIT I-236.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*	*Quan per unit*	*Running spares*	*Orgn stock*	*3d ech*	*4th ech*	*5th ech*	*Depot stock*
	3F4470-236	TEST UNIT I-236: testing unit for checking continuity of circuits and for differentiating between a-c and d-c voltage.							
	2Z9402.37	BOARD, terminal: 2 ring type terminals; bakelite; 1⅛" x ⅜" x 3/32" thk; Cinch #1520; (mounting for resistor).	1				*	*	*
	1B3018-2.18	CABLE, power: copper; two #18 AWG stranded cond; 0.250" OD; color coded; black & white; rubber jacketed; Alpha Wire #1951.	4'				*	*	*
	2Z6125-44	CAP, lens: push-on; lock-tite; brass, dull white nickel; clear, smooth; for pilot panel light; 1⅛" diam overall; Dialco #9200-S; (neon light; may be used as substitute cap for Mazda light).	1				*	*	*

* Indicates stock available.

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29. MAINTENANCE PARTS LIST FOR TEST UNIT I-236 (contd).

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
C_1	3DA500-56.1	CAPACITOR: fixed; hermetically sealed metal tubular; 500,000 mmf ± 20%; 400 vdcw; 2⅝" lg x 1 1/16" diam; Solar #XTIMOW4-.5; (dc test circuit).	1				*	*	*
J_1, J_2	2Z5581-12	CONNECTOR, female contact (pin jack): single round female cont; straight; for 0.080" phone tip; ¾" lg x ⅜" diam body; with retainer ring; Amphenol #78-1P.	2				*	*	*
	2Z3021-58	CONNECTOR, male contact: single round male cont; straight; black phenolic handle 1" lg x 5/16" diam; insulated Scrulok pin 1 9/16" lg; Birnbach #412; (pin tip on test lead).	2				*	*	*
	2Z3022-41	CONNECTOR, male contact: 2 spring type parallel blades; finger grip type; Allied Elec Prod #105-F.	1				*	*	*
	2Z8495.5	GROMMET, rubber: fits 7/16" diam hole; 0.25" ID; Atlan India Rub #AH931-4-7; (service cord bushing).	1				*	*	*
	6D16798-1	LABEL, circuit: diagram; 80 lb, 25 x 38 coated white book paper; approx 5" lg x 3⅝" wd; Sig C dwg SC-D-12765.	1				*	*	*
E_2	2Z5889-3	LAMP, glow: 115v, 0.25w; T-4½ clear; double cont, bayonet base; GE #NE-48.	1	1			*	*	*
E_1	4T74557	LAMP, incandescent: 115v, 15w; clear; intermediate screw base; GE #15T7N.	1	1			*	*	*

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	2Z5991-25	LAMPHOLDER: bayonet; 2¾" lg x 1¼" diam approx; Dialco #9200 DC.	1				*	*	*
	6Z8359-5	LAMPHOLDER: intermediate base; with two #18 AWG stranded copper, rubber covered, cotton braid leads, 6" lg; Noma Elec #I-915.	1				*	*	*
	3F3705-4	PROD, test: black phenolic handle; 3" lg; solderless phone tip; Birnbach #410 special.	2				*	*	*
K_1	2Z7585-106	RELAY, general purpose: SPDT, normally closed single winding, 6v, 31 ohm; Allied Cont #AR3D32.	1				*	*	*
R_1	3RC30BE303J	RESISTOR, fixed: composition; 30,000 ohm ± 5%; 1w; (resistance for neon pilot lamp).	1				*	*	*
	2Z2643.39	RING, retainer: steel wire; ring clamp; for ¼" diam cable; Belden #SP-308; (strain relief clamp for service cable).	2				*	*	*
SW2	3Z9863-13A	SWITCH, toggle: SPST; phenolic; $1\frac{9}{32}$" x $\frac{23}{32}$" x $\frac{23}{32}$" d; AWS type ST13A; AH&H #ST13A; (neon and Mazda lamp circuits).	1				*	*	*
SW1	3Z9863-23N	SWITCH, toggle: DPDT; phenolic; $1\frac{9}{32}$" x $\frac{23}{32}$" x $\frac{23}{32}$" d; AWS type ST23N; AH&H #ST23N ("INT V" & "EXT V" circuits).	1				*	*	*
	1B820.177	WIRE, insulated: copper, tinned; single; #20 AWG stranded cond; 0.140" OD; color coded black; rubber jacketed; Alpha Wire #1635 (test leads).	5'				*	*	*

* Indicates stock available.

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SECTION XII
REFERENCES

30. ARMY REGULATIONS.

AR 380-5	Restricted Documents.

31. PARTS LIST.

SIG 1	Introduction to ASF Signal Supply Catalogue.
SIG 2	Complete Index to ASF Signal Supply Catalogue.
SIG 3	List of Items for Troop Issue.
SIG 4-1	Allowances of Expendable Supplies.
SIG 4-2	Allowances of Expendable Supplies for Schools, Training Centers, and Boards.
SIG 5	Stock List of All Items.
SIG 7 (series)	Organizational Spare Parts.
SIG 8 (series)	Higher Echelon Spare Parts.
SIG 10	Fixed Plant.

32. TECHNICAL MANUALS ON AUXILIARY EQUIPMENT AND TEST EQUIPMENT.

TM 11-2017	Test Set TS-26/TSM.

33. PAINTING, PRESERVING, AND LUBRICATION.

TB SIG 6	A Method of Prolonging the Effective Life of Dry Batteries.

34. SHIPPING INSTRUCTIONS.

U. S. Army Spec No. 100-14A	Army-Navy General Specification for Packaging and Packing for Overseas-shipment.

35. DECONTAMINATION.

TM 3-220	Decontamination.

36. DEMOLITION.

FM 5-25	Explosives and Demolitions.

37. CAMOUFLAGE.

FM 5-20	Camouflage, Basic Principles.

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38. OTHER TECHNICAL PUBLICATIONS.

FM 21-6	List of Publications for Training.
FM 21-7	List of Training Films, Film Strips, and Film Bulletins.
FM 21-8	Military Training Aids.
FM 21-40	Defense Against Chemical Attack.
FM 24-5	Signal Communication.
TB SIG 13	Moistureproofing and Fungiproofing Signal Corps Equipment.
TB SIG 25	Preventive Maintenance of Power Cords.
TB SIG 66	Winter Maintenance of Signal Equipment.
TB SIG 72	Tropical Maintenance of Ground Signal Equipment.
TB SIG 75	Desert Maintenance of Ground Signal Equipment.
TM 1-455	Electrical Fundamentals.
TM 11-453	Shop Work.
TM 11-462	Reference Data.
TM 38-250	Basic Maintenance Manual.

39. FORMS.

W.D., A.G.O. Form No. 468	Unsatisfactory Equipment Report.
AAF Form No. 54	Unsatisfactory Report.

40. ABBREVIATIONS.

ac	alternating current (noun)
a-c	alternating-current (adj)
AH&H	Arrow, Hart & Hegeman Electric Co
Allied Cont	Allied Control Co, Inc
Allied Elec Prod	Allied Electrical Products Co
Alpha Wire	Alpha Wire Corp
Amphenol	American Phenolic Corp
approx	approximate (approximately)
AR	Army Regulation
Atlan India Rub	Atlantic India Rubber Works
AWG	American Wire Gauge
AWS	American War Standard
Belden	Belden Mfg Co
Birnbach	Birnbach Radio Co
Cinch	Cinch Mfg Co
cond	conductor

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cont	contact
contd	continued
d	deep (depth)
dc	direct current (noun)
d-c	direct-current (adj)
diam	diameter
Dialco	Dial Light Corp
DPDT	double-pole, double-throw
dwg	drawing
fig.	figure
ft	foot (feet)
GE	General Electric Co
ID	inside diameter
lb	pound
lg	long (length)
mfg	manufacturing
mmf	micromicrofarad
No.	number
Noma Elec	Noma Electric Co
OD	outside diameter
Sig C	Signal Corps
Solar	Solar Mfg Corp
Spec	specification
SPDT	single-pole, double-throw
SPST	single-pole, single-throw
subpar.	subparagraph
thk	thick
v	volts
vdcw	DC working volts
w	watts
wd	wide (width)
W.D., A.G.O.	War Department, Adjutant General's Office

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