TM 11-393

R DEPARTMENT TECHNICAL MANUAL

VISUAL IDENTIFICATION EQUIPMENTS

AN/VVX-1 and AN/VVX-1X

AR DEPARTMENT 3 APRIL 1944

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WASHINGTON 25, D. C., 3 APRIL 1944.

TM 11-393, War Department Technical Manual, Visual Identification Equipments AN/VVX-1 and AN/VVX-1X is published for the information and guidance of all concerned.

[A. G. 300.7 (31 Jan 44).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

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Major General,
The Adjutant General.

DISTRIBUTION:

C & H 17 (5); IC 11 (5).
(For explanation of symbols see FM 21-6.)

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LIST OF ILLUSTRATIONS

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**—Voltage converter unit, flash lamp, mounting brackets, spare parts box, tubes, etc.

2. **Cut**—Battery connector cord, flash lamp cable, wiring, etc.
3. **Burn**—Cords, cables, technical manuals, etc.
4. **Bend**—Flash lamp shield, battery connector cord lugs, etc.
5. **Bury or scatter**—All of the above pieces after destroying them.

DESTROY EVERYTHING

SAFETY NOTICE

OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF HIGH VOLTAGES WHICH ARE EXTREMELY DANGEROUS TO HUMAN LIFE. OPERATING PERSONNEL MUST AT ALL TIMES FOLLOW ALL SAFETY REGULATIONS.

READ THE FOLLOWING INSTRUCTIONS CAREFULLY. THESE PRECAUTIONS MUST BE OBSERVED.

1. **Normally the bleeder resistors will discharge the high-voltage capacitors in a short time (approximately 3 minutes). HOWEVER, A BROKEN CONNECTION CAN PREVENT NORMAL DISCHARGE. In this case, the high-voltage capacitors may remain charged to a DANGEROUS VOLTAGE for several hours. THEREFORE, BEFORE ANY REPAIRS OR ADJUSTMENTS ARE MADE, MAKE SURE HIGH-VOLTAGE CAPACITORS ARE DISCHARGED. INSTRUCTIONS FOR DISCHARGING HIGH-VOLTAGE CAPACITORS ARE GIVEN IN PARAGRAPH 12. FOLLOW CAREFULLY.**
2. **DO NOT REMOVE COVER OF VOLTAGE CONVERTER UNIT OR LAMP TERMINAL BLOCK COVER UNTIL VOLTAGE CONVERTER UNIT HAS BEEN TURNED OFF FOR AT LEAST 5 MINUTES.**
3. **DISCONNECT INPUT CABLE BEFORE REMOVING COVER OR LAMP TERMINAL BLOCK COVER.**
4. **DO NOT REMOVE TUBE CAPS UNTIL AFTER HIGH-VOLTAGE CAPACITORS HAVE BEEN DISCHARGED.**
5. **DO NOT REMOVE LAMP CONNECTIONS FROM THE TERMINAL BLOCK UNTIL AFTER THE HIGH-VOLTAGE CAPACITORS HAVE BEEN DISCHARGED.**
6. **DO NOT ATTEMPT TO DISCHARGE HIGH-VOLTAGE CAPACITORS THROUGH CARBON RESISTORS.**
7. **DO NOT, FOR ANY REASON, DISASSEMBLE LAMP WHILE IT IS CONNECTED TO THE VOLTAGE CONVERTER UNIT.**
8. **CONNECT LAMP CABLE FIRST. REPLACE TERMINAL COVERS BEFORE MAKING CONNECTIONS TO THE INPUT SOURCE.**

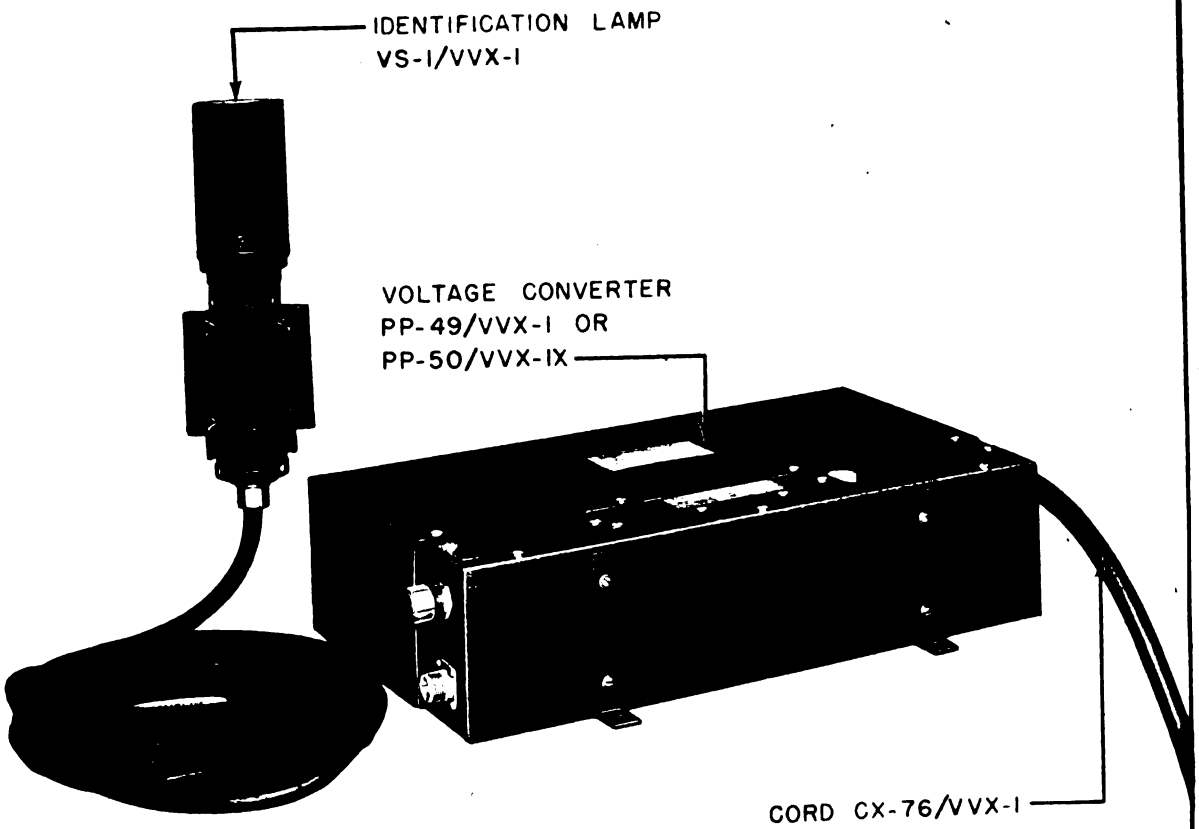


Figure 1. Visual Identification Equipment AN/VVX-1 or AN/VVX-1X, set up for operation.

PART ONE
DESCRIPTION

1. GENERAL.

a. Purpose. Visual Identification Equipments AN/VVX-1 and AN/VVX-1X are used to enable aircraft to identify ground vehicles and also to enable one ground vehicle to identify another ground vehicle. This equipment is designed to deliver an extremely bright flash of light at a rate of approximately 1 flash per 1½ seconds. This flash can be seen by aircraft to a distance of 3 miles, with visibility of 3 miles or more, even in bright sunlight. In clear weather the flash can also be seen by another ground vehicle within 1 mile of the equipment.

b. Points of Difference. Visual Identification Equipments AN/VVX-1 and AN/VVX-1X both consist principally of a voltage converter unit and an identification lamp (fig. 1). The equipments are identical except for the following:
(1) The voltage converter units differ electrically since AN/VVX-1 operates from a 6- or 12-volt d-c source and AN/VVX-1X operates from a 12- or 24-volt d-c source.
(2) The mobile spares for each unit differ according to the voltage converter unit used.

2. MAJOR COMPONENTS (fig. 2).

a. Visual Identification Equipment AN/VVX-1 consists of the following major components:

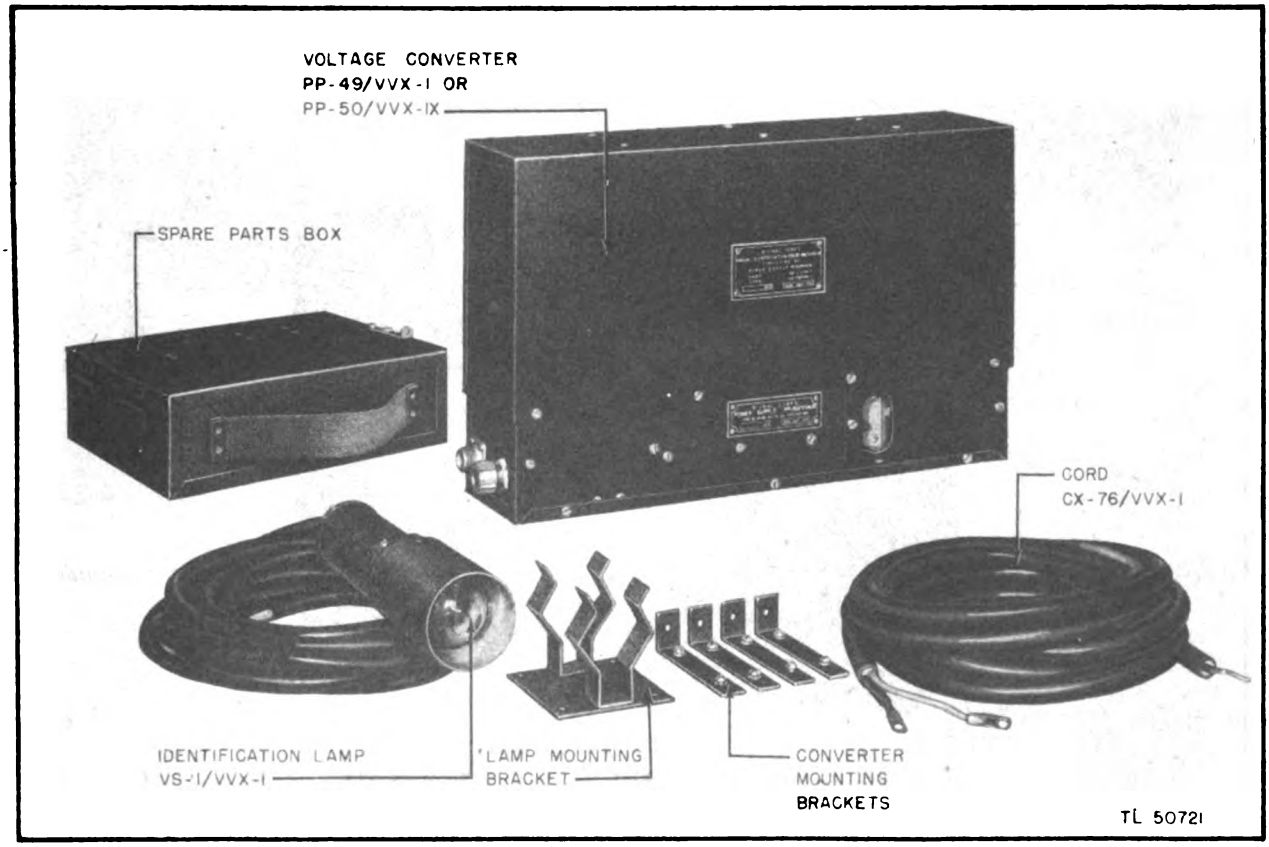


Figure 2. Major components of Visual Identification Equipment AN/VVX-1 or AN/VVX-1X.

1 Voltage Converter PP-49/VVX-1.
1 Identification Lamp VS-1/VVX-1 and cord.
1 Cord CX-76/VVX-1, battery connector.
1 set (4) Converter mounting brackets.
1 Lamp mounting brackets.
1 Mobile spare parts box.

b. Visual Identification Equipment AN/VVX-1X consists of:

1 Voltage Converter Unit PP-50/VVX-1X.
1 Identification Lamp VS-1/VVX-1 and cord.
1 Cord CX-76/VVX-1, battery cord.
1 set (4) Converter mounting brackets.
1 Lamp mounting bracket.
1 Mobile spare parts box.

3. VOLTAGE CONVERTER UNITS.

a. General. The voltage units operate Identification Lamp VS-1/VVX-1 intermittently. The units for Visual Identification Equipments AN/VVX-1 and AN/VVX-1X are identical in external appearance (fig. 3), since they are both inside a rectangular sheetsteel case with removable cover and base. The holes through the cover and base are used for attaching the mounting brackets supplied with the equipment. The chassis is a rectangular shallow case. On the right-hand side of the front of the chassis, an input terminal cover is mounted over a recessed panel which contains the ON-OFF switch, a fuse receptacle, and the input terminal. On the left-hand side of the chassis front, a lamp terminal cover is fastened over another recessed panel on which is mounted the output terminal block. A large hole on the end of the chassis nearest the input terminals permits the input cable to be inserted and attached to the terminals. On the other end a cable clamp is provided to hold the lamp cable in place. A 2-pin socket on the same end of the chassis provides a means for attaching a remote-control trigger device. The voltage converter unit steps up the input voltage to approximately 2,000 volts direct current.

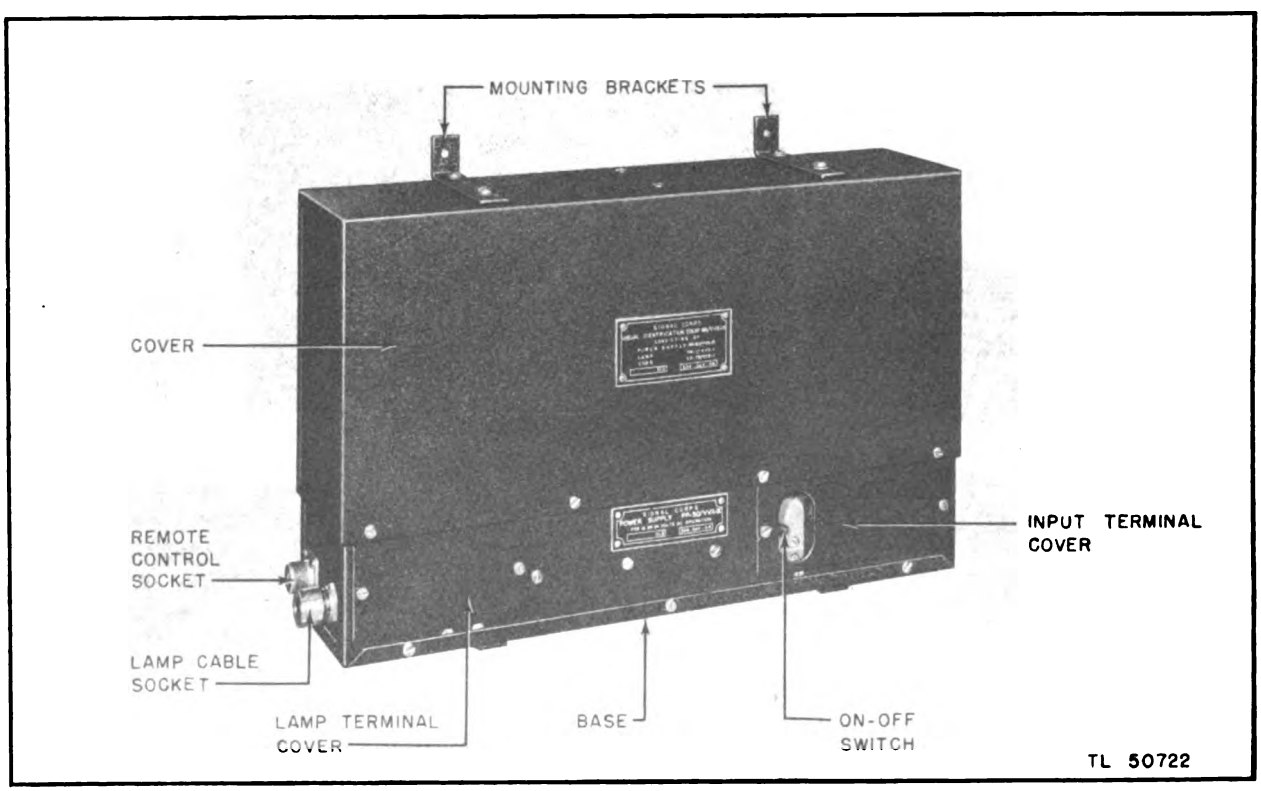


Figure 3. Voltage Converter PP-49/VVX-1 or PP-50/VVX-1X.

b. Voltage Converter PP-49/VVX-1. Voltage Converter PP-49/VVX-1 operates from either a 6- or 12-volt d-c battery. The switching arrangement for 6- or 12-volt d-c operation is given in paragraph 9*d*(1). The converter unit operates satisfactorily over a range of 5- to 8-volts direct current on the 6-volt position, and over a range of 10- to 16-volts direct current on the 12-volt position.

c. Voltage Converter PP-50/VVX-1X. Voltage Converter PP-50/VVX-1X operates from either a 12- or 24-volt d-c battery. The switching arrangement is given in paragraph 9*d*(2). The unit operates satisfactorily over a range of 10- to 16-volts direct current on the 12-volt position, and over a range of 20- to 32-volts direct current on the 24-volt position.

4. IDENTIFICATION LAMP VS-1/VVX-1.

Identification Lamp VS-1/VVX-1 consists of a gaseous-discharge flash lamp and an ignition coil, both mounted in a tubular metal case (fig. 4). The flash lamp has a clear glass lens and fits into a plug-in type socket, where it is held in place by a threaded cap. A trigger switch is mounted on the base of the identification lamp (fig. 4). A shield is provided to limit the lamp signal to one direction. Identification Lamp VS-1/VVX-1 is equipped with a 4-wire cable coded as follows: black for ground connection, green for ignition connection, red for high-voltage connection, and white for trigger connection (figs. 6 and 16).

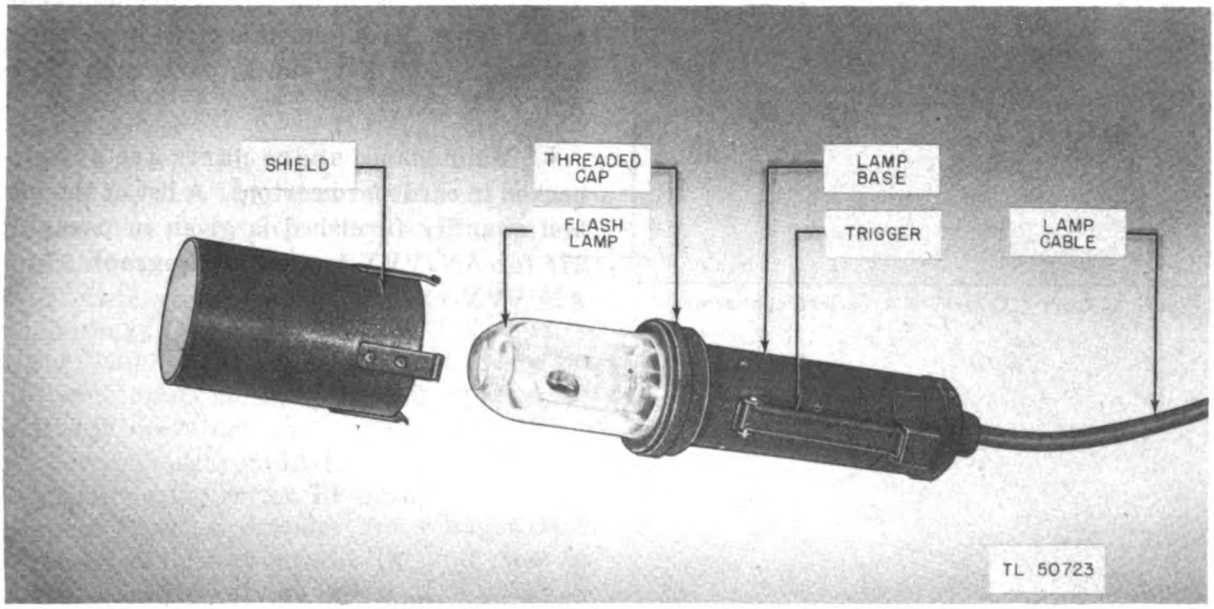


Figure 4. Identification Lamp VS-1/VVX-1.

5. CORD CX-76/VVX-1, BATTERY CONNECTOR (fig. 5).

The battery connector cord consists of 15 feet of No. 10, 2-conductor, rubber-covered cord. The leads are stripped and tinned on one end. The other end contains two large copper lugs for connection to the input terminals.

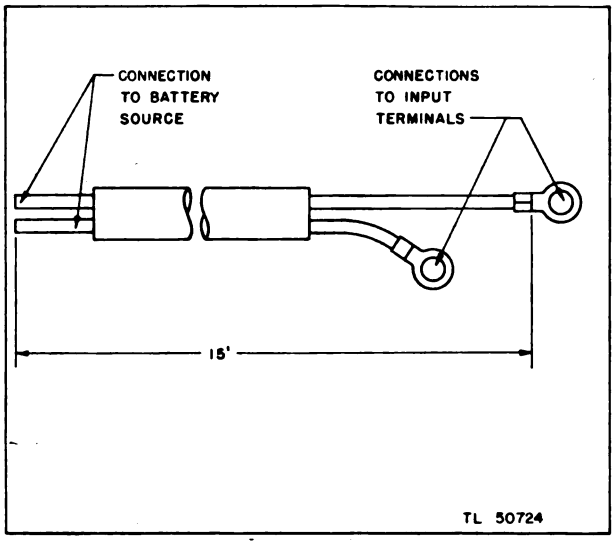


Figure 5. Cord CX-76/VVX-1 battery connector.

6. BRACKETS.

a. Converter mounting brackets are supplied in a set of four. They are steel rods bent at right angles, 4⅛ inches long, with a 1-3/16-inch vertical portion. The brackets each have two mounting holes which correspond to the mounting holes on the converter unit. Two of the rods are fastened to the top of the Voltage Converter PP-49/VVX-1 or PP-50/VVX-1X, and two are mounted on the base (fig. 3).

b. The lamp mounting bracket has a steel base 3½ inches square upon which are spot-welded two steel spring clamps. There is a mounting hole in each corner of the bracket.

7. SPARE PARTS.

a. Running spare parts are supplied packed in a steel box. A list of the parts and quantity furnished for each equipment is given in paragraph 27*d* for AN/VVX-1, and in paragraph 27*e* for AN/VVX-1X.

b. Maintenance spare parts are supplied packed in cardboard cartons. A list of the parts and quantity furnished is given in paragraph 27*f* for AN/VVX-1, and in paragraph 27*g* for AN/VVX-1X.

PART TWO
INSTALLATION

8. PRECAUTIONS.

During installation and operation of the equipment, observe the following:

a. Connect lamp cable first.

b. Replace lamp terminal block cover before connecting input terminal.

c. Read precautions given in paragraph 13 before attempting any repairs or adjustments.

9. INSTALLATION.

a. Mount the identification lamp bracket by means of screws through the four holes provided on the bracket.

b. Mount the identification lamp by pushing it into the clamps on the mounting bracket.

c. Check the voltage of the available source of input power.

d. Set the switching plate of the voltage converter unit to correspond with the input voltage being used.

(1) For voltages from 5- to 8-volts direct current, Voltage Converter PP-49/VVX-1 must be set for 6-volt operation. For voltages from 10- to 16-volts direct current, the unit must be set for 12-volt operation.

(2) For voltages from 10- to 16-volts direct current, Voltage Converter PP-50/VVX-1X must be set for 12-volt operation. For voltages from 20- to 32-volts direct current, the unit must be set for 24-volt operation.

NOTE: See paragraph 10 for method of setting the switching plate.

e. Mount the voltage converter unit by means of the four mounting brackets provided. Mounting holes are for No. 10-32 screws.

f. Remove lamp terminal cover (fig. 3).

g. Connect the lamp cable to the terminal block (fig. 6) as follows:

(1) Connect the black wire to the ground terminal (marked GND on the grounding-terminal bracket).

(2) Connect the white wire to the trigger terminal (marked TRIG on the terminal block).

(3) Connect the green wire to the ignition terminal (marked IGN on the terminal block).

(4) Connect the red wire to the high-voltage terminal (marked HI-VOLT on the terminal block).

NOTE: Connections to the terminal block must be clean and secure.

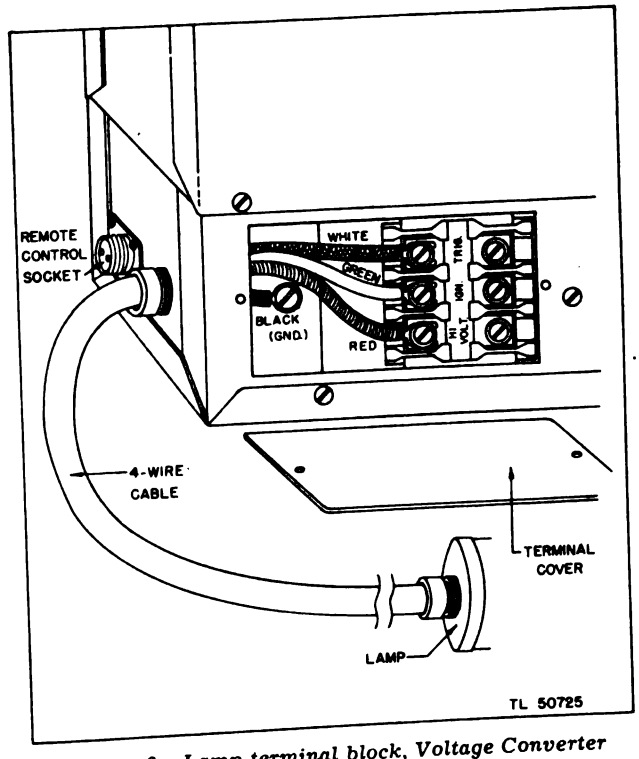


Figure 6. Lamp terminal block, Voltage Converter PP-49/VVX-1 or PP-50/VVX-1X.

h. Replace lamp terminal cover. This must be done BEFORE making connections to the input terminals.

i. Remove input terminal cover.

j. Check fuse (fig. 7). Use the following ratings:

(1) A 40-ampere, 4-AG fuse must be used for 6-volt operation of Voltage Converter PP-49/VVX-1, and a 20-ampere, 4-AG fuse for 12-volt operation.

(2) A 20-ampere, 4-AG fuse must be used for 12-volt operation of Voltage Converter PP-50/VVX-1X, and a 10-ampere, 3-AG fuse for 24-volt operation.

k. Install battery connector Cord CX-76/VVX-1 (fig. 7) as follows:

(1) Insert battery connector cord through hole in the end of the chassis.

(2) Fasten lugs (on the end of the cord) on the ¼-20 input terminal bolts by means of wingnuts.

NOTE: In vehicular installations, be careful to fasten the *same* polarity to the grounded terminal bolt that is grounded in the vehicle's battery installation.

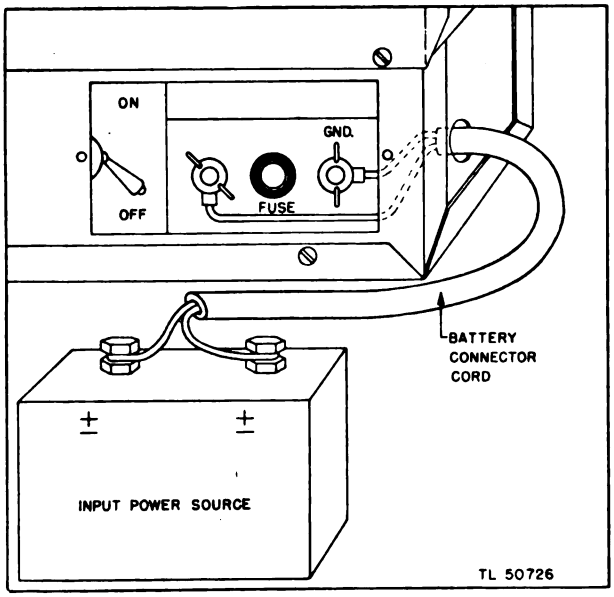


Figure 7. Input terminal block, Voltage Converter PP-49/VVX-1 or PP-50/VVX-1X.

l. Replace input terminal cover.

m. Connect cord to battery.

n. Unless a remote control device is available, no connection is made to the remote control socket on the left-hand end of the chassis alongside the lamp cable socket (fig. 3).

10. SWITCHING PLATE.

To set the switching plate, proceed as follows:

a. Remove the base by unscrewing the flat top, binding head screws holding it. The switching plate is located on the transformer-terminal board (fig. 20) and is held in place by seven screws.

b. For 6-volt d-c operation of Voltage Converter PP-49/VVX-1 (fig. 8), the switching plate must cover the position marked 6. For 12-volt d-c operation, the switching plate must cover the position marked 12.

c. For 12-volt d-c operation of Voltage Converter PP-50/VVX-1X (fig. 9), the switching plate must cover the position marked 12. For 24-volt d-c operation, the switching plate must cover the position marked 24.

d. The brass bars on the switching plate must face the transformer.

e. Each screw must be fastened securely.
NOTE: There is only one position in which the switching plate can be placed so that all seven holes will line up with the tapped terminals on the transformer terminal board.

f. Replace base.

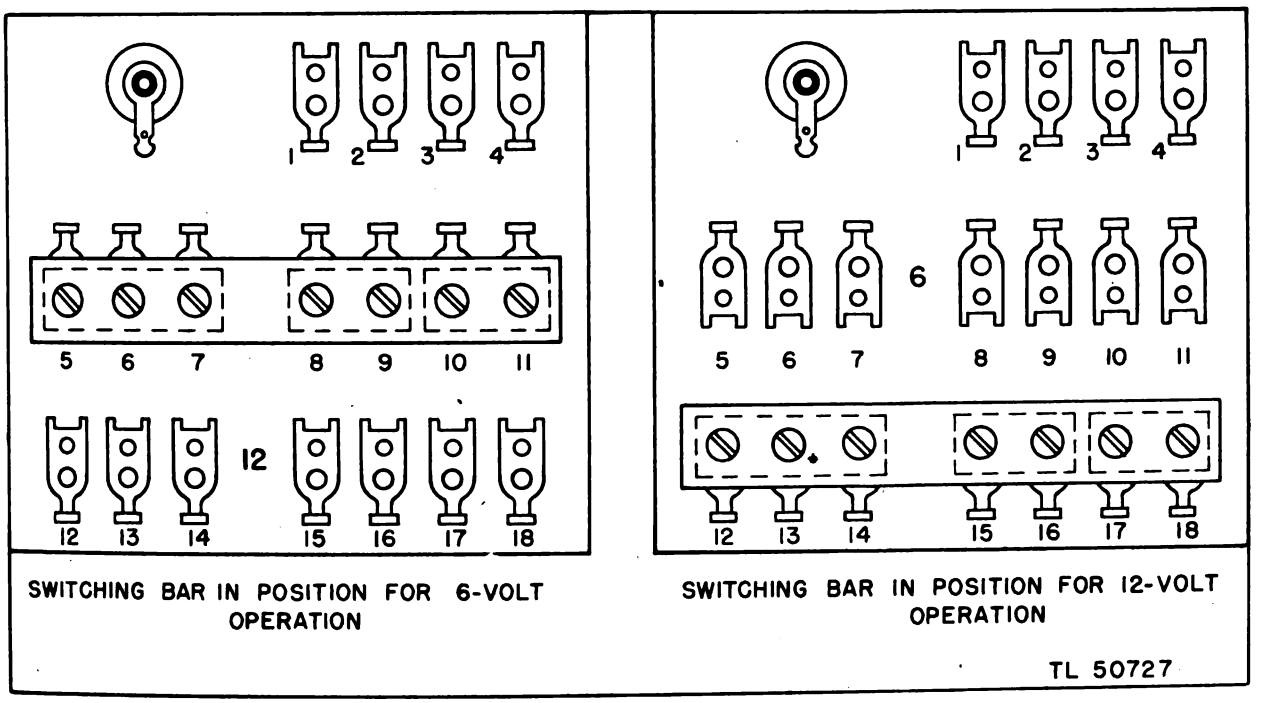


Figure 8. Switching panel diagram, Voltage Converter PP-49/VVX-1.

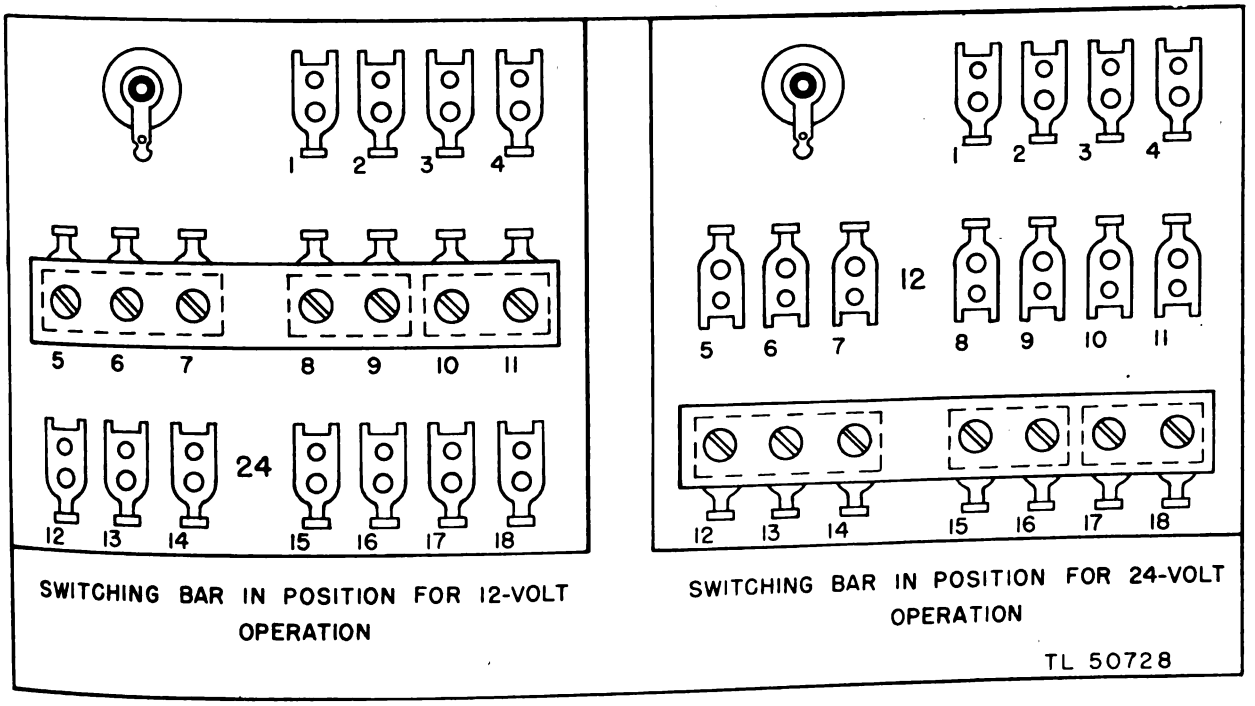


Figure 9. Switching panel diagram, Voltage Converter PP-50/VVX-1X.

PART THREE
OPERATION

11. IDENTIFICATION LAMP.

After all connections have been completed, the equipment is ready for operation.

a. Throw the ON-OFF switch on the voltage converter unit to ON, and let it warm up for 10 seconds before depressing the trigger switch.

b. Push the trigger switch on the identification lamp. The lamp will flash repeatedly at intervals of approximately 1 to 1½ seconds as long as the trigger switch is depressed.

c. When the unit is operating, vibrator hum is easily heard; also, vibration can be felt by touching the case of the voltage converter unit.

12. DISCHARGING CAPACITORS.

a. Discharge high-voltage capacitors (figs. 20 and 21) whenever the equipment is to be moved from one place to another, or whenever any component of the equipment is to be disconnected. Proceed *exactly* in the manner described in subparagraph *b* below.

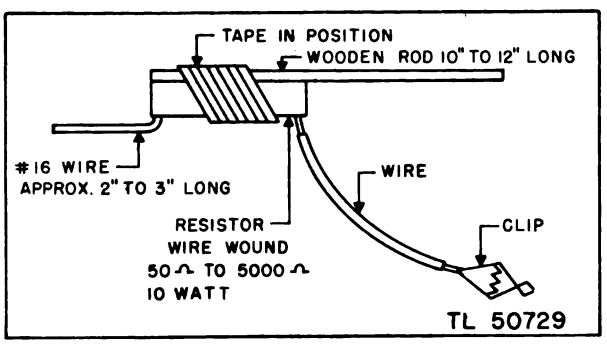


Figure 10. Device for discharging high-voltage capacitors.

b. Prepare the following device for discharging the high-voltage capacitors (fig. 10):

(1) Fasten a *wire-wound* resistor (50 to 5,000 ohms, of at least 10-watt rating) to a wooden dowel rod, or to a rod of any equivalent insulating material.

(2) Attach a wire to one end of the resistor.

(3) Attach a battery clip to the wire.

(4) Attach a No. 16 wire to the other resistor lead.

c. Remove output terminal cover. DO NOT TOUCH TERMINAL BLOCK.

d. Remove input terminal cover. *Do not remove top cover or bottom cover.*

e. Discharge high-voltage capacitors 5-1 and 5-2 through wire-wound resistor as follows:

(1) Connect battery clip to any suitable ground on the chassis. Input ground terminal is satisfactory (fig. 11 (1)). Make sure that ground connection is clean and secure. Do not try to ground to a painted surface.

(2) Hold the insulating rod. DO NOT TOUCH ANY OTHER PART OF THE DEVICE. Use one hand only. Do not touch anything with the other hand.

(3) Touch No. 16 wire to the high-voltage terminal of the terminal block (fig. 11 (1)). Leave for approximately ½ minute. Unless the unit has been resting unused for a long time, a small spark should appear when the terminal is touched. *If no spark is visible, remove the discharging device and check it for continuity. If the device shows continuity, proceed again exactly as stated above.*

f. Place screwdriver (or other metal bar with an insulating handle) from chassis to high-voltage terminal (fig. 11 (2)). Be sure the metal bar makes good contact with the chassis and maintains good contact while the end of the bar is lowered to touch high-voltage terminal.

CAUTION: Do not use screwdriver or other metal bar for discharging capaci-

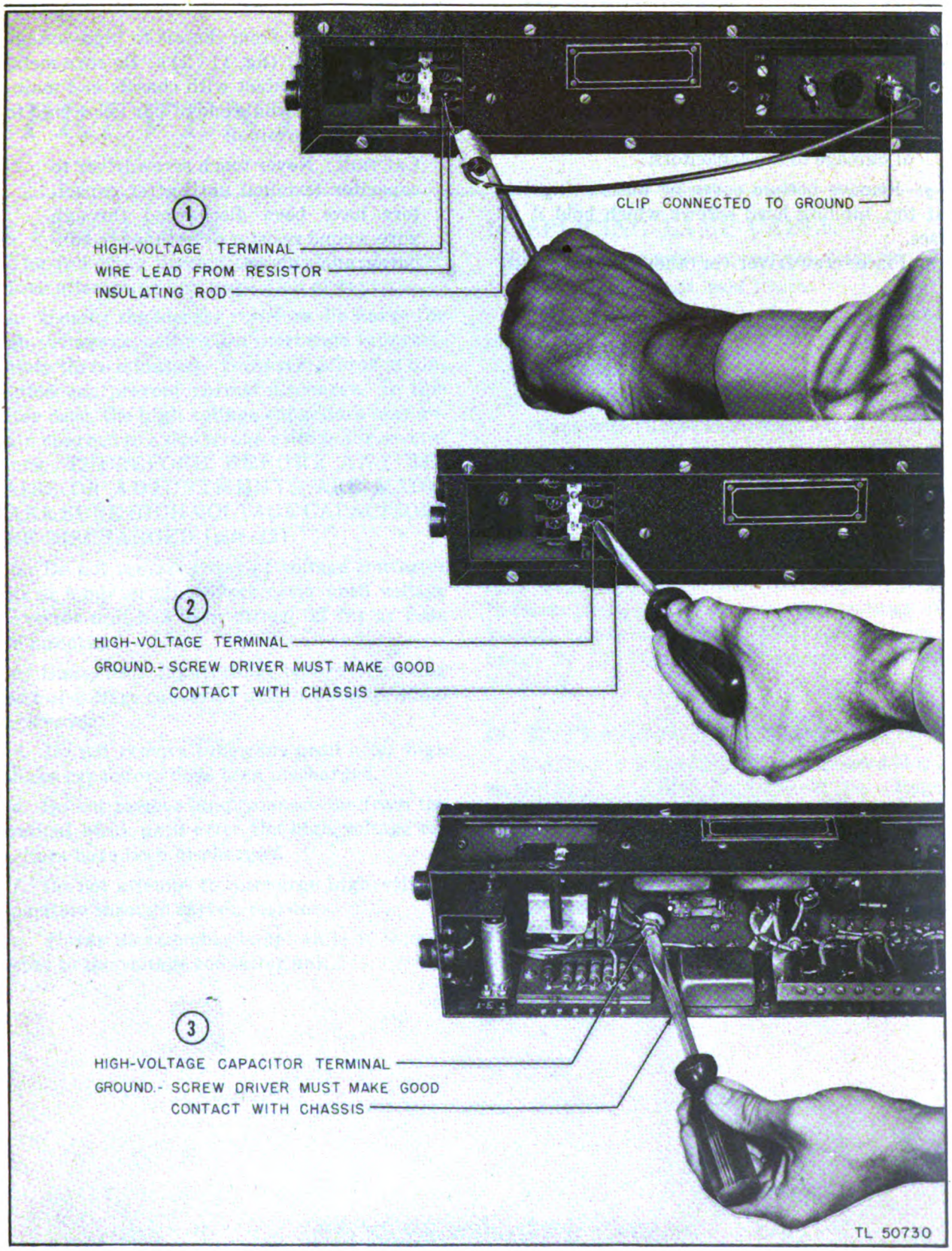


Figure 11. Discharging high-voltage capacitors.

613668 O - 44 - 2

tors until after the capacitors have been discharged through the wire-wound resistor. To do so is extremely dangerous. There is possibility of shock, injury due to flying metal produced in the arc, and of damage to the capacitors.

g. Remove bottom cover by unscrewing the flat top, binding head screws which hold it in place.

h. Place screwdriver (or other metal bar with insulating handle) from chassis to hign-voltage capacitor terminal (fig. 11 (3)). Be sure metal bar makes good contact with chassis and maintains good contact while end of bar is lowered to touch capacitor terminal.

CAUTION: Never touch screwdriver to capacitor terminal until after capacitors have been discharged through wire-wound resistor as outlined in subparagraph *e* above.

PART FOUR
PREVENTIVE MAINTENANCE

13. PRECAUTIONS.

The following precautions must be observed before attempting any inspection or repairs.

a. Usually the bleeder resistors discharge the high-voltage capacitors in a short time (approximately three minutes). However, a broken connection can prevent normal discharge. In this latter case, the high voltage capacitors may remain charged to a *dangerous voltage* for several hours. THEREFORE, BEFORE ANY REPAIRS OR ADJUSTMENTS ARE MADE, MAKE SURE HIGH VOLTAGE CAPACITORS ARE DISCHARGED (par. 12).

b. Do not remove cover of voltage converter unit or lamp terminal block cover until voltage converter unit has been turned off for at least five minutes.

c. Disconnect input cable before removing cover of voltage converter unit or lamp terminal block cover.

d. Do not remove tube caps until *after* high voltage capacitors have been discharged.

e. Do not remove lamp connections from the terminal block until *after* the high voltage capacitors have been discharged.

f. Do not attempt to discharge high voltage capacitors through carbon resistors.

g. Never disassemble lamp while it is connected to the voltage converter unit.

14. SPLICING LAMP CABLE.

The following procedure *must* be observed:

a. Strip the leads at least 1 inch.

b. Tin leads thoroughly, using rosin core solder.

c. Splice leads.

d. Solder splices thoroughly.

e. Tape with rubber electrician's tape.

f. Tape again with friction tape or equivalent.

15. REPLACING FUSE.

Remove input terminal panel. Unscrew the cap marked Fuse (fig. 12). Remove defective fuse. Replace with new fuse of the proper rating. Refer to paragraph 9*j* (1) for fuse ratings of Voltage Converter PP-49/VVX-1 and to paragraph 9*j* (2) for Voltage Converter PP-50/VVX-1X.

16. REPLACING VIBRATOR (fig. 12).

The vibrator is held in place by a wooden block on the cover. Remove the cover of the voltage converter unit by unscrewing the flat top binding head screws which hold it in place. Note the indexing of the vibrator socket before inserting a new vibrator. Insert the vibrator into the socket so that the two large prongs on the vibrator plug fit into the corresponding holes in the socket. Be sure to seat the vibrator securely in the socket.

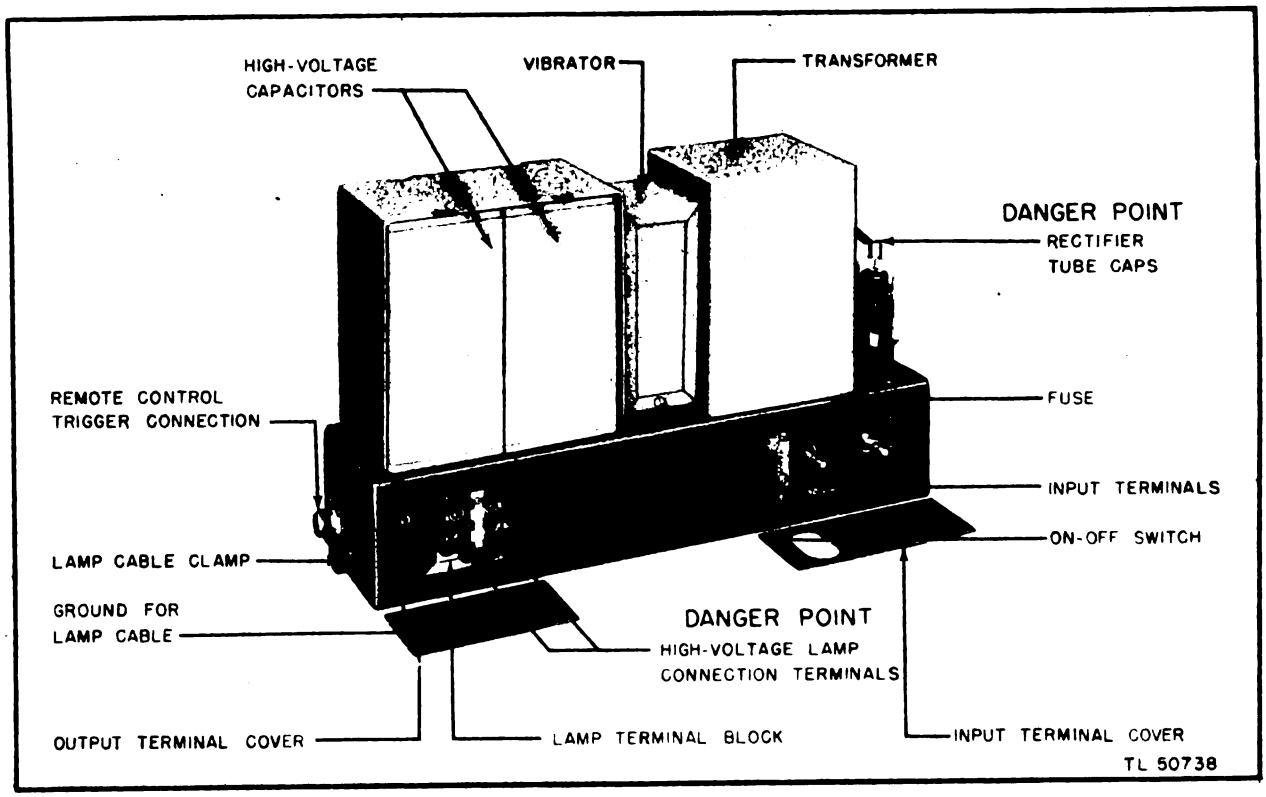


Figure 12. Voltage Converter PP-49/VVX-1 or PP-50/VVX-1X, cover removed.

17. REPLACING TUBES (fig. 12).

Remove tube cap. Pull away the tube clamp to release the tube so that it may be lifted out of the socket. Note the indexing of the tube base and socket before replacing tube. Be sure to seat the tube firmly in the correct position in the socket. Replace tube cap.

18. REPLACING IDENTIFICATION LAMP VS-1/VVX-1 (fig. 4).

a. Remove lamp shield, which is held in place by spring clips, by pulling it off the lamp.

b. Remove the threaded cap which holds the lamp in place.

c. Remove Identification Lamp VS-1/VVX-1 from the socket.

d. Note the indexing of the lamp base and socket before inserting a new lamp into the socket. Be sure lamp is in the correct position before attempting to push it into the socket.

e. Replace threaded cap and tighten.

f. Replace shield.

19. FIELD REPAIRS.

CAUTION: Discharge high-voltage capacitors before attempting any inspection or repairs (par. 12). Danger points are marked on figures 12, 20, and 21. At these points, a shock could mean serious injury or death. However, use care in servicing any part of the equipment since there are other points at which a mild shock may be received.

a. If the visual identification equipment does not operate, examine the fuse. If fuse is blown, first replace vibrator (fig. 12) as explained in paragraph 16. Next, replace fuse as explained in paragraph 15.

b. If the voltage converter unit operates, but the identification lamp does not flash, replace rectifier tubes (par. 17).

c. If the identification lamp still fails to operate, replace flash lamp (par. 18).

d. If the identification equipment still fails to operate, return it to the maintenance depot for repair.

PART FIVE
FUNCTIONING OF PARTS

20. VOLTAGE CONVERTER PP-49/VVX-1.

The voltage converter unit circuit may be considered in three separate sections according to the functions performed by each:

a. Input Circuit (fig. 13). (1) When the ON-OFF switch (6) is thrown to ON, current flows through the fuse (7), the ON-OFF switch, and the RF choke (20) to the switching panel where it flows to tap E on the transformer. In the 12-volt mode of operation, the current flows from tap E through a 5-ohm, 10-watt resistor (17) to the actuating coil of the vibrator (pin No. 3 on the vibrator socket). In the 6-volt mode of operation, the 5-ohm, 10-watt resistor (17) is omitted from the vibrator coil circuit and the current flows directly from tap E to the actuating coil of the vibrator. The vibrator side reeds (pins No. 1 and No. 6 on the vibrator socket) are connected through the switching plate to either

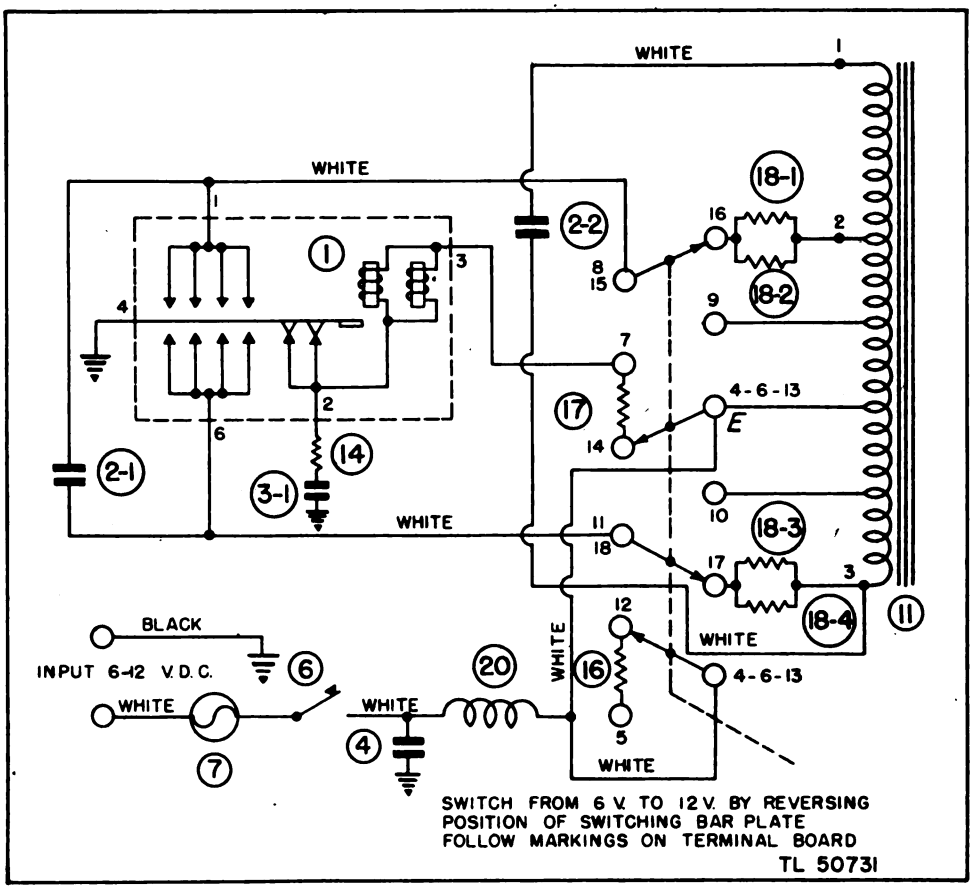


Figure 13. Input circuit, Voltage Converter PP-49/VVX-1.

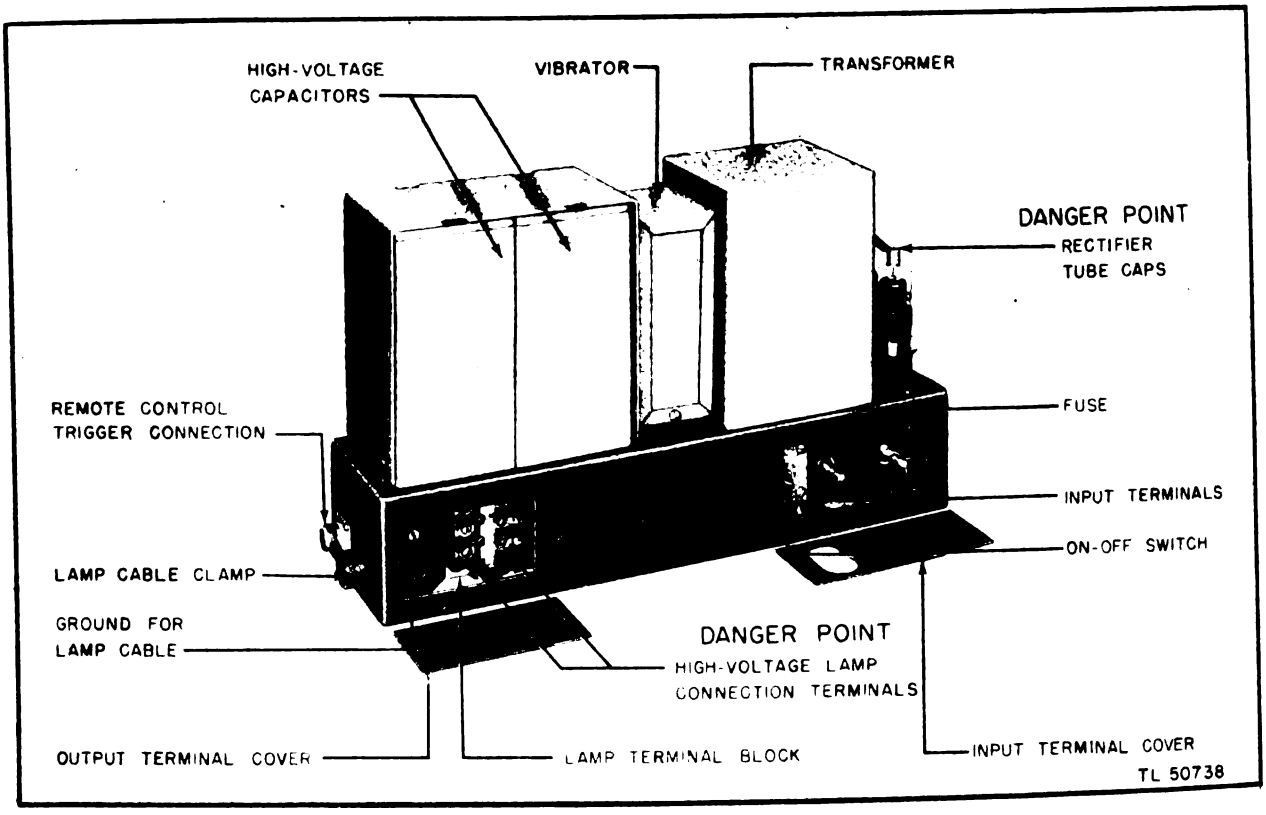


Figure 12. Voltage Converter PP-49/VVX-1 or PP-50/VVX-1X, cover removed.

17. REPLACING TUBES (fig. 12).

Remove tube cap. Pull away the tube clamp to release the tube so that it may be lifted out of the socket. Note the indexing of the tube base and socket before replacing tube. Be sure to seat the tube firmly in the correct position in the socket. Replace tube cap.

18. REPLACING IDENTIFICATION LAMP VS-1/VVX-1 (fig. 4).

a. Remove lamp shield, which is held in place by spring clips, by pulling it off the lamp.

b. Remove the threaded cap which holds the lamp in place.

c. Remove Identification Lamp VS-1/VVX-1 from the socket.

d. Note the indexing of the lamp base and socket before inserting a new lamp into the socket. Be sure lamp is in the correct position before attempting to push it into the socket.

e. Replace threaded cap and tighten.

f. Replace shield.

19. FIELD REPAIRS.

CAUTION: Discharge high-voltage capacitors before attempting any inspection or repairs (par. 12). Danger points are marked on figures 12, 20, and 21. At these points, a shock could mean serious injury or death. However, use care in servicing any part of the equipment since there are other points at which a mild shock may be received.

a. If the visual identification equipment does not operate, examine the fuse. If fuse is blown, first replace vibrator (fig. 12) as explained in paragraph 16. Next, replace fuse as explained in paragraph 15.

b. If the voltage converter unit operates, but the identification lamp does not flash, replace rectifier tubes (par. 17).

c. If the identification lamp still fails to operate, replace flash lamp (par. 18).

d. If the identification equipment still fails to operate, return it to the maintenance depot for repair.

PART FIVE
FUNCTIONING OF PARTS

20. VOLTAGE CONVERTER PP-49/VVX-1.

The voltage converter unit circuit may be considered in three separate sections according to the functions performed by each:

a. Input Circuit (fig. 13). (1) When the ON-OFF switch (6) is thrown to ON, current flows through the fuse (7), the ON-OFF switch, and the RF choke (20) to the switching panel where it flows to tap E on the transformer. In the 12-volt mode of operation, the current flows from tap E through a 5-ohm, 10-watt resistor (17) to the actuating coil of the vibrator (pin No. 3 on the vibrator socket). In the 6-volt mode of operation, the 5-ohm, 10-watt resistor (17) is omitted from the vibrator coil circuit and the current flows directly from tap E to the actuating coil of the vibrator. The vibrator side reeds (pins No. 1 and No. 6 on the vibrator socket) are connected through the switching plate to either

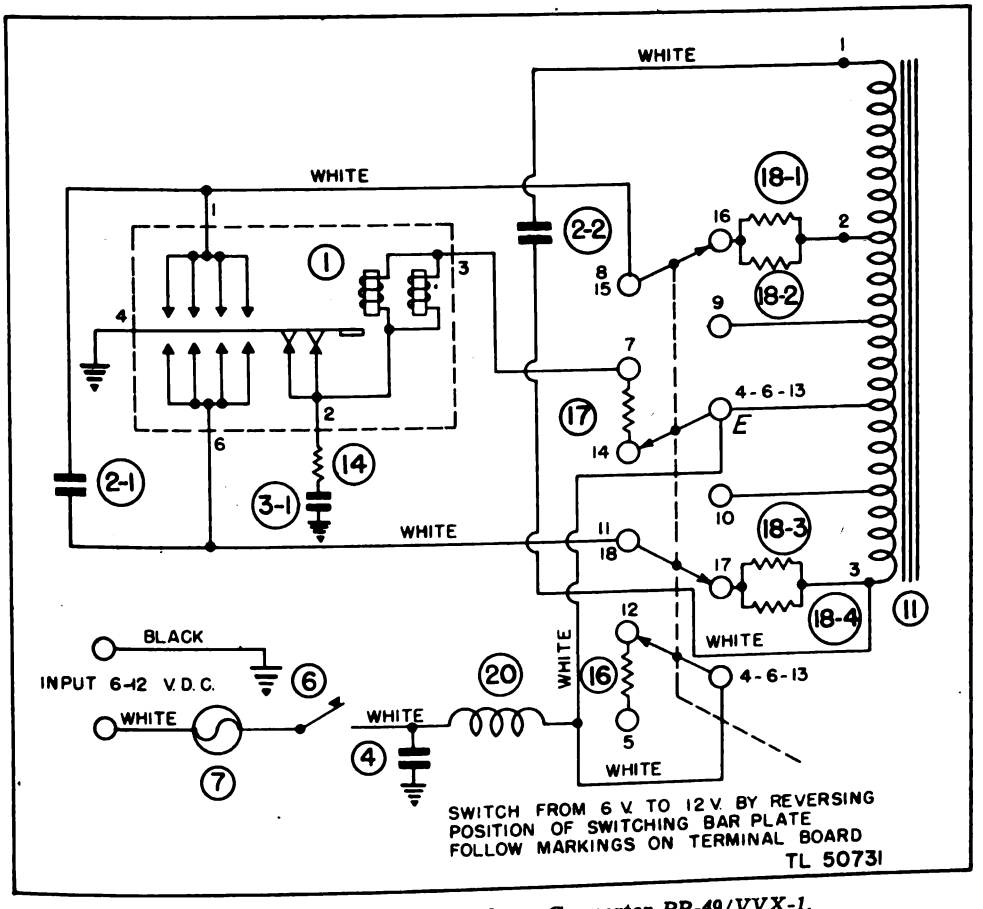


Figure 13. Input circuit, Voltage Converter PP-49/VVX-1.

the 6-volt primary connections (terminals 9 and 10) or to the 12-volt primary connections (terminals 16 and 17). In the 12-volt mode of operation terminals 16 and 17 are connected through two pairs of parallel 0.25-ohm, 10-watt resistors (18-1), (18-2), (18-3), and (18-4). When the vibrator is operating, it reverses the direction of current flow in the primary of the transformer at a rate of approximately 120 cycles per second, causing an induced voltage to appear in the secondary winding.

(2) A 1-mfd, 165-volt a-c capacitor (2-2) serves as the buffer and is connected to the ends of the transformer primary winding.

(3) A 0.5-mfd, 50-volt d-c capacitor (4) is the input RF filter capacitor.

(4) Another 1-mfd, 165-volt a-c capacitor (3-1) and a 5-ohm, ½-watt resistor (14) serve as the vibrator driver-point suppressors and provide improved vibrator operation.

(5) Another 1-mfd, 165-volt a-c capacitor (2-1) serves as the primary buffer.

b. High-voltage Secondary Circuit (fig. 14). The ends of the center-tapped winding of the power transformer (11) are connected to the plate terminals of two 12 X 3 rectifier tubes (12-1) and (12-2). The resulting d-c output, which is taken from the transformer secondary center tap, charges two 23-mfd, 2,000-volt d-c capacitors (5-1) and (5-2).

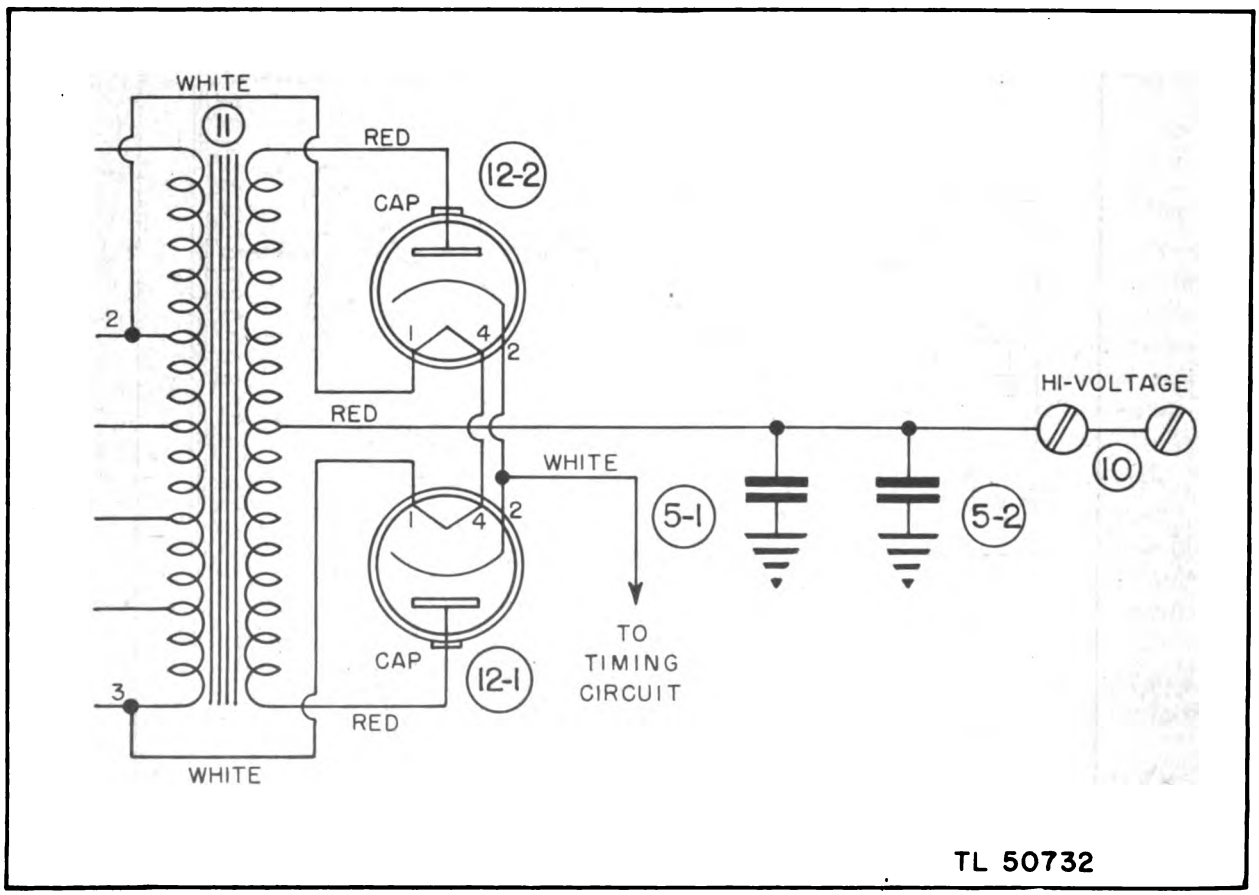


Figure 14. High-voltage secondary circuit, Voltage Converter PP-49/VVX-1.

c. Timing and Trigger Circuit (fig. 15). (1) Six 200,000-ohm, 1-watt bleeder resistors (15-1), (15-2), (15-3), (15-4), (15-5), and (15-6), pass current and charge capacitor (2-3) to approximately 300 volts direct current. The capacitor (2-3) is in series with the primary of the ignition coil in the identification lamp. When capacitor (2-3) is shorted to ground, an impulse of current passes through the primary of the lamp ignition coil (fig. 16). The high voltage produced on the secondary of the ignition coil ionizes the gas in the lamp. The charge on the high-voltage capacitors (5-1) and (5-2) then discharges through the lamp, causing a brilliant flash of light.

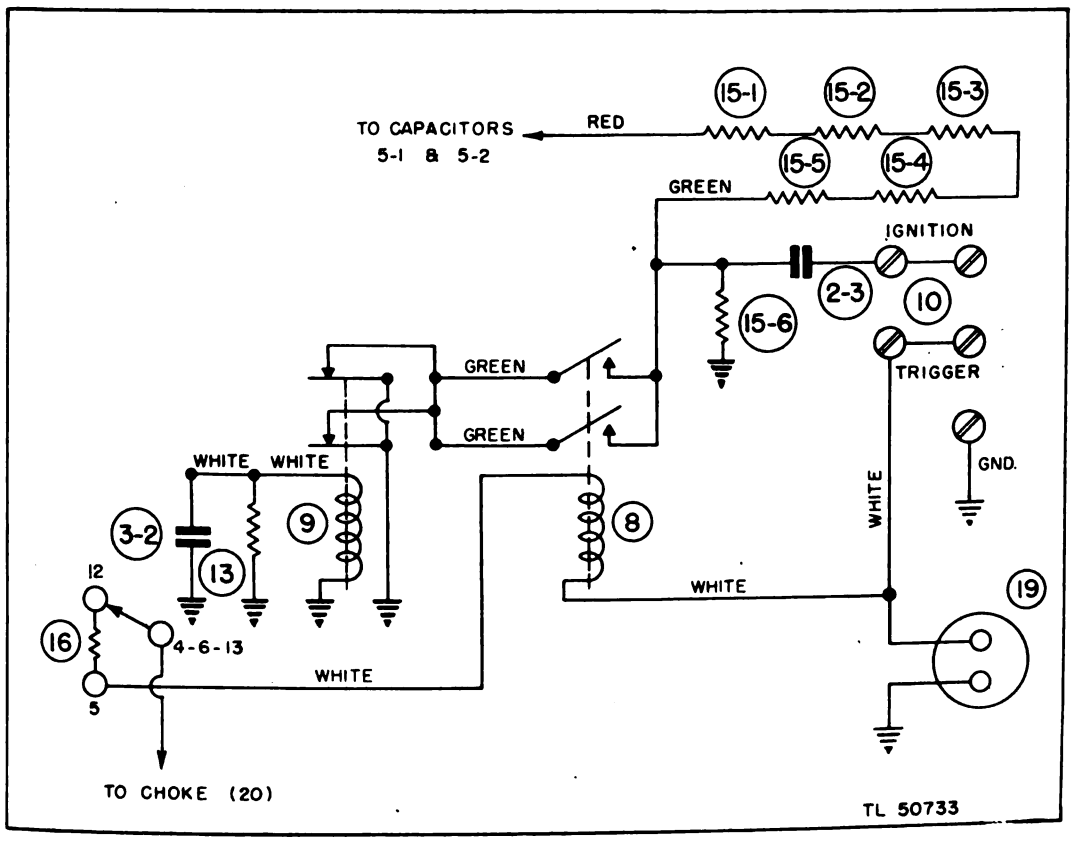


Figure 15. Timing and trigger circuit, Voltage Converter PP-49/VVX-1.

(2) Timing of the ignition circuit is accomplished as follows: immediately after a flash, the high-voltage capacitors (5-1) and (5-2) are discharged. This constitutes a short circuit on the secondary of the transformer. The current at this time is high (approximately 150 ma). This current is passed through the coil of relay 9 and causes the relay to close. As the voltage on the capacitors (5-1) and (5-2) increases, the current through the coil of the relay 9 decreases until the relay opens. The time required for this cycle is between 1 and 1½ seconds. When relay 9 is open and relay 8 is closed, capacitor (2-3) is shorted out to ground.

(3) A 0.5-mfd, 50-volt d-c capacitor (3-2) improves the action of relay 9.

(4) A 500-ohm, 10-watt resistor (13) determines the timing of relay 9.

(5) Relay 8 is actuated by means of the push button on the identification lamp.

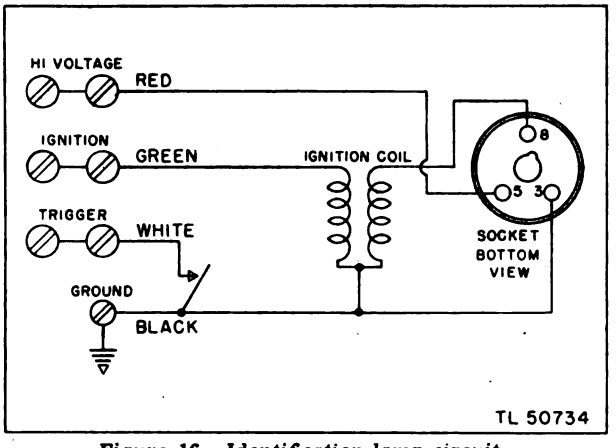


Figure 16. Identification lamp circuit.

21. VOLTAGE CONVERTER PP-50/VVX-1X.

The voltage converter unit circuit may be considered in three separate sections according to the functions performed by each:

a. Input Circuit (fig. 17). (1) When the ON-OFF switch (6) is thrown to ON, current flows through the fuse (7), the ON-OFF switch, and the RF choke (21) to the switching panel where it flows to tap E on the transformer. In the 24-volt mode of operation, the current flows from tap E through a 10-ohm, 10-watt resistor (16) to the actuating coil of the vibrator (pin No. 3 on the vibrator socket). In the 12-volt mode of operation, the 10-ohm, 10-watt resistor (16) is omitted from the vibrator coil circuit and current flows directly from tap E to the actuating coil of the vibrator. The vibrator side reeds (pins No. 1 and No. 6 on the vibrator socket) are connected through two pairs of parallel 0.25-ohm, 10-watt resistors (18-1), (18-2), (18-3), and (18-4) to the switching plate. From the switching plate connection is made to either the 12-volt primary connections (terminals 9 and 10) or to the 24-volt primary connections

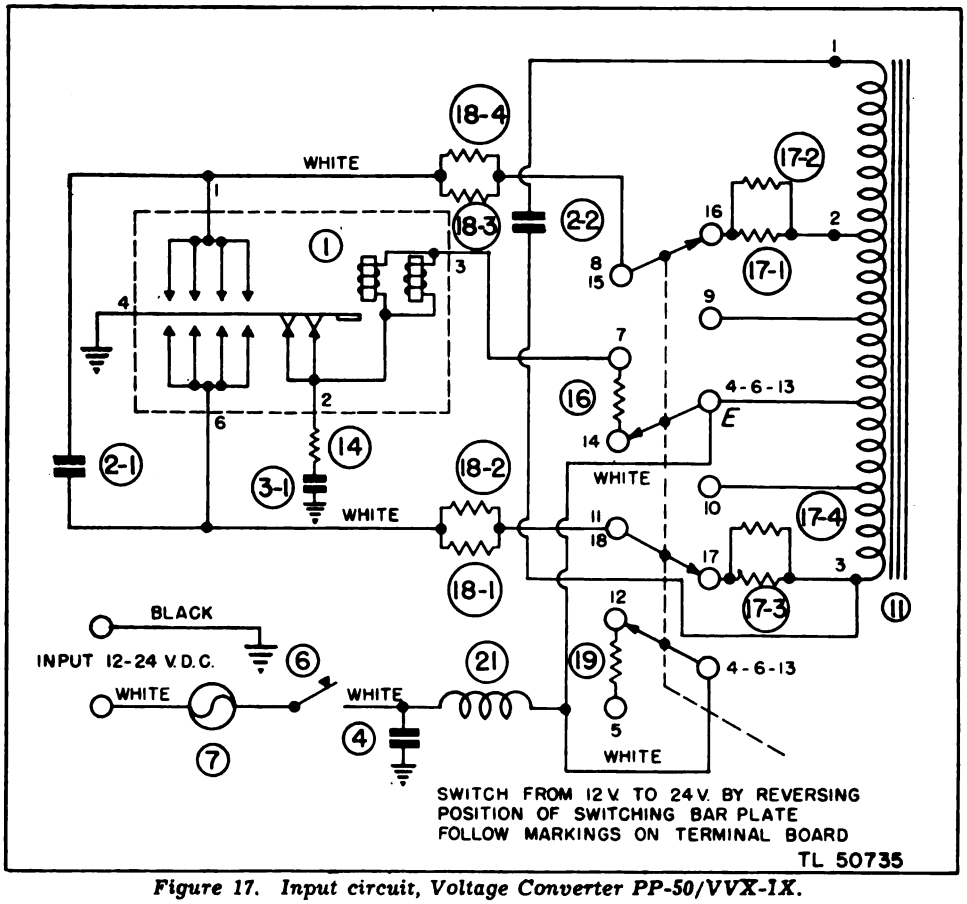


Figure 17. Input circuit, Voltage Converter PP-50/VVX-1X.

(terminals 16 and 17). In the 24-volt mode of operation terminals 16 and 17 are connected to the transformer windings through two pairs of parallel 2-ohm, 10-watt resistors (17-1), (17-2), (17-3), and (17-4). When the vibrator is operating, it reverses the direction of current flow in the primary of the transformer at a rate of approximately 120 cycles per second, causing an induced voltage to appear in the secondary winding.

(2) A 1-mfd, 165-volt a-c capacitor (2-2) serves as the buffer and is connected to the ends of the transformer primary winding.

(3) A 0.5-mfd, 50-volt d-c capacitor (4) is the input RF filter capacitor.

(4) Another 0.5-mfd, 50-volt d-c capacitor (3-1) and a 5-ohm, ½-watt resistor (14) serve as the vibrator driver-point suppressors and provide improved vibrator operation.

(5) Another 1-mfd, 165-volt a-c capacitor (2-1) serves as the primary buffer.

b. High-voltage Secondary Circuit (fig. 18). The ends of the center-tapped winding of the power transformer (11) are connected to the plate terminals of two 12 X 3 rectifier tubes (12-1) and (12-2). The resulting d-c output, which is taken from the transformer secondary center tap, charges two 23-mfd, 2,000-volt d-c capacitors (5-1) and (5-2).

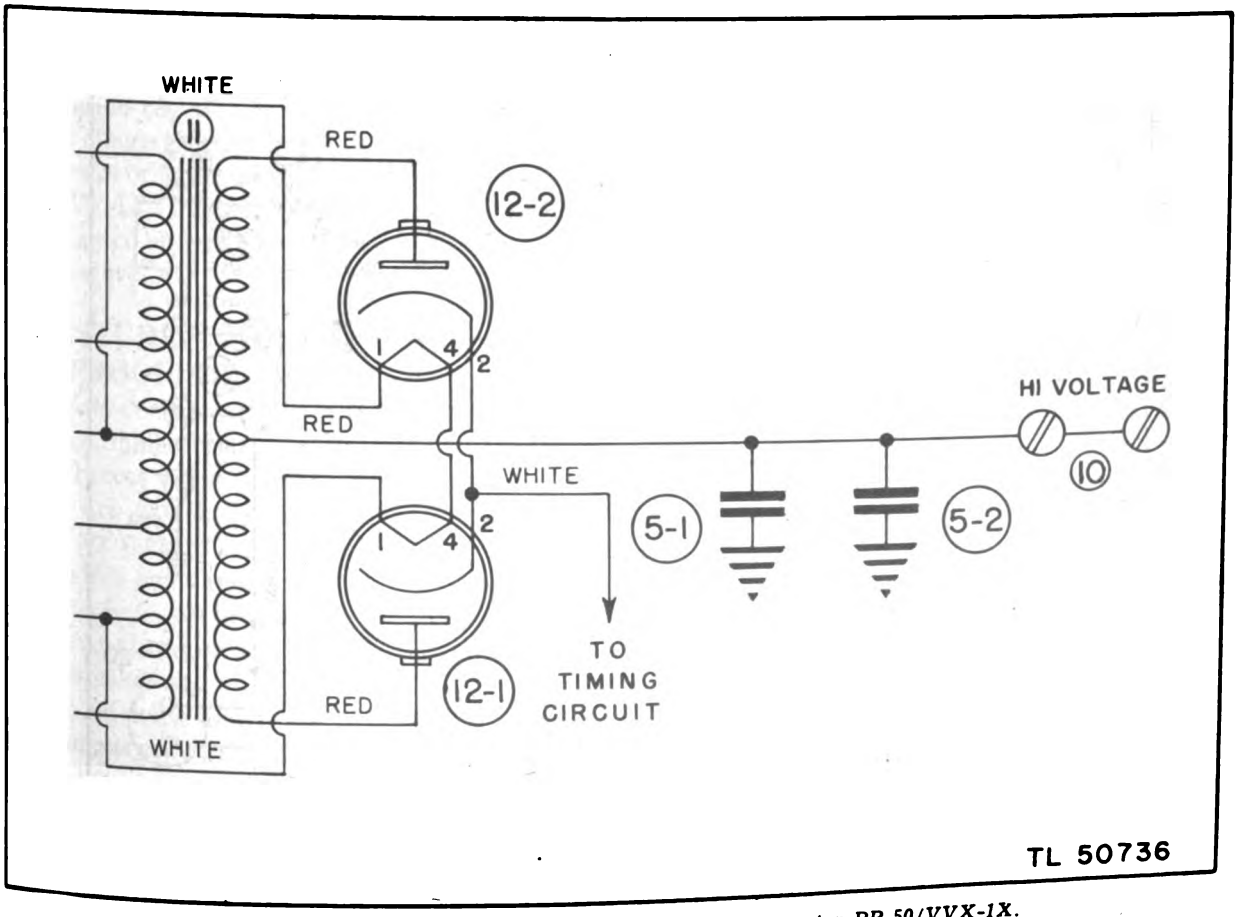


Figure 18. High-voltage secondary circuit, Voltage Converter PP-50/VVX-1X.

c. Timing and Trigger Circuit (fig. 19). (1) Six 200,000-ohm, 1-watt bleeder resistors (15-1), (15-2), (15-3), (15-4), (15-5), and (15-6) pass current and charge capacitor (2-3) to approximately 300 volts d-c. The capacitor (2-3) is in series with the primary of the ignition coil in the identification lamp. When this capacitor (2-3) is shorted to ground, an impulse of current passes through the primary of the lamp ignition coil (fig. 16). The high voltage produced on the secondary of the ignition coil ionizes the gas in the lamp. The charge on the high-voltage capacitors (5-1) and (5-2) then discharges through the lamp, causing a brilliant flash of light.

(2) Timing of the ignition circuit is accomplished as follows: immediately after a flash, the high-voltage capacitors (5-1) and (5-2) are discharged. This constitutes a short circuit on the secondary of the transformer. The current at this time is high (approximately 150 ma). This current passes through the coil of relay 9 and causes the relay to close. As the voltage on the capacitors (5-1) and (5-2) increases, the current through the coil of the relay 9 decreases until the relay opens. The time required for this cycle is between 1 and 1½ seconds. When relay 9 is open and relay 8 is closed, capacitor (2-3) is shorted out to ground.

(3) A 0.5-mfd, 50-volt d-c capacitor (3-2) improves the action of relay 9.

(4) A 500-ohm, 10-watt resistor (13) determines the timing of relay 9.

(5) Relay 8 is actuated by means of the push button on the identification lamp.

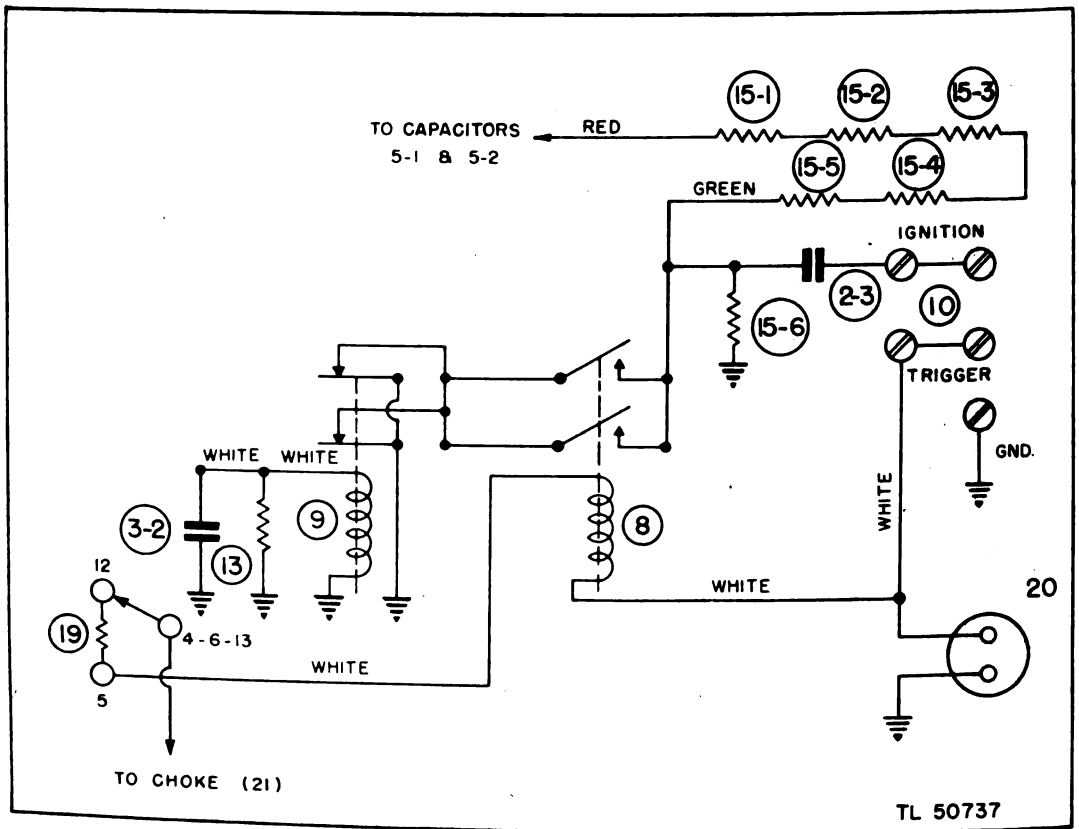


Figure 19. Timing and trigger circuit, Voltage Converter PP-50/VVX-1X.

PART SIX
CORRECTIVE MAINTENANCE

22. REPLACING PARTS, VOLTAGE CONVERTER UNIT.

a. Location of Parts. Two high-voltage capacitors (5-1) and (5-2), the transformer (11), the vibrator (1), and two 12 X 3 rectifier tubes (12-1) and (12-2) are mounted on top of the chassis (fig. 12).

CAUTION: DISCHARGE HIGH-VOLTAGE CAPACITORS BEFORE ATTEMPTING ANY INSPECTION OR REPAIR.

b. Replacing Vibrator and Tubes (pars. 16 and 17).

c. Other Components. Other components will rarely have to be replaced. To replace any of them, check the wiring of the unit with the schematic diagram (fig. 22) or wiring diagram (fig. 23) for Voltage Converter PP-49/VVX-1, and with figure 24 or figure 25 for Voltage Converter PP-50/VVX-1X. Make sure that new parts are firmly mounted and that all new connections are firm and secure.

23. MOISTUREPROOFING AND FUNGIPROOFING.

a. General. Communication failures commonly occur when Signal Corps equipment is operated in tropical areas where temperature and relative humidity are extremely high. The following problems are typical:

(1) Resistors and capacitors fail.

(2) Electrolytic action takes place in coils, chokes, transformer windings, etc., causing eventual breakdown.

(3) Hook-up wire and cable insulation break down. Fungus growth accelerates deterioration.

(4) Moisture forms electrical leakage paths on terminal boards and insulating strips.

(5) Moisture provides leakage paths between battery terminals.

b. Treatment. A moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection against fungus growth, insects, corrosion, salt spray, and moisture. The treatment involves the use of a moisture and fungiresistant varnish applied by means of a spray gun. A brief description of the method of application follows:

(1) All repairs and adjustments necessary for the proper operation of the equipment are made.

(2) Equipment to be processed is thoroughly cleaned of all dirt, dust, rust, fungus, oil, grease, etc.

(3) Equipment is partially disassembled and certain points, such as relay contacts, open switches, air capacitors, sockets, bearings, etc., are covered with masking tape.

(4) Equipment is thoroughly dried by heat to expel moisture which the circuit elements have absorbed.

(5) All circuit elements and all parts of the equipment are sprayed with three coats of moistureproofing and fungiproofing varnish.

(6) The equipment is given a final operational check.

c. Step by step Instructions. (1) CHECKING EQUIPMENT. Be sure the equipment is in operating condition. Make any repairs to put the equipment in perfect operating condition before proceeding.

(2) DISASSEMBLY. Remove the input terminal cover and the output terminal cover of the voltage converter by unscrewing the two screws holding each in place (fig. 12). Turn the voltage converter upside down, and remove the bottom cover by unscrewing the six retaining screws holding it in place. This exposes the bottom of the chassis.

(3) CLEANING. Use a dry air blast or a small brush to remove dirt, oil, and grease from the exposed parts on the chassis. Then wipe with a clean cloth dampened with naphtha.

(4) MASKING. Cover with masking tape those parts of the following items where a coating of varnish would prevent electrical continuity: relays No. 8 and No. 9 (figs. 20 and 21), input terminals (fig. 12), lamp terminals (fig. 12), and input switching terminals (figs. 8, 9, 20, 21).

(5) DRYING. Dry the voltage converter for two hours in an oven at 160° F. Watch for indications of melted wax, and, if necessary, lower the oven temperature. Add one hour to the drying time for each 10° F. that the temperature has been lowered.

(6) VARNISHING. (*a*) Remove chassis from oven, and immediately apply the coating material (Dulac No. 86 + thinner) in a wet spray coat to all hook-up wire, circuit elements, and fabric insulated elements. Spray the exposed parts from all directions and from all angles to make sure that each item or element is *entirely* covered.

(*b*) Apply three coats of moistureproofing and fungiproofing varnish. Allow sufficient time between coats for the equipment to dry. The chassis may be placed in the oven to hasten the drying.

(*c*) Remove all the masking tape. Coat with a brush all parts that cannot be reached by spray. *Do not coat any electrical contact points.*

(7) RECHECKING. Replace the bottom cover on the voltage converter. Recheck the operating condition of the equipment. If the equipment is in good operating condition, then replace input and output terminal covers.

(8) MARKING. Mark MFP and date of treatment.

(9) REFERENCE. For a full description of the varnish spray method of moistureproofing and fungiproofing, refer to TB Sig 13. TB Sig 13 also contains instructions regarding the preparation and use of the materials required.

24. TROUBLE ANALYSIS.

a. Danger points are labeled on figures 12, 20, and 21. At these points a shock could mean *serious injury or death.* However, care must be used in servicing any parts of the equipment since there are other points at which a mild shock could be received.

b. If the voltage converter unit fails to operate when the ON-OFF switch is thrown to ON:

(1) Check fuse.

(2) Check voltage on input terminals of voltage converter unit.

(3) Check setting of switching plate.

(4) Check continuity of primary circuit. Refer to schematic diagrams (fig. 22 for Voltage Converter PP-49/VVX-1 and fig. 24 for Voltage Converter PP-50/VVX-1X).

c. If the voltage converter unit operates, but the identification lamp does not flash: (1) Place a 0-50 ampere ammeter in the input circuit. The normal input current when the identification lamp is not flashing is approximately as follows:

(*a*) *PP-49/VVX-1.* 4.3 amperes on 6 volts. 2.8 amperes on 12 volts.

(*b*) *PP-50/VVX-1X.* 2.3 amperes on 12 volts. 1.5 amperes on 24 volts.

(2) Throw the ON-OFF switch to ON. If the ammeter reading in the input circuit rises to a high value and then falls to a low value, proceed as follows:

(*a*) Check flash lamp.

(*b*) Take resistance and voltage readings of the timing and trigger circuit. Refer to paragraphs 25*b* and 25*c* for Voltage Converter PP-49/VVX-1 and to paragraphs 26*b* and 26*c* for Voltage Converter PP-50/VVX-1X.

(*c*) Check switch and coil in the identification lamp.

(3) If, when the ON-OFF switch is thrown to ON, the current reading on the ammeter rises to a high value and remains high, proceed as follows:

(*a*) Check rectifier tubes.

(*b*) Check high-voltage capacitors.

(*c*) Check for possible short circuit in the identification lamp.

(*d*) Check capacitor (2-2) for a possible short circuit.

(*e*) Check transformer for a possible short circuit.

25. CIRCUIT TEST, VISUAL IDENTIFICATION EQUIPMENT AN/VVX-1.

CAUTION: DISCHARGE HIGH-VOLTAGE CAPACITORS BEFORE ATTEMPTING ANY INSPECTION OR REPAIRS (par. 12).

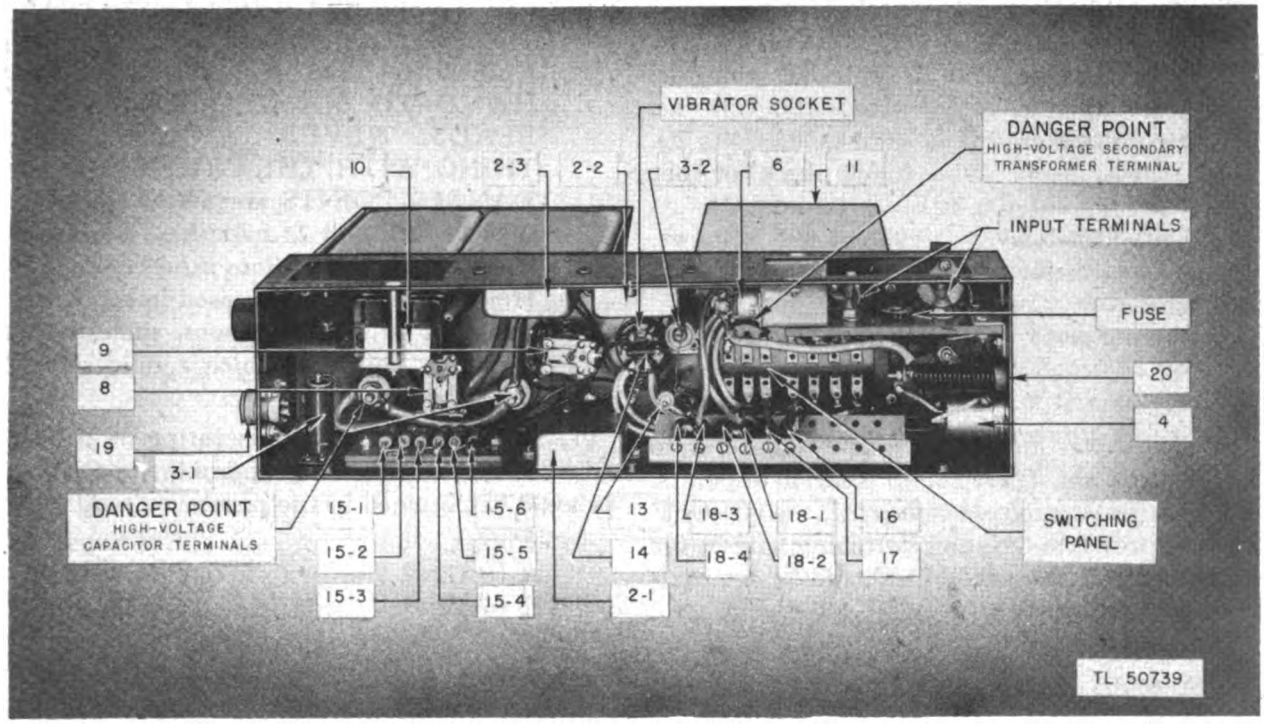


Figure 20. Voltage Converter PP-49/VVX-1, inside view of chassis.

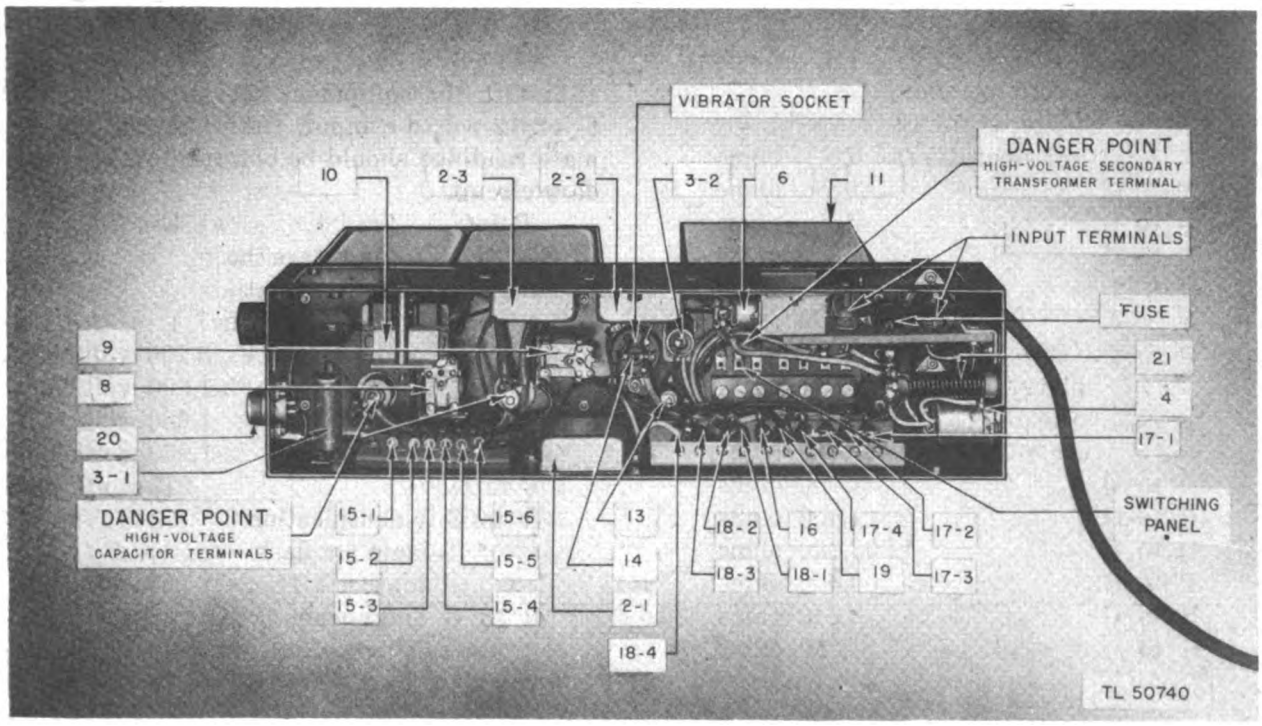


Figure 21. Voltage Converter PP-50/VVX-1X, inside view of chassis.

a. Meters Required. The following meters are required for a point-to-point circuit test:

Meter	*Range*
D-c voltmeter.	0 to 50 volts dc.
A-c voltmeter.	0 to 100 volts ac.
D-c voltmeter.	0 to 500 volts dc (5,000 ohms per volt, at least).
A-c voltmeter.	0 to 5,000 volts ac.
D-c voltmeter.	0 to 2,500 volts dc.
Ammeter.	0 to 50 amps.
Ohmmeter.	0 to 500 ohms.
	0 to 5,000 ohms.
	0 to 5,000,000 ohms.

b. Resistance and Continuity Test. Refer to wiring diagram, figure 23, for location of points. With the *input cable disconnected,* the ON-OFF switch thrown to ON, and switching bar set for 6 volts, resistance readings should be approximately as follows:

Points	*Readings*
A to B.	0.0 ohms.
A to C.	0.0 ohms.
A to D.	0.0 ohms.
A to E.	0.0 ohms.
A to G (with switching plate set for 6-volt operation).	1.5 ohms.
A to G (with switching plate set for 12-volt operation).	6.5 ohms.
M to G.	1.5 ohms.
N to G.	0.0 ohms.
L to K.	5.0 ohms.
F to H.	0.02 ohms.
I to J.	0.075 ohms.
O to P (O and P are the plate terminals, one on top of each 12X3 tube).	2,000 ohms.
O to Q.	1,000 ohms.
P to Q.	1,000 ohms.
Q to G.	1,200,000 ohms.
T to G.	200,000 ohms.
R to G.	340 ohms.
S to U.	50 ohms.

c. Voltage Test.

CAUTION: BE CAREFUL. DO NOT TOUCH DANGER POINTS WITH YOUR HANDS. USE ONLY ONE HAND TO MANIPULATE TEST LEADS. NEVER TOUCH ANYTHING WITH THE OTHER HAND. DANGER POINTS are marked on figures 12, 20, and 21. *At these points, a shock could mean serious injury or death.* However, care must be used in servicing any part of the equipment, since there are other points at which a mild shock could be obtained.

(1) With the equipment operating on a 6-volt d-c input, the following approximate readings should be obtained in the primary circuit:

Points	*Readings*
A to G.	6 volts dc.
H to F.	11 volts ac.
I to J.	22 volts ac.

(2) With the equipment operating on a 12-volt d-c input, the following approximate readings should be obtained on the primary circuit:

Points	*Readings*
A to G.	12 volts dc.
H to F.	11 volts ac.
I to J.	22 volts ac.

(3) With the equipment operating on either a 6- or 12-volt d-c input, the following approximate readings should be obtained on the secondary circuit:

Points	*Readings*
O to P (O and P are the plate terminals, one on top of each 12X3 tube).	3,200 volts ac.
O to Q.	1,600 volts ac.
P to Q.	1,600 volts ac.
Q to G.	1,900 volts dc.
T to G.	275 volts dc.
R to G (identification lamp not flashing).	1.5 volts dc.
R to G (max when lamp is flashing).	30 volts dc.

26. CIRCUIT TEST, VISUAL IDENTIFICATION EQUIPMENT AN/VVX-1X.

CAUTION: DISCHARGE HIGH-VOLTAGE CAPACITORS BEFORE ATTEMPTING ANY INSPECTION OR REPAIRS (par. 12).

a. Meters Required. The following meters are required for a point-to-point circuit test:

Meter	*Range*
D-c voltmeter.	0 to 50 volts dc.
A-c voltmeter.	0 to 100 volts ac.
D-c voltmeter.	0 to 500 volts dc (5,000 ohms per volt, at least).
D-c voltmeter.	0 to 2,500 volts dc.
A-c voltmeter.	0 to 5,000 volts ac.
Ammeter.	0 to 50 amps.
Ohmmeter.	0 to 500 ohms.
	0 to 5,000 ohms.
	0 to 5,000,000 ohms.

b. Resistance and Continuity Test. Refer to wiring diagram, figure 25, for location of points. With the *input cable disconnected,* the ON-OFF switch thrown to ON, and switching bar set for 12-volt operation, resistance readings should be approximately as follows:

Points	*Readings*
A to B.	0.0 ohms.
A to C.	0.0 ohms.
A to D.	0.0 ohms.
A to E.	0.0 ohms.
A to G (with switching plate set for 12-volt operation).	6.0 ohms.
A to G (with switching plate set for 24-volt operation).	16.0 ohms.
M to G.	6.0 ohms.
N to G.	0.0 ohms.
L to K.	10.0 ohms.
F to H.	0.075 ohms.
I to J.	0.3 ohms.
O to P (O and P are the plate terminals, one on top of each 12X3 tube).	2,000 ohms.
O to Q.	1,000 ohms.
P to Q.	1,000 ohms.
Q to G.	1,200,000 ohms.
T to G.	200,000 ohms.
R to G.	340 ohms.
S to U.	200 ohms.

c. Voltage Test.

Caution: Be careful. Do not touch danger points with your hands. Use only one hand to manipulate test leads. Never touch anything with the other hand. **DANGER POINTS are marked on figures 12, 20, and 21. *At these points, a shock could mean serious injury or death.* However, care must be used in servicing any part of the equipment, since there are other points at which a mild shock could be obtained.**

(1) With the equipment operating on a 12-volt d-c input, the following approximate readings should be obtained in the primary circuit:

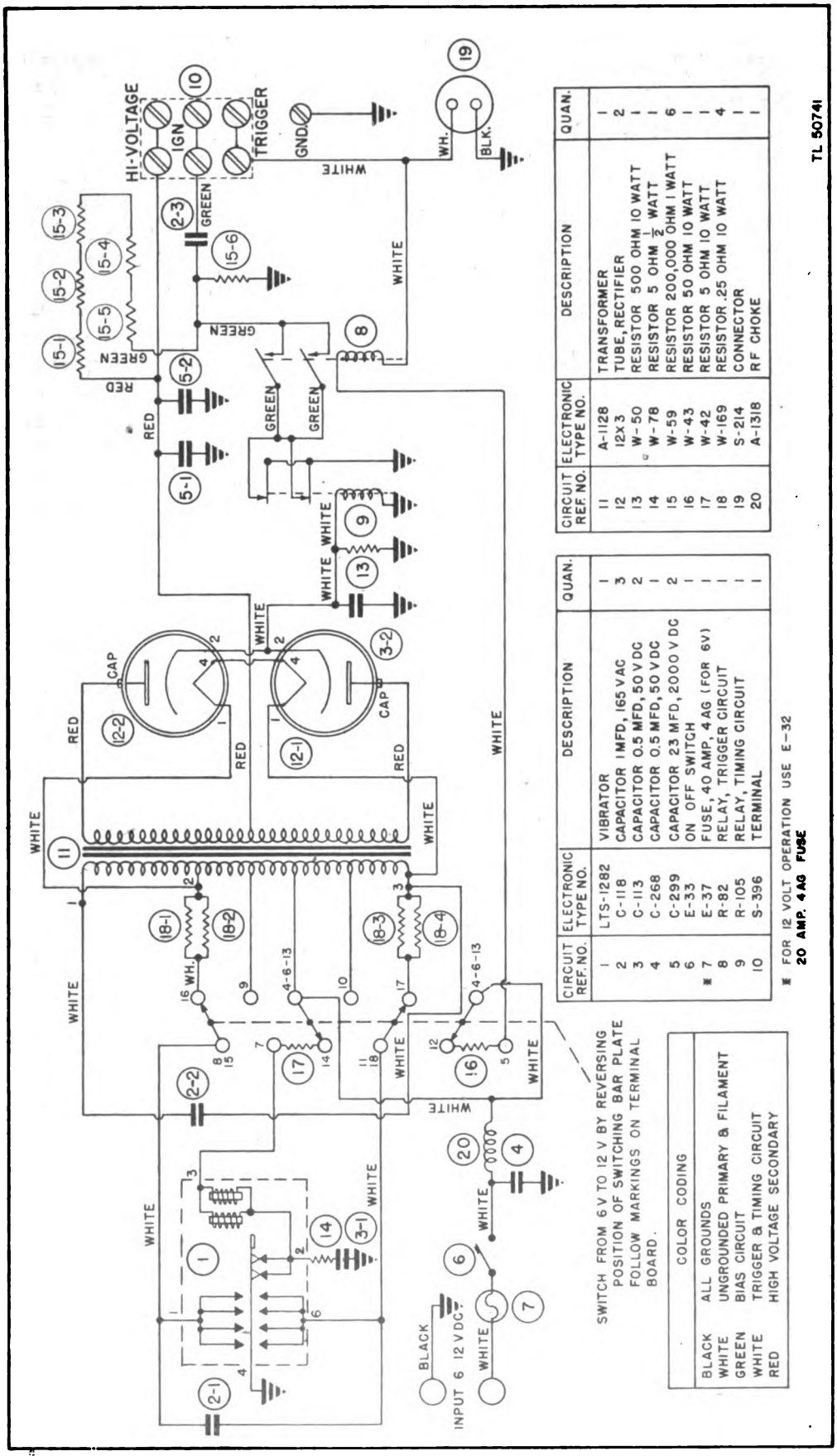
Points	*Readings*
A to G.	12 volts dc.
H to F.	22 volts ac.
I to J.	44 volts ac.

(2) With the equipment operating on a 24-volt d-c input, the following approximate readings should be obtained on the primary circuit:

Points	*Readings*
A to G.	24 volts dc.
H to F.	22 volts ac.
I to J.	44 volts ac.

(3) With the equipment operating on either a 12-volt or 24-volt d-c input, the following approximate readings should be obtained on the secondary circuit:

Points	*Readings*
O to P (O and P are the plate terminals, one on top of each 12X3 tube).	3,200 volts ac.
O to Q.	1,600 volts ac.
P to Q.	1,600 volts ac.
Q to G.	1,900 volts dc.
T to G.	275 volts dc.
R to G (identification lamp not flashing).	1.5 volts dc.
R to G (max when lamp is flashing).	30 volts dc.



CIRCUIT REF. NO.	ELECTRONIC TYPE NO.	DESCRIPTION	QUAN.
1	LTS-1282	VIBRATOR	1
2	C-118	CAPACITOR 1 MFD, 165 VAC	3
3	C-113	CAPACITOR 0.5 MFD, 50 V DC	2
4	C-268	CAPACITOR 0.5 MFD, 50 V DC	1
5	C-299	CAPACITOR 23 MFD, 2000 V DC	2
6	E-33	ON OFF SWITCH	1
* 7	E-37	FUSE, 40 AMP, 4AG (FOR 6V)	1
8	R-82	RELAY, TRIGGER CIRCUIT	1
9	R-105	RELAY, TIMING CIRCUIT	1
10	S-396	TERMINAL	1

CIRCUIT REF. NO.	ELECTRONIC TYPE NO.	DESCRIPTION	QUAN.
11	A-1128	TRANSFORMER	1
12	12X3	TUBE, RECTIFIER	2
13	W-50	RESISTOR 500 OHM 10 WATT	1
14	W-78	RESISTOR 5 OHM $\frac{1}{2}$ WATT	1
15	W-59	RESISTOR 200,000 OHM 1 WATT	6
16	W-43	RESISTOR 50 OHM 10 WATT	1
17	W-42	RESISTOR 5 OHM 10 WATT	1
18	W-169	RESISTOR 25 OHM 10 WATT	4
19	S-214	CONNECTOR	1
20	A-1318	RF CHOKE	1

* FOR 12 VOLT OPERATION USE E-32
20 AMP. 4AG FUSE

COLOR CODING	
BLACK	ALL GROUNDS
WHITE	UNGROUNDED PRIMARY & FILAMENT
GREEN	BIAS CIRCUIT
WHITE	TRIGGER & TIMING CIRCUIT
RED	HIGH VOLTAGE SECONDARY

Figure 22. Schematic diagram, Voltage Converter PP-49/VVX-1.

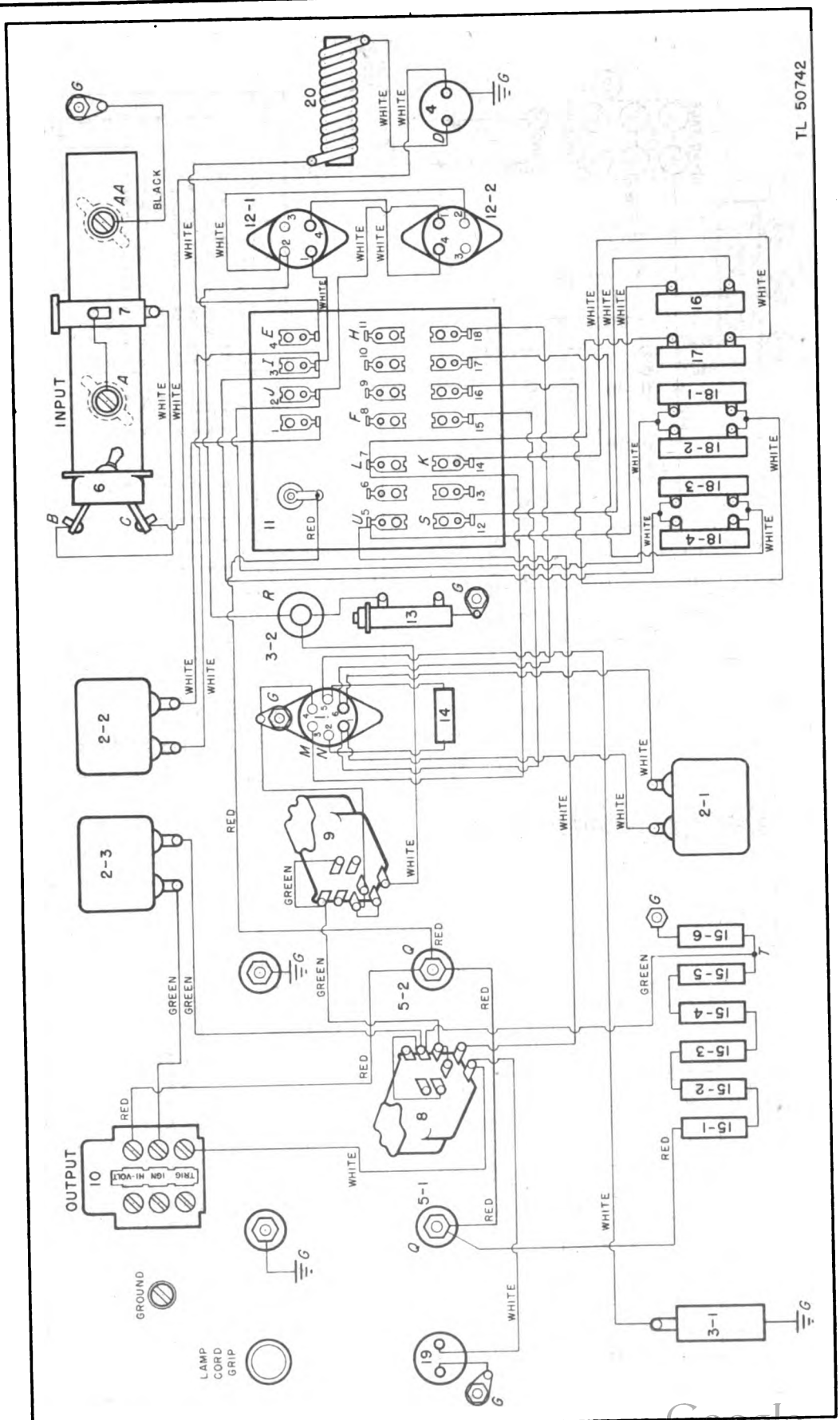
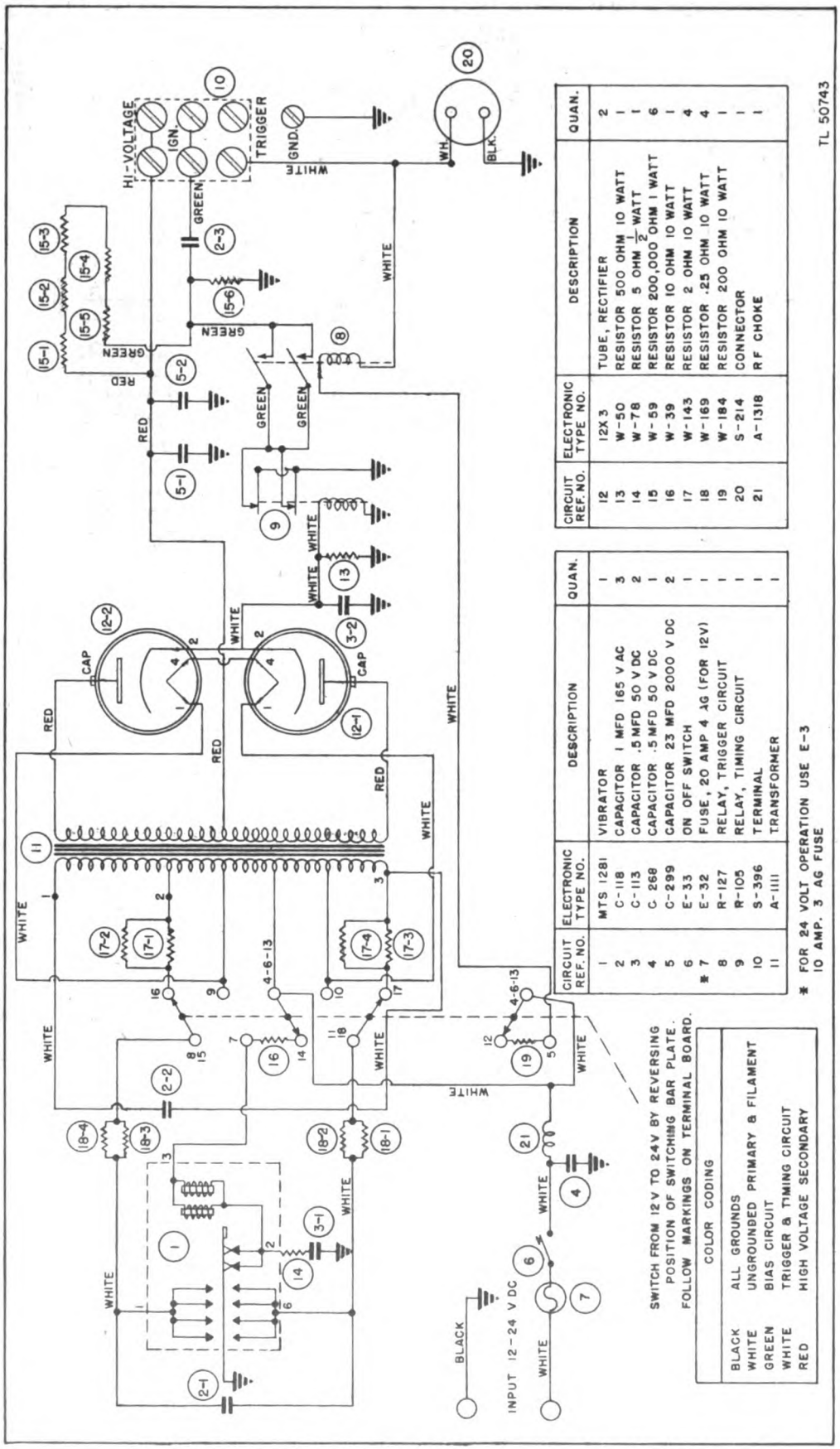


Figure 23. Wiring diagram, Voltage Converter PP-49/VVX-1.



CIRCUIT REF. NO.	ELECTRONIC TYPE NO.	DESCRIPTION	QUAN.
1	MTS 1281	VIBRATOR	1
2	C-118	CAPACITOR 1 MFD 165 V AC	3
3	C-113	CAPACITOR .5 MFD 50 V DC	2
4	C 268	CAPACITOR .5 MFD 50 V DC	1
5	C-299	CAPACITOR 23 MFD 2000 V DC	2
6	E-33	ON OFF SWITCH	1
* 7	E-32	FUSE, 20 AMP 4 AG (FOR 12V)	1
8	R-127	RELAY, TRIGGER CIRCUIT	1
9	R-105	RELAY, TIMING CIRCUIT	1
10	S-396	TERMINAL	1
11	A-1111	TRANSFORMER	1

CIRCUIT REF. NO.	ELECTRONIC TYPE NO.	DESCRIPTION	QUAN.
12	12X3	TUBE, RECTIFIER	2
13	W-50	RESISTOR 500 OHM 10 WATT	1
14	W-78	RESISTOR 5 OHM $\frac{1}{2}$ WATT	1
15	W-59	RESISTOR 200,000 OHM 1 WATT	6
16	W-39	RESISTOR 10 OHM 10 WATT	1
17	W-143	RESISTOR 2 OHM 10 WATT	4
18	W-169	RESISTOR .25 OHM 10 WATT	4
19	W-184	RESISTOR 200 OHM 10 WATT	1
20	S-214	CONNECTOR	1
21	A-1318	RF CHOKE	1

Figure 24. Schematic diagram, Voltage Converter PP-50/VVX-1X.

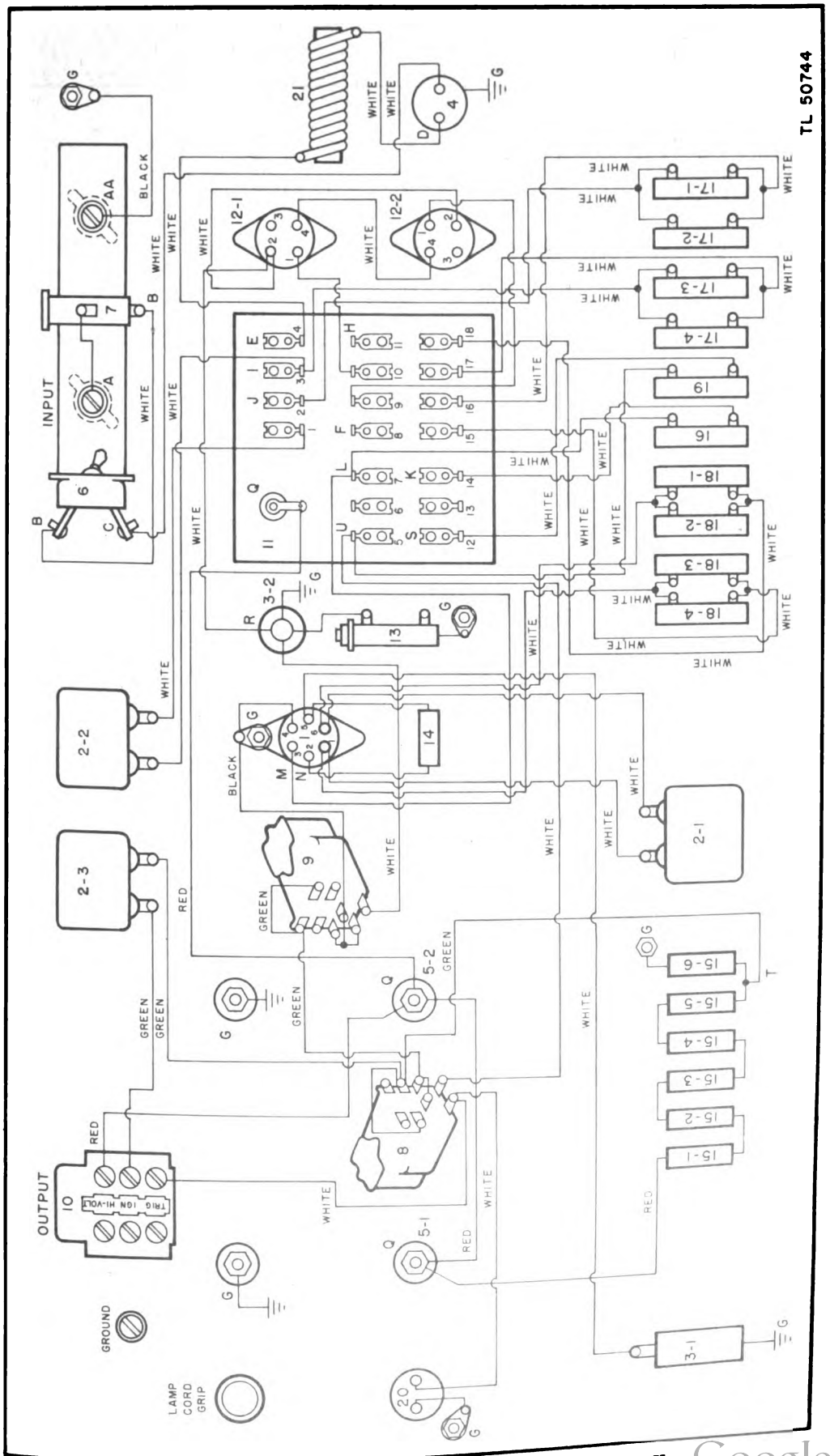


Figure 25. Wiring diagram, Voltage Converter PP-50/VVX-1X.

PART SEVEN
SUPPLEMENTARY DATA

27. TABLE OF REPLACEABLE PARTS.

NOTE: Order replacement parts by stock number, name and description.

a. Voltage Converter PP-49/VVX-1.

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
———		CHASSIS ASSEMBLY: 16 gauge, steel; max dimension, 16⅝" x 4⅛" x 3 $\frac{5}{16}$". Finish: olive drab wrinkle over blue gray primer.	———	E.L.I.	A-1119	1
———		CHASSIS COVER ASSEMBLY: 18 gauge, steel; max dimension, 16⅞" x 4 $\frac{5}{16}$" x 7 $\frac{7}{16}$". Finish: olive drab wrinkle over blue gray primer.	———	E.L.I.	M-1610	1
———		CHASSIS BASE ASSEMBLY: 18 gauge, steel; max dimension, 16 $\frac{9}{16}$" x 4 $\frac{5}{16}$" x $\frac{7}{16}$". Finish: olive drab wrinkle over blue gray primer.	———	E.L.I.	M-1617	1
———		INPUT TERMINAL COVER: 18 gauge, steel; max dimension, 5¾" x 2¼" x 0.050". Finish: olive drab wrinkle over blue gray primer.	———	E.L.I.	L-1538	1
———		LAMP TERMINAL COVER: 18 gauge, steel; max dimension, 4⅜" x 2¼" x 0.050". Finish: olive drab wrinkle over blue gray primer.	———	E.L.I.	L-1539	1
———		CONDENSER MOUNTING BRACKET: 18 gauge, steel; max dimensions, 3¾" x 6⅝" x 6¼". Finish: blue gray primer.	———	E.L.I.	L-1529	1
11		TRANSFORMER ASSEMBLY: max dimension of case 4" x 4⅝" x 6⅜". *Winding Data:* Primary: turns; 500. Taps: 0-16-32-48-64-500. Wire size: 0 to 16 & 48 to 64, #15; 16 to 48, double #15; 64 to 500, #29. Resistance, 32 ohms. Secondary: turns; 9,200. Taps: 0-4,600-9,200. Wire size; #35. Resistance, 2,000 ohms. Output voltage; 2,000-volt d-c.	Power.	E.L.I.	A-1128	1
1		VIBRATOR: 6-volt coil; frequency, 110 to 120 cycles, max dimension, 5⅝" x 2¾" x 2⅜".	To change input d-c voltage to a-c and apply it to the transformer.	E.L.I.	LTS-1282	1

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
3-2		CAPACITOR: 0.5 mfd −10% + 40%, 50-volt d-c, paper dielectric, metal container; max dimension, $\frac{1}{16}$" diam x 2$\frac{5}{16}$".	To improve the action of relay 9.	J.E.F.	C-113	2
3-1		CAPACITOR: same as 3-2, above.	Vibrator actuating point suppression.			
2-1		CAPACITOR: 1 mfd ±10%, 165-volt a-c, oil, metal container, 1$\frac{3}{16}$" x 2" x $\frac{3}{4}$".	Primary buffer.	J.E.F.	C-118	3
2-2		CAPACITOR: same as 2-1, above.	Buffer.	J.E.F.	C-118	
2-3		CAPACITOR: same as 2-1, above.	Trigger.	J.E.F.	C-118	
4		CAPACITOR: 0.5 mfd −10% +40%, 50-volt d-c, oil, metal container; max dimension, 1" diam x 1$\frac{5}{16}$".	Rf suppression.	E.U.C.	C-268	1
5-1 5-2		CAPACITOR: 23.0 to 28.2 mfd, 1,000-volt d-c continuous duty or 2,000-volt d-c intermittant duty, oil impregnated and filled. Metal container; dimension 3$\frac{3}{4}$" x 3$\frac{5}{16}$" x 7$\frac{1}{32}$".	Stores charge for operation of lamp.	G.E.	C-299	2
7		FUSE: 40 amp, 4 AG. (for 6-volt operation) 20 amp, 4 AG. (for 12-volt operation).	Input fuse.	L.L.	E-37 or E-32	1
6		SWITCH: single pole, single throw.	ON-OFF switch.	C.H.	E-33	1
12-1 12-2		TUBE: type 12X3.	Rectifier.	R.R.T.	H-132	2
9		RELAY: double pole, double throw, 110-volt a-c, 50 to 60 cycles. Contact current: 1.5 amp at 110-volt a-c. Coil current: 50 ma at 110-volt a-c. Coil wound to resistance 1,500 ohms, ±5%.	Trigger timing.	A.E.C.	R-105	1
———		SOCKET: 4 prong, molded phenolic.	Tube sockets.	A.P.C.	S-74	2
———		SOCKET: 6 prong, molded phenolic.	Vibrator socket.	A.P.C.	S-75	1
19		CONNECTOR (AN-3102-12S-3P): 2-prong, male, chassis mounting.	Remote control trigger connections.	A.P.C.	S-214	1
———		FUSE RECEPTACLE: 4 AG size, molded phenolic, max dimension $\frac{3}{4}$" diam x 2$\frac{3}{32}$".	Receptacle for input fuse.	B.C.	S-325	1
———		CORD GRIP: zinc, max dimension, $\frac{7}{8}$" diam x 1", $\frac{3}{8}$" pipe thread.	Holds input cable in position.	R.M.C.	S-343	1
10		TERMINAL BLOCK: molded phenolic, 3 terminals, max dimension, 1$\frac{5}{16}$" x 2$\frac{1}{16}$" x 2".	Output terminal connections to lamp.	C.D.M.	S-396	1
20		CHOKE ASSEMBLY: Coil diameter, $\frac{5}{16}$". Coil length, 1$\frac{3}{4}$". Number of turns, 16. Size of wire, #10 enameled.	Rf suppression.	E.L.I.	A-1318	1

27. TABLE OF REPLACEABLE PARTS—(Contd).

a. Voltage Converter PP-49/VVX-1.

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
17		RESISTOR: 5 ohms, ±10%, 10 watts; wire-wound, vitreous enameled; max dimension, $\frac{5}{16}$" diam x 1¾".	Voltage limiting resistor.	O.M.C.	W-42	1
13		RESISTOR: 500 ohms, ±10%, 10 watts; wire-wound, vitreous enameled; max dimension, $\frac{5}{16}$" diam x 1¾".	Flashing rate timing resistor.	O.M.C.	W-50	1
15-1 15-2 15-3 15-4 15-5 15-6		RESISTOR: 200,000 ohms, ±10%, 1 watt; carbon; max dimension, $\frac{8}{32}$" diam x ⅞".	Bleeders & bias voltage.	C.L.	W-59	6
14		RESISTOR: 5 ohms ±10%, ½ watt; wire-wound, molded phenolic covering; max dimension, $\frac{5}{16}$" diam x $\frac{5}{8}$".	Vibrator actuating point suppression.	I.R.C.	W-78	1
18-1 18-2 18-3 18-4		RESISTOR: ¼ ohm ±10%, 10 watts; wire-wound, vitreous enameled; max dimension, $\frac{5}{16}$" diam x 1¾".	Current limiting resistors.	O.M.C.	W-169	4
16		RESISTOR: 50 ohms, ±10%, 10 watts; wire-wound, vitreous enameled; max dimension, $\frac{5}{16}$" diam x 1¾".	Reduces voltage to operate relay 8.	O.M.C.	W-43	1
8		RELAY: double pole, double throw, 6-volt coil, 75 ohms, +0 -20.	Completes circuit for triggering lamp.	A.E.C.	R-82	1
————		CONNECTOR STRIP ASSEMBLY: bakelite; max dimension, $\frac{1}{16}$" x $\frac{3}{32}$" x 3$\frac{5}{16}$".	Transformer switching connections.	E.L.I.	A-1122	1
————		INPUT CABLE ASSEMBLY: including 15' of #10 dual rubber covered cord and 2 terminal lugs.	Input connections.	E.L.I.	A-1121	1
————		NAME PLATE: power supply.	————		F-1791	1
————		NAME PLATE: complete equipment.			F-1885	1
————		CIRCUIT LABEL.	————	E.L.I.	F-1789	1
————		SWITCH MOUNTING BRACKET ASSEMBLY: 18 gauge, steel. Finish: blue gray primer; max dimension, 2$\frac{31}{32}$" x 1" x 1⅜".	Mounts ON-OFF switch.	E.L.I.	A-1115	1

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
_____		RESISTOR MOUNTING PANEL: bakelite; max dimension, 2" x 3½" x ⅛".	Mounts bleeder resistors.	E.L.I.	A-1117	1
_____		BUSHING: $\frac{1}{16}$" OD x $\frac{11}{64}$" ID x 1⅝"; steel, zinc plated.	_____	R.L.	G-55	2
_____		BUSHING: $\frac{1}{8}$" OD x ½", tapped 10-32, steel, nickel plated.	_____	R.L.	G-67	1
_____		TUBE CLAMP: 0.022" spring monel, max dimension, 1¾" x ⅜" x $\frac{7}{16}$".	Holds rectifier tube in place.	E.L.I.	M-1225	2
_____		TUBE BRACE: 0.023" monel, max dimension ⅞" x $\frac{7}{16}$" x $\frac{13}{32}$".	Holds rectifier tube vertical.	E.L.I.	L-1513	2
_____		PANEL ASSEMBLY MOUNTING BRACKET: 18 gauge, steel. Finish: blue gray primer; max dimension 1¾" x $\frac{11}{16}$" x $\frac{11}{16}$".	_____	E.L.I.	L-1516	1
_____		VIBRATOR BLOCK: wood, max dimension, 3" x 1" x 1$\frac{1}{16}$".	To hold vibrator in position.	E.L.I.	L-1517	1
_____		CHASSIS MOUNTING BRACKET: 14 gauge, steel. Finish: olive drab wrinkle over blue gray primer. Max dimension 4⅛" x 1$\frac{3}{16}$" x ¾".	To mount voltage converter unit.	E.L.I.	L-1519	4
_____		RESISTOR INSULATING PANEL: bakelite; max dimension, 3½" x 2" x ⅛".	_____	E.L.I.	L-1526	1
_____		RIVET SOLDERING LUG: brass, tinned.	_____	Z.C. 110	U-583	5
_____		SOLDERING LUG: spade type; max dimension, ¾" x $\frac{3}{16}$" x 0.020".	_____	I.M.I.	U-154	4
_____		GRID CAP.	_____	N.C. 24	U-437	2
_____		FIBRE WASHER: extruded, ⅜" OD x $\frac{3}{64}$" ID x ¼" OD shoulder.	_____	C.D.F.	U-460	14
_____		SOLDERING LUG.	_____	B.M.C. Natty	U-496	7
_____		SOLDERING LUG: copper.	_____	B.M.C. Diet	U-551	2
_____		RESISTOR MOUNTING BRACKET: 18 gauge, steel. Finish: blue gray primer; max dimension, 5¾" x $\frac{5}{16}$" x 2$\frac{1}{16}$".	Support current limiting resistors.	E.L.I.	L-1528	1

27. TABLE OF REPLACEABLE PARTS—(Contd).

a. Voltage Converter PP-49/VVX-1.

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
———		INPUT PANEL: bakelite; max dimension, 4¾" x 1¾" x $\frac{3}{16}$".	———		L-1531	1
———		WASHER: bakelite; 1⅛" OD x 0.130" ID x $\frac{3}{32}$".	———	S.C.	L-433	2
———		RIVET: $\frac{3}{32}$" x 0.088", truss head.	———	C.R.M.	U-38	4
———		RIVET: $\frac{3}{32}$" x 0.120", brass, nickel plated, truss head.	———	T.R.C.	U-25	4
WIRING MATERIALS						
———		WIRE: #12, bus, tinned.	———	A.C.	X-86	5"
———		WIRE: #20, white with green tracer.	———	R.P.C.	X-287	25"
———		WIRE: #20, white with red tracer.	———	R.P.C.	X-289	30"
———		WIRE: #10, white.	———	R.P.C.	X-291	50"
———		WIRE: #20, white.	———	R.P.C.	X-310	133"
———		TUBING: #9, red, XTE-30, vinylite.	———	I.V.C.	Y-245	30"
———		TUBING: #9, green, XTE-30 vinylite.	———	I.V.C.	Y-241	4"
———		TUBING: #8, black, XTE-30, vinylite.	———	I.V.C.	Y-243	6"
———		TUBING: #4, white, vinylite.	———	I.V.C.	Y-247	4"
		TUBING: #9, white, vinylite.	———	I.V.C.	Y-244	8"

b. Voltage Converter PP-50/VVX-1X.

———		CHASSIS ASSEMBLY: 16 gauge, steel; max dimension, 16⅝" x 4⅛" x $\frac{5}{16}$". Finish: olive drab wrinkle over blue gray primer.	———	E.L.I.	A-1119	1
———		CHASSIS COVER ASSEMBLY: 18 gauge, steel; max dimension, 16⅞" x 4$\frac{5}{16}$" x 7$\frac{7}{16}$". Finish: olive drab wrinkle over blue gray primer.	———	E.L.I.	M-1610	1
———		CHASSIS BASE ASSEMBLY: 18 gauge, steel; max dimension 16$\frac{9}{16}$" x 4$\frac{5}{16}$" x $\frac{1}{16}$". Finish: olive drab wrinkle over blue gray primer.	———	E.L.I.	M-1617	1
———		INPUT TERMINAL COVER: 18 gauge, steel; max dimension, 5¾" x 2¼" x 0.050". Finish: olive drab wrinkle over blue gray primer.	———	E.L.I.	L-1538	1

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
———		LAMP TERMINAL COVER: 18 gauge, steel; max dimension, 4⅜" x 2¼" x 0.050". Finish: olive drab wrinkle over blue gray primer.	———	E.L.I.	L-1539	1
———		CAPACITOR MOUNTING BRACKET: 18 gauge, steel. Finish: blue gray primer. Max dimension, 3¾" x 6⅝" x 6¼".	———	E.L.I.	L-1529	1
11		TRANSFORMER ASSEMBLY: max dimension of case 4" x 4⅝" x 6⅜". *Winding data:* Primary: turns; 500. Taps; 0-32-64-96-128-500. Wire size: 0 to 32 & 96 to 128 #18; 32 to 96, double #18; 128 to 500, #28. Resistance, 34 ohms. Secondary: turns; 9,200. Taps: 0-4,600-9,200. Wire size: #35. Resistance, 2,000 ohms. Output voltage; 2,000-volt d-c.	Power.	E.L.I.	A-1111	1
1		VIBRATOR: 12-volt coil frequency, 110 to 120 cycles; max dimension, 5⅝" x 2¾" x 2⅜".	To change input d-c voltage to a-c and apply it to the transformer.	E.L.I.	MTS-1281	1
3-2		CAPACITOR: 0.5 mfd, −10% +40%, 50-volt d-c, paper dielectric. Metal container; max dimension, $\frac{11}{16}$" diam x $2\frac{5}{16}$".	To improve the action of relay 9.	J.E.F.	C-113	2
3-1		CAPACITOR: Same as 3-2, above.	Vibrator actuating point suspension.			
2-1		CAPACITOR: 1 mfd, ±10%, 165-volt a-c, oil. Metal container, $1\frac{13}{16}$" x 2" x ¾".	Primary buffer.	J.E.F.	C-118	1
2-2		CAPACITOR: same as 2-1, above.	Buffer.	J.E.F.	C-118	1
2-3		CAPACITOR: same as 2-1, above.	Trigger.	J.E.F.	C-118	1
4		CAPACITOR: 0.5 mfd, −10% +40%, 50-volt d-c, oil. Metal container; max dimension, 1" diam x $1\frac{5}{16}$".	Rf suppression.	E.U.C.	C-268	1
5-1 5-2		CAPACITOR: 23.0 to 28.2 mfd, 1,000-volt d-c continuous duty; 2,000-volt d-c, intermittant duty; oil impregnated and filled; metal container; dimension, 3¾" x $3\frac{3}{16}$" x $7\frac{13}{32}$".	Stores charge for operation of lamp.	G.E.	C-299	2
7		FUSE: 20 amp, 4 AG (for 12-volt operation). 10 amp, 3 AG (for 24-volt operation).	Input fuse.	L.L.	E-32 or E-3	1
6		SWITCH: single pole, single throw.	ON-OFF switch.	C.H.	E-33	1
12-1		TUBE: type 12X3.	Rectifier.	R.R.T.	H-132	2
12-2						

27. TABLE OF REPLACEABLE PARTS—(Contd).

b. Voltage Converter PP-50/VVX-1X.

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
9		RELAY: double pole, double throw, 110-volt a-c, 50 to 60 cycles. Contact current: 1.5 amp at 110-volt a-c. Coil current: 50 ma at 110-volt a-c. Coil wound to resistance 1,500 ohms, ±5%.	Trigger timing.	A.E.C.	R-105	1
———		SOCKET: 4-prong, molded phenolic.	Tube sockets.	A.P.C.	S-74	2
———		SOCKET: 6-prong, molded phenolic.	Vibrator socket.	A.P.C.	S-75	1
20		CONNECTOR: (AN-3102-12S-3P), 2-prong, male, chassis mounting.	Remote control trigger connections.	A.P.C.	S-214	1
———		RECEPTACLE FUSE: 4 AG size, molded phenolic, ¾" diam x 2 $\frac{9}{32}$".	Receptacle for input fuse.	B.C.	S-325	1
———		CORD GRIP: zinc; max dimension, ⅞" diam x 1", ⅜" pipe thread.	Holds input cable in position.	R.M.C.	S-343	1
10		TERMINAL BLOCK: molded phenolic, 3 terminals, max dimension, 1 $\frac{5}{16}$" x 2 $\frac{7}{16}$" x 2".	Output terminal connections to lamp.	C.D.M.	S-396	1
21		CHOKE: coil diameter, $\frac{9}{16}$". Coil length, 1¾". Number of turns, 16. Size of wire, #10.	R-f suppression.	E.L.I.	A-1318	1
17-1, 17-2 17-3, 17-4		RESISTOR: 2 ohms, ±10%, 10 watts; wire-wound, vitreous enameled; max dimension, $\frac{5}{16}$" x 1¾".	Current limiting resistor.	O.M.C.	W-143	4
13		RESISTOR: 500 ohms, ±10%, 10 watts; wire-wound, vitreous enameled; max dimension, $\frac{5}{16}$" x 1¾".	Flashing rate timing resistor.	W.J.C.	W-50	1
15-1, 15-2 15-3, 15-4 15-5, 15-6		RESISTOR: 200,000 ohms, ±10%, 1 watt; carbon; max dimension, $\frac{9}{32}$" diam x ⅞".	Bleeders & bias voltage.	C.L.	W-59	6
19		RESISTOR: 200 ohms, ±10%, 10 watts; wire wound, max dimension, ⅜" diam x 1 $\frac{13}{32}$".	Voltage dropping resistor.	C.C.C.	W-184	1
14		RESISTOR: 5 ohms, ±10%, ½ watt; wire-wound, molded phenolic covering; max dimension, $\frac{3}{16}$" diam x ⅝".	Vibrator actuating point suppression.	I.R.C.	W-78	1
18-1 18-2 18-3 18-4		RESISTOR: ¼ ohm, ±10%, 10 watts; wire-wound, vitreous enameled; max dimension, $\frac{5}{16}$" diam x 1¾".	Current limiting resistor.	O.M.C.	W-169	4

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
16		RESISTOR: 10 ohms, ±10%, 10 watts; wire-wound, vitreous enameled; max dimension, $\frac{5}{16}$" diam x 1¾".	Voltage dropping resistor.	O.M.C.	W-39	1
8		RELAY: double pole, double throw. 12-volt coil, 250 ohms, ±10%.	Completes circuit for triggering lamp.	A.E.C.	R-127	1
———		CONNECTOR STRIP ASSEMBLY: bakelite; max dimension, $\frac{1}{16}$" x $\frac{5}{32}$" x 3 $\frac{9}{10}$".	Transformer switching connections.	E.L.I.	A-1122	1
———		INPUT CABLE ASSEMBLY: includes 15 feet of #10 dual rubber covered cord and 2 terminal lugs.	Input connections.	E.L.I.	A-1121	1
———		NAME PLATE: name plate.	———		F-1796	1
———		NAME PLATE: complete equipment.	———		F-1886	1
———		CIRCUIT LABEL:	———	E.L.I.	F-1790	1
———		SWITCH MOUNTING BRACKET ASSEMBLY: 18 gauge, steel. Finish: blue gray primer. Max dimension, $2\frac{13}{32}$" x 1" x 1⅜".	Mounts ON-OFF switch.	E.L.I.	A-1115	1
———		RESISTOR MOUNTING PANEL: bakelite; max dimension, 2" x 3½" x ⅛".	Mounts bleeders resistors.	E.L.I.	A-1117	1
———		BUSHING: $\frac{5}{16}$" OD x $\frac{11}{64}$" ID x 1⅝"; steel, zinc plated.	———	R.L.	G-55	2
———		BUSHING: $\frac{5}{16}$" OD x ½", tapped 10-32, steel, nickel plated.	———	R.L.	G-67	1
———		TUBE CLAMP: 0.022" spring monel. Max dimension, 1¾" x ⅜" x $\frac{7}{10}$".	Holds rectifier tube in place.	E.L.I.	M-1225	2
———		TUBE BRACE: 0.23" monel. Max dimension, ⅞" x $\frac{7}{10}$" x $\frac{13}{32}$".	Holds rectifier tube vertical.	E.L.I.	L-1513	2
———		PANEL ASSEMBLY MOUNTING BRACKET: 18 gauge, steel. Finish: blue gray primer; max dimension, 1¾" x $\frac{11}{16}$" x $\frac{11}{16}$".	———	E.L.I.	L-1516	1
———		VIBRATOR BLOCK: wood, max dimension, 3" x 1" x 1 $\frac{1}{16}$".	To hold vibrator in position.	E.L.I.	L-1517	1
———		CHASSIS MOUNTING BRACKET: 14 gauge, steel. Finish: olive drab wrinkle over blue gray primer; max dimension, 4⅛" x 1 $\frac{5}{16}$" x ¾".	To mount voltage converter unit.	E.L.I.	L-1519	4
———		RESISTOR INSULATING PANEL: bakelite; max dimension, 3½" x 2" x ⅛".	———	E.L.I.	L-1526	1

27. TABLE OF REPLACEABLE PARTS—(Contd).

a. Voltage Converter PP-49/VVX-1.

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
———		INPUT PANEL: bakelite; max dimension, 4¾" x 1¾" x $\frac{3}{16}$".	———		L-1531	1
———		WASHER: bakelite; 1⅛" OD x 0.130" ID x $\frac{3}{32}$".	———	S.C.	L-433	2
———		RIVET: $\frac{3}{32}$" x 0.088", truss head.	———	C.R.M.	U-38	4
———		RIVET: $\frac{3}{32}$" x 0.120", brass, nickel plated, truss head.	———	T.R.C.	U-25	4
WIRING MATERIALS						
———		WIRE: #12, bus, tinned.	———	A.C.	X-86	5"
———		WIRE: #20, white with green tracer.	———	R.P.C.	X-287	25"
———		WIRE: #20, white with red tracer.	———	R.P.C.	X-289	30"
———		WIRE: #10, white.	———	R.P.C.	X-291	50"
———		WIRE: #20, white.	———	R.P.C.	X-310	133"
———		TUBING: #9, red, XTE-30, vinylite.	———	I.V.C.	Y-245	30"
———		TUBING: #9, green, XTE-30 vinylite.	———	I.V.C.	Y-241	4"
———		TUBING: #8, black, XTE-30, vinylite.	———	I.V.C.	Y-243	6"
———		TUBING: #4, white, vinylite.	———	I.V.C.	Y-247	4"
		TUBING: #9, white, vinylite.	———	I.V.C.	Y-244	8"

b. Voltage Converter PP-50/VVX-1X.

———		CHASSIS ASSEMBLY: 16 gauge, steel; max dimension, 16⅝" x 4⅛" x $\frac{3}{16}$". Finish: olive drab wrinkle over blue gray primer.	———	E.L.I.	A-1119	1
———		CHASSIS COVER ASSEMBLY: 18 gauge, steel; max dimension, 16⅞" x 4$\frac{3}{16}$" x 7$\frac{7}{16}$". Finish: olive drab wrinkle over blue gray primer.	———	E.L.I.	M-1610	1
———		CHASSIS BASE ASSEMBLY: 18 gauge, steel; max dimension 16$\frac{9}{16}$" x 4$\frac{3}{16}$" x $\frac{1}{16}$". Finish: olive drab wrinkle over blue gray primer.	———	E.L.I.	M-1617	1
———		INPUT TERMINAL COVER: 18 gauge, steel; max dimension, 5¾" x 2¼" x 0.050". Finish: olive drab wrinkle over blue gray primer.	———	E.L.I.	L-1538	1

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
————		LAMP TERMINAL COVER: 18 gauge, steel; max dimension, 4⅜" x 2¼" x 0.050". Finish: olive drab wrinkle over blue gray primer.	————	E.L.I.	L-1539	1
————		CAPACITOR MOUNTING BRACKET: 18 gauge, steel. Finish: blue gray primer. Max dimension, 3¾" x 6⅝" x 6¼".	————	E.L.I.	L-1529	1
11		TRANSFORMER ASSEMBLY: max dimension of case 4" x 4⅝" x 6⅜". *Winding data:* Primary: turns; 500. Taps; 0-32-64-96-128-500. Wire size: 0 to 32 & 96 to 128 #18; 32 to 96, double #18; 128 to 500, #28. Resistance, 34 ohms. Secondary: turns; 9,200. Taps: 0-4,600-9,200. Wire size: #35. Resistance, 2,000 ohms. Output voltage; 2,000-volt d-c.	Power.	E.L.I.	A-1111	1
1		VIBRATOR: 12-volt coil frequency, 110 to 120 cycles; max dimension, 5⅝" x 2¾" x 2⅜".	To change input d-c voltage to a-c and apply it to the transformer.	E.L.I.	MTS-1281	1
3-2		CAPACITOR: 0.5 mfd, −10% +40%, 50-volt d-c, paper dielectric. Metal container; max dimension, 1⅛" diam x 2 $\frac{5}{16}$".	To improve the action of relay 9.	J.E.F.	C-113	2
3-1		CAPACITOR: Same as 3-2, above.	Vibrator actuating point suspension.			
2-1		CAPACITOR: 1 mfd, ±10%, 165-volt a-c, oil. Metal container, 1 $\frac{3}{16}$" x 2" x ¾".	Primary buffer.	J.E.F.	C-118	1
2-2		CAPACITOR: same as 2-1, above.	Buffer.	J.E.F.	C-118	1
2-3		CAPACITOR: same as 2-1, above.	Trigger.	J.E.F.	C-118	1
4		CAPACITOR: 0.5 mfd, −10% +40%, 50-volt d-c, oil. Metal container; max dimension, 1" diam x 1 $\frac{5}{16}$".	Rf suppression.	E.U.C.	C-268	1
5-1 5-2		CAPACITOR: 23.0 to 28.2 mfd, 1,000-volt d-c continuous duty; 2,000-volt d-c, intermittant duty; oil impregnated and filled; metal container; dimension, 3¾" x 3 $\frac{5}{16}$" x 7 $\frac{13}{32}$".	Stores charge for operation of lamp.	G.E.	C-299	2
7		FUSE: 20 amp, 4 AG (for 12-volt operation). 10 amp, 3 AG (for 24-volt operation).	Input fuse.	L.L.	E-32 or E-3	1
6		SWITCH: single pole, single throw.	ON-OFF switch.	C.H.	E-33	1
12-1 12-2		TUBE: type 12X3.	Rectifier.	R.R.T.	H-132	2

27. TABLE OF REPLACEABLE PARTS—(Contd).

b. Voltage Converter PP-50/VVX-1X.

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
9		RELAY: double pole, double throw, 110-volt a-c, 50 to 60 cycles. Contact current: 1.5 amp at 110-volt a-c. Coil current: 50 ma at 110-volt a-c. Coil wound to resistance 1,500 ohms, ±5%.	Trigger timing.	A.E.C.	R-105	1
———		SOCKET: 4-prong, molded phenolic.	Tube sockets.	A.P.C.	S-74	2
———		SOCKET: 6-prong, molded phenolic.	Vibrator socket.	A.P.C.	S-75	1
20		CONNECTOR: (AN-3102-12S-3P), 2-prong, male, chassis mounting.	Remote control trigger connections.	A.P.C.	S-214	1
———		RECEPTACLE FUSE: 4 AG size, molded phenolic, ¾" diam x 2 $\frac{9}{32}$".	Receptacle for input fuse.	B.C.	S-325	1
———		CORD GRIP: zinc; max dimension, ⅞" diam x 1", ⅜" pipe thread.	Holds input cable in position.	R.M.C.	S-343	1
10		TERMINAL BLOCK: molded phenolic, 3 terminals, max dimension, 1 $\frac{5}{16}$" x 2 $\frac{1}{16}$" x 2".	Output terminal connections to lamp.	C.D.M.	S-396	1
21		CHOKE: coil diameter, $\frac{9}{16}$". Coil length, 1¾". Number of turns, 16. Size of wire, #10.	R-f suppression.	E.L.I.	A-1318	1
17-1, 17-2 17-3, 17-4		RESISTOR: 2 ohms, ±10%, 10 watts; wire-wound, vitreous enameled; max dimension, $\frac{5}{16}$" x 1¾".	Current limiting resistor.	O.M.C.	W-143	4
13		RESISTOR: 500 ohms, ±10%, 10 watts; wire-wound, vitreous enameled; max dimension, $\frac{5}{16}$" x 1¾".	Flashing rate timing resistor.	W.J.C.	W-50	1
15-1, 15-2 15-3, 15-4 15-5, 15-6		RESISTOR: 200,000 ohms, ±10%, 1 watt; carbon; max dimension, $\frac{9}{32}$" diam x ⅞".	Bleeders & bias voltage.	C.L.	W-59	6
19		RESISTOR: 200 ohms, ±10%, 10 watts; wire wound, max dimension, ⅜" diam x 1 $\frac{13}{32}$".	Voltage dropping resistor.	C.C.C.	W-184	1
14		RESISTOR: 5 ohms, ±10%, ½ watt; wire-wound, molded phenolic covering; max dimension, $\frac{3}{16}$" diam x ⅝".	Vibrator actuating point suppression.	I.R.C.	W-78	1
18-1 18-2 18-3 18-4		RESISTOR: ¼ ohm, ±10%, 10 watts; wire-wound, vitreous enameled; max dimension, $\frac{5}{16}$" diam x 1¾".	Current limiting resistor.	O.M.C.	W-169	4

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
16		RESISTOR: 10 ohms, ±10%, 10 watts; wire-wound, vitreous enameled; max dimension, $\frac{5}{16}$" diam x 1¾".	Voltage dropping resistor.	O.M.C.	W-39	1
8		RELAY: double pole, double throw. 12-volt coil, 250 ohms, ±10%.	Completes circuit for triggering lamp.	A.E.C.	R-127	1
_____		CONNECTOR STRIP ASSEMBLY: bakelite; max dimension, $\frac{1}{16}$" x $\frac{3}{32}$" x 3 $\frac{9}{16}$".	Transformer switching connections.	E.L.I.	A-1122	1
_____		INPUT CABLE ASSEMBLY: includes 15 feet of #10 dual rubber covered cord and 2 terminal lugs.	Input connections.	E.L.I.	A-1121	1
_____		NAME PLATE: name plate.	_____		F-1796	1
_____		NAME PLATE: complete equipment.	_____		F-1886	1
_____		CIRCUIT LABEL:	_____	E.L.I.	F-1790	1
_____		SWITCH MOUNTING BRACKET ASSEMBLY: 18 gauge, steel. Finish: blue gray primer. Max dimension, $2\frac{49}{32}$" x 1" x 1⅜".	Mounts ON-OFF switch.	E.L.I.	A-1115	1
_____		RESISTOR MOUNTING PANEL: bakelite; max dimension, 2" x 3½" x ⅛".	Mounts bleeders resistors.	E.L.I.	A-1117	1
_____		BUSHING: $\frac{5}{16}$" OD x $\frac{11}{64}$" ID x 1⅝"; steel, zinc plated.	_____	R.L.	G-55	2
_____		BUSHING: $\frac{5}{16}$" OD x ½", tapped 10-32, steel, nickel plated.	_____	R.L.	G-67	1
_____		TUBE CLAMP: 0.022" spring monel. Max dimension, 1¾" x ⅜" x $\frac{7}{16}$".	Holds rectifier tube in place.	E.L.I.	M-1225	2
_____		TUBE BRACE: 0.23" monel. Max dimension, ⅞" x $\frac{7}{16}$" x $\frac{13}{32}$".	Holds rectifier tube vertical.	E.L.I.	L-1513	2
_____		PANEL ASSEMBLY MOUNTING BRACKET: 18 gauge, steel. Finish: blue gray primer; max dimension, 1¾" x $\frac{11}{16}$" x $\frac{11}{16}$".	_____	E.L.I.	L-1516	1
_____		VIBRATOR BLOCK: wood, max dimension, 3" x 1" x 1 $\frac{1}{16}$".	To hold vibrator in position.	E.L.I.	L-1517	1
_____		CHASSIS MOUNTING BRACKET: 14 gauge, steel. Finish: olive drab wrinkle over blue gray primer; max dimension, 4⅛" x 1 $\frac{3}{16}$" x ¾".	To mount voltage converter unit.	E.L.I.	L-1519	4
_____		RESISTOR INSULATING PANEL: bakelite; max dimension, 3½" x 2" x ⅛".	_____	E.L.I.	L-1526	1

27. TABLE OF REPLACEABLE PARTS—(Contd).

b. Voltage Converter PP-50/VVX-1X.

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
		RIVET SOLDERING LUG: brass, tinned.		Z.C. 110	U-583	5
		LUG, SOLDERING: spade type, max dimension, ¾" x $\frac{5}{16}$" x 0.020".		M.S.P.	U-154	4
		GRID CAP:		N.C. 24	U-437	2
		FIBRE WASHER: extruded, ⅜" OD x $\frac{9}{64}$" ID x ¼" OD shoulder.		C.D.F.	U-460	22
		LUG, SOLDERING:		B.M.C. Natty	U-496	7
		LUG, SOLDERING: copper.		B.M.C. Diet	U-551	2
		RESISTOR MOUNTING BRACKET: 18 gauge, steel. Finish: blue gray primer; max dimension, 5¾" x $\frac{9}{16}$" x 2$\frac{1}{16}$".	Support current limiting resistors.	E.L.I.	L-1528	1
		INPUT PANEL: bakelite; max dimension, 4¾" x 1¾" x $\frac{5}{16}$".			L-1531	1
		WASHER: bakelite, 1⅛" OD x 0.130" ID x $\frac{3}{32}$".		S.C.	L-433	2
		RIVET: $\frac{3}{32}$" x 0.088", truss head.		C.R.M.	U-38	8
		RIVET: $\frac{3}{32}$" x 0.120", brass, nickel plated, truss head.		T.R.C.	U-25	4
WIRING MATERIALS						
		WIRE: #12, bus, tinned.		A.C.	X-86	5"
		WIRE: #20, white with green tracer.		R.P.C.	X-287	25"
		WIRE: #20, white with red tracer.		R.P.C.	X-289	30"
		WIRE: #14, white.		R.P.C.	X-306	60"
		WIRE: #20, white.		R.P.C.	X-310	120"
		TUBING: #9, red, XTE-30, vinylite.		I.V.C.	Y-245	30"
		TUBING: #9, green, XTE-30, vinylite.		I.V.C.	Y-241	4"
		TUBING: #9, black, XTE-30, vinylite.		I.V.C.	Y-243	5"
		TUBING: #7, white, vinylite.		I.V.C.	Y-228	4"
		TUBING: #9, white, vinylite.		I.V.C.	Y-224	8"

c. Identification Lamp VS-1/VVX-1

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
		LAMP ASSEMBLY.	Flash lamp.	S.E.C.	A-1073	1
		LAMP BODY ASSEMBLY: *Includes:*	Lamp housing.	E.L.I.	A-1072	1
		LAMP BODY: 18 gauge Shelby seamless tubing; 1.875" diam x 6".		——	M-1593	1
		COLLAR: steel, 2¼-16 SAE threaded.		——	L-1486	1
		SWITCH HINGE: 20 gauge steel; max dimension, ⅝" x $\frac{1}{16}$" x ⅜".		——	L-1489	1
		SWITCH GUARD: 20 gauge steel; max dimension, 1½" x ⅞" x $\frac{11}{16}$".		——	L-1490	1
		END CAP ASSEMBLY: *Includes:*		E.L.I.	A-1312	1
		END CAP: 20 gauge steel; 1.906" ID x ⅜".		——	M-1591	1
		CORD GRIP: zinc; max dimension, ⅞" diam x 1". ⅜" pipe thread.		——	S-343	1
		NUT CONDUIT: steel. For ⅜" pipe thread.		——	U-682	1
		LOCKWASHER.		——	U-681	1
		MOUNTING BRACKET: *Includes:*	To mount lamp.	E.L.I.	A-1316	1
		BASE: 18 gauge steel; max dimension, 3½" x 3½".		——	A-1316 detail A	1
		SPRING: 20 gauge spring steel.		——	A-1316 detail B	2
		RIVET: .120" x ¼".		——	U-44	4
		LAMP COIL ASSEMBLY: *Includes:*	Ignition coil.	E.L.I.	A-986	1
		SOCKET: 3-pin, ceramic; 1$\frac{3}{16}$" diam x $\frac{13}{16}$".		——	S-377	1
		COIL: 1⅛" diam x 1⅞".		——	T-769	1
		SOCKET MOUNTING PIECE: Amphenol 912B. Max dimension, 1¾" diam x 1⅞".		——	L-1493	1
		COIL HOUSING: Amphenol 912B 1.75" OD x 1⅜" ID x 2$\frac{11}{32}$".		——	L-1492	1
		COIL HOUSING END: Amphenol 912B; 1.75" diam x $\frac{3}{16}$".		——	L-1494	1
		SCREW: drive, type U. 00 x ¼, steel.		——	U-760	2
		POTTING COMPOUND.		——	K-13	2 oz
		WIRE: #16, 4-conductor; rubber covered; color code: red, white, green, black.		——	X-258	20½'
		CEMENT: amphenol, #53-901-G.		——	K-27	1 oz

27. TABLE OF REPLACEABLE PARTS—(Contd).

c. Identification Lamp VS-1/VVX-1

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
———		RING CLAMP: steel. 2.500" OD x ¾"; internal thread 2¼-16 SAE.	———	L.M.C.	L-1487	1
———		LIGHT SHIELD: 18 gauge, Shelby seamless tubing. 2½" OD x 2.402" ID x 4".	To make light unidirectional.	R.L.	M-1592	1
———		NAME PLATE.	———		F-1887	1
———		SPRING: for light shield; 24 gauge, spring monel; 1" x $\frac{7}{16}$".	———	R.L.	L-1488	4
———		GASKET: Neoprene, 2⅛" OD x 1⅜" x $\frac{1}{32}$".	———	———	N-459	1
———		LEVER: switch, ⅛", strip steel, ½" x 4".	———	R.L.	L-1491	1
———		PIN: hinge, steel. 0.062" diam x $\frac{11}{32}$".	———	S.W.	U-747	1
———		SCREW: #6-32 x ¼", round head, steel.	———	———	U-124	3
———		SCREW: self-tapping; stove head, steel. #4 x $\frac{3}{16}$" long.	———	———	U-27	3
———		RIVET: $\frac{5}{32}$" x 0.088" diam.	———	———	U-18	8
———		LUG: soldering.	———	———	U-131	4
———		SWITCH: interlock; single pole, single throw; rating: 1 amp at 125 volts a-c.	Trigger switch.	A.H.H.	E-50	1
———		WIRE: #14 white.	———	R.P.C.	X-306	6"
———		TUBING: #9 white, vinylite.	———	I.V.C.	Y-244	1"
———		TUBING: #7 red, vinylite.	———	I.V.C.	Y-226	1"

d. Running Spares, Visual Identification Equipment AN/VVX-1 (for 6- or 12-volt operation).

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
1		VIBRATOR: 6-volt coil frequency; 110-120 cycles.	To change input d-c voltage to a-c and apply it to the transformer.	E.L.I.	LTS-1282	1
_____		FUSE: 20-amp 4AG.	Input fuse (for 12-volt d-c operation).	L.L.	E-32	2
7		FUSE: 40-amp 4AG.	Input fuse (for 6-volt d-c operation).	L.L.	E-37	2
12-1 12-2		TUBE: type 12X3.	Rectifier.	R.R.T.	H-132	2
_____		SCREW: #6-32 x $\frac{5}{16}$"; flat top, binding head, steel.	To fasten base and cover to voltage converter unit chassis.		U-136	14
_____		LOCKWASHER: #6.	Used with #6-32 screws.		U-235	14
_____		FLASH LAMP: including: flash tube, lens and 3-prong base; max dimension, 2⅛" diam x 5$\frac{3}{16}$".	Replacement flash lamp for identification lamp.	S.E.C.	A-1073	1

e. Running Spares, Visual Identification Equipment AN/VVX-1X (for 12- or 24-volt operation).

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
1		VIBRATOR: 12-volt coil frequency, 110-120 cycles.	To change input d-c voltage to a-c and apply it to the transformer.	E.L.I.	MTS-1281	1
_____		FUSE: 10-amp, 3AG.	Input fuse (for 24-volt d-c operation).	L.L.	E-3	2
7		FUSE: 20-amp, 4AG.	Input fuse (for 12-volt d-c operation).	L.L.	E-32	2
12-1 12-2		TUBE: type 12X3.	Rectifier.	R.R.T.	H-132	2
_____		SCREW: #6-32 x $\frac{5}{16}$", flat top binding head, steel.	To fasten base and cover to voltage converter unit chassis.		U-136	14
_____		LOCKWASHER: #6.	Used with #6-32 screws.		U-235	14
_____		FLASH LAMP: including flash tube, lens and 3-prong base; max dimension, 2⅛" diam x 5$\frac{3}{16}$".	Replacement flash lamp for identification lamp.	S.E.C.	A-1073	1

27. TABLE OF REPLACEABLE PARTS—(Contd).

f. Maintenance Spares, Visual Identification Equipment AN/VVX-1.

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
1		VIBRATOR: 6-volt Coil; frequency 110 to 120 cycles; max dimension, 5⅝" x 2¾" x 2⅜".	To change input d-c voltage to a-c and apply it to the transformer.	E.L.I.	LTS-1282	10
11		TRANSFORMER: dimension of case: 4" x 4⅝" x 6⅜". *Winding data:* Primary: turns; 500. Taps; 0-16-32-48-64-500. Wire size: 0 to 16 & 48 to 64, #15; 16 to 48, double #15; 64 to 500, #29. Resistance, 32 ohms. Secondary: turns; 9,200. Taps: 0-4,600-9,200. Wire size: #35. Resistance, 2,000 ohms. Output voltage; 2,000 volts d-c.	Power.	E.L.I.	A-1128	2
————		CAPACITOR MOUNTING BRACKET ASSEMBLY: includes mounting bracket and mounting bolts; max dimension, 4" x 4⅝" x 6⅜".	Mounts 5-1 and 5-2 capacitors.	E.L.I.	A-1112	2
————		SWITCH MOUNTING BRACKET ASSEMBLY: max dimension, 2$\frac{29}{32}$" x 1" x 1⅜".	Mounts ON-OFF switch.	E.L.I.	A-1115	2
————		RESISTOR MOUNTING PANEL ASSEMBLY: bakelite; max dimension, 2" x 3½" x ⅛".	Mounts bleeder resistors.	E.L.I.	A-1117	2
————		INPUT CABLE ASSEMBLY: includes 15 feet of #10 dual rubber covered cord & 2 terminal lugs.	Input connections.	E.L.I.	A-1121	2
2-1 2-2 2-3		CAPACITOR: 1 mfd, ±10%, 165 volts a-c, oil. Metal container, 1$\frac{11}{16}$" x 2" x ¾".	Buffer. Buffer. Trigger.	J.E.F.	C-118	6
3-2 3-1		CAPACITOR: 0.5 mfd, −10% +40%, 50-volt d-c, paper. Metal container; max dimension, $\frac{11}{16}$" diam x 2$\frac{5}{16}$".	To improve the action of relay 9. Vibrator actuating point suppression.	J.E.F.	C-113	8
4		CAPACITOR: 0.5 mfd, −10% +40%, 50-volt d-c, oil. Max dimension, 1" diam x 1$\frac{5}{16}$".	R-f suppression.	E.U.C.	C-268	4
5-1 5-2		CAPACITOR: 23.0 to 28.2 mfd, 1,000-volt d-c continuous duty; 2,000-volt d-c intermittant duty; metal container; max dimension, 3¾" x 3$\frac{5}{16}$" x 7$\frac{13}{32}$".	Stores charge for operation of lamp.	G.E.	C-299	4
7		FUSE: 20-amp, 4 AG.	Input fuse (for 12-volt d-c operation).	L.L.	E-32	50

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
7		FUSE: 40-amp, 4 AG.	Input fuse (for 6-volt d-c operation).	L.L.	E-37	50
6		SWITCH: Single pole, single throw.	ON-OFF switch.	C.H.	E-33	2
12-1 12-2		TUBE: type 12X3.	Rectifier.	R.R.T.	H-132	20
———		TUBE CLAMP: 0.022" spring monel. Max dimension, 1¾" x ⅜" x $\frac{7}{16}$".	Holds rectifier tube in position.	E.L.I.	M-1225	4
———		TUBE BRACE: 0.23" monel. Max dimension, ⅞" x $\frac{7}{16}$" x $\frac{13}{32}$".	Holds rectifier tube vertical.	E.L.I.	L-1513	4
———		MOUNTING BRACKET: panel assembly; 18 gauge, steel. Finish: blue gray primer; max dimension, 1¾" x $\frac{11}{16}$" x $\frac{11}{16}$".	Mounts input panel.	E.L.I.	L-1516	2
———		MOUNTING BRACKET: resistor; 18 gauge, steel. Finish: blue gray primer; max dimension, 5¾" x $\frac{11}{16}$" x 2$\frac{1}{16}$".	Support current limiting resistors.	E.L.I.	L-1528	2
8		RELAY: 6-volt coil, 75 ohms, +0 -20. Double pole, double throw.	Completes circuit for triggering lamp.	A.E.C.	R-82	2
9		RELAY: double pole, double throw, 110-volt a-c, 50 to 60 cycles. Contact Current: 1.5 amp at 110-volt a-c. Coil Current: 50 ma at 110-volt a-c. Coil wound to resistance 1,500 ohms, ±5%.	Trigger timing.	A.E.C.	R-105	2
———		SOCKET: 4-prong, molded phenolic.	Tube sockets.	A.P.C.	S-74	8
———		SOCKET: 6-prong, molded phenolic.	Vibrator sockets.	A.P.C.	S-75	4
19		CONNECTOR (AN-3102-12S-3P): 2-prong, male, chassis mounting.	Remote control trigger connections.	A.P.C.	S-214	2
———		FUSE RECEPTACLE: 4 AG size, molded phenolic; max dimension, ¾" diam x 2$\frac{9}{32}$".	Receptacle for input fuse.	B.C.	S-325	2
———		CORD GRIP: zinc; max dimension, ⅞" diam x 1". ⅜" pipe thread.	Holds input cable in position.	R.M.C.	S-343	2
10		BLOCK: terminal, molded phenolic, 3 terminals; max dimension, 1$\frac{5}{16}$" x 2$\frac{7}{16}$" x 2".	Output terminal connections to lamp.	C.D.M.	S-396	2
20		CHOKE: coil diameter: $\frac{9}{16}$". Coil length: 1¾". Number of turns: 16. Size of wire: #10 enameled.	R-f suppression.	E.L.I.	A-1318	2

27. TABLE OF REPLACEABLE PARTS—(Contd).

f. Maintenance Spares, Visual Identification Equipment AN/VVX-1.

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
————		LOCKWASHER: #6, internal tooth type.	————		U-235	72
————		CAP: grid; National Co. part No. 24.	————	N.C.	U-437	4
————		LOCKWASHER: #8.	————		U-548	18
17		RESISTOR: 5 ohm, ±10%, 10 watt; wire-wound, vitreous enameled; max dimension, $\frac{5}{16}$" diam x 1¾".	Voltage limiting resistor.	O.M.C.	W-42	5
16		RESISTOR: 50 ohms, ±10%, 10 watt; wire-wound, vitreous enameled; max dimension, $\frac{5}{16}$" diam x 1¾".	Reduces voltage to operate relay 8.	O.M.C.	W-43	2
13		RESISTOR: 500 ohms, ±10%, 10 watt; wire-wound, vitreous enameled; max dimension, $\frac{5}{16}$" diam x 1¾".	Flashing rate timing resistor.	O.M.C.	W-50	2
15-1 15-2 15-3 15-4 15-5 15-6		RESISTOR: 200,000 ohms, ±10%, 1 watt; carbon; max dimension, $\frac{5}{32}$" diam x ⅞".	Bleeders and bias voltage.	C.L.	W-59	30
14		RESISTOR: 5 ohms, ±10%, ½ watt; wire-wound, molded phenolic covering.	Vibrator actuating point suppression.	I.R.C.	W-78	5
18-1 18-2 18-3 18-4		RESISTOR: ¼ ohm, ±10%, 10 watt; wire-wound, vitreous enameled; max dimension, $\frac{5}{16}$" diam x 1¾".	Current limiting resistors.	O.M.C.	W-169	20
		ASSEMBLY: lamp, including flash tube, lens, and 3-prong base; max dimension, 2⅛" diam x 5$\frac{3}{16}$".	Replacement flash lamp for identification lamp.	S.E.C.	A-1073	10
————		LAMP COIL ASSEMBLY: includes ignition coil, coil housing, 3-pin socket, and 20½ inches of #16 4-conductor wire.	Lamp ignition.	E.L.I.	A-986	4
————		SWITCH: interlock, single pole, single throw. Rating: 1 amp at 125-volts a-c.	Trigger switch for lamp.	A.H.H.	E-50	2
————		CONNECTOR STRIP ASSEMBLY: bakelite; max dimensions, $\frac{1}{16}$" x $\frac{5}{32}$" x 3$\frac{5}{16}$".	Transformer switching connections.	E.L.I.	A-1122	1

g. Maintenance Spares, Visual Identification Equipment AN/VVX-1X.

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
1		VIBRATOR: 12-volt coil. Frequency: 110 to 120 cycles; max dimension, 5⅝" x 2¾" x 2⅜".	To change input d-c voltage to a-c and apply it to the transformer.	E.L.I.	MTS-1281	10
11		TRANSFORMER: dimension of case, 4" x 4⅝" x 6⅜". *Winding data:* Primary: turns; 500. Taps; 0-32-64-96-128-500. Wire size: 0 to 32 & 96 to 128 #18; 32 to 96, double #18; 128 to 500 #28. Resistance, 34 ohms. Secondary: turns; 9,200. Taps: 0-4,600-9,200. Wire size: #35. Resistance, 2,000 ohms. Output voltage; 2,000 volts d-c.	Power.	E.L.I.	A-1111	2
———		CAPACITOR MOUNTING BRACKET ASSEMBLY: Includes mounting bracket and mounting bolts; max dimension, 4" x 4⅝" x 6⅜".	Mounts 5-1 and 5-2 capacitors.	E.L.I.	A-1112	2
———		SWITCH MOUNTING BRACKET ASSEMBLY: max dimension, 2$\frac{23}{32}$" x 1" x 1⅜".	Mounts ON-OFF switch.	E.L.I.	A-1115	2
———		RESISTOR MOUNTING PANEL ASSEMBLY: bakelite; max dimension, 2" x 3½" x ⅛".	Mounts bleeder resistors.	E.L.I.	A-1117	2
———		INPUT CABLE ASSEMBLY: Includes 15 feet of #10 dual rubber covered cord & 2 terminal lugs.	Input connections.	E.L.I.	A-1121	2
2-1 2-2 2-3		CAPACITOR: 1 mfd, ±10% 165-volt a-c, oil. Metal container; 1$\frac{13}{16}$" x 2" x ¾".	Buffer. Buffer. Trigger.	J.E.F.	C-118	6
3-1 3-2		CAPACITOR: 0.5 mfd, -10%, +40%, 50-volt d-c, paper. Metal container; max dimension, $\frac{11}{16}$" diam x 2$\frac{5}{16}$".	Vibrator actuating point suppression. To improve the action of relay 9.	J.E.F.	C-113	8
4		CAPACITOR: 0.5 mfd, -10% +40%, 50-volt d-c, oil; max dimension, 1" diam x 1$\frac{5}{16}$".	R-f suppression.	E.U.C.	C-268	4
5-1 5-2		CAPACITOR: 23.0 to 28.2 mfd, 1,000-volt d-c continuous duty; 2,000-volt d-c intermittant duty; metal container; max dimension, 3¾" x 3$\frac{5}{16}$" x 7$\frac{13}{32}$".	Stores charge for operation of lamp.	G.E.	C-299	4
7		FUSE: 10-amp 3 AG.	Input fuse (for 24-volt d-c operation).	L.L.	E-3	50
7		FUSE: 20-amp 4 AG	Input fuse (for 12-volt d-c operation).	L.L.	E-32	50

27. TABLE OF REPLACEABLE PARTS—(Contd).

g. Maintenance Spares, Visual Identification Equipment AN/VVX-1X.

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
6		SWITCH: Single pole, single throw.	ON-OFF switch.	C.H.	E-33	2
12-1 12-2		TUBE: type 12X3.	Rectifier.	R.R.T.	H-132	20
_____		CLAMP: tube, 0.022", spring monel.	Holds rectifier tube in position.	E.L.I.	M-1225	4
_____		BRACE: tube, 0.023" monel, max dimension, $\frac{7}{8}$" x $\frac{7}{16}$" x $\frac{13}{32}$".	Holds rectifier tube vertical.	E.L.I.	L-1513	4
_____		PANEL ASSEMBLY MOUNTING BRACKET: 18 gauge, steel. Finish: blue gray primer. Max dimension, 1$\frac{3}{4}$" x $\frac{11}{16}$" x $\frac{1}{16}$"	Mounts input panel.	E.L.I.	L-1516	2
_____		RESISTOR MOUNTING BRACKET: 18 gauge, steel. Finish: blue gray primer. Max dimension, 5$\frac{3}{4}$" x $\frac{9}{16}$" x 2$\frac{1}{16}$".	Supports current limiting resistors.	E.L.I.	L-1528	2
8		RELAY: 12-volt coil, 250 ohms, ±10%; double pole, double throw.	Completes circuit for triggering lamp.	A.E.C.	R-127	2
9		RELAY: Double pole, double throw. 110-volt a-c, 50 to 60 cycles. Contact current; 1.5 amps at 110-volt a-c. Coil Current: 50 ma at 110-volt a-c. Coil wound to resistance 1,500 ohms, ±5%.	Trigger timing.	A.E.C.	R-105	2
_____		SOCKET: 4-prong, molded phenolic.	Tube sockets.	A.P.C.	S-74	8
_____		SOCKET: 6-prong, molded phenolic.	Vibrator sockets.	A.P.C.	S-75	4
20		CONNECTOR (AN-3102-12S-3P): 2-prong, male, chassis mounting.	Remote control trigger connections.	A.P.C.	S-214	2
_____		RECEPTACLE: fuse, 4 AG size, molded phenolic; max dimension, $\frac{3}{4}$" diam x 2$\frac{9}{32}$".	Receptacle for input fuse.	B.C.	S-325	2
_____		CORD GRIP: zinc; max dimension, $\frac{7}{8}$" diam x 1", $\frac{3}{8}$" pipe thread.	Holds input cable in position.	R.M.C.	S-343	2
10		BLOCK: terminal; molded phenolic, 3 terminals; max dimension, 1$\frac{5}{16}$" x 2$\frac{7}{16}$" x 2".	Output terminal connections to lamp.	C.D.M.	S-396	2
21		CHOKE: coil diameter; $\frac{9}{16}$". Coil length; 1$\frac{3}{4}$". Number of turns; 16. Size of wire; #10 enameled.	R-f suppression.	E.L.I.	A-1318	2

Ref. No.	Signal Corps stock No.	Name of part and description	Function	Mfr.	Contractor's drawing No.	Quan. in equipt.
————		LOCKWASHER: #6, internal tooth type.	————		U-235	80
————		GRID CAP:	————	N.C. No. 24	U-437	4
————		LOCKWASHER: #8.	————		U-548	18
————		SWITCH: Interlock, single pole, single throw. Rating: 1 amp at 125-volts a-c.	Lamp trigger switch.	A.H.H.	E-50	2
17-1 17-2 17-3 17-4		RESISTOR: 2 ohm, ±10%, 10 watt; wire-wound, vitreous enameled; max dimension, $\frac{5}{16}$" diam x 1¾".	Current limiting resistors.	O.M.C.	W-143	20
16		RESISTOR: 10 ohms, ±10%, 10 watt; wire-wound, vitreous enameled; max dimension, $\frac{5}{16}$" diam x 1¾".	Voltage dropping resistor.	O.M.C.	W-39	5
13		RESISTOR: 500 ohms, ±10%, 10 watt; wire-wound, vitreous enameled; $\frac{5}{16}$" diam x 1¾".	Flashing rate timing resistor.	W.J.C.	W-50	2
15-1 15-2 15-3 15-4 15-5 15-6		RESISTOR: 200,000 ohms, ±10%, 1 watt; carbon; $\frac{9}{32}$" diam x ⅞".	Bleeders and bias voltage.	C.L.	W-59	30
14		RESISTOR: 5 ohms, ±10%, ½ watt; wire-wound, molded phenolic covering.	Vibrator actuating point suppression.	I.R.C.	W-78	5
18-1 18-2 18-3 18-4		RESISTOR: ¼ ohm, ±10%, 10 watt; wire-wound, vitreous enameled; $\frac{5}{16}$" diam x 1¾".	Current limiting resistors.	O.M.C.	W-169	20
19		RESISTOR: 200 ohms, ±10%, 10 watts; wire-wound, ⅜" diam x $1\frac{33}{32}$".	Voltage dropping resistor.	C.C.C.	W-184	2
		LAMP ASSEMBLY: includes flash tube, lens, and 3-prong base; 2⅛" diam x $5\frac{3}{16}$".	Replacement flash lamp for identification lamp.	S.E.C.	A-1073	10
————		LAMP COIL ASSEMBLY: includes ignition coil, coil housing, 3-pin socket, and 20½ inches of #16 4-conductor wire.	Lamp Ignition.	E.L.I.	A-986	4
————		CONNECTOR STRIP ASSEMBLY: bakelite; max dimensions, $1\frac{1}{16}$" x $\frac{3}{32}$" x $3\frac{9}{16}$".	Transformer switching connections.	E.L.I.	A-1122	1

28. TABLE OF STANDARD NUTS, BOLTS, SCREWS, AND WASHERS.

The tables of standard nuts, bolts, screws, and washers for Voltage Converter Units PP-49/VVX-1 and PP-50/VVX-1X are identical.

Quantity	Description	Size	Length	Thread	Where used
4	SCREW: round head, steel.	#4	3/8"	40 NC	To mount remote control trigger connector.
4	NUT: hex, steel.	#4		40 NC	Used with #4-40 screws to mount remote control trigger connector.
2	SCREW: flat head, steel.	#6	3/8"	32 NC	To mount components.
27	SCREW: flat top, binding head, steel.	#6	5/16"	32 NC	To mount components.
2	SCREW: flat head, steel.	#6	1/2"	32 NC	To mount components.
22	SCREW: flat top, binding head, steel.	#6	1/2"	32 NC	To mount components.
4	SCREW: binding head.	#6	5/8"	32 NC	To mount components.
7	SCREW: round head, steel.	#6	2 1/4"	32 NC	To mount components.
41	NUT: hex, steel.	#6		32 NC	Used with #6-32 screws to mount components.
62	LOCKWASHER: internal tooth type.	#6			Used with #6-32 screws and hex nuts.
2	SCREW: flat head, steel.	#8	2"	32 NC	To mount component.
4	MOUNTING BOLT: steel.	#8	3/8"	32 NC	To mount components.
12	NUT: hex, steel.	#8		32 NC	Used with #8-32 screws to mount components.
10	LOCKWASHER: internal tooth type.	#8			Used with #8-32 screws and hex nuts to mount components.
1	SCREW: flat head, steel.	#10	3/8"	32 NF	To mount component.
8	SCREW: round head, steel.	#10	1/2"	32 NF	To mount voltage converter unit mounting brackets.
8	LOCKWASHER: internal tooth type.	#10			Used with #10-32 screws.
2	BOLT: round head, steel.	#1/4	1"	20 NC	Used for input terminals.
2	WING NUT: steel.	#1/4		20 NC	Used with 1/4-20 bolts for input terminals.
2	NUT: hex, steel.	#1/4		20 NC	Used with 1/4-20 bolts for input terminals.
4	LOCKWASHER: steel.	#1/4			Used with 1/4-20 bolts and nuts on input terminals.
1	LOCKWASHER.	3/8"			Used with cord grip.
1	NUT: conduit.	3/8"			Used with cord grip.

29. LIST OF MANUFACTURERS.

CODE	NAME	ADDRESS
A.C.	Anaconda Copper	Chicago, Ill.
A.E.C.	Advance Electric Co.	Los Angeles, Calif.
A.H.H.	Arrow, Hart and Hegeman Co.	Hartford, Conn.
A.P.C.	American Phenolic Corp.	Chicago, Ill.
B.C.	Bussman Mfg. Co.	St. Louis, Mo.
B.M.C.	Belden Manufacturing Co.	Chicago, Ill.
C.C.C.	Continental Carbon Co.	Cleveland, Ohio
C.D.F.	Continental Diamond Fibre Co.	Valparaiso, Ind.
C.D.M.	Curtis Development and Manufacturing Co.	Milwaukee, Wis.
C.H.	Cutler Hammer Manufacturing Co.	Milwaukee, Wis.
C.L.	Centralab	Milwaukee, Wis.
C.R.M.	Chicago Rivet & Machine Co.	Bellwood, Ill.
E.L.I.	Electronic Laboratories, Inc.	Indianapolis, Ind.
E.U.C.	Electrical Utilities Co.	Chicago, Ill.
G.E.	General Electric Supply Corp.	Indianapolis, Ind.
I.M.I.	Industrial Manufacturers, Inc.	Elizabeth, N. J.
I.R.C.	International Resistance Corp.	Philadelphia, Pa.
I.V.C.	Irvington Varnish & Insulator Co.	Irvington, N. J.
J.E.F.	John E. Fast & Co.	Chicago, Ill.
L.L.	Littelfuse Laboratories, Inc.	Chicago, Ill.
L.M.C.	Lamb Machine Co.	Indianapolis, Ind.
M.S.P.	Manufacturers Screw Products Co.	Chicago, Ill.
N.C.	National Co.	Malden, Mass.
O.M.C.	Ohmite Manufacturing Co.	Chicago, Ill.
R.L.	Rex Laboratories	Indianapolis, Ind.
R.M.C.	Ralco Manufacturing Co.	Chicago, Ill.
R.P.C.	Rockbestos Products Corp.	New Haven, Conn.
R.R.T.	Rogers Radio Tubes, Ltd.	Toronto, Ontario, Canada
S.E.C.	Sylvania Electric Products Co.	New York, N. Y.
S.C.	Synthane Corp.	Oaks, Pa.
S.W.	Stanley Works	New Britain, Conn.
T.R.C.	Tubular Rivet Co.	Boston, Mass.
W.J.C.	Walker-Jimieson Co.	Chicago, Ill.
Z.C.	Zierick Company	New York, N. Y.

Order No. 334-Day-44-6M-17 April 1944