TM 11-951

WAR DEPARTMENT TECHNICAL MANUAL

RECTIFIER

RA-36-J, K, L

WAR DEPARTMENT • 8 JUNE 1943

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CONTENTS

LIST OF ILLUSTRATIONS

DESTRUCTION OF ABANDONED MATERIAL IN THE COMBAT ZONE

In case it should become necessary to prevent the capture of this equipment, and when ordered to do so,

DESTROY IT SO THAT NO PART OF IT CAN BE SALVAGED, RECOGNIZED OR USED BY THE ENEMY. BURN ALL PAPERS AND BOOKS.

BY:

1. Explosives, when provided.
2. Hammers, axes, sledges, or whatever heavy objects are readily available.
3. Burning with gasoline, oil, paper, or wood.
4. Grenades and shots from available arms.

PROCEDURE:

1. Obliterate all identifying marks. Destroy nameplates and circuit labels.
2. Demolish all panels, castings, switch- and instrument-boards.
3. Destroy all controls, switches, relays, connecting means and meters.
4. Rip out all wiring in electrical equipment. Smash water-cooling, gas and oil systems in gas-engine generators, etc.
5. Smash every electrical or mechanical part whether rotating, moving or fixed.
6. Break up all operating instruments such as keys, phones, microphones, etc.
7. Destroy all classes of carrying cases, straps, containers, etc.

DISPOSAL:

1. Where possible, and when time permits, bury all debris or dispose of it in streams or other bodies of water.

SAFETY NOTICE

Operation of this equipment involves the use of voltages which are dangerous to life. Operating personnel must observe all safety regulations at all times. Do not change fuses or make adjustments inside of equipment with voltage supply on. Keep away from live circuits.

SECTION I. DESCRIPTION

1. General

Rectifier RA-36-(*) is a compact charging unit for charging telephone switchboard storage batteries. It may also be used for charging vehicle storage batteries. The rectifier has two separate charging circuits, one on the right and one on the left. Each of the two charging circuits has separate ammeter and control boards as shown in Figure 2.

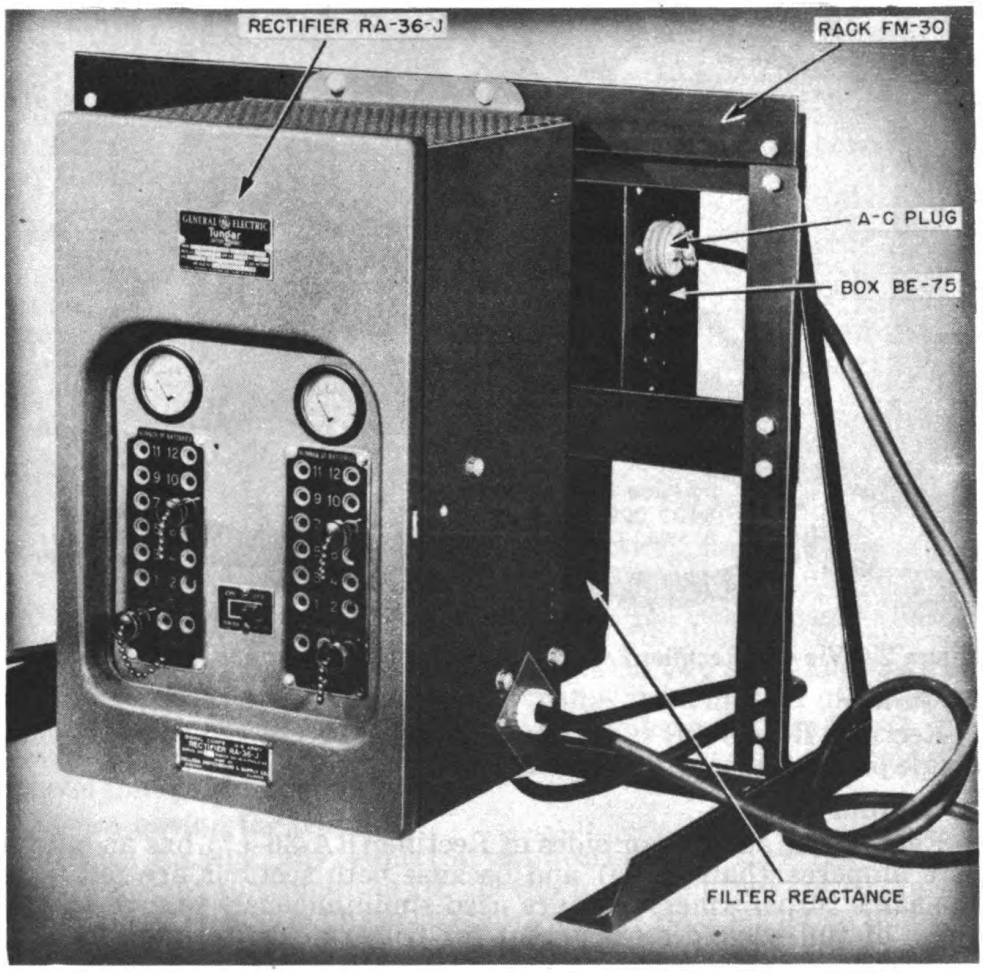

Figure 1—Exterior view of Rectifier RA-36-(*)

(*) Wherever this sign is used the equipment will be issued with suffix letters J, K or L.

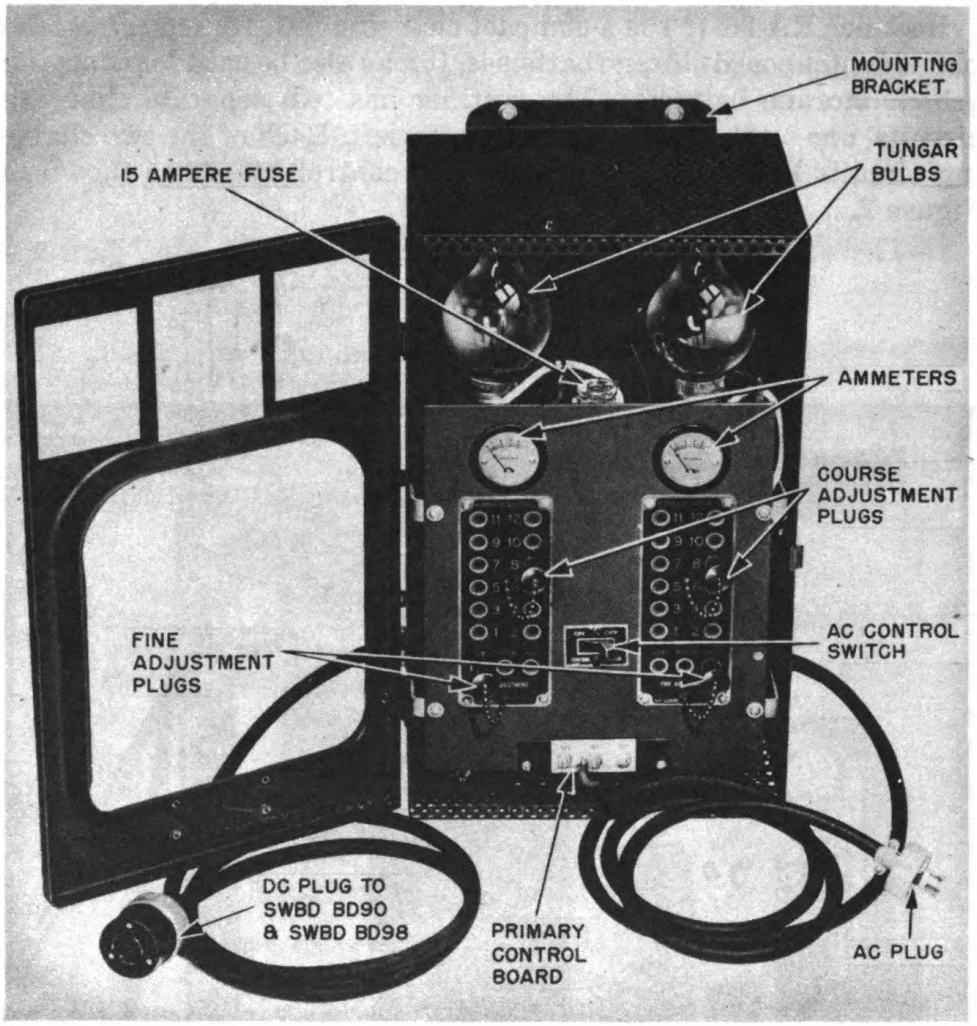

Figure 2—View of Rectifier RA-36-(*) with cabinet door open, showing interior

2. Power

Rectifier RA-36-(*) is designed to operate from 110-volt, 60-cycle, single phase, alternating current.

3. Output

Each of the sections or sides of Rectifier RA-36-(*) has an output of 6 amperes (half wave) and because both sections are fed from the same transformer, they are used simultaneously to give 12 amperes of full wave direct current for battery charging service.

4. List of Component Parts

Rectifier RA-36-(*) includes the following major components:

2 Ammeters	Weight .25 lb. each
2 Bulbs, Tungar 6 amp.	Weight .4 lb. each
1 Capacitor	Weight .3 lb. each

2 Fuses, 15 amp.	Weight .2 lb. each
1 Fuse Block	Weight .5 lb. each
2 Plugs, Fine Adjuster	Weight .05 lb. each
2 Plugs, Coarse Adjuster	Weight .05 lb. each
2 Plugs, Boards	Weight .3 lb. each
1 Filter Reactance	Weight 63.5 lbs. each
1 Receptacle and Cap	Weight .4 lb. each
1 Switch	Weight .02 lb. each
1 Power Transformer	Weight 60.00 lbs. each
1 Terminal Board	Weight .06 lb. each
2 Sockets	Weight .25 lb. each

The weight of Rectifier RA-36-(*) is 82 pounds.

SECTION II
INSTALLATION AND OPERATION

5. Initial Procedure

If Rectifier RA-36-(*) is to be used as a separate unit, it will be packed in an individual packing case. Remove it carefully. Avoid damaging the instruments and Tungar charging bulbs which are included in the unit package. Take bulbs out as soon as possible and lay them aside carefully to prevent breakage.

6. Installation

Select a clean dry place (not over batteries) for installing, preferably on a wall or bench and away from dirt, moisture and battery fumes. If a wall is selected as a location, first drive two No. 12 screws into a solid point at the same height as the keyhole slots in the mounting bracket at the top and back of the rectifier cabinet. Insert a third screw at the bottom and in the place provided for it. Install the filter reactance coil close to Rectifier RA-36-(*) and in series with d-c charging leads. When Rectifier RA-36-(*) is assembled on Rack FM-30, the filter reactor and Cabinet BE-75 are also mounted on the same rack. This assembly is in itself a complete charging unit with circuit breakers for overload protection. Rack FM-30 is also provided with Case CS-73 (a sturdy shipping container for transportation between points of service). When Case CS-73 is set in position for service, expose the equipment for use by first removing the slotted hexagon head machine screws on two sides and near the bottom of the case. Then lift the cover upward and clear of the apparatus, leaving Rack FM-30 mounted on the base of Case CS-73. The cover can then be used as a table or support to raise the equipment to a level convenient for operation.

7. Preparation for Use

Before making any electrical connections, be sure that the a-c supply circuit to which the rectifier is to be connected is 105 to 125 volts, 60-cycle, single phase as shown on the rectifier name plate.

8. Electrical Connections

If you are sure that a-c supply and name plate are in agreement, plug the a-c line connection, which is a rubber covered 2-conductor cord (with two-prong male plug) extending from the right hand side of Rectifier RA-36-(*), into Cabinet BE-75. Plug the d-c charging lead which is a rubber covered 2-conductor cord (with two-prong

male plug) extending from the left hand side of Rectifier RA-36-(*) into the charging receptacle provided on the power panel of Switchboard BD-90 or on Switchboard BD-98. Test the tightness of the fuses used on Rectifier RA-36-(*) (which are 15 ampere and are located as shown on Figure 2) and be sure that they are firmly screwed in place. Adjust the tap on the primary control board (see Figure 2) to agree with the voltage of the a-c supply line. To reach the primary control board, open the door on the front of the rectifier. The door is held in the closed position by a spring fastener on the right hand side. Screw both Tungar bulbs firmly into the large sockets and attach connecting leads with clip to the wires on the top of the bulbs.

9. Battery Connections

a. Before attaching charging leads to batteries, turn the rectifier switch to OFF and remove all four adjustment plugs. Insert the coarse adjustment plugs on both sides of the rectifier in the holes numbered to correspond with the voltage of the battery to be charged divided by six. Thus the setting for a 24-volt battery would be No. 4 hole and for a 48-volt battery would be No. 8 hole. These figures indicate the number of equivalent 6-volt, 3-cell batteries. Be sure that the plugs are pushed in as far as they will go. Battery equipment for Switchboard BD-98 is 24 volts. Battery equipment for Switchboard BD-90 is 48 volts.

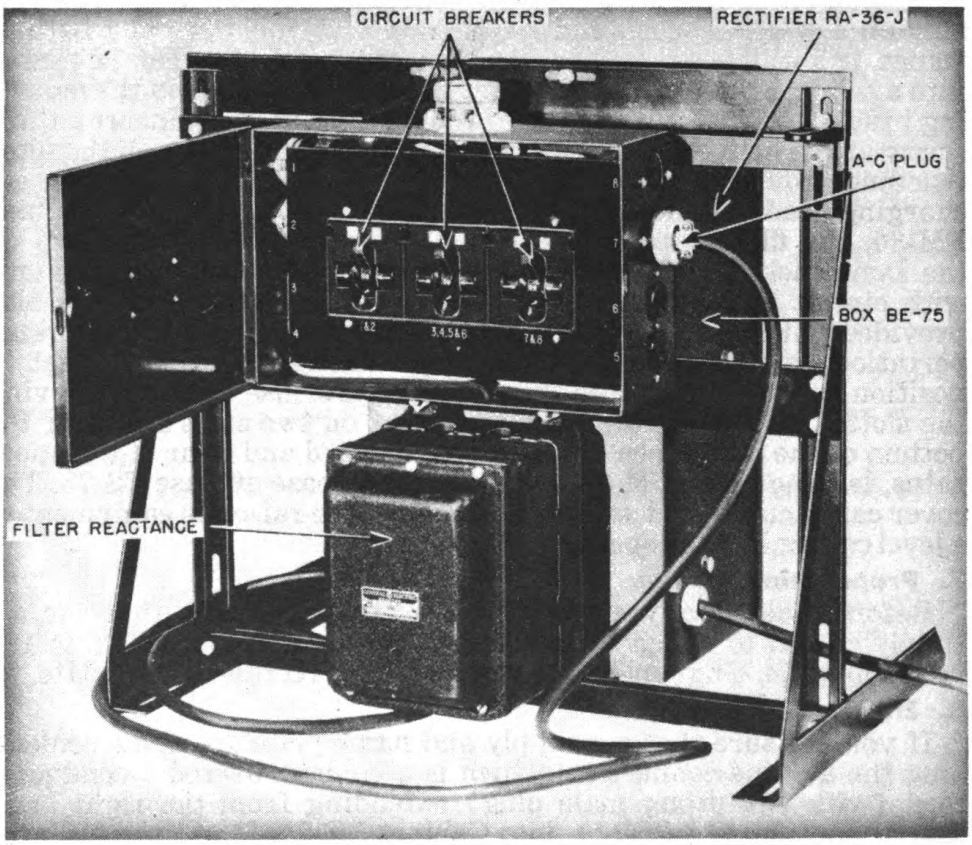

Figure 3—Back view of Rack FM-30 showing filter reactance and Cabinet BE-75

NOTE: THE FINE ADJUSTMENT PLUGS ARE NOT INSERTED AT THIS POINT.

b. Check the following:

(1) The control switch is turned OFF.
(2) Both bulbs are screwed firmly into the sockets.
(3) The connecting leads with clips are attached to the wires on top of the bulbs.
(4) The fuses have been inserted.
(5) The coarse adjustment plugs are inserted in the proper hole as far as they will go.

10. Operation

After making sure that neither fine adjustment plug has been inserted, snap the control switch to ON and both the bulbs should light. If both bulbs light, insert the fine adjustment plugs in the holes marked LOW. (See paragraph 11 below for procedure to follow if bulbs do not light.) The charging rate of the right hand circuit will be indicated by the ammeter on the right, and the charging rate of the left hand circuit by the meter on the left. If the charging rate indicated on an ammeter is less than one-half of the desired charging rate, first turn off the control switch and move the fine adjustment plug of its associated circuit, which is on the same side, to MEDIUM or if necessary to HIGH. If still unable to obtain a charging rate as high as desirable, but less than 6 amperes as indicated on each ammeter, turn off the control switch and move both coarse adjustment plugs to the hole of the next higher number, and proceed as before. Normal operation is established when both ammeters read one-half of the desired charging rate, and no excessive ripple or hum is caused in the telephone circuits.

RATES HIGHER THAN 6 AMPERES PER CIRCUIT SHOULD NOT BE USED AS THIS PRACTICE WILL MATERIALLY REDUCE THE LIFE OF THE BULBS.

11. If Bulbs Do Not Light

If when turning on the control switch, the bulbs do not light proceed to find the cause as follows:

a. See that the a-c supply is on.

b. Examine the line supply fuses. If these are blown out or defective, replace them with new 15 ampere fuses.

c. Make sure that the bulbs are screwed well into the sockets. A bulb screwed in loosely often causes trouble and may result in short life of the bulb.

d. Examine the contacts inside the socket. If they are tarnished or dirty, clean them with sandpaper.

e. Try a new bulb if one fails to light. The old bulb may be defective.

SECTION III
FUNCTIONING OF PARTS

12. Control Boards

One control board on each circuit is for coarse adjustment of the charging rate and one for fine adjustment of the charging rate. Both coarse and fine adjustments are made by means of inserted plugs as indicated on Figure 2.

13. Power Transformer

a. The power transformer used in Rectifier RA-36-(*) is of the insulated type; that is, the primary and secondary windings are entirely separate and insulated from each other. The advantage of the use of such an insulated transformer is that a telephone battery can be charged while it is being used to operate a telephone system or switchboard without interfering ground connections being introduced by the charging equipment.

b. The power transformer primary winding is provided with taps to compensate for fluctuations in a-c line voltage. These taps are indicated on Figure 4 showing proper tap for operation on 105, 115, and 125 volt lines.

14. Filter Reactance Coil

Because of the fact that rectified alternating current does not have a straight line characteristic and would cause a disturbing hum in telephone circuits if applied to a telephone battery while battery was being used for the operation of telephone equipment, a filter reactance coil is installed in series with the d-c charging lead to absorb hum or ripple.

SECTION IV. MAINTENANCE

15. There are no continuously moving parts in Rectifier RA-36-(*). Therefore, no routine care is required other than that of keeping the equipment clean and dry, replacing burned out fuses and bulbs and repairing damage caused by accident. Other than this, the equipment will most likely have to be returned to higher echelon for repair if it goes bad. Field repair or replacement of the transformer is not practicable.

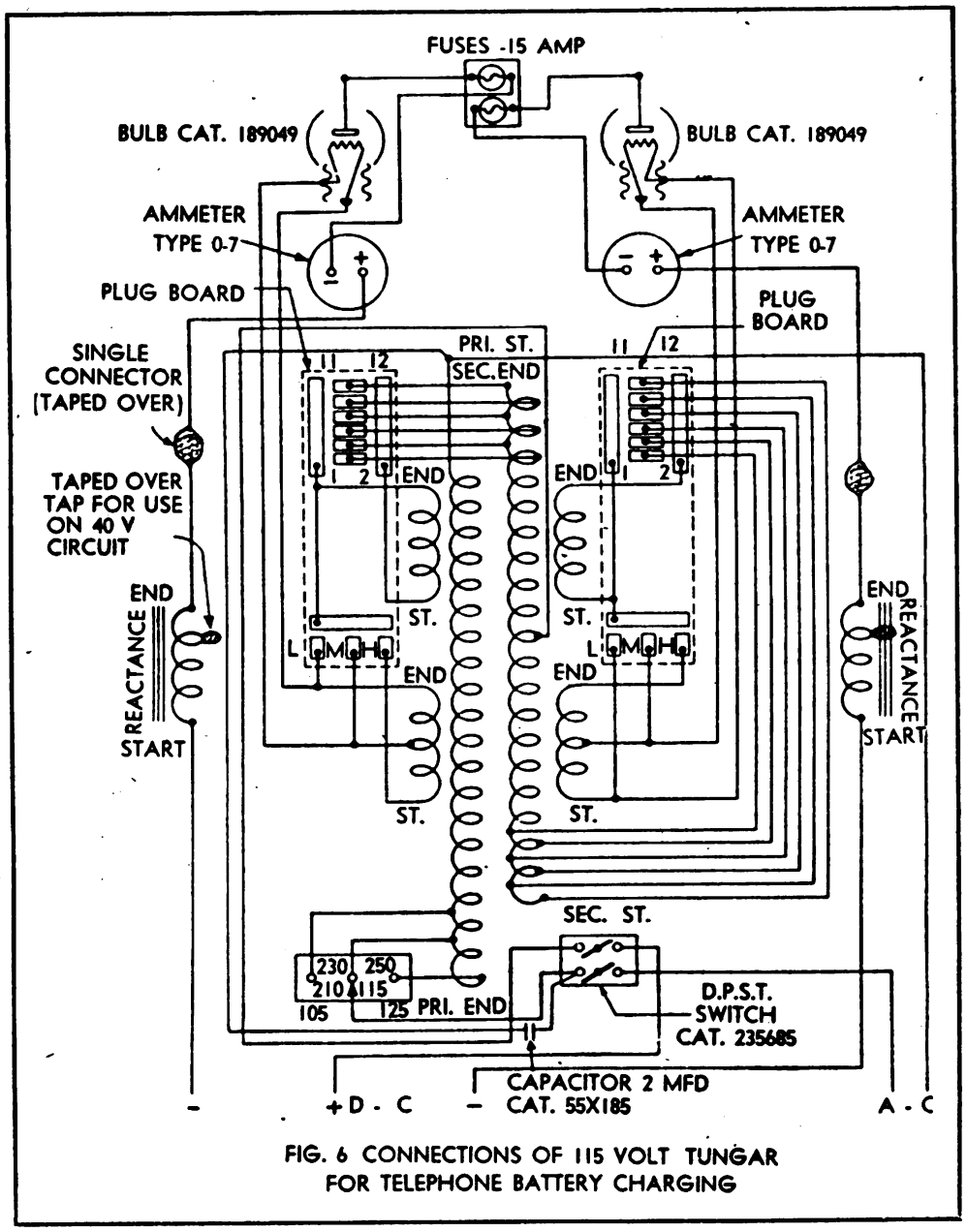

FIG. 6 CONNECTIONS OF 115 VOLT TUNGAR FOR TELEPHONE BATTERY CHARGING

Figure 4—Rectifier RA-36-(*) circuit diagram

SECTION V. SUPPLEMENTARY DATA

16. Table of Replaceable Parts

Sig. Corps Stock No.	Name of Part	Description	Mfgr.	Part or Mfg. No.	Function
	Filter Reactance	Heavy coil on iron core enclosed	G. E. Co.	Cat. 3126680	Filter out ripple in charging current
	Tungar Bulb	Glass bulb with screw base—6 amperes	G. E. Co.	Cat. 189049	2 element charging tube
	Power Transformer	Tapped coil on iron core —open type	G. E. Co.	Cat. 99316	Voltage supply
	Capacitor	Metal case capacitor—2 microfarad—330 V.A.C.	G. E. Co.	Cat. 55X185	Bulb protection
	Terminal Board	Bakelite strip	G. E. Co.	Cat. 489353	Battery charging connection
	Plug Board	Bakelite plug panel—15 plug holes	G. E. Co.	Cat. 44815478	Charge rate control
	Plug	Metal plug with chain—Bakelite handle—fine adjustment	G. E. Co.	Cat. 55X151	Charge rate control

	Plug	Metal plug with chain—Bakelite handle—coarse adjustment	G. E. Co.	Cat. 55X150	Charge rate control
	Ammeter	Type 0-7 meter—2 inch	G. E. Co.	Drg. K-3778371	Charge rate measure
	Receptacle	Cord connector—polarized	H. H.	7313	Inter-connecting fitting
	Receptacle Cup	Metal covered "Twist-Lock" cap	H. H.	7238	Inter-connecting fitting
	Switch	Toggle switch—30 amp. 125 volt	G. E. Co.	Cat. 235685	Primary power control
	Fuse Block	Porcelain block—2 receptacle	G. E. Co.	Cat. 62965	Fuse receptacle
	Fuse	15 amp. plug type	G. E. Co.	Cat. 23X335	Overload protection
	Socket	Porcelain base receptacle—Mogul size	G. E. Co.	Cat. 217967	For Tungar bulbs

G. E. Co. is General Electric Company
H. H. is Harvey Hubbell

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By order of the Secretary of War

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Chief of Staff

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Major General
The Adjutant General

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(For explanation of symbols see FM 21-6)

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