

TM 11-963

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

11A - 621

RECTIFIERS

RA-83-A AND

RA-83-C



DEPARTMENT OF THE ARMY

FEBRUARY 1955

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

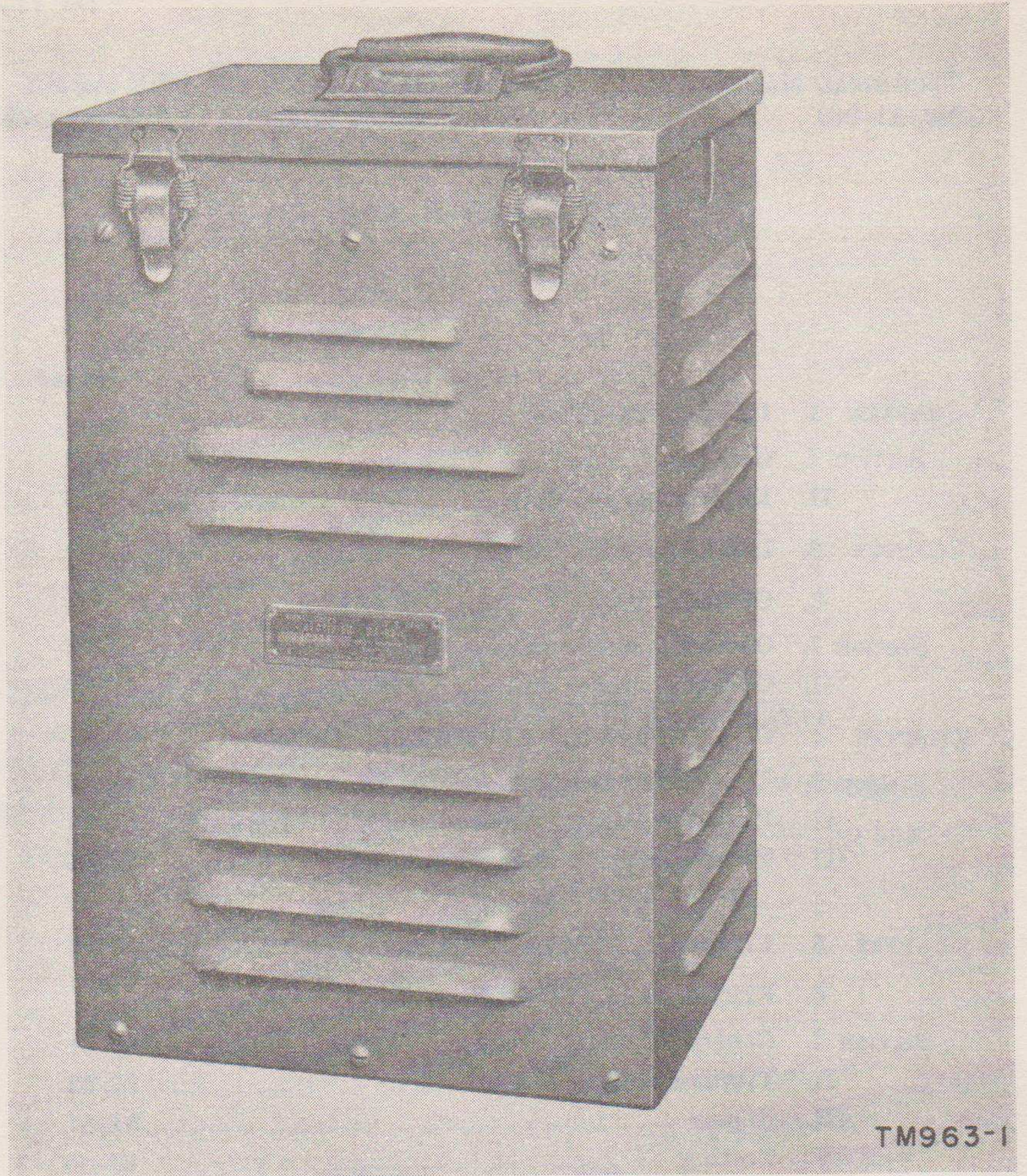
Never change the position of the 3-ampere ac fuse nor attempt any repair of the equipment while the rectifier is connected to the power source.

DON'T TAKE CHANCES!

RECTIFIERS RA-83-A AND RA-83-C

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* This manual supersedes TM 11-963, 7 January 1944, including C 1, 19 September 1944, and C 2, 17 December 1951.



TM963-1

Figure 1. Rectifier RA-83-C, front view, cover closed.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual contains a description of the equipment, instructions for its operation and organizational and field maintenance, and a discussion of the theory of its operation. It applies only to Rectifiers RA-83-A and RA-83-C.

b. Forward comments on this publication directly to Commanding Officer, The Signal Corps Publications Agency, Fort Monmouth, N. J., ATTN: Standards Division.

2. Forms and Records

a. The following forms will be used for reporting unsatisfactory conditions of Army equipment and in performing preventive maintenance:

- (1) DD Form 6 (Report of Damaged or Improper Shipment) will be filled out and forwarded as prescribed in SR 745-45-5 (Army); Navy Shipping Guide, Article 1850-4 (Navy); and AFR 71-4 (Air Force).
- (2) DA Form 468 (Unsatisfactory Equipment Report) will be filled out and forwarded to the Office of the Chief Signal Officer, as prescribed in SR 700-45-5.
- (3) DD Form 535 (Unsatisfactory Report) will be filled out and forwarded to Commanding General, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio, as prescribed in SR 700-45-5 and AF TO 00-35D-54.
- (4) DA Form 11-242 (Operator First Echelon Maintenance Check List for Signal Corps Equipment (Telephone Central Office Set)) will be prepared in accordance with instructions on the back of the form.
- (5) DA Form 11-243 (Second and Third Echelon Maintenance Check List for Signal Corps Equipment (Telephone Central Office Set)) will be prepared in accordance with instructions on the back of the form.

b. Use other forms and records as authorized.

Section II. DESCRIPTION AND DATA

3. Description

Rectifiers RA-83-A and RA-83-C are portable equipments designed to convert 115- or 230-volt, 50- to 60-cycle per second, single phase, alternating current (ac) to 6- or 12-volt direct current (dc) to charge lead-acid type storage batteries. Either one or two 3-cell, 6-volt storage batteries or one 12-volt storage battery may be charged at one time. An ac input cable and a dc output cable are included with the equipment. All the components are mounted on a steel chassis and inclosed in a removable steel case that has a hinged cover. Figure 1 shows Rectifier RA-83-C with the top closed, ready for transportation; Rectifier RA-83-A is similar in appearance except that a different type of catch and a nonfolding carrying handle are used.

4. Technical Characteristics

Ac input:

Voltage	115 or 230 volts.
Frequency	50 to 60 cps.
Phase	Single.
Power (full load)	325 watts (approx).

Dc output:

Voltage	6 or 12 volts.
Current	20 amperes at 6 volts; 10 amperes at 12 volts.

5. Packaging Data

a. For domestic shipment and limited storage, Rectifiers RA-83-A and RA-83-C are packaged for mechanical and physical protection only and the packaged unit is placed in a wooden, fiberboard, or wireboard box. For oversea shipment, the unit is cushioned on all sides and placed, together with a suitable amount of desiccant, within a corrugated fiberboard box. This box is sealed within a moisture-vaporproof barrier and placed in an outer, water resistant fiberboard box, which then is sealed with water resistant tape. This package then is packed in a wooden box, and the box is strapped with steel straps.

b. The chart below gives the approximate dimensions and weight of Rectifiers RA-83-A and RA-83-C unpacked and packed for oversea shipment.

RA-83-A or RA-83-C	Dimensions (in.)			Volume (cu ft)	Weight (lb)
	Height	Width	Depth		
Unpacked-----	16½	10½	10¾	1	51
Packed-----	20	16½	13	2.4	80

6. Differences Between Models

Rectifier RA-83-A and Rectifier RA-83-C are essentially alike and may be used interchangeably. The chief differences are the arrangement of the components mounted on the top panel (figs. 2 and 3) and the mounting of the ac and dc fuses. Rectifier RA-83-A has post extractor-type fuse holders for the active fuses and clips to secure the spare fuses. In Rectifier RA-83-C, all the fuses are held by spring clip fuse holders mounted on a fuse block located near the center of the top panel and protected by a hinged cover. A folding-type carrying handle and improved spring-type latches are used on Rectifier RA-83-C.

CHAPTER 2

INSTALLATION

7. Siting

Place the rectifier upright (cover on top) in a cool, dry, well-ventilated location near the ac supply to which it will be connected. Keep the equipment off damp ground and out of the direct rays of the sun. Allow enough free space around the rectifier to permit air to circulate freely. *Do not locate the rectifier directly above batteries that are being charged.* Fumes from batteries undergoing charge are corrosive and will damage the charging equipment.

8. Uncrating, Unpacking, and Checking

Unpack the equipment near the place where it will be used and where it will not be exposed to dust, dirt, or excessive moisture. Do not thrust tools into the shipping container nor into the interior cartons. Do not damage the packing and packaging materials more than is necessary to remove the equipment; these materials will be useful if the equipment is repacked for storage or shipment. To unpack the equipment, follow the instructions below that are applicable to the type of packing (par. 5a).

a. *Uncrating and Unpacking.*

- (1) On each side of the shipping container, cut the steel straps close to the top of the box.
- (2) Remove the nails (use a nail puller) that secure the box top and lift off the top.
- (3) Carefully remove the carton containing the equipment.
- (4) Slit the outer carton along the upper edges on three sides. Leave the fourth side to act as a hinge. Fold back the top.
- (5) Slit and fold back the moisture-vaporproof barrier.
- (6) Open the inner carton in the same manner that the outer carton was opened ((4) above).
- (7) Pull the rectifier out of the carton by the lifting handle.

b. *Checking.* Inspect the rectifier to be sure it is in good condition and has not been damaged during shipment.

- (1) See that the case is not damaged and that the latches hold the cover securely closed. Release the latches and raise the cover.

- (2) Uncoil and extend the two cables coiled inside the cover. Carefully inspect the items mounted on the top panel. See that the cover glass of the ammeter is not cracked or broken. Operate the switches and check them for positive action. Be sure that the proper number of active and spare fuses of the correct values are present.
- (3) Carefully inspect the input and output cables. See that the plug, clips, and insulators are in good condition.
- (4) If any damage is noted, fill out and forward DD Form 6 according to the instructions in paragraph 2a.

9. Preoperation Procedures

Caution: Do not connect the rectifier to the ac supply until the procedures described in *a* through *d* below have been completed.

a. Unlatch and raise the cover of the case. Uncoil the two cables and place them in the slots provided in the sides of the case.

b. Place the ON-OFF switch lever in the OFF position. Place the tap changing switch in No. 1 position, that is, turn the knob to the left as far as it will move.

c. Check the ac supply that is to be used. Be sure it is 115- or 230-volt, 50- to 60-cycle per second, single phase ac. If necessary, use a voltmeter to determine the voltage. *Never connect the rectifier to a dc source.*

d. Install a 3-ampere fuse in the proper fuse holder.

- (1) If the voltage of the ac supply is 115 volts, place a 3-ampere fuse in the 115V- 3 AMP fuse holder. In the RA-83-A, use the fuse post located at the front, *left-hand* corner of the top panel (fig. 2). In the RA-83-C, use the center clip and the *right-hand* clip of the fuse clips near the front edge of the fuse block (fig. 3).
- (2) If the voltage of the ac supply is 230 volts, place a 3-ampere fuse in the 230V - 3 AMP fuse holder. In the RA-83-A, use the fuse post located at the front *right-hand* corner of the top panel. In the RA-83-C, use the center clip and the *left-hand* clip of the three clips near the front edge of the fuse block.
- (3) In the RA-83-C, close the cover that protects the fuses and fuse block after the fuse is installed.

e. Connect the ac input cable to the ac supply.

CHAPTER 3 OPERATION

Section I. OPERATION UNDER USUAL CONDITIONS

10. Switches and Ammeter

All switch operating levers and the ammeter are located on the top panel and are accessible when the cover of the rectifier is raised.

Item	Purpose and use
ON-OFF switch	Used to start and stop rectifier. Place in ON position to close ac input circuit. Place in OFF position to open ac input circuit.
6V-12V switch	Connects circuits to provide 6-volt or 12-volt output. Place in 6V position to charge one 6-volt battery; place in 12V position to charge two 6-volt batteries or one 12-volt battery.
Tap changing switch	Adjusts load current. Turn knob clockwise (from position No. 1 in direction indicated by arrow) to increase current; turn counterclockwise toward position No. 1 to decrease current.
Ammeter	Measures load current. Do not exceed 20-ampere point marked 6V MAX during 6-volt charging. Do not exceed 10-ampere point marked 12V MAX during 12-volt charging.

11. Precautions Before Starting

- a. Be sure the operations described in paragraph 9 have been completed.
- b. See that the terminals of the battery to be charged are clean and free of corrosion. Clean them, if necessary.
- c. See that the battery or batteries to be charged are not located beneath or very close to the rectifier.
- d. Be sure which of the battery terminals is the positive terminal and which is the negative terminal before attaching the rectifier leads.

12. Charging One 3-Cell, 6-Volt Storage Battery

- a. Place the 6V-12V switch in the 6V position.

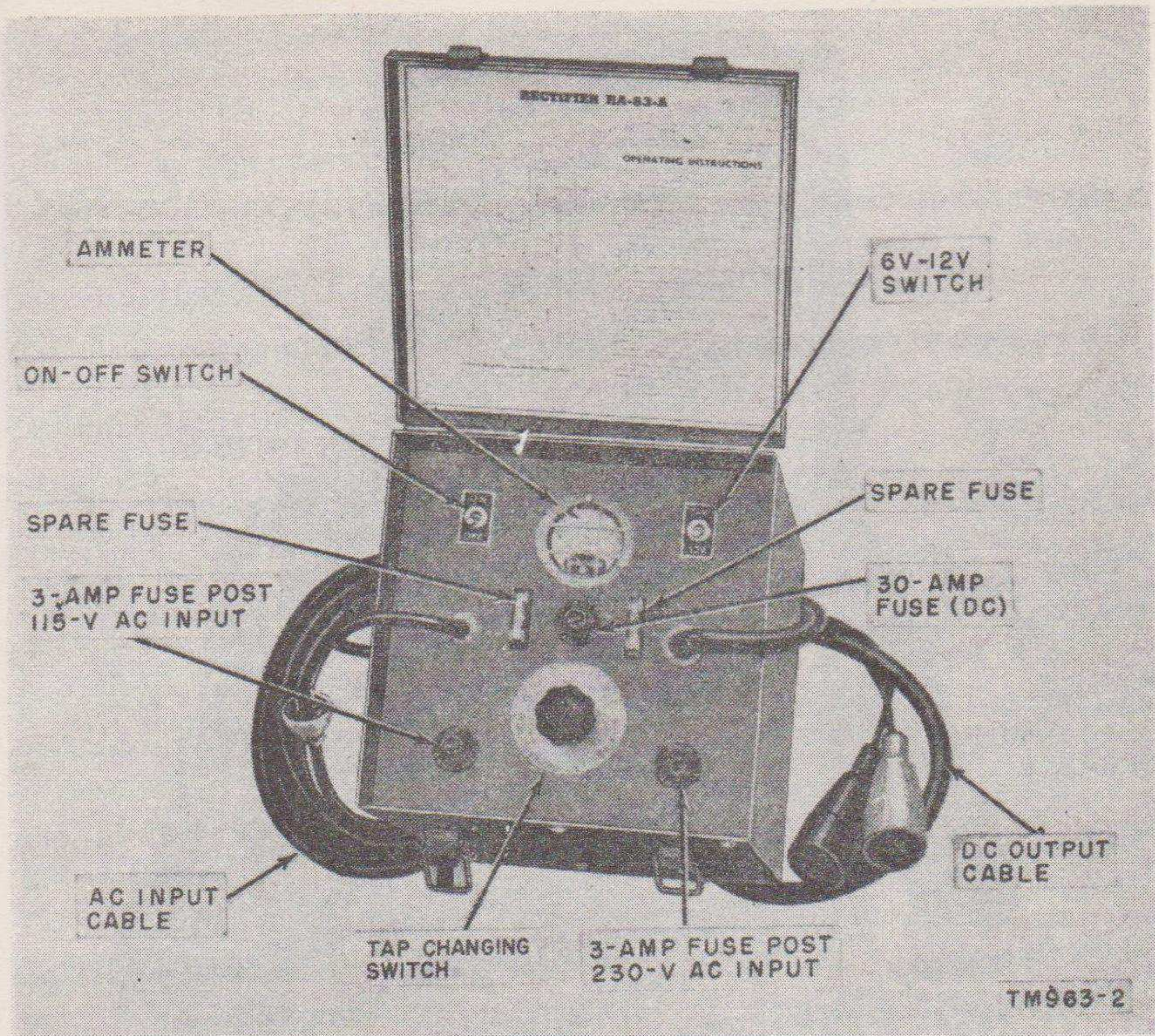


Figure 2. Rectifier RA-83-A, cover raised showing control panel.

b. Attach the positive output lead clip to the positive terminal of the battery to be charged. The positive output lead clip is marked + and has a red insulator.

c. Attach the negative output lead clip to the negative terminal of the battery. The negative lead clip is marked — and has a black insulator.

d. Place the ON-OFF switch in the ON position.

e. Watch the ammeter pointer and slowly turn the knob of the tap changing switch to the right (clockwise) until the ammeter reading indicates the desired current value but not more than 20 amperes (scale marked 6V MAX.). *This ammeter reading must not be exceeded when the 6V-12V switch is in the 6V position.*

f. See that the cables are in their slots and close the cover of the rectifier case.

13. Charging Two 3-Cell, 6-Volt Storage Batteries

a. Place the 6V-12V switch in the 12V position.

b. Attach the positive output lead clip (marked +) that has the RED insulator to the positive terminal of one of the two batteries.

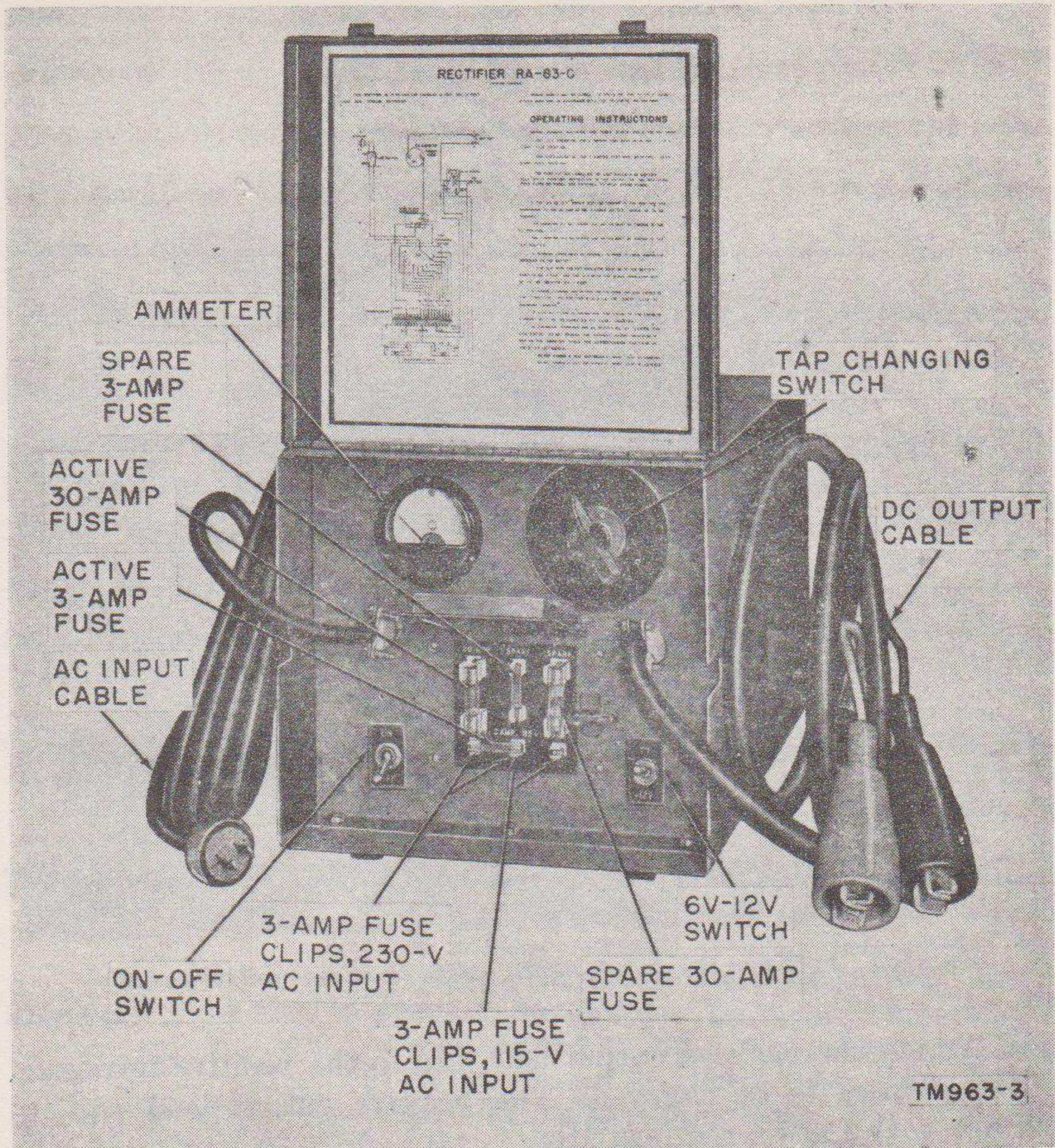


Figure 3. Rectifier RA-83-C, cover raised showing control panel.

Attach the negative output lead clip (marked —) that has the BLACK insulator to the negative terminal of the second of the two batteries.

c. Obtain or make a jumper consisting of a short length (about 12 inches) of insulated copper wire with a spring clip at each end. Using this jumper, connect the negative terminal of the first battery to the positive terminal of the second battery (*b* above).

d. Place the ON-OFF switch in the ON position.

e. Watch the ammeter pointer and slowly turn the knob of the tap changing switch clockwise until the ammeter reading indicates the desired current value, but not more than 10 amperes (scale marked 12V MAX.). *This ammeter reading must not be exceeded when the 6V-12V switch is in the 12V position.* See that the cables are in their slots and close the cover of the rectifier case.

14. Charging One 12-Volt Storage Battery

- a. Place the 6V-12V switch in the 12V position.
- b. Attach the positive output lead clip (marked +) that has the RED insulator to the positive terminal of the battery to be charged. Attach the negative output lead clip (marked —) that has the BLACK insulator to the negative terminal of the battery.
- c. Follow the procedure described in paragraph 13*d* and *e*.

15. Stopping

When the battery (or batteries) has been charged sufficiently, proceed as follows:

- a. Place the ON-OFF switch in the OFF position. Place the tap changing switch in the No. 1 position.
- b. Disconnect the clips of the dc output leads from the battery or batteries.
- c. Wipe the clips with a clean, dry cloth to remove any deposits.
- d. Coil the output cable neatly inside the cover of the case.
- e. If the rectifier is to be used next in the same location, leave the input cable connected to the ac supply. If the rectifier is to be moved to a different location, coil the input cable neatly inside the coil of the output cable.
- f. Close and latch the cover of the case.

Section II. OPERATION UNDER UNUSUAL CONDITIONS

16. Operation in Arctic Climates

If the rectifier is operated in areas where subzero temperatures and the climatic conditions associated with extremely cold weather prevail, follow the instructions in *a* through *d* below.

a. Handle the equipment carefully. Materials become brittle at extremely low temperatures. Warm the cables before uncoiling them; do not bend them sharply and avoid bending them more than necessary.

b. Keep the equipment dry. Locate it within a heated shelter whenever possible. Do not operate the rectifier when the temperature of the surrounding air is below -40° F. Lead-acid storage batteries will not accept a charge when the temperature is below 0° F. At subzero temperatures, batteries to be charged should be removed to a heated shelter, unless special means for heating the batteries are provided.

c. When equipment that has been exposed to the cold is brought into a warm place, it will sweat until it reaches room temperature. Remove the steel case (par. 36), and wipe the moisture from all accessible parts of the equipment, especially from terminal connections and the rectifier stacks. If possible, use a fan to circulate air throughout the interior. Do not operate the rectifier until it is thoroughly dry.

d. Refer to TB SIG 66, Winter Maintenance of Signal Equipment, for instructions on the maintenance of equipment in cold weather.

17. Operation in Tropical Climates and Desert Areas

a. *Tropical Climates.* When the rectifier is operated in areas where very high temperatures and relative humidity prevail, follow the instructions in (1) through (3) below.

- (1) Protect the equipment from sun and rain. Do not operate it in an excessively damp location.
- (2) Allow sufficient free space around the equipment to assure adequate ventilation. Watch for indications of overheating. Stop the rectifier if it becomes very hot. If the temperature exceeds 110° F., reduce the charging rate; do not operate the rectifier if the temperature exceeds 125° F. Discontinue charging if the temperature of the electrolyte exceeds 120° F.
- (3) Refer to TB SIG 72, Tropical Maintenance of Ground Signal Equipment, and TB SIG 13, Moistureproofing and Fungiproofing Signal Corps Equipment, for instructions on the maintenance of equipment in hot or humid areas.

b. *Desert Areas.* When the rectifier is operated in desert areas, protect it from the sun and protect it as much as possible from dust and sand. Keep the unit covered when it is not in operation. Follow the instructions concerning operations in high temperatures that are recommended in *a* above for operation in tropical climates. Inspect and clean the equipment more frequently than under normal operating conditions. Refer to TB SIG 75, Desert Maintenance of Ground Signal Equipment, for instructions on the maintenance of equipment in desert areas.

CHAPTER 4

ORGANIZATIONAL MAINTENANCE

Section I. LUBRICATION AND PRESERVATION

18. Lubrication

Rectifiers RA-83-A and RA-83-C have no moving parts that require lubrication. Keep the jaws of the clips of the dc output leads covered with a thin coat of Petrolatum (PET) to prevent corrosion.

19. Weatherproofing

Signal Corps equipment, when operated under severe climatic conditions, requires special treatment and maintenance. Fungus growth, insects, dust, corrosion, salt spray, excessive moisture, and extreme temperatures are harmful to most materials. A special moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection. This treatment is explained in TB SIG 13 and TB SIG 72. If only a few connections have been disturbed, brush a coat of Lacquer, fungus-resistant, specification No. 71-2202 (Sig C stock No. 6G1005-3.3 or equivalent) on all connections that have been disturbed. Avoid getting the moistureproofing and fungiproofing varnish on switch contacts or on the rectifier disks. Do not attempt complete moistureproofing and fungiproofing at the organizational level.

20. Painting and Refinishing

If the outside of the case or the top panel shows evidence of rust or corrosion, or if the finish is scratched badly or worn, refinish the damaged area or, if necessary, the entire case (*a* and *b* below). Avoid getting paint on the nameplate on the front of the case and on the operating instructions and wiring diagram inside the cover of the case. If the top panel is repainted, use a very small brush and be careful not to get paint on the items mounted on the panel. If the chassis requires refinishing, it must be removed from the case and the components mounted on the chassis must be removed. Do not attempt this at the organizational maintenance level. For detailed painting instructions, refer to TM 9-2851.

a. Preparation for Painting. Use No. 00 or No. 000 sandpaper to remove all paint, rust, and corrosion from the affected area. If

necessary, use Solvent, Dry Cleaning (SD) to soften the rust and use sandpaper to complete the cleaning operation. Dress the cleaned area with No. 0000 sandpaper to obtain a bright, smooth surface; wipe clean with a dry cloth.

Caution: Do not use steel wool for cleaning; very small particles of metal may get into the equipment and short or ground the circuits.

b. Painting. Use paint that conforms with existing regulations. If a small area is being refinished, apply two light coats of paint of the same type and color as the original finish. If the entire case is being refinished, apply a priming coat and then a finishing coat of paint. Allow the first coat of paint to dry thoroughly before the second coat is applied.

Section II. PREVENTIVE MAINTENANCE

21. Meaning of Preventive Maintenance

Preventive maintenance is a series of systematic operations performed on equipment at regular intervals. It consists of inspections and services designed to keep the equipment always in good operating condition. The primary purpose of preventive maintenance is to prevent failures or breakdowns, and thus to prevent the necessity for major repairs. Inspect this equipment at regular intervals so that minor defects may be discovered and removed before they cause serious damage and the complete failure of the equipment.

22. Use of Preventive Maintenance Forms (figs. 4 and 5)

a. The decision as to which items on DA Forms 11-242 and 11-243 are applicable to this equipment is a tactical decision to be made, in the case of first echelon maintenance, by the communications officer/chief or his designated representative and, in the case of second and third echelon maintenance, by the individual making the inspection. Instructions for the use of each form are on the form.

b. The items circled on figures 4 and 5 are partially or wholly applicable to Rectifiers RA-83-A and RA-83-C. Paragraph references in the ITEM block refer to paragraphs in the text that contain additional related information.

23. Preventive Maintenance Services

a. General. Perform the inspections and maintenance services indicated on DA Forms 11-242 and 11-243 and those described in

**OPERATOR FIRST ECHELON MAINTENANCE CHECK LIST FOR SIGNAL CORPS EQUIPMENT
TELEPHONE CENTRAL OFFICE SET**

INSTRUCTIONS: See other side

EQUIPMENT NOMENCLATURE _____ EQUIPMENT SERIAL NO. _____

LEGEND FOR MARKING CONDITIONS: ✓ Satisfactory; X Adjustment, repair or replacement required; (X) Defect corrected.
NOTE: Strike out items not applicable.

DAILY

NO.	ITEM	CONDITION						
		S	M	T	W	T	F	S
1	INSPECT SET FOR PRESENCE OF ALL COMPONENTS - SWITCHBOARD, CABINETS, HEAD AND CHEST SET, FRAMES, RACKS, PANELS, POWER UNIT, RECTIFIER, CONVERTER, MICROPHONE, CORDS, CABLES, MISCELLANEOUS ACCESSORIES AND RUNNING SPARE PARTS. PAR 23 c (2)							
2	CLEAN OUTSIDE SURFACES OF COMPONENTS OF DIRT, DUST, OIL, GRIME, RUST, CORROSION, FUNGUS. PAR 23 c (1)							
3	TIGHTEN ALL LOOSE ASSEMBLY SCREWS, EXTERIOR APPARATUS MOUNTING SCREWS, FASTENINGS, SUPPORTS, BRACKETS. PAR 23 c (5)							
4	CHECK ALL VISIBLE ELECTRICAL CONNECTIONS, TERMINALS, BINDING POSTS, FOR PROPER CONTACT, FIRMNESS OF SEATING, BENT BINDING POSTS, RUST, CORROSION. PAR 23 c (2)							
5	TIGHTEN ALL LOOSE VISIBLE TERMINALS, CABLES, AND BINDING POSTS UNTIL THEY ARE SNUG.							
6	INSPECT GROUND RODS FOR TIGHT CONNECTIONS, FRACTURES, BENDS, RUST, FIRMLY EMBEDDED.							
7	CHECK ALL MARKINGS AND DESIGNATION STRIPS FOR LEGIBILITY.							
8	CHECK SIGNAL DROPS TO SEE THAT THEY WORK FREELY; DO NOT DROP WHEN SWITCHBOARD IS JARRED.							
9	CHECK NIGHT ALARM BY ALLOWING A DROP TO FALL.							
10	CHECK SIGNALS TO SEE THAT DROPS ARE RESTORED WHEN PLUG IS INSERTED IN JACK, WHERE APPLICABLE.							
11	CHECK ALL LINE CIRCUITS FOR SATISFACTORY RING AND TALK OPERATION.							
12	CHECK CHARGING RATE OF BATTERIES FOR THE PROPER VALUE OF CURRENT FOR THE EQUIPMENT INVOLVED.							

WEEKLY

NO.	ITEM	COND- ITION	NO.	ITEM	COND- ITION
13	INSPECT OUTSIDE SURFACES OF COMPONENTS FOR LOOSE OR MISSING SCREWS, CRACKS, CHIPPED PAINT, RUST, GOUGES, CORROSION, BROKEN GLASS.		17	CHECK PLUGS FOR CHIPS, CRACKS, TARNISH, ROUGHNESS, SNUG FIT AND GOOD CONTACT.	
14	INSPECT ALL VISIBLE CORDS, CABLES AND WIRING FOR SECURELY FASTENED TERMINALS, BROKEN CONDUCTORS, DAMAGED INSULATION, MILDEW, FUNGUS, KINKS, STRAINS, SHARP BENDS, CORRECT POSITIONS. PAR 23 c (4)		18	CLEAN PLUGS OF TARNISH, GREASE, DUST, GRIME, OIL. PAR 23 c (4)	
15	CLEAN ALL VISIBLE CORDS, CABLING AND WIRING OF DIRT, DUST, GRIME, OIL, FUNGUS, MILDEW. PAR 23 c (4)		19	INSPECT STORAGE BATTERIES FOR WATER LEVEL, SPECIFIC GRAVITY, CRACKED CASE, CORROSION AT POSTS, DIRT, LOOSE CONNECTIONS.	
16	CLEAN ALL VISIBLE ELECTRICAL CONNECTIONS, TERMINALS, BINDING POSTS, OF DIRT, DUST, GREASE, GRIME AND CORROSION. PAR 23 c (4)		20	CHECK ALL SWITCHES AND KEYS FOR POSITIVE ACTION AND GOOD CONTACT.	
			21	INSPECT TO SEE THAT RECTIFIER HAS BEEN LOCATED WELL AWAY FROM BATTERY FUMES.	

22 IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION.

DA FORM 11-242
1 MAY 51

REPLACES DA AGO FORM 419, 1 DEC 50, WHICH IS OBSOLETE.

TM963-6

Figure 4. DA Form 11-242.

c below at the intervals determined by the officer in command and whenever the equipment has been moved or stored or has been out of service for a long period of time. Unsatisfactory conditions that cannot be corrected at the organizational level should be reported for referral to higher echelon maintenance repair organizations.

b. Tools and Test Equipment.

(1) *First echelon.* The materials and common tools available to the organizational unit are adequate to perform first echelon preventive maintenance.

**SECOND AND THIRD ECHELON MAINTENANCE CHECK LIST FOR SIGNAL CORPS EQUIPMENT
TELEPHONE CENTRAL OFFICE SET**

INSTRUCTIONS: See other side

EQUIPMENT NOMENCLATURE

EQUIPMENT SERIAL NO.

LEGEND FOR MARKING CONDITIONS: ✓ Satisfactory; X Adjustment, repair or replacement required; (X) Defect corrected.
NOTE: Strike out items not applicable.

NO.	ITEM	CONDIT- TION	NO.	ITEM	CONDIT- TION
1	INSPECT SET FOR PRESENCE OF ALL COMPONENTS - SWITCHBOARD, CABINETS, HEAD AND CHEST SET, FRAMES, RACKS, PANELS, POWER UNIT, RECTIFIER, CONVERTER, MICROPHONE, CORDS, CABLES, MISCELLANEOUS ACCESSORIES AND RUNNING SPARE PARTS. PAR 23 C (2)		18	CLEAN PLUGS OF TARNISH, GREASE, DUST, GRIME, OIL. PAR 23 C (4)	
2	CLEAN OUTSIDE SURFACES OF COMPONENTS OF DIRT, DUST, OIL, GRIME, RUST, CORROSION, FUNGUS. PAR 23 C (1)		19	INSPECT STORAGE BATTERIES FOR WATER LEVEL, SPECIFIC GRAVITY, CRACKED CASE, CORROSION AT POSTS, DIRT, LOOSE CONNECTIONS.	
3	TIGHTEN ALL LOOSE ASSEMBLY SCREWS, EXTERIOR APPARATUS MOUNTING SCREWS, FASTENINGS, SUPPORTS, BRACKETS. PAR 23 C (5)		20	CHECK ALL SWITCHES AND KEYS FOR POSITIVE ACTION AND GOOD CONTACT.	
4	CHECK ALL VISIBLE ELECTRICAL CONNECTIONS, TERMINALS, BINDING POSTS, FOR PROPER CONTACT, FIRMLINESS OF SEATING, BENT BINDING POSTS, RUST, CORROSION. PAR 23 C (2)		21	INSPECT TO SEE THAT RECTIFIER HAS BEEN LOCATED WELL AWAY FROM BATTERY FUMES.	
5	TIGHTEN ALL LOOSE VISIBLE TERMINALS, CABLES, AND BINDING POSTS UNTIL THEY ARE SNUG.		22	INSPECT PROTECTOR BLOCKS AND FUSES FOR CRACKS, CHIPS, CRUMBLING, GREASE, GRIME, DUST, OIL, CORROSION, TARNISH.	
6	INSPECT GROUND RODS FOR TIGHT CONNECTIONS, FRACTURES, BENDS, RUST, FIRMLY EMBEDDED.		23	CLEAN INTERIOR APPARATUS AND THE SMALL CREVICES BETWEEN THE PROTECTOR BLOCKS OF DUST, DIRT, GREASE, GRIME, OIL. PAR 23 C (1)	
7	CHECK ALL MARKINGS AND DESIGNATION STRIPS FOR LEGIBILITY.		24	TIGHTEN ALL LOOSE SCREWS AND FASTENINGS USED TO MOUNT INTERIOR APPARATUS.	
8	CHECK SIGNAL DROPS TO SEE THAT THEY WORK FREELY; DO NOT DROP WHEN SWITCHBOARD IS JARRED.		25	ADJUST SIGNAL SHUTTER LATCHES SO THAT SHUTTERS DO NOT FALL WHEN SWITCHBOARD IS JARRED.	
9	CHECK NIGHT ALARM BY ALLOWING A DROP TO FALL.		26	INSPECT HAND GENERATOR FOR FREE TURNING, SUFFICIENT OUTPUT TO RING TELEPHONE.	
10	CHECK SIGNALS TO SEE THAT DROPS ARE RESTORED WHEN PLUG IS INSERTED IN JACK, WHERE APPLICABLE.		27	CLEAN HAND GENERATOR OF DIRT, DUST, GREASE, EXCESS OIL.	
11	CHECK ALL LINE CIRCUITS FOR SATISFACTORY RING AND TALK OPERATION.		28	INSPECT TELEGRAPH CIRCUITS FOR SATISFACTORY OPERATION BY SETTING UP AND OPERATING.	
12	CHECK CHARGING RATE OF BATTERIES FOR THE PROPER VALUE OF CURRENT FOR THE EQUIPMENT INVOLVED.		29	REMOVE DRY BATTERIES BEFORE STORING.	
13	INSPECT OUTSIDE SURFACES OF COMPONENTS FOR LOOSE OR MISSING SCREWS, CRACKS, CHIPPED PAINT, RUST, GOUGES, CORROSION, BROKEN GLASS.		30	INSPECT SWITCH AND KEY MECHANISMS FOR PITTING, WEAR, PROPER CONTACT, DIRT, GREASE, CORROSION, FUNGUS, AND PROPER OPERATION. PAR 23 C (1)	
14	INSPECT ALL VISIBLE CORDS, CABLES AND WIRING FOR SECURELY FASTENED TERMINALS, BROKEN CONDUCTORS, DAMAGED INSULATION, MILDEW, FUNGUS, KINKS, STRAINS, SHARP BENDS, CORRECT POSITIONS. PAR 23 C (4)		31	INSPECT INTERIOR ELECTRICAL CONNECTIONS FOR TIGHTNESS, MOISTURE, OIL, GREASE, FUNGUS.	
15	CLEAN ALL VISIBLE CORDS, CABLING AND WIRING OF DIRT, DUST, GRIME, OIL, FUNGUS, MILDEW. PAR 23 C (4)		32	OPERATE SET AND CHECK FOR OVERHEATING, SATISFACTORY OVER-ALL OPERATION OF SET. PAR 23 C (3)	
16	CLEAN ALL VISIBLE ELECTRICAL CONNECTIONS, TERMINALS, BINDING POSTS, OF DIRT, DUST, GREASE, GRIME AND CORROSION. PAR 23 C (4)		33	LUBRICATE AS SPECIFIED IN LATEST DEPARTMENT OF THE ARMY LUBRICATION ORDER.	
17	CHECK PLUGS FOR CHIPS, CRACKS, TARNISH, ROUGHNESS, SNUG FIT AND GOOD CONTACT.		34	INSPECT MOISTURE AND FUNGIPROOFING FOR GENERAL CONDITION.	
35	IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION				

DA FORM 11-243
1 MAY 51

REPLACES DA AGO FORM 419, 1 DEC 50, WHICH IS OBSOLETE.

TM 963-7

Figure 5. DA Form 11-243.

(2) *Second and third echelon.*

Tool Equipment TE-123.

Tool Equipment TE-111.

Multimeter TS-352/U.

Note. TM 11-5527 contains instructions for the use of Multimeter TS-352/U.

c. Special Instructions.

- (1) *Cleaning.* Before cleaning the interior of the rectifier, disconnect the unit from the ac supply and disconnect any batteries from the rectifier. Use clean, dry cloths or a soft, dry brush to remove dust; use a soft, long bristled brush to remove dust from the plates of the rectifier stacks and to clean between them. When it is available, cool, dry compressed air, at a line pressure not exceeding 60 pounds per square inch, may be used to blow dust and dirt from inaccessible areas. Use compressed air carefully because the air blast can cause mechanical damage; do not use hot air because it might damage the rectifier plates. Except for electrical connections, parts may be cleaned, if necessary, with solvent (SD) and wiped dry with a clean cloth. Clean electrical connections with a cloth moistened with carbon tetrachloride and wipe them dry with a clean cloth. Use crocus cloth to clean connections that have become corroded.

Caution: Repeated contact of carbon tetrachloride with the skin, or prolonged breathing of the fumes is dangerous. Make sure adequate ventilation is provided.

- (2) *Fuses.* See that all fuses, both active and spare, are present. Inspect the caps of the fuses for evidence of burning, charring, and corrosion; look for broken fuse elements and burned glass. See that the fuses are held securely by the fuse holders and that contact is good. If necessary, clean fuse contacts and caps with fine sandpaper (do not use emery cloth or steel wool) and wipe them with a clean, dry cloth. The spring clips of the fuse holders may be bent slightly to provide better contact. Replace fuses found in unsatisfactory condition.
- (3) *Rectifier stacks.* Carefully inspect the plates of the rectifier stacks; look for blistering or discoloration caused by overheating.
- (4) *Wire, cable, and connections.* See that all leads and cables are in their original positions and are in good condition. Be sure all connections are clean and tight. See that the

battery clips on the dc output cable are in good condition and will grip the battery terminals securely. Keep the clips clean; coat them with petrolatum (PET) (par. 18) to prevent corrosion.

- (5) *Mountings and fastenings.* Inspect all mountings and fastenings, including those securing structural parts, to be sure that all components are mounted securely. See that the cover latches and carrying handle are attached securely and that the case is fastened securely to the chassis.

Caution: When tightening hardware, do not use too much force or the threads of the fastenings will be damaged. If the bolt on which the disks of a rectifier are mounted is loose, be extremely careful when tightening it. The disks of the rectifier will be damaged if this bolt is overtightened.

Section III. TROUBLESHOOTING AT ORGANIZATIONAL MAINTENANCE LEVEL

24. General

Frequently, unsatisfactory operation, or even apparent failure of the rectifier, is the result of a poor contact, a loose connection, an incorrect switch setting, a blown fuse, or failure of the ac supply, and not of trouble in the rectifier. Before turning in the equipment for repair, be sure the difficulty cannot be corrected at the organizational level. The troubleshooting chart (par. 25) lists some troubles that may be experienced, their possible causes, and suggested remedies that can be accomplished by organizational personnel.

25. Troubleshooting Chart

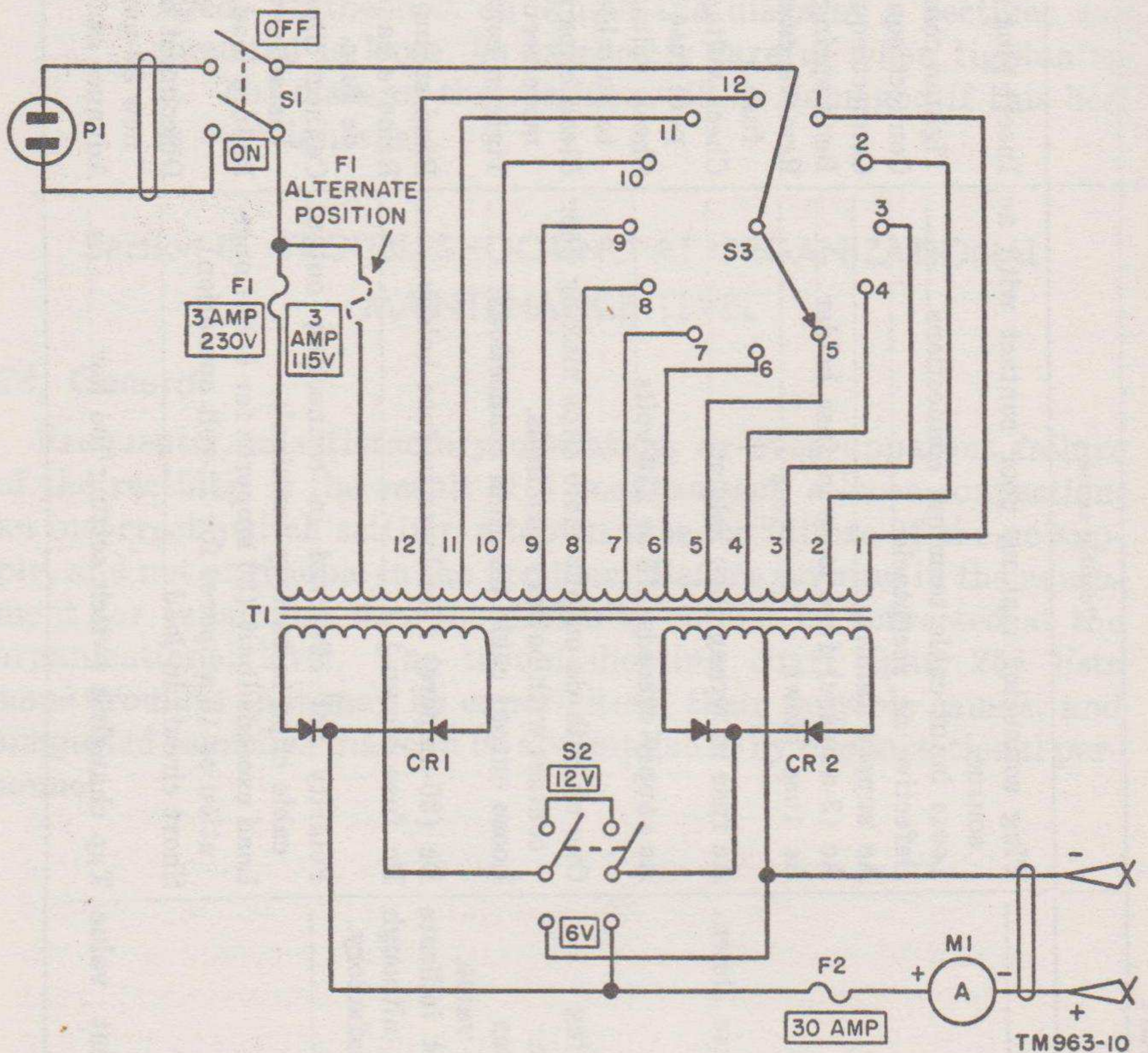
AGO 3812B

Item	Symptom	Possible cause	Suggested remedy
1	No ac input-----	Plug connector making poor contact with ac source.	Insert plug securely into ac receptacle.
		Loose input cable terminal connections-----	Tighten connections.
		Defective ac receptacle-----	Connect equipment at satisfactory receptacle.
		Ac supply failure-----	Connect equipment to satisfactory source.
		Ac (3-ampere) fuse loose in fuse holder-----	Bend spring contacts to provide better contact.
		Ac fuse blown-----	Remove cause (item 2 below) and install new fuse.
2	Ac (3-ampere) fuse blown-----	Ac fuse in wrong fuse holder-----	Check voltage of ac supply. Install new 3-ampere fuse in correct fuse holder.
		Ac supply exceeds 115 or 230 volts-----	Check voltage of ac supply. Connect rectifier to suitable source.
3	Battery not receiving charge, although ammeter indicates correct current value.	One or both dc output cable clips making poor contact with battery terminals.	Clean clips and battery terminals; attach clips more securely.
		Loose output cable terminal connections-----	Tighten connections.
4	Ammeter does not indicate any dc output, although ac input is satisfactory.	Dc (30-ampere) fuse loose in fuse holder-----	Bend spring contacts to provide better contact.
		Dc fuse blown-----	Remove cause (item 5 below) and install new dc fuse.
5	Dc fuse blown-----	Polarity not observed in connecting output cable clips to battery terminals.	Connect clips correctly (par. 12b, 13b, and 14b). Install new 30-ampere fuse.
		Load exceeds limit (20 amperes for 6-volt operation or 10 amperes for 12-volt operation).	Reduce load. Install new fuse.
		Short circuit in load-----	Disconnect battery and check for short. Install new 30-ampere fuse.
6	Dc output current value low.	Tap changing switch setting too low-----	Advance switch to higher setting.

CHAPTER 5 THEORY

26. General

Rectifiers RA-83-A and RA-83-C are designed to convert 115- or 230-volt ac to 6- or 12-volt dc for charging lead-acid storage batteries. One 6-volt or one 12-volt battery or two 6-volt batteries



- CR1 Dry disk selenium rectifier stack.
- CR2 Dry disk selenium rectifier stack.
- F1 3-ampere fuse, ac input circuit.
- F2 30-ampere fuse, dc output circuit.
- M1 Ammeter, 0- to 30-ampere range.
- P1 Male plug connector, ac input cable.
- S1 On-Off switch.
- S2 6v-12v switch.
- S3 12-position tap changing switch.
- T1 Transformer.

Figure 6. Rectifiers RA-83-A and RA-83-C, schematic diagram.

can be charged. Figure 9 is a wiring diagram for Rectifier RA-83-A; figure 10 is a wiring diagram for Rectifier RA-83-C; and figure 6 is a schematic diagram of both rectifiers.

27. Input Circuit

The ac input is connected, through the ON-OFF switch, a 3-ampere fuse, and the tap changing switch, to the single primary winding of the transformer. The 3-ampere fuse serves two purposes. It protects the equipment from damage that might be caused by excessive or inappropriate input voltages and provides a means of arranging the input circuit so the rectifier will operate on a 115-volt or a 230-volt ac supply. The tap changing switch provides a means of varying the ratio of transformer primary winding turns to secondary winding turns. When the 3-ampere fuse is in the 230V position (ac supply 230 volts) and the tap changing switch is in the No. 1 position, the ac input is connected across the entire primary winding. When the 3-ampere fuse is in the 115V position (ac supply 115 volts) and the tap changing switch is in the No. 1 position, the ac input is connected across a lesser number of turns of the primary winding. With the 3-ampere fuse in either position, when the tap changing switch is moved from the No. 1 position toward the No. 12 position, the number of turns of the primary winding across which the ac input is connected becomes smaller at each successive position. This reduces the ratio of primary winding turns to secondary winding turns and increases the voltage of the energy induced in each of the two separate secondary windings of the transformer.

28. Rectifying Circuit

Each of the two rectifier stacks consists of 14 selenium coated disks mounted on a stud and arranged to form a full-wave rectifier. The disks have the property of conducting electrical energy effectively only in one direction. The ac input is connected to the end terminals of the stack and the dc output is taken from the center terminal. During one half-cycle of an alternation, energy passes from one end terminal, through one-half of the rectifier stack, to the center terminal. During the other half-cycle, energy passes from the other end terminal, through the other half of the rectifier stack, to the center terminal. The output of one secondary winding of the transformer is connected across one of the rectifier stacks and the output of the other secondary winding is connected across the other rectifier stack. This arrangement provides two independent 6-volt dc output circuits.

29. Output Circuit

The output of the two rectifier stacks is connected through the 6V-12V switch, the 30-ampere dc fuse, and the ammeter, to the

dc output cable. When the 6V-12V switch is in the 6V position, the two rectifier stacks are connected in parallel and 6-volt dc is available at the clips terminating the dc output cable. When the 6V-12V switch is in the 12V position, the two rectifier stacks are connected in series and 12-volt dc is available at the output cable clips. The 30-ampere fuse is connected into the positive side of the dc output circuit to protect the equipment against overload or a short circuit in the connected equipment. The ammeter, connected also into the positive side of the dc output circuit, measures the value of the current being delivered to the load. This current must not exceed 20 amperes when the 6V-12V switch is in the 6V position or 10 amperes when the 6V-12V switch is in the 12V position. The value of the current being delivered to the load is controlled by adjusting the position of the tap changing switch (par. 27).

CHAPTER 6

FIELD MAINTENANCE

Section I. GENERAL

30. Extent of Field Maintenance

The extent of repair that may be performed on Rectifiers RA-83-A and RA-83-C is limited only by the replacement parts, tools, test equipment, and shop facilities available and the skill of the assigned personnel. Complete field maintenance includes overhaul or complete rebuilding of the equipment, moistureproofing and fungiproofing, refinishing, and final testing after repair.

31. Tools and Test Equipment

To overhaul or rebuild the equipment and to perform the tests necessary to check the individual components and to test the overall operation of the equipment before it is returned to service or stock, the tools and test equipment (or their equivalent) listed in *a* and *b* below are required.

a. Tools.

Tool Equipment TE-123.

Tool Equipment TE-111.

b. Test Equipment.

Multimeter TS-352/U

Resistor, 1.1 (± 0.1) ohms, 166 watts.

Note. Multimeter TS-352/U is suitable for making most of the voltage, current, and resistance measurements. Instructions for using this instrument are given in TM 11-5527. The ammeter supplied with the rectifier may be used to measure dc values greater than 10 amperes. Special test equipment, such as Voltammeter I-50, is required to test the ammeter.

Section II. TROUBLESHOOTING

32. Meaning of Troubleshooting

The function of troubleshooting is to locate quickly and to remove the cause of faulty operation or of failure of equipment before the fault develops into a breakdown that will necessitate

major repair. Operational difficulties have rather definite symptoms that serve as clues to the cause of the trouble. Whenever difficulty with equipment is experienced, the operator or repairman must be able to locate and to remove the cause as quickly as possible. The chart in paragraph 33 indicates various troubles that may be experienced, the possible causes, and suggested remedies.

33. Troubleshooting Chart for Field Maintenance Use

Symptom	Possible cause	Suggested remedy
No ac input	Broken or short circuited input cable Broken or defective plug connector Defective ON-OFF switch Transformer primary winding open, burned out, or short circuited. Short circuit in input circuit	Repair or replace cable. Install new plug. Install new switch. Check transformer primary for continuity (par. 39a). If unsatisfactory, install new transformer. Check continuity (par. 38) of input circuit to locate short. Remove short and install new fuse. Install new switch. Repair lead or install new output cable. Install new clips.
Ac (3-ampere) fuse blows repeatedly.	Defective 6V-12V switch Broken lead in dc output cable Spring clips weak or broken	Install new fuse holder. Install new switch. Install new ammeter.
Battery not receiving charge although ammeter shows correct current value. Ammeter does not indicate any dc output although ac input is satisfactory.	Dc (30-ampere) fuse holder defective Defective 6V-12V switch Defective ammeter Loose connection or break in output circuit	Check continuity (par. 38). Tighten loose connection or repair break.
No dc output when 6V-12V switch is in 12V position.	Defective 6V-12V switch Transformer secondary winding open, burned out, or shorted.	Install new switch. Check continuity of both secondary windings (par. 39a). If either is unsatisfactory, install new transformer.
Dc output current low when 6V-12V switch is in 6V position.	Defective rectifier stack One secondary of transformer open or burned out	Test both rectifier stacks (par. 39b). If either is unsatisfactory, install new rectifier stack. Test continuity of both secondary windings (par. 39a). If one is unsatisfactory, install new transformer.

Symptom	Possible cause	Suggested remedy
Dc fuse blows repeatedly-----	One rectifier stack defective----- Short circuit in output circuit-----	Test both stacks (par. 39b). Replace defective stack with new stack. Check output circuit. Remove short.

Section III. REPAIR

34. General

Repair of Rectifiers RA-83-A and RA-83-C usually will be confined to the installation of new parts to replace components that have failed and to the replacement or repair of external wiring. When trouble necessitating the replacement of any component occurs more frequently than repair personnel consider normal, DA Form 468 or DD Form 535 should be filled out and forwarded according to the instructions in paragraph 2.

35. Inspection Preliminary to Repair

When the rectifier does not operate properly, before attempting to repair the fault, make a preliminary inspection to determine the extent of repair necessary and the replacement parts required.

a. Inspect wires and cabling for cracked or broken insulation and broken conductors. Inspect all terminal connections to be sure they are clean and tight.

b. Inspect and smell the transformer for evidence of overheating. If the transformer is overheating, check for possible short circuits in the transformer secondary circuits (par. 39*a*).

c. Inspect the rectifier stacks. Look for arcing between or around the disks, for evidence of overheating, and for bumps on the disks. If any of these conditions are present, test the rectifier stacks.

d. Use the troubleshooting chart (par. 33) as an aid in determining the cause of unsatisfactory performance and in locating a faulty component.

36. Removal of Case

a. Raise the cover of the case.

b. Remove the six nuts and bolts that secure the case to the top panel of the chassis. These nuts and bolts are located along the top front and rear edges of the case.

c. Coil the input and output cables inside the cover of the case and close and latch the cover.

d. Remove the six nuts and bolts that secure the case to the bottom flange of the chassis.

e. Use the lifting handle to lift the case and carefully slide it upward until it is clear of the chassis.

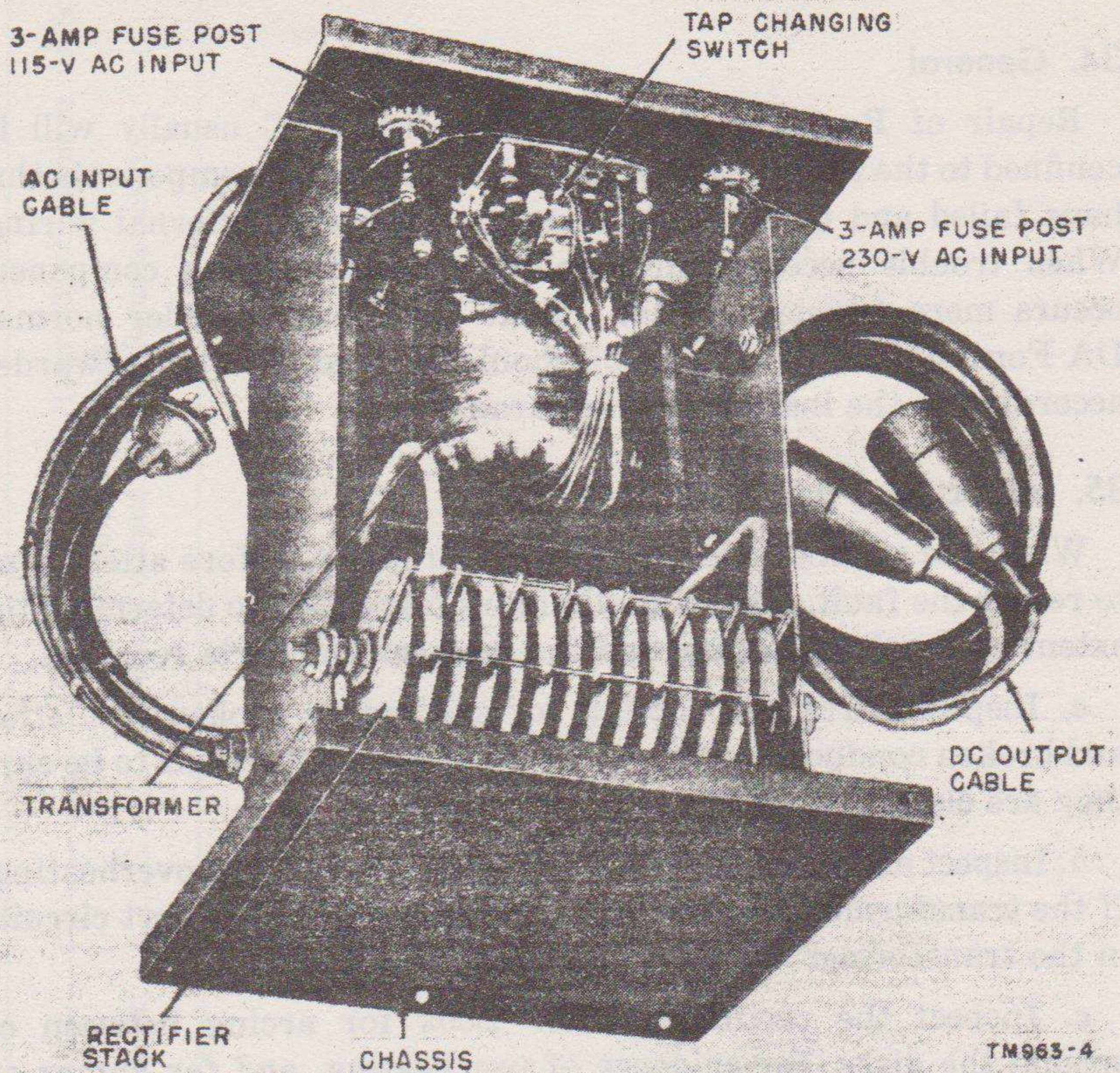


Figure 7. Rectifier RA-83-A, case removed.

37. Removal and Reinstallation of Components

a. Removal. After the case has been removed (par. 36), any of the components of Rectifier RA-83-A or RA-83-C can be removed for test, repair, or replacement by detaching the leads and taking out the fastenings that secure the component to the chassis. Be sure to tag each lead for identification before detaching it.

b. Reinstallation. To install a repaired or replacement component, secure it to the chassis in the proper position (fig. 7 or 8) and tighten the fastenings. Reconnect the leads to the terminals. Check the wiring with the appropriate wiring diagram (fig. 9 or 10) before connecting the equipment to the ac supply.

Caution: Do not let solder fall on the rectifier disks, because it might cause a short circuit and cause the disks to overheat and the rectifier stack to fail.

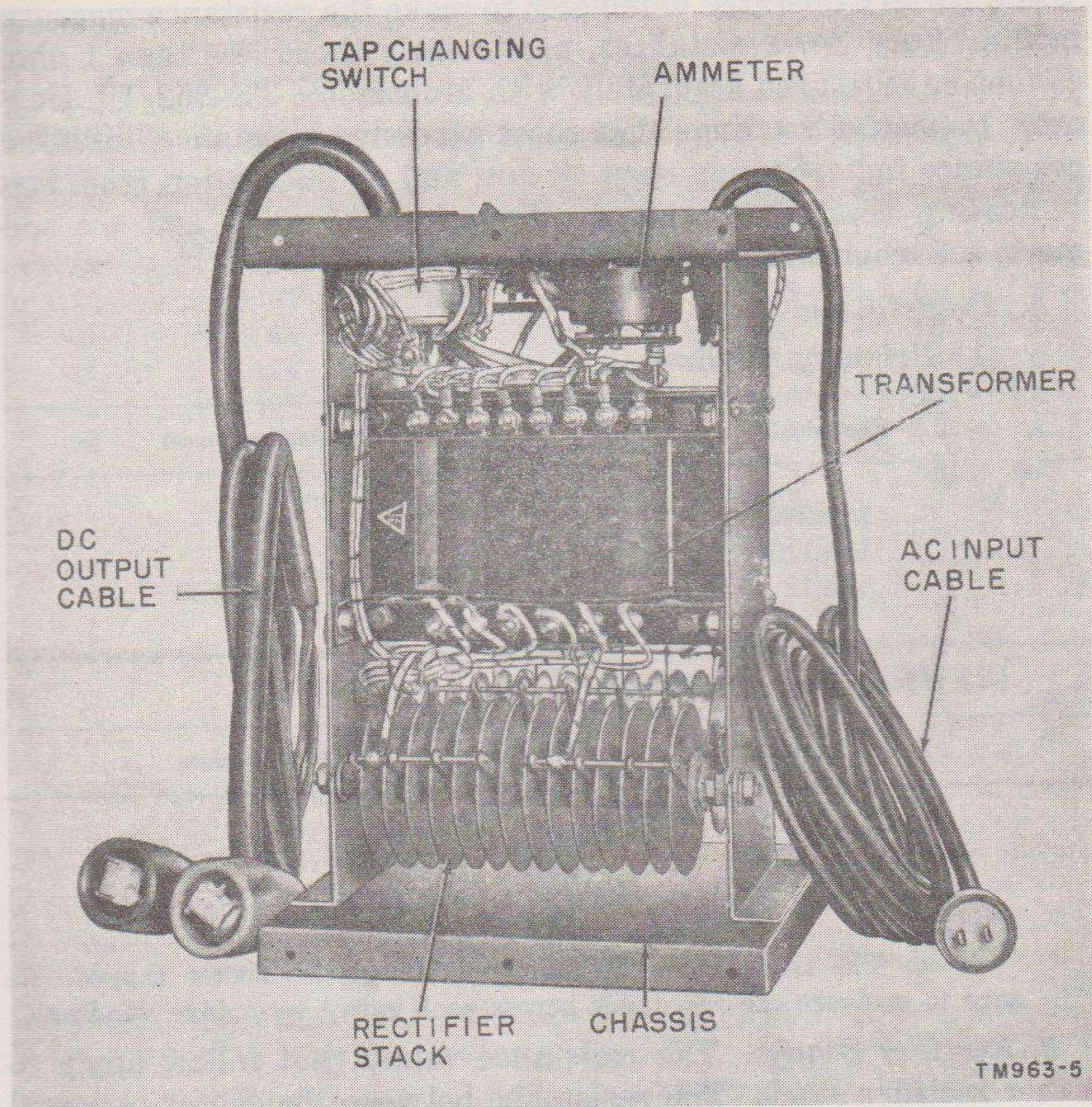


Figure 7. Rectifier RA-83-A, case removed.

Section IV. TESTING

38. Continuity Test

This test is useful in localizing trouble existing in the rectifier. With the equipment disconnected from the ac source, use an ohmmeter and check through systematically, from the input terminals to the output terminals, for circuit continuity. Refer to figure 9 (wiring diagram for Rectifier RA-83-A) or figure 10 (wiring diagram for Rectifier RA-83-C) for circuit sequence.

39. Transformer and Rectifier Stack Internal Resistance Tests

If it seems possible that the transformer or one of the rectifier stacks may be faulty, the resistance values given in *a* and *b* below may be used when the components to which they apply are tested for internal short or open circuits. The component undergoing test must be disconnected from the other circuits of the rectifier.

Use a battery-operated ohmmeter to make the resistance measurements. Very low resistances, particularly those less than 1 ohm, cannot be measured accurately with Multimeter TS-352/U. However, indicative readings that show excessive resistance, infinitive resistance indicating an open circuit, and no fluctuation from zero indicating possibly shorted windings, can be made and are adequate for troubleshooting purposes.

a. Transformer.

(1) Primary winding.

Terminals	Resistance (ohms)
1 to 230	4.5
1 to 115	2.8
1 to 12	1.9

(2) Secondary windings.

Terminals	Resistance (ohms)
Y1 to Y1	.05
Y2 to Y2	.05

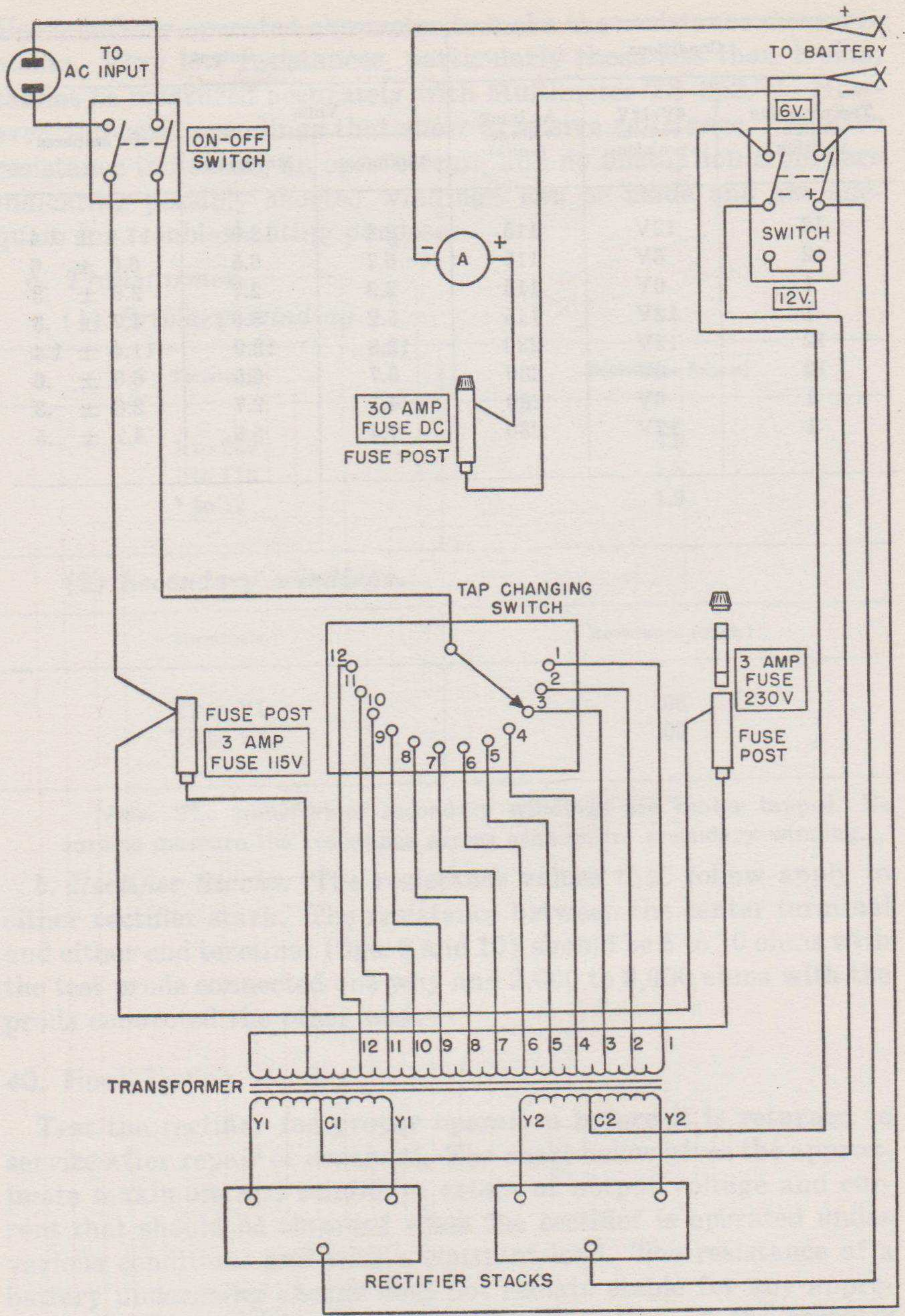
Note. The transformer secondary windings are center tapped. Be sure to measure the resistance across each entire secondary winding.

b. Rectifier Stacks. The resistance values that follow apply to either rectifier stack. The resistance between the center terminal and either end terminal (figs. 9 and 10) should be 5 to 10 ohms with the test prods connected one way and 2,000 to 3,000 ohms with the prods connected the other way.

40. Final Testing

Test the rectifier for proper operation before it is returned to service after repair or overhaul. The chart below gives the approximate maximum and minimum values of output voltage and current that should be obtained when the rectifier is operated under various conditions and with a constant load. The resistance of a battery undergoing charge does not remain stable for any appreciable length of time; therefore, the operation of the rectifier should be tested using a resistor as a load. The values shown below should be obtained with a resistance load of 1.1 ($\pm .1$) ohms.

Conditions			Output		
Tap changing switch position	6V-12V switch position	Ac input voltages (volts)	Volts		Dc amperes
			Maximum	Minimum	
12	12V	115	12.8	12.0	11.4 ± 1.4
12	6V	115	6.7	6.5	6.0 ± .6
1	6V	115	2.9	2.7	2.6 ± .3
1	12V	115	5.2	5.0	4.7 ± .5
12	12V	230	12.8	12.0	11.4 ± 1.4
12	6V	230	6.7	6.5	6.0 ± .6
1	6V	230	4.1	2.7	2.6 ± .3
1	12V	230	7.4	5.0	4.7 ± .5



TM 963-8

Figure 9. Rectifier RA-83-A, wiring diagram.

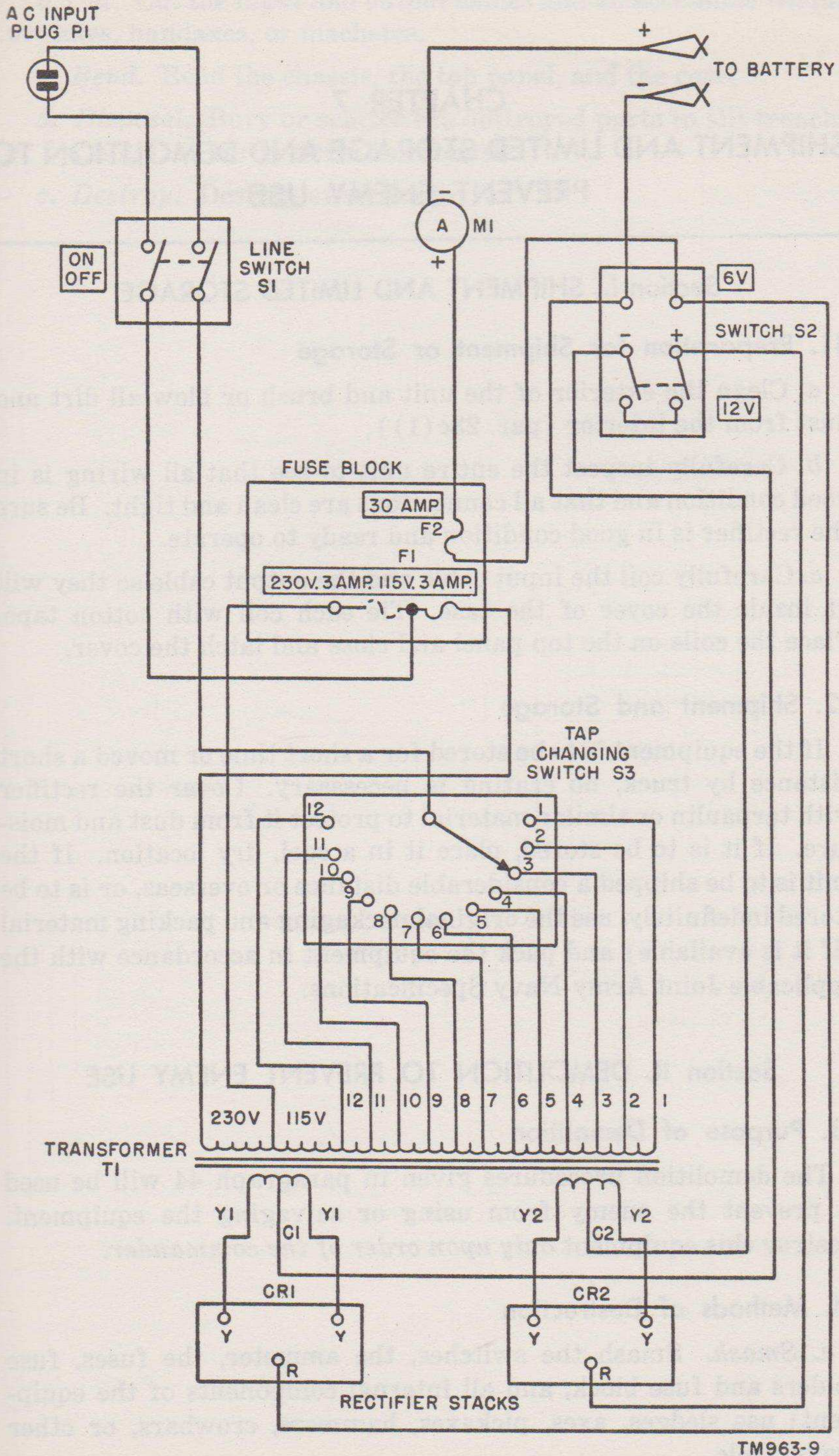


Figure 10. Rectifier RA-83-C, wiring diagram.

CHAPTER 7

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

41. Preparation for Shipment or Storage

a. Clean the exterior of the unit and brush or blow all dirt and dust from the interior (par. 23c(1)).

b. Carefully inspect the entire unit to see that all wiring is in good condition and that all connections are clean and tight. Be sure the rectifier is in good condition and ready to operate.

c. Carefully coil the input cable and the output cable so they will fit inside the cover of the case. Tie each coil with cotton tape. Place the coils on the top panel and close and latch the cover.

42. Shipment and Storage

If the equipment is to be stored for a short time or moved a short distance by truck, no crating is necessary. Cover the rectifier with tarpaulin or similar material to protect it from dust and moisture. If it is to be stored, place it in a cool, dry location. If the unit is to be shipped a considerable distance or overseas, or is to be stored indefinitely, use the original packaging and packing material (if it is available) and pack the equipment in accordance with the applicable Joint Army-Navy Specifications.

Section II. DEMOLITION TO PREVENT ENEMY USE

43. Purpose of Demolition

The demolition procedures given in paragraph 44 will be used to prevent the enemy from using or salvaging the equipment. Destroy this equipment *only upon order of the commander*.

44. Methods of Destruction

a. *Smash*. Smash the switches, the ammeter, the fuses, fuse holders and fuse block, and all internal components of the equipment; use sledges, axes, pickaxes, hammers, crowbars, or other heavy tools.

b. Cut. Cut the input and output cables and all accessible wiring; use axes, handaxes, or machetes.

c. Bend. Bend the chassis, the top panel, and the case.

d. Disposal. Bury or scatter the destroyed parts in slit trenches or fox holes, or throw them in streams.

e. Destroy. Destroy everything.

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[AG 413.44(21 Jan 55)]

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6-116A, H&S Btry, FA Bn (75mm How, Pack) (2)	

17A, Armd Div (2)
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17-51, Armd Cav Regt
(2)
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Armd Cav Regt (2)
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19-37, MP Co, Corps or
Abn Corps, A (2)
19-47A, MP Esc Grd
Co (2)
19-55A, MP Bn (2)

19-56A, Hq&Hq Co, MP
Bn (2)
19-57A, MP Co (Sep)
or MP Co, MP Bn (2)
19-97A, MP Co, Abn
Div (2)
19-217A, MP Co, Post-
Cp-or-Sta (2)
19-247A, MP Gd Co (2)
20-7, Repl Co (2)
44-15A, AAA Gun Bn
90mm (2)
55-37, T Amph Trk Co
(A or Comz) (2)
57, Abn Div (2)
57-1A, Hq Abn Div (2)

NG: None.

USAR: None.

Unless otherwise noted, distribution applies to CONUS and overseas.
For explanation of abbreviations used, see SR 320-50-1.

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