J86278A RECTIFIER
SEMICONDUCTOR TYPE — MANUALLY REGULATED
OPERATING METHODS

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1. GENERAL

1.01 This section covers the operation of the J86278A, Lists 1 and 2 rectifiers. ←

1.02 This section is reissued to change the title, to describe the operation of the J86278A, List 2 rectifier, to revise Fig. 1, and to add Fig. 2. Distribution of issue 2 of this section was limited. It was cancelled on discovery of a printing error in Fig. 1 and 2.

1.03 The J86278A, Lists 1 and 2 rectifiers are← manually regulated, semiconductor-type← rectifiers initially designed for use in the TH radio system. When properly connected to a source of 230-volt, 60-cycle power, each rectifier will deliver 0.010 to 0.125 ampere at a direct current voltage between 137.5 and 132.5 volts. The rectifier output is continuously variable within this range. Protective fusing of the rectifier is provided in the associated circuit.

Caution: The voltages in each unit exceed 200 volts to ground. Avoid all contact with terminals. Do not allow a test pick to touch two metal parts at the same time or destructive and dangerous short circuits may occur. Disconnect the alternating current supply before working on the rectifier except when necessary to make tests.

1.04 Routine checks are intended to detect defects particularly in infrequently operated parts of the equipment and, insofar as possible, guard against circuit failures liable to interfere with service. Tests and adjustments, other than those required by trouble conditions, should be made during a period when they will cause the least unfavorable reaction.

1.05 The instructions in this section are based on SD-81343-01. For a detailed description of the operation of the circuit, see the corresponding circuit description.

1.06 More detailed information on the operation and maintenance of individual pieces of apparatus is given in other sections and the attendant should be familiar with them.

2. TOOLS, GAUGES, AND TEST APPARATUS

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
KS-6367	7/16- and 5/8-inch Open, Double-end, Flat Wrench
—	3-inch Cabinet Screwdriver
GAUGES	
KS-14510, L1	Volt-ohm-milliammeter
—	Ammeter, DC, Weston Model No. 281, or equivalent ←

CODE OR SPEC NO.	DESCRIPTION
TEST APPARATUS	
—	1000-15,000 Ohm Rheostat, 100 Watt

3. OPERATION

→How the Rectifier Works (See Fig. 1 and 2)

3.01 The 60-cycle power is supplied to the T1 and T2 transformers. The T1 transformer is a variable autotransformer which adjusts the voltage impressed across the primary of the T2 transformer. This voltage is stepped down by the T2 transformer and fed to a bridge composed of CR1 to CR8 semiconductor diodes, inclusive, in the J86278A, List 1 rectifier; or CR1 to CR4 semiconductor diodes, inclusive, in the J86278A, List 2 rectifier, which rectifies the alternating current. The network composed of the L1 inductor, the C1 to C3 capacitors, and their associated resistors, R1 to R3, inclusive, filters the pulsating direct current into a relatively smooth direct current. The R1 to R3 resistors discharge the C1 to C3 capacitors, inclusive, when the rectifier is disconnected from input power and the load.

Preparing to Start Initially

3.02 When preparing to put the rectifier into service initially, check that:

(a) The ADJ VOLTS control shaft is turned to the extreme counterclockwise position.

(b) All external connections are made in accordance with the SD drawing covering the associated circuit of which the rectifier is a part.

(c) The proper circuit breaker is provided in the alternating current power leads as specified on SD-81343-01.

Initial Adjustments

3.03 Proceed as follows.

(a) Connect the ac power.

(b) Adjust the rectifier output as required. The adjustment of the ADJ VOLTS control will be determined by the requirements of the associated equipment, or circuit, of which this rectifier is a part.

Routine Adjustments (Normal Operation)

3.04 The rectifier output voltage is adjusted by turning the ADJ VOLTS control with the 3-inch cabinet screwdriver in the direction required. Turning this control counterclockwise decreases the voltage, and clockwise increases it.

4. ROUTINE CHECKS

4.01 The following should be performed.

(a) The output voltage should be checked from time to time with the KS-14510, L1 volt-ohm-milliammeter to make certain that the proper voltage, as measured across the filter capacitors inside the rectifier, is being maintained.

(b) Electrolytic capacitors should be maintained in accordance with Section 032-110-701.

5. TROUBLES

5.01 In general, the only items likely to become defective with use are the electrolytic capacitors.

Trouble Chart

5.02 Should any of the following troubles develop, it is suggested that the possible causes be checked in the order given. If the trouble is not found, look for loose or open connections or short circuits due to foreign matter lying across wiring terminals.

TROUBLE	POSSIBLE CAUSE
No output voltage	Failure or disconnection of the input power
	Shorted capacitors or resistors
	Open L1 inductor
	Open winding between terminals 1 and 2 and 4 and 5 of T2 transformer
Low output voltage	Low input power voltage
	Excessive load on rectifier
	Breakdown of any or all capacitors

TROUBLE	POSSIBLE CAUSE
Low output voltage	Defective T1 autotransformer
	Open or shorted windings 4 and 5 of T2 transformer
	Defective semiconductor diodes ←
	Change in value of resistors
High output voltage	High input power voltage
	Shorted L1 inductor
	Defective T1 autotransformer
	Shorted windings in primary of T2 transformer
High ripple voltage	Open capacitor
	Shorted L1 inductor
	Defective semiconductor diodes ←
Erratic output voltage	Fluctuating input power voltage
	Arcing contact in T1 autotransformer
	Intermittent open or short in any component
	Defective connections

6. POINT-TO-POINT VOLTAGES

6.01 As long as the rectifier operates satisfactorily, point-to-point voltage values are not needed and are not operating requirements to be checked in routine. In case the rectifier output cannot be obtained, they may be useful in locating defects or trouble conditions.

6.02 High voltages are present within the rectifier and every precaution should be observed to avoid any bodily contact with terminals when the rectifier is in operation, or when connected to the input power source.

Caution: When using any portable instrument, the leads should be carefully examined to make sure the insulation is undamaged. The leads should be properly connected to the instrument before making any contact with the circuit to be tested. If connections are to be changed from one instrument range to another, the power should first be disconnected from the equipment being tested, or if test picks are being used, they should be removed from the equipment under test.

6.03 Readings should be made with a KS-14510, L1 volt-ohm-milliammeter. The output of the rectifier will not be appreciably affected by connecting the meter leads to the circuit elements.

Table of Point-to-Point Voltages

6.04 The readings shown in Table A are made with the ADJ VOLTS control in the extreme counterclockwise position and with the load adjusted to draw 0.125-ampere direct current. If the normal load is not adjustable, the rheostat may be substituted.

Caution: The voltage readings shown in Table A are for a typical rectifier in good working condition. A defective rectifier may yield readings which differ greatly from those shown. Therefore, to protect the meter, it may be desirable to use a higher voltage scale until actual readings indicate the proper scale.

TABLE A — VOLTAGES FOR J86278A, LISTS 1 AND 2 RECTIFIERS ←

VOLTAGE ACROSS	MEASUREMENTS TAKEN FROM		TO*		METER READING IN VOLTS	
	APP	TERM.	APP	TERM.	SCALE	READING
C3	C3	2	C3	1	300dc	115 ±5
C1	C1	2	C1	1	300dc	117.5 ±5
T2 Sec	T2	4	T2	5	300ac	90 ±5
T2 Pri	T2	1	T2	3	300ac	230 ±6 ←

*TO terminal should be connected to negative jack of meter for direct current measurements

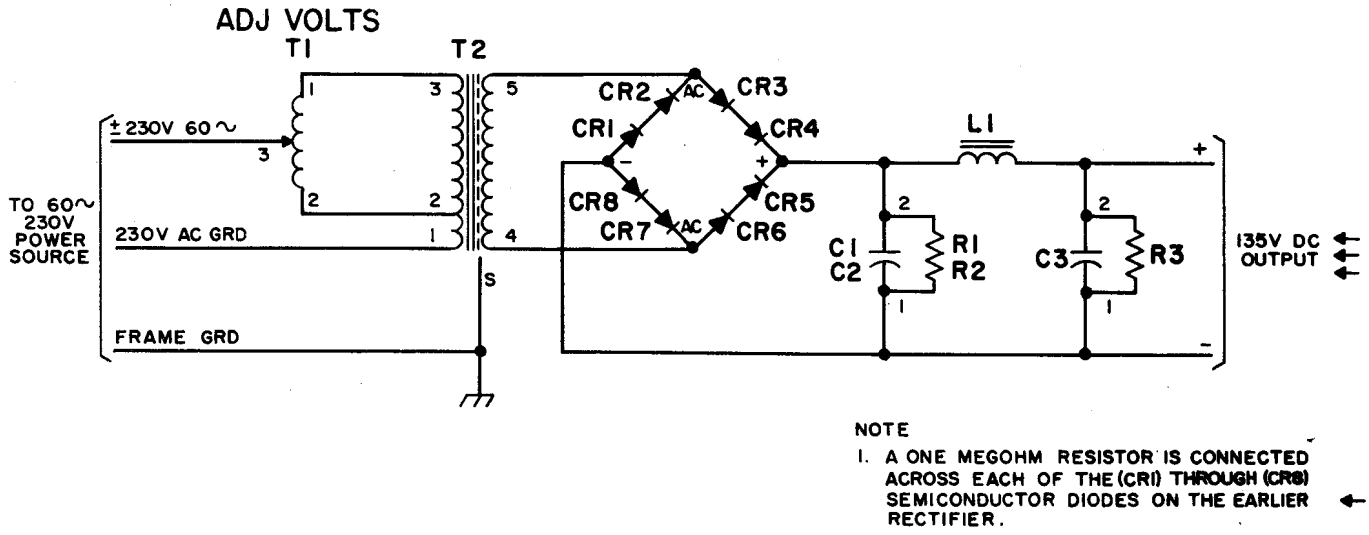

Fig. 1 – Simplified Schematic J86278A, List 1 Rectifier

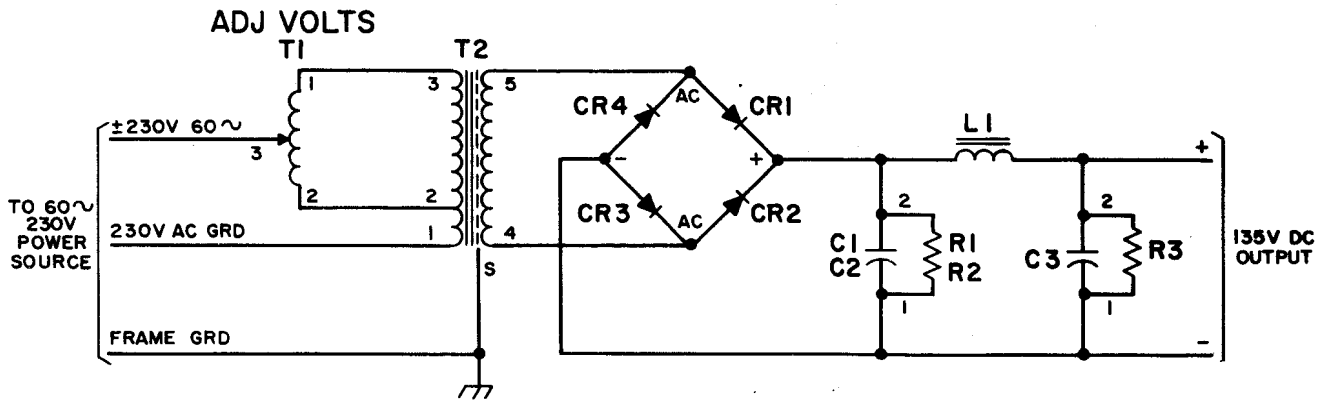

Fig. 2 – Simplified Schematic J86278A, List 2 Rectifier

Fig. 1 and 2