J86288A RECTIFIER
METALLIC TYPE — MANUALLY REGULATED
OPERATING METHODS

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1. GENERAL

1.01 This section covers the operation of the J86288A rectifier.

1.02 The J86288A rectifier is a manually regulated metallic-type rectifier initially designed for use in the TH system. When properly connected to a 230-volt, 60-cycle regulated source, this rectifier is adjustable in six steps to deliver 0.4 to 0.6 ampere at a nominal 7 volts, direct current, with either side grounded. Fusing is provided in the associated circuits.

Caution: The voltages in this 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.

1.03 Routine checks are intended to detect defects, particularly in infrequently operated parts of the equipment, and insofar as possible to guard against circuit failures liable to interfere with service. Checks and adjustments, other than those required by trouble conditions, should be made during a period where they will not interfere with service.

1.04 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.

1.05 The instructions in this section are based on SD-81363-01. For a detailed description of the operation of the circuit, see the corresponding circuit description.

2. TOOLS, GAUGES, AND TEST APPARATUS

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
—	3-inch Cabinet Screwdriver
GAUGES	
KS-14510,L1	Volt-ohm-milliammeter
—	Weston Model No. 281, Direct Current Ammeter, or equivalent
TEST APPARATUS	
—	2-24 Ohm Rheostat, 25 Watt

3. OPERATION

How the Rectifier Works (See Fig. 1)

3.01 Sixty-cycle input power is fed to the T1 transformer through the S1 tap switch (ADJ VOLTS). The tap switch is used for manual control of the rectifier output voltage. Voltage control is obtained by changing the transformer step-down ratio through the selection of one of the six transformer taps. This stepped-down voltage received from the T1 transformer is then fed through the CR1 and CR2 varistors to obtain full-wave rectification. The L1 inductor and the C1 and C2 capacitors filter the pulsating direct current received from the varistors into a smooth direct current.

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 in which the rectifier is installed.

(c) The proper circuit breaker is provided in the input power leads as specified in SD-81363-01.

Initial Adjustments

3.03 Proceed as follows:

(a) Connect the ac power.

(b) Adjust the rectifier voltage as required. The adjustment of the ADJ VOLTS control is determined by the requirements of the associated equipment, or circuit, in which the rectifier is installed.

Routine Adjustments (Normal Operation)

3.04 Adjustment of the rectifier output voltage is done by turning the ADJ VOLTS control shaft with the 3-inch cabinet screwdriver in the direction required. Turning the shaft counterclockwise decreases the output 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 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.

5.02 If replacement of other major components such as varistors or the T1 transformer becomes necessary, select the proper connection of the 230-volt ac ground lead to T1 primary terminals 1, 2, or 3, as follows. With the 2-24 ohm rheostat connected across the rectifier output and in series with the Weston No. 281 ammeter, temporarily connect the ac ground lead to one of the three terminals. Connect 230 volts, alternating current to the rectifier. With the S1 switch (ADJ VOLTS) set to switch tap No. 3, adjust the load to produce an ammeter reading of 0.6 ampere. Measure the voltage across the rheostat using the KS-14510,L1 meter and select the terminal (1, 2, or 3) which will give a rectifier output voltage nearest to 6.5 volts, direct current.

Caution: Disconnect the power from the rectifier each time the 230-volt ac ground lead is changed to a different terminal. Dangerous and destructive voltages exist on these terminals and leads when connected to the alternating current line.

Trouble Chart

5.03 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
	Open S1 switch contacts
	Shorted C1 or C2 capacitor
	Open L1 inductor
	Open T1 transformer primary
	Defective CR1 *and* CR2 varistors
Low output voltage (ADJ VOLTS control range not sufficient to raise voltage)	Low input power voltage
	Excessive load on rectifier
	Dirty or high resistance contacts in S1 switch
	Low resistance short in C1 or C2 capacitor
	Shorted windings in T1 transformer
	Defective CR1 *or* CR2 varistor
High output voltage	High input power voltage
	Shorted L1 inductor
	Shorted windings in primary of T1 transformer
High ripple voltage	Open C1 or C2 capacitor
	Shorted L1 inductor
	Defective CR1 or CR2 varistor
Erratic output voltage	Fluctuating input voltage
	Dirty or arcing contact in S1 switch
	Intermittent open or short in components C1, C2, L1, or T1
	Defective connection or cold solder joint

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 voltmeter leads to the circuit elements.

Table of Point-to-Point Voltages

6.04 The readings given in the following table are made with the ADJ VOLTS control in the second position from the extreme counterclockwise position and with the load adjusted to draw 0.6 ampere dc. If the normal load is not adjustable, a rheostat may be substituted.

Caution: The voltage readings shown in the following table 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.

VOLTAGES FOR J86288A RECTIFIER

VOLTAGE ACROSS	MEASUREMENTS TAKEN FROM APP	FROM TERM.	TO* APP	TO* TERM.	METER READING IN VOLTS SCALE	METER READING IN VOLTS READING
C2	C2	2	C2	1	12 dc	6.5
L1	L1	2	L1	1	3.0 dc	0.5
CR1 and CR2	T1	11	—	TP3	12 dc	7.0
T1 Secondary	—	TP1	—	TP2	60 ac	18.2
T1 Primary	S1	C	230-volt ac ground lead		300 ac	230
T1 (4-9)	T1	4	T1	9	60 ac	16†

Notes

* "To" terminal should be connected to negative jack of the meter.

✓ Each half of winding should yield a reading that is half of this voltage.

† Measurements taken across 4-5, 5-6, 6-7, 7-8, and 8-9 terminals of T1 should yield readings one-fifth of this voltage.

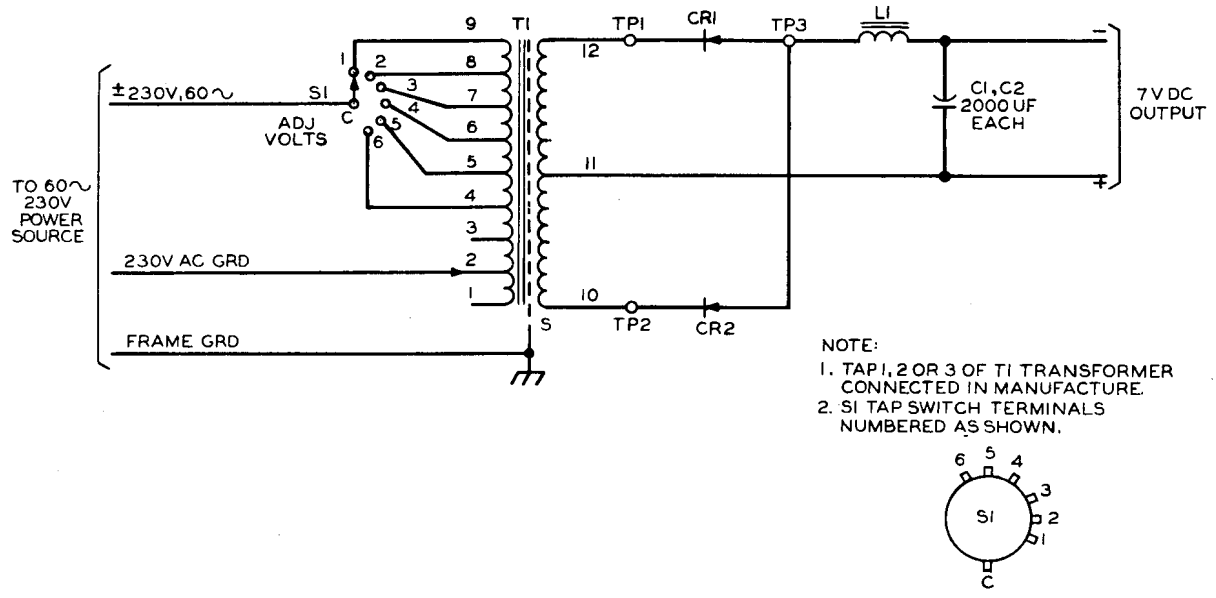

Fig. 1 – Functional Schematic of J86288A Rectifier