RECTIFIERS
J87249A AND J87249B
OPERATING METHODS

1. GENERAL

1.01 The J87249A and J87249B semiconductor-type regulated rectifier battery chargers are primarily intended to provide regulated dc power to charge and float engine starting batteries used in 900-type plants. ▶The J87249A rectifier is rated MD and is replaced by the J87249B rectifier.◀

1.02 This section is reissued to include the procedure for obtaining the required float voltage and current limit (droop) adjustment, to correct technical errors, and to update the trouble-shooting procedures. This reissue does not affect the Equipment Test List.

1.03 The J87249A rectifier is adaptable for connection to a 208- to 240-volt ±5 percent, 60-Hz power source. The J87249A List 1 rectifier will provide 26.5 volts ±1 percent, 0 to 5 amperes to a 12-cell lead-acid battery ("Z" option). The J87249A List 2 rectifier will provide 28 volts ±1 percent, 0 to 5 amperes to a 20-cell nickel-cadmium battery ("Y" option). The J87249B rectifier is adaptable for connection to a 208- to 240-volt ±10 percent, 60-Hz power source. ▶The J87249B rectifier will provide 26.0 volts ±1 percent, 0 to 4 amperes to a 12-cell lead-acid battery; 28.5 volts ±1 percent 0 to 4 amperes to a 20-cell nickel-cadmium battery; or 27.1 volts ±1 percent, 0 to 4 amperes to a 19-cell nickel-cadmium battery or a 12-cell, high-gravity, lead-acid battery.◀ The rectifier will deliver 6 amperes in the current regulating mode. ▶When ordering the J87249B rectifier, specify the list number and battery-type list number with which it is to be used (Table A), so that the unit may be correctly adjusted at the factory and appropriately marked as to its function.◀

1.04 The rectifier is arranged to activate an external alarm should it fail to provide charging current when required. The unit is protected against short circuits by fuses on both the input and output side of the rectifier.

TABLE A

LIST NO.	RECTIFIER OUTPUT	BATTERY TYPE
TA	28.5 Volts	20-Cell Nickel-Cadmium Battery
TB	26.0 Volts	12-Cell Lead-Acid Battery
TC	27.1 Volts	19-Cell Nickel-Cadmium Battery
		12-Cell High-Gravity Lead-Acid Battery

1.05 The rectifier unit is arranged for shelf mounting in the cabinet section of the power plant. ▶An external capacitor assembly also has to be mounted.◀ Input and output connections to the rectifier are made by means of a quick disconnect-type connector. Within the unit, there is a completely wired assembly in the form of a card. Electrical connections are made between the card assembly and other components of the rectifier by means of a plug and connector arrangement.

1.06 The J87249B card has been designed to be interchangeable with the J87249A card so that the J87249A rectifier chassis can operate with the new J87249B card. ▶The J87249B card should be substituted for the J87249A card, as required.◀

Caution: Voltages over 150 volts to ground are present within the rectifiers, and every precaution should be observed to avoid any contact with exposed metal parts or terminals when the rectifier is in operation or when not in operation but connected to either line or battery. Do not allow a test pick to touch two metal parts at the same time, as dangerous and destructive short circuits may occur.

1.07 The instructions are based on drawings SD-81649-01 for J87249A rectifier and SD-81796-01 for J87249B rectifier. For detailed description of the operation of the rectifier, see the corresponding circuit description.

1.08 The abbreviations cw and ccw refer to clockwise and couterclockwise, respectively.

2. LIST OF TEST APPARATUS

CODE OR SPEC NO.	DESCRIPTION
TEST APPARATUS	
—	Voltmeter, DC Weston Model 931, Ranges 30/7.5/3 Volts (or equivalent)
—	Voltmeter, AC Weston Model 904, Ranges 300/150 Volts

3. OPERATION

3.01 The rectifier unit has no disconnecting switches and is connected to both ac input power and battery when the combined AC INPUT DC OUTPUT receptacle is connected. If it is necessary to take a unit out of service, remove the AC INPUT fuses first and then the DC OUTPUT fuse. To restart, insert the DC OUTPUT fuse and then the AC INPUT fuses.

Caution: For 208-volt ac input, insert the COM and 208V fuses only. For 220- to 240-volt ac input, insert the COM and 240V fuses only. In no case shall the 208V and 240V fuses be inserted at the same time.

Note: The R11 and R14 potentiometers, J87249B rectifier, (R16 and R18 potentiometers, J87249A rectifiers) located on the card assembly, are factory adjusted for proper output voltage and proper droop current, respectively. ▶Any adjustment of the R11 and R14 potentiometers, J87249B rectifier, should be made in accordance with 4.03.◀

4. ROUTINE CHECKS

4.01 The dc output voltage should be checked periodically to make sure that the battery is being properly floated. To check the output voltage, connect the Weston model 931 dc voltmeter to the (+) and (−) DC OUTPUT VOLTS test jacks, and note that the voltage is within the rated range. (See 1.03).

4.02 An approximate output current can be obtained on the J87249B rectifier. To check the output current, connect the Weston model 931 dc voltmeter to the (+) and (−) DC OUTPUT AMPS test jacks. Use a conversion factor of 4 amperes/volt and subtract 0.4 ampere. For fully charged batteries, the battery current should be less than 0.5 ampere. ▶Note that the measured current consists of the battery current plus the current to any active engine control circuits.◀

4.03 ▶The R11 and R14 potentiometers, which are located on the J87249B card assembly, are factory adjusted for proper output voltage and proper droop current, respectively. If the output voltage or droop current should need adjusting, proceed as follows.

(a) ***Voltage Adjustment:*** Using the Weston model 931 dc voltmeter, measure the voltage at the battery (J2 and J3). This measurement must be made only when the voltage at the rectifier current measuring Jacks (J4 and J5) is 0.5 volt or less. If the voltage at the battery is not within the limits specified in 1.03, adjust R11 to obtain the proper value. If the value is too high, adjust R11 ccw to permit the battery voltage to decrease to approximately 0.5 volt less than the specified voltage. Then adjust R11 slowly cw to obtain the specified battery terminal voltage, observing that the voltage at the rectifier current measuring jacks (J4 and J5) is 0.5 volt or less. The clockwise adjustment of R11 may cause the voltage at J4 and J5 to momentarily exceed 0.5 volt.

(b) ***Current Limit (Droop) Adjustment:*** With the rectifier output properly adjusted, start the engine. (Refer to the appropriate engine-alternator practice.) Using the dc voltmeter, measure the voltage at the rectifier current measuring jacks (J4 and J5). With the engine at full speed, the voltage should be 1.60 ± 0.05 volts. If the voltage needs adjusting,

adjust R14 (ccw to increase or cw to decrease the voltage) to obtain the proper value.

Note: The current limit adjustment is somewhat temperature sensitive. It is desirable to make the adjustment at room temperature (70±10°F). In a cold temperature, the current limit level will be higher than the room temperature setting. In a hot temperature, the current limit level will be lower than the room temperature setting.◀

5. TROUBLES

5.01 Should any troubles occur, check the outputs as covered in 4.01 and 4.02.

5.02 Check the input voltage using the Weston model 904 ac voltmeter.

5.03 Should any of the troubles in Table B develop, check the possible causes listed. If the trouble is not found, look for loose or open connections or short circuits due to foreign matter lying across wiring terminals.

Note: When it is necessary to repair or replace a card in the J87249A rectifier, it should be replaced with a card for the J87249B rectifier. When ordering this card, it is necessary to specify the correct list number as shown in Table A in order that the unit may be correctly adjusted at the factory and appropriately marked as to its function.

5.04 If the trouble still exists, replace the entire rectifier in accordance with local instructions.

TABLE B

TROUBLE	POSSIBLE CAUSE (CODE A)	POSSIBLE CAUSE (CODE B)
(a) Output voltage oscillates		Check C2, C3, C4, and C7 for a short or open.
(b) No control of output voltage	Q1, Q2 shorted or open. Q3 shorted. Check R16, CR5, CR10, CR6. Check CR8 and/or CR9 for a short.	Q2 shorted or open. Q3 shorted. Check that sense leads are properly connected. Check R22 and R23 for an open. Check R11, Q1, C1, and CR7.
(c) Output current oscillates (rectifier in droop; output current approximately 6 amperes)	Check C2.	Check C5, C6, and C8 for a short or open.
(d) High output current (F4 blows)	Check R12, R13, R14, and R17. Check setting and value of R18. Check C2 and Q1 for a short. Check Q2 and Q3 for an open.	Check CR8 for an open. Check Q2 and Q3 for an open. Check C5, C6, and C9 for a short. Check R13, R16, R17, R18, R19, and R20. Check CR9. Check RA relay. Check setting and value of R14.
(e) No output voltage	Check Q2, Q3, and CR6 for a short. Check Q1 for an open.	Check input and output fuses. Check Q1, C1, and CR7. Check Q2, Q3, C7, and CR8 for a short.
(f) Input fuse keeps blowing	Check CR1, CR2, CR3, CR4, and CR10 for a short. Check that only two input fuses are inserted.	Check CR3, CR4, CR5, CR6, and CR13 for a short. Check that only two input fuses are inserted.