J87224 RECTIFIER

OPERATING METHODS

1. GENERAL

1.01 The J87224 rectifier operates in conjunction with the J87214C regulator unit to automatically charge and float storage batteries of the 400- and 700-type power plants.

1.02 This section is reissued to include information for the adjustment of the FINE ADJ VOLTS potentiometer and information for the operation of the external fuse panel ("ZB" Option). This reissue does affect the Equipment Test List.

1.03 The rectifier is adaptable for connection to a 3-phase, 60-hertz nominal, 208- to 230-volt, or 400- to 480-volt ac input, depending upon the transformer option used. The rated output is 0 to 100 amperes at 130 volts dc. The rectifier with its associated regulator unit will maintain the connecter battery voltage within ± 0.5 percent for any combination of load current variations from 1 to 100 amperes and ac line voltage variations of ± 10 percent.

1.04 The rectifier utilizes PNPN devices for 3-phase full-wave rectification and a self-contained transistorized regulating circuit which controls the PNPN devices and automatically limits the output current. In addition, an alarm circuit is provided to shut down the rectifier when the charge fuse (CHG) or control fuse A or B blows or when the rectifier is putting out current at higher than normal voltages.

Caution: Voltages inside the rectifier case are over 150 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.

1.05 This rectifier is designed to mount on a 23-inch relay rack and can be serviced and maintained from the front. Access to the rear is made possible by a removable rear cover. Terminal strips for ac input and dc output are provided at the top of the unit.

1.06 Options are provided for operation as follows. With any option, the output current meter is in the ground lead.

(a) For use in a 130-volt positive plant (negative ground).

(b) For use in a 130-volt negative plant (positive ground).

1.07 Routine checks are intended to detect defects in the equipment and to guard against circuit failures. Checks other than those required by trouble conditions should be made during a period when they will not interfere with service.

1.08 ◗This issue of the section is based on the following:

SD-81593-01, Issue 11AR

SD-81543-03, Issue 7D

If this section is to be used with equipment or apparatus reflecting later issue(s) of the drawing(s), reference should be made to the SDs and CDs to determine the extent of the changes and the manner in which the section may be affected.◖

1.09 For more detailed information on the operation and maintenance of individual equipment or apparatus, refer to the appropriate Bell System Practices.

1.10 The abbreviations cw and ccw refer to clockwise and counterclockwise, respectively.

2. TOOLS AND TEST APPARATUS

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
—	3-inch C Screwdriver
TEST APPARATUS	
KS-14510	Volt-Ohm-Milliammeter
▶KS-8039	Volt-Milliammeter◀

3. OPERATION

Preparing to Start

3.01 When preparing to place the rectifier into service, check that:

(a) The ON-OFF key is in the OFF position.

(b) The proper size fuses are provided and removed from the rectifier and associated ac power supply.

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

(d) The option wiring is correct for the service to be used.

(e) The T1, T2, and T3 input transformer taps used are correct for the power supply voltage as measured with a KS-14510 meter.

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.

(f) The ADJ VOLTS potentiometer is rotated to the maximum ccw position.

(g) ▶The FINE ADJ VOLTS potentiometer is adjusted to its midposition.

(h) The S2 switch on the external fuse panel ("ZB" option) is in the midposition (TST position).◀

Starting

3.02 To place the rectifier in service, proceed as follows.

(a) Install control fuses A and B.

(b) Install the CHG fuse and then its associated alarm fuse.

Note: Sparking will occur when the CHG fuse is inserted due to charging of the filter capacitors in the rectifier.

(c) Install the ac service fuses.

(d) Operate the ON-OFF key to the ON position.

(e) Rotate the ADJ VOLTS potentiometer cw until the voltage output of the rectifier is equal to the battery float voltage of the associated power plant.

(f) ▶If a vernier adjustment is required, adjust the FINE ADJ VOLTS potentiometer cw to increase the voltage or ccw to decrease the voltage.◀

Note: The CC potentiometer is factory set for a constant current of 100 amperes.

4. ROUTINE CHECKS

4.01 As often as local experience demands, the relays should be inspected for adjustment and condition of contacts, making sure that they are in accordance with the Circuit Requirements Tables and Bell System Practices which apply.

4.02 The dc output should be checked from time to time to make certain that it is correct. ▶(Connect the KS-8039 volt-milliammeter across the output of the rectifier).◀

4.03 Electrolytic capacitors should be maintained in accordance with Section 032-110-701.

4.04 ***Regulator Operation ("ZB" Option):*** The operation of the regulator circuit can be checked using the S2 switch on the external fuse panel. To check the rectifier, proceed as follows.

(a) Operate the S2 switch to the FL position. This places the VR1 varistor in the circuit causing a voltage drop in the voltage on the regulator lead. The rectifier will sense the voltage drop and raise its output voltage to compensate. The rectifier output current will increase correspondingly. Return the S2 switch to the TST position. The rectifier output voltage will return to the battery float voltage.

(b) Operate the S2 switch to the NL position. This shorts out the VR1 and VR2 varistor causing a voltage increase in the voltage on the regulator lead. The rectifier will sense the voltage increase and lower its output to compensate. The rectifier output current will decrease correspondingly. Return the S2 switch to the TST position. The rectifier output voltage will return to the battery float voltage.

5. TROUBLES

5.01 If the F1 CHG fuse of the F3 control circuit fuse is blown, the RFA relay is operated and held until released by operation of the ON-OFF key.

5.02 Should a diode or PNPN device in the rectifier stack become defective, replace the complete rectifier stack.

5.03 Should any component of the regulator unit become defective, replace the complete regulator.

Caution: In making continuity checks, use the ohmmeter portion of the KS-14510 meter. Do not use the X10,000 position for testing transistors, as the higher voltage used may damage them.

Trouble Chart

5.04 Should any of the following troubles 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.

TROUBLE	POSSIBLE CAUSE
No dc current at low float voltage	Failure or disconnection of the input power
	Blown ac supply fuses or other fuses in the rectifier
Low dc voltage at partial output	Low input voltage
	Shorted capacitors
	Incorrect transformer taps used
	Defective D1, D2, D3, CR1, CR2, or CR3 rectifying element
	Potentiometer out of adjustment
High dc voltage	Potentiometer out of adjustment
	Defective D1, D2, D3, CR1, CR2, or CR3 rectifying element
Erratic dc current	Loose connections at potentiometers or resistors
	Intermittent open or short in any component