

# RECTIFIER

## J87358

### FERRORESONANT CONTROLLED OPERATING METHODS

#### 1. GENERAL

**1.01** This rectifier is designed to supply a filtered dc output voltage from an ac power source. It is intended for use in the 805A PBX to furnish ac and dc power for 19 and 38 Line Systems. The rectifier contains a ferroresonant regulator which, in conjunction with an associated ac capacitor, regulates the output voltage to  $\pm 12\%$  for the effects of line voltage, line frequency, load current and ambient temperature variations.

**1.02** This is a full-wave type rectifier designed to use a commercial or standby ac power source, depending on the option for which the rectifier is wired. The "X" wiring option is intended for use where a commercial ac power source is available. The "Y" wiring option is suitable for use where standby power must be used. Taps are provided on the inductor L2 to provide a fine level set adjustment of the output voltage in order to compensate for frequency variations.

**1.03** This rectifier will provide -24 volts dc, 0-0.6 amperes TALK; -24 volts dc, 2-10 amperes SIG; and  $\pm 10$  volts ac, 0-0.3 amperes INTER. It will isolate the dc and ac output circuits from the ac supply. It requires an ac input of 105 to 129 volts RMS, at a frequency of 60 Hz  $\pm 0.1$  Hz for the "X" wiring option or 60 Hz  $\pm 3$  Hz for the "Y" wiring option.

**1.04** The output ripple voltage is reduced to less than .75 volts peak-to-peak SIG and 23 dBnc TALK. This is accomplished by C2.1, C2.2 and C3 capacitors and the L1 inductor, arranged as a  $\pi$  filter.

**Warning:** *Avoid all contact with terminals; high voltages are present. Do not allow a test pick to touch two metal surfaces at the same time as destructive and dangerous short circuits may occur.*

*Disconnect all power before performing maintenance of the rectifier.*

**1.05** This rectifier has an inherent output current limiting characteristic. The regulator circuit has a decided *droop* characteristic when operating in the overload region. Variations in the degree of saturation of the nonlinear coil (the secondary coil of T1) tend to maintain a fairly constant output voltage in the normal load range.

**1.06** These instructions are based on circuit schematic drawing SD-82054-01, Issue 3A. For a detailed description of the operation, see the corresponding circuit description. If this section is to be used with equipment or apparatus reflecting later or earlier issue(s) of drawings reference should be made to the SDs and CDs to determine the extent of the change and the manner in which this section may be affected.

#### 2. LIST OF TOOLS AND TEST APPARATUS

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
—	3-Inch C Screwdriver
TEST APPARATUS	
KS-14510	Volt-Ohm-Milliammeter
—	DC Ammeter, Weston Model 281, Scale 15/3/0.15

#### 3. OPERATION

**3.01** *Preparing to Start:* When preparing to put the rectifier into service, check that:

- The rectifier is of the proper wiring option ("X" or "Y"), depending on the nature of the ac power source (commercial or standby). See 1.02.

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(b) The DC OUTPUT (F1) and the AC OUTPUT (F2) fuses are installed and are of the proper type and size.

(c) The load is connected to terminals 1 through 6 of TB2.

**3.02 Starting:** The rectifier has no disconnecting switches. It is started automatically when the P1 connector is connected to the ac power source.

**3.03 Output Voltage Adjust:** (Available only when the "Y" wiring option is specified).

**Note:** When the available ac power supply is a standby unit, the frequency may vary from 57 to 63 Hz; therefore, the rectifier should be equipped with the "Y" wiring option.

- (1) Verify that the rectifier is in service and is operating normally.
- (2) Connect the KS-14510 volt-ohm-milliammeter to terminals 1(-) and 2(+) of TB2.

**Requirement:** The KS-14510 meter should indicate approximately -24 volts output.

**Note:** If the requirement is met in (2), proceed to (4). If not, proceed with (3).

- (3) Select different tap connections on the L2 inductor until the requirement in (2) is met. The taps provide increments of about 0.6 volts, with tap 5 providing the maximum output voltage and tap 1 providing the minimum.
- (4) Disconnect the KS-14510 meter.

**3.04 Stopping:** The rectifier is stopped by disconnecting the P1 connector from the ac power source. If the rectifier is to be left out of service for a long period of time the DC OUTPUT and AC OUTPUT fuses should be removed.

**4. ROUTINE CHECKS**

**4.01** The following should be checked periodically or after the rectifier has been left out of service for an extended period of time, or after the occurrence of a trouble situation.

- (a) Using the KS-14510 meter, on the DC or AC scale as appropriate, the output voltages should be checked. Under no circumstances should the dc output voltages exceed 28 volts.

(b) Using the Weston Model 281 ammeter, check the output currents. See 1.03 for desired current ranges.

**4.02** If the rectifier is left out of service for an extended period of time, refer to Section 032-110-701 for information on maintaining electrolytic capacitors when not in service.

**5. TROUBLES**

**5.01** In general, the only components likely to become defective with use are the electrolytic capacitors and the semiconductor diodes.

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

TROUBLE	POSSIBLE CAUSE
No output voltage	Improper connection to the ac power source Blown DC OUTPUT or AC OUTPUT fuse Shorted capacitor or resistor
Low dc output voltage	Low ac line voltage Overload Defective C1 capacitor Defective CR1 or CR2 diode
High dc output voltage	Defective C1 capacitor High ac line voltage Shorted L1 inductor
High or low ac output voltage	High or low ac line voltage Defective C1 capacitor Defective T1 transformer
High ripple voltage on dc TALK output	Open C2.1, C2.2, or C3 capacitor Shorted L1 inductor
High ripple voltage on dc SIG output	Open C2.1 or C2.2 capacitor