FILAMENT SUPPLY
KS-15915, L1
OPERATING METHODS

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1. GENERAL

1.01 This section covers the operation of the KS-15915, L1 filament supply containing silicon diode rectifiers. This filament supply is initially intended to supply filament power to the components of the J68408A FM terminal test set used in the TH radio system.

1.02 This unit is designed for connection to a 117-volt, 60-cycle, single-phase power source and will deliver 6.4 volts dc at 1.5 amperes and 6.4 volts ac at 15 amperes. With full load on the ac and dc outputs, a ±10 per cent variation in input voltage will result in less than ±1.0 per cent change in output voltages. This unit uses a ferro-resonant isolating transformer having windings to supply four silicon diodes connected in a full-wave bridge circuit for obtaining the dc output voltage. The 60-cycle ac output voltage is obtained from other secondary windings on the transformer. Protective fusing is provided in the ac input and dc output circuits. The unit is equipped with screw-type terminals for input and output power connections. Jacks for measuring the ac and dc output voltages are accessible without removal of the cover.

> ***Caution: The voltages in this unit exceed 500 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 unit except when necessary to make tests.***

1.03 Keeping the ventilating passages and silicon diodes clean is especially important to avoid excessive heating.

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

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

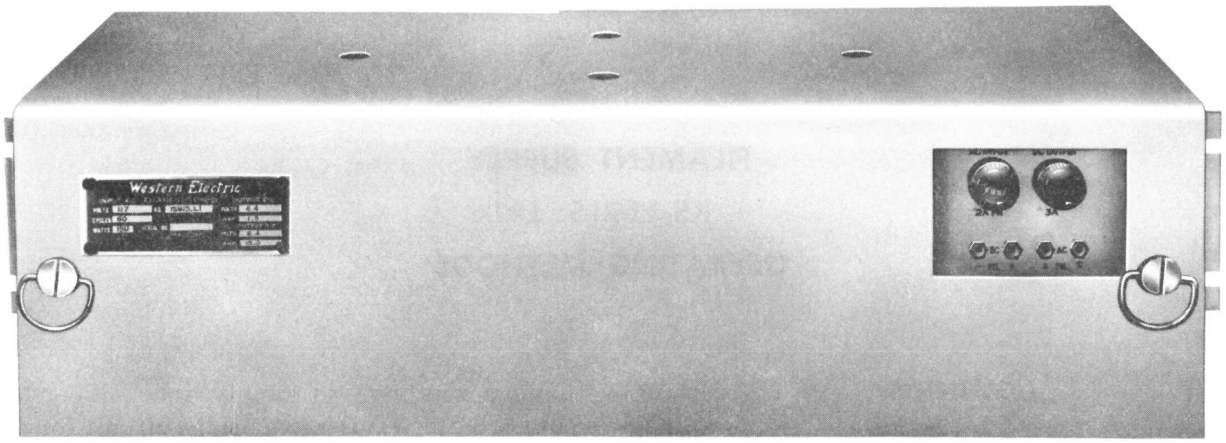

Fig. 1 – KS-15915, L1 Filament Supply

2. TEST APPARATUS

CODE OR SPEC NO.	DESCRIPTION
TEST APPARATUS	
KS-14510, L1	Volt-Ohm-Milliammeter
—	Weston Model 622 AC-DC Thermo-Voltmeter (300/150/30/3 volt range, 500 ohms per volt, or equivalent)

3. OPERATION

How the Unit Works (See Fig. 2)

3.01 Sixty-cycle power is supplied to the primary of the T1 single core ferro-resonant regulating transformer which consists of a section that saturates magnetically and a section that does not saturate. Alternating current from part of the transformer secondary windings is rectified by the CR1-CR4 silicon full-wave rectifier bridge. The current from the rectifier bridge is filtered by the L1 series inductor and the C1 shunt capacitor. The R1 resistor maintains a minimum load on the dc output of the unit and also discharges the filter capacitor when the unit is disconnected from the input power and load. The low voltage ac output is taken from a portion of the secondary windings of the T1 transformer. Some line compensation is provided by connecting the secondary windings on the saturable portion of the T1 transformer core in series with windings on the nonsaturable portion of the T1 transformer core. The ac and dc output voltages may be measured by connecting an external voltmeter to the proper pin jacks.

Preparing to Start Initially

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

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

(b) Input and output fuses of proper size are provided in the circuit.

Initial Adjustments

3.03 This unit has no adjustments.

Routine Adjustments (Normal Operation)

3.04 The unit has no disconnecting switches and is connected to both ac power and the load when the associated fuses are in place. If it is necessary to take a unit out of service, remove the fuses. To restart, replace the fuses.

4. ROUTINE CHECKS

4.01 The following should be performed.

(a) The dc output voltage should be checked from time to time with the KS-14510 meter to make certain that it is correct.

(b) The ac output voltage should be checked with the Weston Model 622 thermo-voltmeter or an equivalent instrument to make certain that the voltage is correct.

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

5. TROUBLES

5.01 In general, the components most likely to become defective with use are the electrolytic capacitors and the rectifying element (semiconductor diodes).

5.02 Any replacements of the T1 ferro-resonant transformer and the associated C2 tuning capacitor should be made at the factory of the supplier. All other components can be replaced in the field.

5.03 To avoid unbalance in the rectifying element, diode replacement should be made as follows.

(a) When replacing a defective diode or diodes, all other diodes in the rectifying element that have been in service 2 years or longer should also be replaced.

(b) Do not combine diodes of different list numbers or those produced by different manufacturers.

Trouble Chart

5.04 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.

Caution: The ac voltage across the terminals of the C2 tuning capacitor exceeds 500 volts. When making tests inside the unit, take care to avoid any contact with the leads and terminals of this capacitor.

TROUBLE	POSSIBLE CAUSE
AC Output	
(a) No voltage	Failure or disconnection of the input power
	Blown F1 fuse
	Defective transformer
(b) Low voltage	Low input voltage
	Excessive loads on unit
	Defective C2 capacitor
	Defective transformer
(c) High voltage	High input voltage
	Defective transformer
(d) Erratic voltage	Intermittent open or short in any component
	Defective connections
DC Output	
(e) No voltage	Failure or disconnection of the input power
	Blown F1 and/or F2 fuse
	Defective transformer
	Defective resistor or capacitors
	Defective inductor
(f) Low voltage	Low input voltage
	Excessive loads on unit
	Defective capacitors
	Defective transformer
	Defective rectifying element
(g) High voltage	High input voltage
	Defective transformer
	Open resistor
(h) High ripple voltage	Defective C1 capacitor
	Defective rectifying element
	Defective inductor
(i) Erratic voltage	Intermittent open or short in any component
	Defective connections

6. POINT-TO-POINT VOLTAGES

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

6.02 High voltages to ground are present within the unit and every precaution should be observed to avoid any bodily contact with exposed metal parts or terminals when the unit is in operation, or when not in operation, but connected to either power source or outputs.

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 at 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 meter. The outputs of the unit will not be appreciably affected by connecting the meter leads to the circuit elements.

Caution: The values shown in the table in 6.04 are for a typical unit in good working condition. A defect in the unit may leave a high-voltage charge on a capacitor and other parts of the circuit with the power off. A defective unit with the power connected may have quite different voltages than those shown. Therefore it may be desirable to use a higher voltage scale until readings indicate the proper scale to use for the defective condition.

6.04 ***Table of Point-to-Point Voltages:*** Unit adjusted as follows.

Input power — 117 volts, 60 cycle ac
AC and dc outputs — no load

VOLTAGES FOR KS-15915, L1 FILAMENT SUPPLY

VOLTAGE ACROSS	MEASUREMENT MADE		SCALE AC OR DC	KS-14510 METER	
	FROM APPARATUS	*TO APPARATUS		RANGE (VOLTS)	READING (VOLTS)
AC Output	J3	J4	AC	12	7.2
C2	—	—	AC	600	560
Rectifying Element	Junction of CR1 and CR2	Junction of CR3 and CR4	AC	12	9.5
DC Output	J1	J2	DC	12	7.0

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

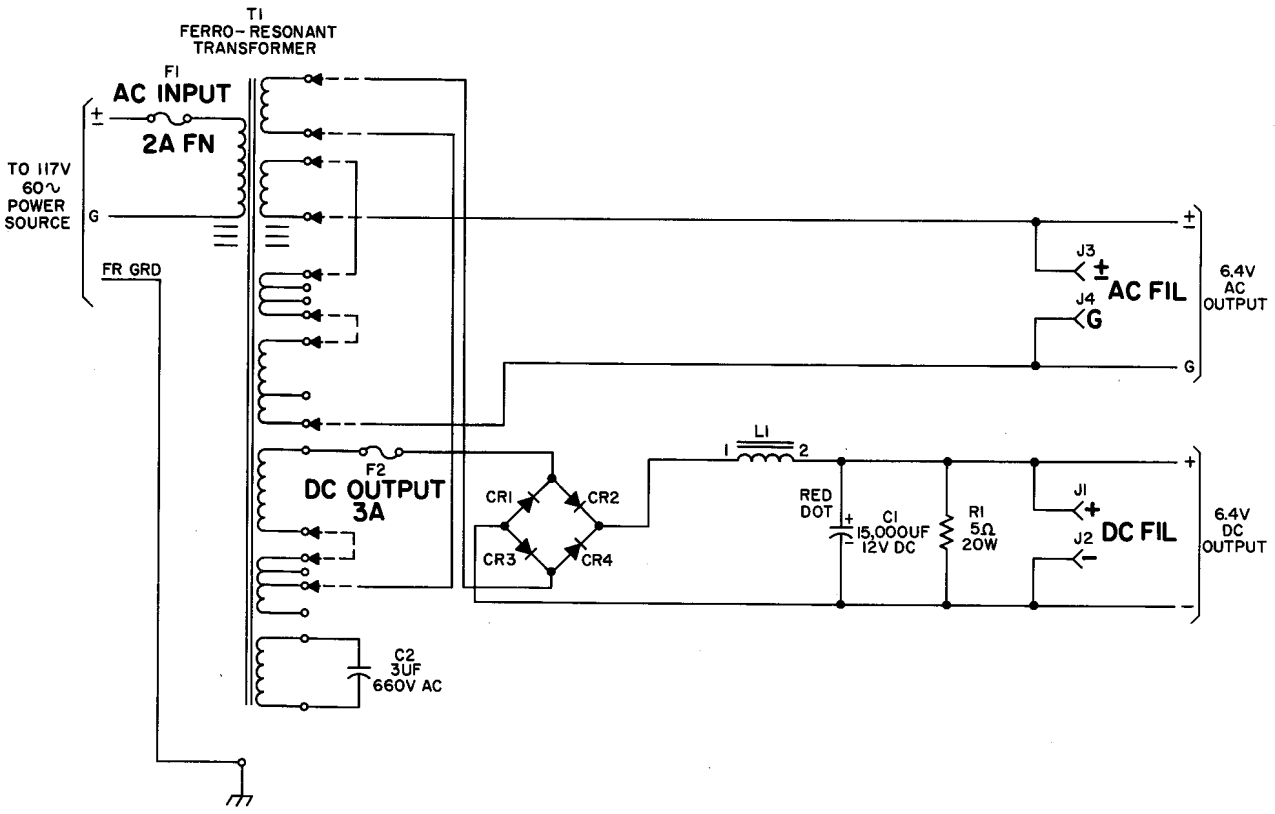

Fig. 2 – KS-15915, L1 Filament Supply — Simplified Schematic