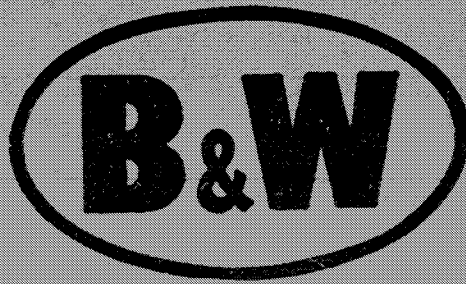


INSTRUCTION BOOK  
**MODEL L-1000-A**  
Grounded Grid Linear Amplifier



**BARKER & WILLIAMSON**

INCORPORATED

237 FAIRFIELD AVENUE, UPPER DARBY, PA.

## B. INSTALLATION AND OPERATION

The B&W Model L-1000-A Linear Amplifier is shipped in a baffled and padded fibreboard container complete with tubes and instruction manual. All tubes and tune-up power reducing resistor are shipped in a separate package in the container. All tubes and the tune-up resistor may be installed by removing the cabinet rear cover; however, the following procedure is urgently suggested in order to insure against equipment damage occasioned by shipping and handling. This involves removing the RF and Power Supply units from the cabinet for complete inspection.

### 1. Removing Units from Cabinet

- A. Remove rear cabinet cover, lay cabinet on its back and remove the three screws that fasten the power supply unit to bottom of cabinet.
- B. Return cabinet to upright position and remove the eight screws that hold the panels to front of cabinet.
- C. Slide both units out together as interconnecting cable will not allow removal of one at a time.
- D. Disconnect one end of interconnecting cable and lift amplifier unit off power supply unit. Inspect both units for possible damage. Insert Type 816 rectifier tubes and power reducing resistor in their sockets and connect plate caps to rectifier tubes. (See Fig. 2)
- E. Replace amplifier unit on top of power supply unit and insert type 813 amplifier tubes in their sockets and connect plate caps. (See Fig. 4)
- F. Reconnect interconnecting cable. The RF amplifier unit as delivered from the factory has a jumper connecting terminals 1 and 2 on the terminal board at rear of unit. When this jumper is removed, amplifier tubes are biased beyond plate current cutoff. If break-in operation is used, this jumper should be removed and two leads connected to these terminals; of adequate length to reach the terminals of a pair of normally open contacts on the voice actuated relay in the driver source.
- G. Slide both units into cabinet, routing VOR relay wires through cabinet opening for AC line cord. Replace front panel screws and bottom screws, also rear cabinet cover.

### 2. Installing and Connecting the Equipment.

The L-1000-A has been designed for tabletop operation and should be located as close as possible to the driving unit. Adequate free space should be left behind the cabinet (at least 6 inches) for ventilation and nothing should be placed on top of the cabinet. The A.C. line connections should be made with #14 wire, separately fused with 15A fuses. If three wire service is available connect to opposite side of line used for driver unit. Before connecting power line make sure "Line Switch" on power supply unit is in the "OFF" position. The input and output feeder lines should be plugged into their corresponding receptacles (See Fig. 5) and the wires from terminals 1 and 2 of amplifier terminal strip, connected to the voice break-in relay of driver unit.

#### A. Antenna Systems

The Model L-1000-A may be used with a variety of antenna systems; however, since the amplifier is designed to feed into a nominal 52 or 75 ohm unbalanced line, the antenna feed system should be arranged accordingly. Data on antenna systems is supplied in the instruction book for the B&W Model 5100 series transmitters, while more complete information is available in the ARRL Antenna Handbook.

### 3. Function of Controls

All operating controls of the L-1000-A are located on the front panels and perform the following functions:

"Band Selector" - changes taps on final tank coil and switches in proper tuning capacitor sections.

"Amplifier Tuning" control - adjusts the plate tuning capacitor of the pi-network output circuit. This capacitor is adjusted for minimum plate current dip.

"Amplifier Loading" - control - adjusts loading capacitor of the pi-network output circuit. Setting of this control determines loading of the amplifier. Never load amplifier to more than 200 MA. in the "Tune" position of the "Power Switch".

"Meter Switch" - selects function of meter.

"Grid" - indicates amplifier grid current.

"Plate" - indicates amplifier plate current.

Note: In both positions Meter Scale is 0-500 MA.

"Bias Adjust" - For CW operation this control applies enough bias to the amplifier tubes to cut plate current off with the key up. For SSB operation a small bias of the order of 5 volts is applied so the plate current rests at 40 MA. when no input signal is present.

"Power Switch" - This switch has four positions with the following functions:

"OFF" - All voltages are removed from the power supply transformers.

"Fils." - Voltage is applied to rectifier and amplifier filaments, grid bias rectifier and blower motor.

"Tune" - Voltage is applied to high voltage transformer primary through a voltage dropping resistor so that the amplifier tuning and loading adjustments can be made with reduced plate voltage (about 50% of normal).

"Oper." - Voltage is applied directly to primary of high voltage transformer for normal operation.

CAUTION: Do not leave Power Switch in "Oper." position when drive is applied to amplifier except momentarily to check tuning and loading of amplifier. Plate current should not exceed 400 MA.

"Fuse" - 10A-125V Line Fuse

"H.V." - 6V miniature bayonet pilot lamp to indicate that voltage is applied to high voltage transformer primary.

### 4. Operation

When first placing the amplifier in operation or when new rectifier tubes are installed, it is necessary to operate the amplifier for a period of 15 minutes with filament power only, by placing "Power Switch" in the "Fils." position. This is to insure a proper distribution of the condensed mercury in the Type 816 Mercury Vapor Rectifier Tubes. In subsequent operation a filament heatup time of 15 to 30 seconds is adequate, although a longer period tends to increase tube life.

With all of the connections completed and with an antenna or dummy load connected to the amplifier output, proceed as directed below:

#### A. CW Operation

- (1) Place "Meter Switch" in "Plate" position and "Power Switch" in "Fils." position and allow 15 to 30 seconds for filaments to warm up. Apply a short between terminals 1 and 2 on TB-201. Closing the VOR will accomplish this; however, a SPST switch will also serve the purpose. Then

- turn "Power Switch" to "Oper." position (No drive should be applied to amplifier) and by means of the "Bias Adjust" control set plate current until it just reaches zero. (Clockwise rotation of "Bias Adjust" increases plate current and counter clockwise rotation decreases plate current) Return "Power Switch" to "Fils." position.
- (2) Leave the "Power Switch" in the "Fils." position and place the "Meter Switch" in the "Grid" position. Apply power to the driving transmitter with key down, and adjust its tuning and loading to obtain a grid current indication on the amplifier meter of 90 to 110 MA.
  - (3) Make sure "Band Selector" control is set to same band as driving transmitter and "Amplifier Loading" control is set on zero. Place amplifier "Meter Switch" in the "Plate" position and even though the high tension is not applied there will be an indication of plate current due to rectification of the driving voltage. Adjust "Amplifier Tuning" for a minimum indication on the meter.
  - (4) Place "Power Switch" in the "Tune" position and readjust "Amplifier Tuning" for minimum meter indication. Adjust "Amplifier Loading" control so that plate current reads 180 MA. Each time the "Amplifier Loading" control is moved 2 or 3 degrees readjust "Amplifier Tuning" control for minimum plate current dip.
  - (5) Place "Power Switch" in the "Oper." position and retouch loading and tuning for a plate current of 350 MA. CAUTION: Do not hold key down any longer than necessary to make these final adjustments.

#### B. SSB Operation

- (1) Place "Meter Switch" in "Plate" position and "Power Switch" in "Fils." position and allow 15 to 30 seconds for filaments to warm up, then turn "Power Switch" to "Oper." position (No drive should be applied to amplifier) and by means of the "Bias Adjust" control set plate current to 40 MA. (Clockwise rotation of "Bias Adjust" increases plate current and counter clockwise rotation decreases plate current) Return "Power Switch" to "Fils." position
- (2) Leave "Power Switch" in the "Fils." position and place the "Meter Switch" in the "Grid" position. Apply power to the driving transmitter (The output stage of the transmitter should be driven into grid current to simulate audio peak power conditions. With the B&W 5100 series transmitter and 51SB series single sideband generators, this is accomplished by placing the "Norm-SSB" Switch in the "Norm" position thus operating the unit as a CW transmitter) and adjust tuning and loading to obtain a grid current indication on the amplifier meter of 120 to 130 MA. (Excessive drive will impair the linearity of the amplifier)
- (3) Make sure "Band Selector" control is on same band as driving transmitter and "Amplifier Loading" control is set on zero. Place amplifier "Meter Switch" in the "Plate" position, even though the high tension is not applied there will be an indication of plate current due to rectification of the driving voltage, adjust "Amplifier Tuning" for a minimum indication on the meter.

- (4) Place "Power Switch" in the "Tune" position and readjust "Amplifier Tuning". For minimum meter indication, adjust "Amplifier Loading" control so that plate current reads 200 MA. Each time the "Amplifier Loading Control" is moved 2 or 3 degrees readjust "Amplifier Tuning" control for minimum plate current dip.
- (5) Place "Power Switch" in the "Oper." position and retouch loading and tuning for a plate current of 400 MA. Place "Meter Switch" in the "Grid" position and check grid current. For best linearity the grid current should be 100 MA., if necessary readjust loading of driving transmitter to obtain this reading.
- CAUTION: With the "Power Switch" in the "Oper." position full drive should be applied to the amplifier only long enough to make these final adjustments.
- (6) Place "Power Switch" in the "Fils." position and set up driving transmitter for SSB operation. Place "Power Switch" in "Oper." position and "Meter Switch" in the "Plate" position and equipment is ready to operate. With normal speech levels the plate current of the amplifier will kick up to about 150 MA. While a sustained whistle will indicate up to 400 MA. when using the 51SB series single sideband generator and 5100 series transmitters the best indication of full drive is given by the grid current meter in the sideband generator. On the strongest voice peaks this meter should just barely move up from zero.

The following chart shows the approximate dial settings of a typical amplifier when set up for SSB operation. In each case the amplifier is loaded to 400 MA. into a 75 ohm dummy load. Variations from these settings will occur due to load impedance differences and feed line VSWR. These are normal.

Approximate Dial Setting

Frequency	Amplifier Tuning	Amplifier Loading
3500	35	27
4000	65	50
7000	85	62
7300	90	67
14,000	24	41
<u>14,350</u>	<u>35</u>	<u>45</u>
21,000	63	67
21,450	70	70
27,100	38	68
28,000	50	70
29,700	75	71

## C. Circuit Description

### 1. Power Supply Unit

The high voltage power supply and switching are mounted on the lower chassis.

Referring to the schematic wiring diagram, Fig. 6, Transformer T-101 supplies high voltage (3000 VAC) to a full wave single phase bridge rectifier consisting of four type 816 Mercury Vapor Rectifier Tubes whose filaments are supplied by transformer T-102. RF filtering to prevent hash radiation and to protect the rectifier tubes from RF voltages is obtained by means of RF chokes L-102, L-103, L-104 and L-105 and capacitor C-110. D.C. filtering is obtained by means of a single section filter consisting of input choke L-101 tuned by capacitor C-109, and an output capacitor of 10 MFD. 3600 WV., consisting of capacitors C101 through C-108, connected in series. Resistors R-101 through R-108 form a voltage divider for the capacitors and also act as a 160,000 ohm bleeder.

All power switching operations are performed by a single switch, SW-101, which progressively connects filaments then reduced plate voltage for tuning, and finally full plate voltage for operating.

The A.C. line is connected to feed through connectors at rear of chassis which are RF filter capacitors C-111 and C-112.

A 10A. 125V. fuse, F-101, protects all of the transformers against accidental shorts or overloads.

### 2. Amplifier Unit

The amplifier unit, with its corresponding filament transformer and bias supply rectifier, is mounted on the upper chassis.

A thorough investigation of a wide variety of vacuum tubes, in both grounded cathode and grounded grid circuits, disclosed that a pair of 813 beam power tubes connected as high MU triodes in a grounded grid circuit proved the best solution for a linear amplifier of 1 Kw. D.C. input level, for the following reasons:

- A. Easily obtainable at reasonable cost.
- B. Small size with ample plate dissipation.
- C. Low Plate Current with zero bias.
- D. Driving power of 50 to 80 watts (depending on frequency) making an ideal complement for the B&W 5100 series transmitters and a number of other similar transmitters in the nominal 100 watt range. Although this driving power may seem high for a 1 Kw. amplifier it must be remembered that in a grounded grid amplifier approximately 80% of the driving power appears as useful power in the amplifier output.
- E. Very stable operation due to the low impedance offered by the cathode input circuit. No dissipative loading is needed on the input circuit.
- F. Broadband input circuit, no tuning necessary, and can be coupled to output of driving transmitter with 52 or 75 ohm coax cable.

Referring to the schematic wiring diagram, Fig. 6, the drive is applied to the 813 filaments through capacitor C-201. The A.C. filament power is supplied by transformer T-201 through two windings of the special

broad band filament choke T-202, the third winding of this choke connects between ground and the neutralizing stud NS. It was found that considerable improvement of operation could be obtained on the 10 meter band by using neutralization.

Negative bias to cut off the tubes for CW and SSB break-in operation is obtained from a third winding on transformer T-201, rectified by a selenium rectifier CR-201 and filtered by capacitor C-214 and resistor R-201. Potentiometer R-202 adjusts this bias and from its arm the bias voltage is fed through RF filter C-202 and L-201 to the No. 1 grids which are grounded for RF through C-204. The No. 2 grids and beam forming electrodes are grounded directly at the tube sockets.

The plates are connected in parallel and fed through RF choke L-202 and RF filter C-208, L-203 and C-209. The output pi-network is fed from the plates through the D.C. blocking capacitor formed by C-205, C-206 and C-207. The tuning capacitor, C-210, of the pi-network is a special variable air dielectric capacitor with two stators which are automatically switched in conjunction with the band selector switch on L-204 which is a B&W pi-network inductor. Loading capacitor C-211 is a variable air dielectric capacitor of 50 to 1500 MMF. range while RF choke L-205 serves to keep the whole pi-network at D.C. ground potential and as a static discharge for the antenna feeder system.

The metering circuit consists of meter M-201 by-passed for RF by C-216, series resistor R-205 and meter switch SW-201 which selects either the plate shunt R-204 or the grid shunt R-203.

#### D. Maintenance and Trouble Shooting

##### 1. General

The Model L-1000-A Linear Amplifier has been designed to require a minimum of servicing. Most cases of faulty operation are usually caused by defective tubes. Details of procedure for locating faults in tubes will be dealt with in subsequent paragraphs.

In order to minimize the need for repairs and to insure uninterrupted operation, it is advisable to fix a standard procedure of maintenance. We suggest that every three months the following work be done:

- A. Remove equipment from cabinet (See paragraph 1 of section B)
- B. Remove all tubes from sockets and check contact pins for any signs of heating caused by bad contact. Just removing and reinserting tubes in sockets will clean both tube pins and socket contacts. Clean tube bulbs and bases before reinserting in sockets.
- C. Clean chassis and parts thoroughly with a soft brush. If dirt or dust sticks to chassis or parts use carbon tetrachloride.
- D. Put several drops of light machine oil in each oiling tube of blower motor. Make sure blower rotates freely.
- E. Check all screws and nuts for tightness and inspect all connections.
- F. Put a little "Lubriplate" on switch arm of "Band Selector" switch.

## 2. Trouble Symptoms, Possible Causes and Remedies

The following is a list of trouble symptoms that may be encountered, together with their possible causes and remedies. The list, however, is not intended to be all inclusive, but is intended rather as a guide to help the trouble shooter to locate troubles that may arise.

CAUTION: DO NOT APPLY VOLTAGE TO UNITS WHEN REMOVED FROM CABINET AS THE HIGH VOLTAGE (2500V.) FURNISHED BY THE HIGH VOLTAGE POWER SUPPLY IS LETHAL.

- A. Amplifier completely inoperative:  
Check fuse and A.C. line voltage. If fuse is burnt out make following checks for cause.
- (1) Place "Power Switch" in the "Fils." position. If fuse burns out it can be due to a shorted filament in one of the 813 power tubes or a defect in T-201 or T-102.
  - (2) If filaments light normally with "Power Switch" in the "Fils." position, place "Meter Switch" in the "Plate" position and turn "Power Switch" to the "Tune" position. If meter reads off scale, check for a blue glow in one of the 813 power tubes. If tubes appear to be normal, the defect may be a short in one of the capacitors C-205, C-206, C-207, C-208 and C-209.
  - (3) If conditions appear to be normal with "Power Switch" in the "Tune" position turn it to the "Oper." position, if fuse burns out and meter kicks off scale the defect may be any of those mentioned in paragraph (2) above. If, however, the fuse burns out and no indication is seen on the meter the cause may be a defective 816 rectifier tube. To check this replace tubes one at a time with a new tube. If this does not clear up the trouble then the defect may be in T-101, the capacitor bank C-101 through C-108 capacitor C-110 or T-102.
- CAUTION: NEVER USE A FUSE OF MORE THAN 10A. CAPACITY AS PERMANENT DAMAGE MAY RESULT TO THE EQUIPMENT.
- B. No grid current indication when drive is applied to amplifier.  
Shorted C-202, C-203, or C-204. Open circuit in L-201 or R-202.
- C. No plate current indication.  
Open circuit in L-101, L-105, L-202 or L-203.
- D. Excessive drop of grid current when full plate voltage is applied. Normally the grid current drops about 25% say from 130 MA. to 100 MA. on SSB full drive and load conditions. If the drop is more than this, it is usually due to lack of filament emission in one or both of the 813 power tubes. If one tube is at fault this can be checked in the following manner: With amplifier set up for SSB operation apply full excitation with "Power Switch" in the "Oper." position and allow to operate for several minutes. If one of the 813 power tubes shows color on the plate it is the good tube. Replace the other tube.
- E. Tuning or loading variable capacitors spark over when plate power is applied or on speech peaks.  
This can be caused by dust accumulating on the condenser plates or by an open circuit in L-205. Check for high VSWR in antenna system.



- F. "Amplifier Tuning" control will not tune properly when the amplifier "Bandselector" control is on same band as driving transmitter.

Check for correct positioning of "Band Selector" knob with reference to switch blade on rear of Model 850 pi-network inductor and capacitor switch as follows:

- (1) Place "Band Selector" knob on 801 capacitor switch activating lever (the one mounted on the same shaft as the knob) and switch blade on rear of 850 pi-network inductor should point straight down. (Switch blade on inductor does not engage any contact in this position.)
- (2) The second capacitor switch activating arm (the one mounted on the shaft that activates the capacitor switch blade) should be in its lower position so that the capacitor switch blade engages the two contacts on side of tuning capacitor. The correct position of this arm on the shaft is when it is horizontal midway between its upper and lower position.
- (3) Before moving "Band Selector" knob place second lever in its lower position, then rotate "Band Selector" knob through all its positions and back again to the 80 position. As knob is moved from 40 to 20 the capacitor switch should open and remain open in the 20, 15 and 10 - 11 positions. As knob is moved in the opposite direction the switch should close as knob moves from 20 to 40 and remain closed in the 40 and 80 positions.

Note: Vacuum tubes of the thoriated filament type such as the 813 and oxide coated filament type such as the 816 seldom if ever terminate their life by filament burn-out but usually fail due to lack of filament emission. For the 813 the symptoms caused by lack of emission are covered in paragraph D above. In the case of the 816 reduced emission causes excessive voltage drop across the tube during the conduction cycle. This increases the temperature of the condensed mercury which in turn increases the mercury vapor pressure reducing the peak inverse voltage rating to a point where flash backs will occur. These flash backs can be quite erratic and if all the tubes in the rectifier are equally old the best solution is to replace the whole set. Best tube life is assured when tubes are operated at rated voltage.

#### Model L-1000-A Parts List

<u>Circuit Symbol</u>	<u>Description Power Supply Unit</u>	<u>B&amp;W Part No.</u>
C-101 to C-108 Inc.	Capacitor, Electrolytic 80 MF. 450V.	T-1243
C-109	Capacitor, Paper oil impregnated .1MF.3000V.	T-1244
C-110	Capacitor, ceramic .001 MF.5000V.	T-944
C-111 - C-112	Capacitor, feed-thru line filter	T-680
L-101	Choke, filter iron core	T-1204
L-102 to L-104 Inc.	Choke, R.F.	T-359
L-105	Choke, R.F. 1 MH. 300 MA.	X-371
R-101	Resistor, wire wound, 20W. 20,000 ohms	R-198
R-102 to R-108 Inc.	Resistor, wire wound, 20W. 20,000 ohms	R-198
R-109	Resistor, cone heater type, 1000W. 115V.	R-179

<u>Circuit Symbol</u>	<u>Description Power Supply Unit</u>	<u>B&amp;W Part No.</u>
SW-101	Switch, power	T-1276
T-101	Transformer, plate Prim. 115V. Sec. 3000V.	T-1205
T-102	Transformer, rectifier filaments	T-1207
V-101 to V-104 Inc.	Vacuum tube, type 816	T-1248
F-101	Fuse 10A. 125V.	T-1245
PL-101	Pilot Lamp 6.3 Volt 300 MA. Bayonet type	T-179
C-201 - C-202	Capacitor, Disc. Ceramic .01 MF. 500V.	T-607
C-203	Capacitor, tubular ceramic, 50MF.	T-616
C-204	Capacitor, disc. ceramic .001 MF. 500V.	T-509
C-205 to C-209 Inc.	Capacitor, ceramic .001MF. 5000V.	T-944
C-210	Capacitor, variable air	T-1242
C-211	Capacitor, variable air	T-1241
C-212 - C-213	Capacitor, disc. ceramic .01MF. 500V.	T-607
C-214	Capacitor, electrolytic dual 40MF. 150V.	T-335
C-215 - C-216	Capacitor, disc. ceramic .01MF. 500V.	T-607
CR-201	Rectifier, selenium 130V. 65MA.	T-1253
L-201	Choke, R.F. 500UH 100MA.	T-711
L-202	Choke, R.F. Plate	X-368
L-203	Choke, R.F. 1MH. 300MA.	X-371
L-204	Inductor, pi-network	Mod-850
L-205	Choke, R.F. 1MH. 300MA.	X-371
M-201	Meter, movement 0-1MA. Scale 0-500MA.	T-1250
R-201	Resistor, wire wound 500 ohms 5W.	T-536
R-202	Resistor, pot. wire wound 500 ohms 2W.	R-121
R-203 - R-204	Resistor, meter shunt 5 ohm 1W $\pm 1\%$	R-180
R-205	Resistor, meter series 2445 ohms $\frac{1}{2}W \pm 1\%$	R-181
SW-201	Switch, meter	T-1251
T-201	Transformer, filament, Prim. 115V. Sec. 1-10V-10A Sec. 2-50V-50MA.	T-1206
T-202	Choke, filament B&W special	X-373
V-201 - V-202	Vacuum tube, type 813	T-1264
Blower	Ripley 2 $\frac{1}{2}$ " 115 V.AC. motor	T-1255
J-201 - J-202	Receptacle, amphenol SO-239	L-300

POWER TUBES SUCH AS THE 813, WHEN NEW OR AFTER LENGTHY PERIODS OF STORAGE, WILL OCCASIONALLY FLASH OVER WHEN PLATE VOLTAGE IS FIRST APPLIED. THIS IS DUE TO RESIDUAL GAS IN THE TUBE WHICH IS THUS ELIMINATED. THIS WILL NOT RECUR IN NORMAL SERVICE.

STANDARD WARRANTY

Adopted and Recommended by the  
Radio-Electronics-Television Manufacturers Association

Barker & Williamson, Inc. warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under NORMAL INSTALLATION, USE and SERVICE discloses such defect, provided the unit is delivered by the owner, to our authorized dealer or wholesaler, from whom purchased, intact, for their examination, with all transportation charges prepaid. This warranty is valid only within 90 days from the date of purchase and is limited to new equipments.

This warranty does not extend to any of our radio products which have been subjected to MISUSE, NEGLIGENCE, ACCIDENT, INCORRECT WIRING NOT OUR OWN, IMPROPER INSTALLATION, OR TO USE IN VIOLATION OF INSTRUCTIONS FURNISHED BY US, NOR EXTEND TO UNITS WHICH HAVE BEEN REPAIRED OR ALTERED OUTSIDE OF OUR FACTORY, NOR IN CASES WHERE THE SERIAL NUMBER THEREOF HAS BEEN REMOVED, DEFACED OR CHANGED, NOR TO ACCESSORIES USED THEREWITH NOT OF OUR OWN MANUFACTURE.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products.

BARKER & WILLIAMSON, INC.  
237 Fairfield Avenue Upper Darby, Penna.

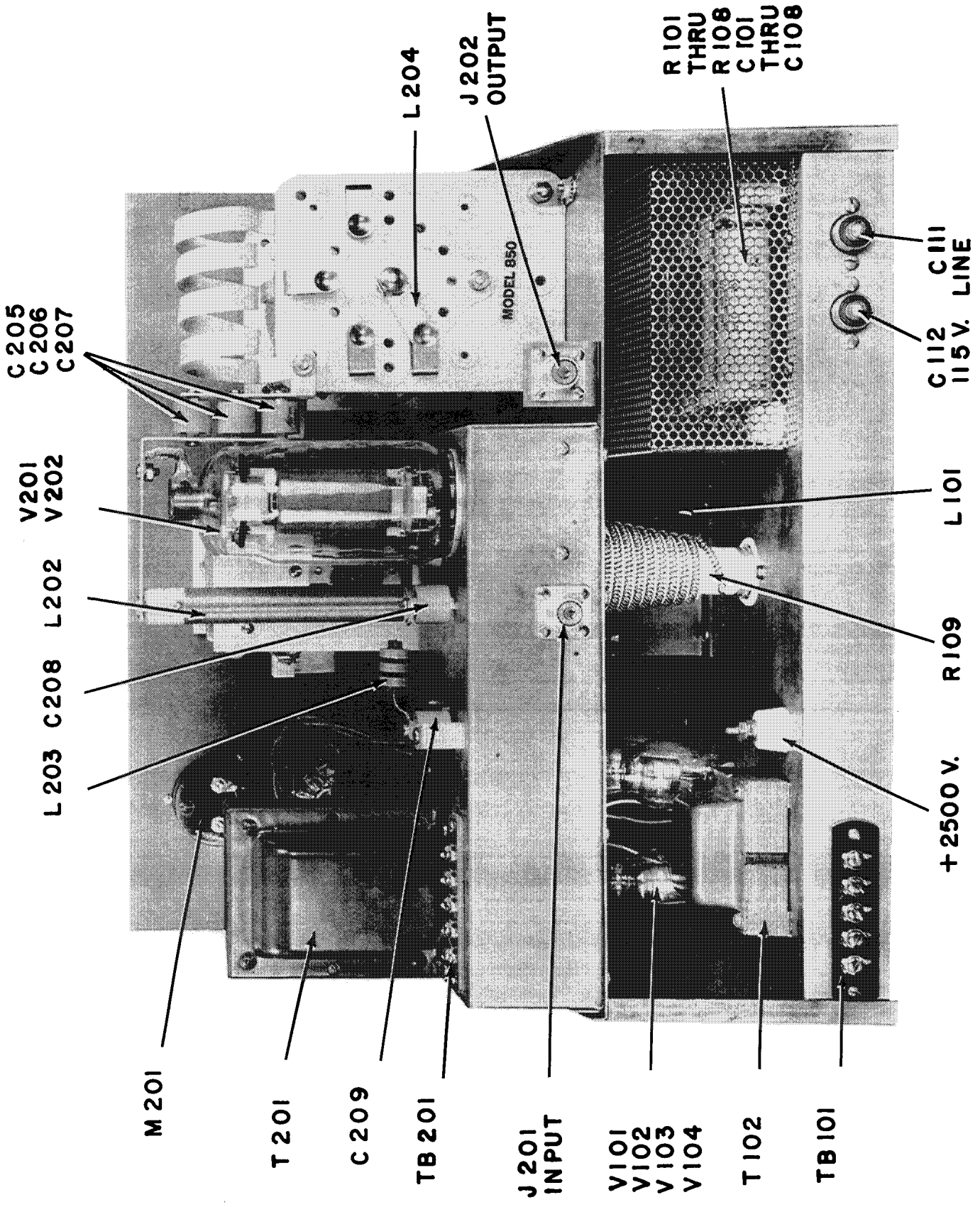
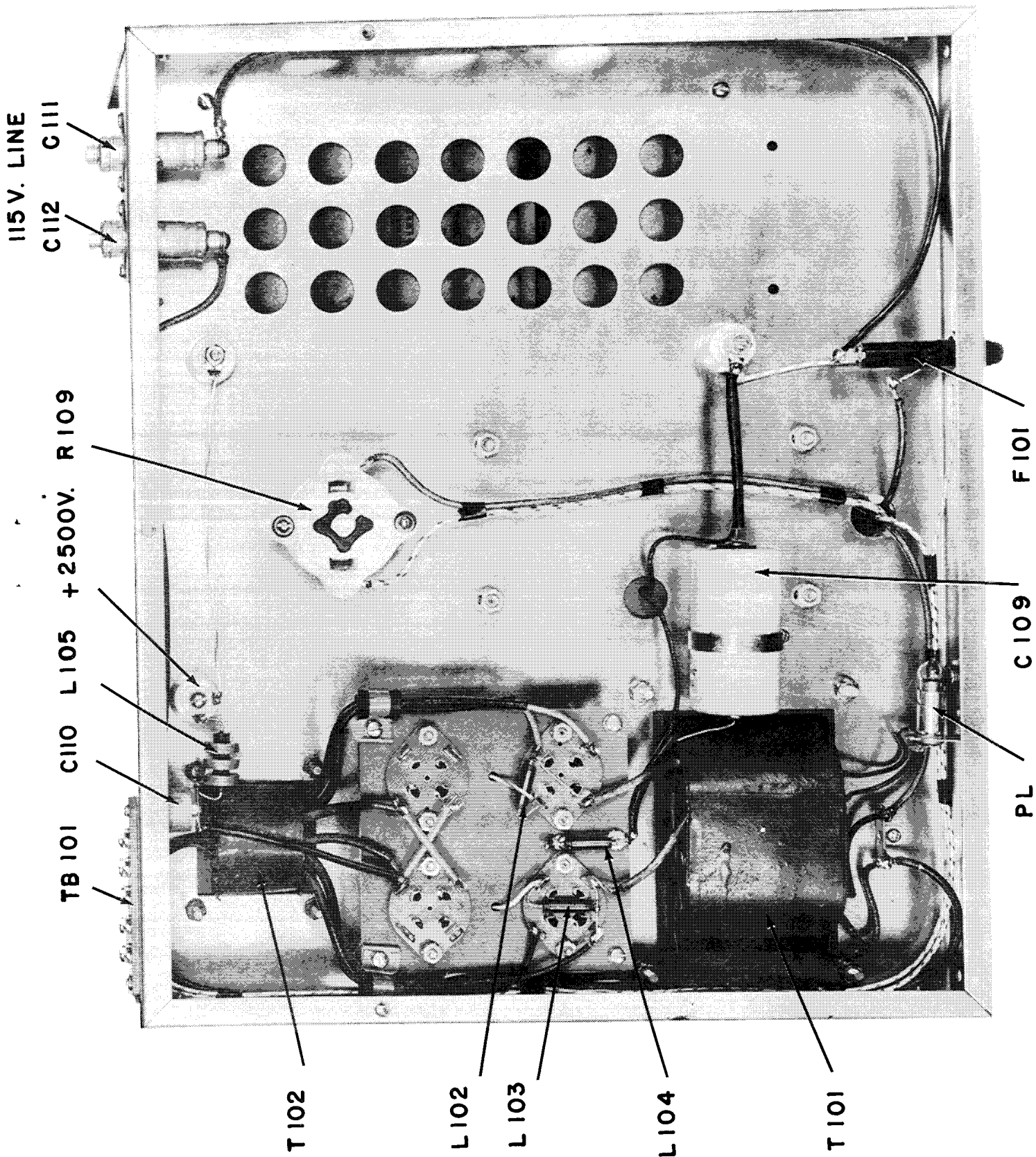
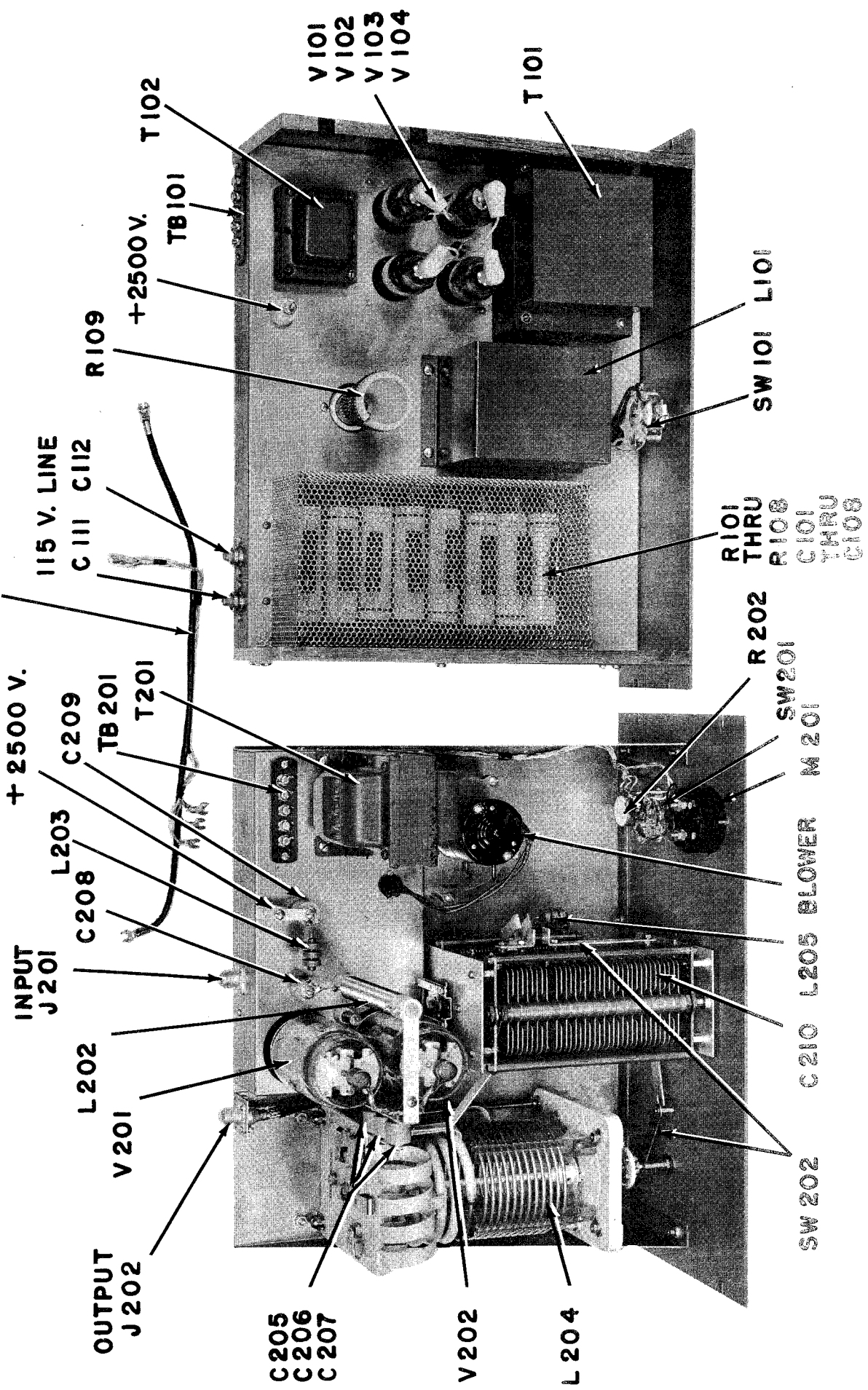


FIGURE 5 REAR VIEW



PL C 109 F 101  
**FIGURE 3 BOTTOM VIEW OF POWER SUPPLY**

INTERCONNECTING CABLE



INPUT  
J 201

+ 2500 V.

115 V. LINE

OUTPUT  
J 202

L 202

C 208

L 203

C 111 C 112

R 109

+2500V.

T 102

V 101  
V 102  
V 103  
V 104

TB 101

T 101

SW 101 L 101

R 101  
THRU  
R 108  
C 101  
THRU  
C 108

R 202

SW 201

M 201

C 210 L 205 BLOWER

C 205  
C 206  
C 207

V 201

L 204

FIGURE 2 TOP VIEW OF POWER SUPPLY

FIGURE 4 TOP VIEW OF AMPLIFIER

SUPPLEMENT #1 TO MODEL L-1000-A LINEAR AMPLIFIER

INSTRUCTION MANUAL

LINEAR AM OPERATION

August 28, 1956

The Model L-1000-A Grounded Grid Linear Amplifier has been designed expressly for operation in single sideband and CW applications. While AM has not been specifically recommended, it is not to be assumed such is the result of limitations in design or constructional features. Rather it is due to the power supply duty cycle. The integral power supply was selected for 1-KW peak envelope power on SSB, but not designed for use under constant carrier conditions.

Linear AM operation is feasible with the equipment to the extent of the integral power supply limit or to a limit of 625 watts input when powered with an external supply capable of delivering a constant DC potential of 2500 volts at 250 MA. Limitation of plate input power with integral power supply is 375 watts (150 MA. at 2500 V.)

Under Linear AM operating conditions, the Model L-1000-A requires a driving power of approximately 20 watts. This can be supplied by any exciter-driver unit capable of delivering this or a higher level of power output. A typical exciter-driver unit for the L-1000-A is the B&W 5100 - 5100-B Series Transmitters, combined with the 51SB - 51SB-B Series Single Sideband Generators or Collins 32V Series Transmitters combined with 51SB Generator - Viking I and II Series Transmitters combined with 51SB Generators and other equivalents of these combination transmitters with SSB provisions.

Two methods of AM Linear operation are possible. These are, namely: Single Sideband with Carrier or Amplitude Modulation (Carrier with Double Sideband).

Listed below are step by step instructions for operating the L-1000-A as a Linear AM Amplifier with its integral power supply to include single sideband with carrier and carrier with double sideband. For the purpose of clarifying these two methods of operation, we will choose the combination of a B&W Model 5100-B/51SB-B. However, other combination equipments as given above may also be used, so long as equivalent step by step instructions are followed.

Paragraph I - Single Sideband with Carrier

- A) Having interconnected the 5100-B/51SB-B output to L-1000-A input, along with antenna and VOR connections as given in the manuals, turn filament switches on both equipments to the "On" position.
- B) Turn Power Switch to "Operate" position and adjust Bias Control on L-1000-A so that meter reads 40 mils when meter switch is in "Plate" position. Return Power Switch to "Fils" position.
- C) Turn Meter Switch on L-1000-A to "Grid" position, then proceed to tune and load the 5100-B/51SB-B with Balance-Unbalance Switch in the "Unbalanced" position, so as to feed carrier to the L-1000-A. Adjust loading and tuning controls on 5100-B/51SB-B for a "Grid Current" value of 90-100 MA. as read on meter of L-1000-A.
- D) Turn Meter Switch on L-1000-A to "Plate" position. Turn Power Switch on L-1000-A to "Tune" position. Adjust Amp. Loading and

- 2 - LINEAR AM OPERATION

Tuning Controls on L-1000-A for a plate current value of 150 MA. Make sure to adjust Tuning Control for minimum dip each time Loading Control is adjusted.

- E) Place Power Switch on L-1000-A to "Operate" position and readjust Amp. and Tuning Controls for a plate current value of 300 MA. with tuning control indicating minimum dip.
- F) Next, throw Balance-Unbalance switch on 51SB-B to "Balanced" position and proceed to balance out carrier in a normal manner with both balance pots.
- G) Adjust one of the two balance pots on 51SB-B so as to again feed carrier to the L-1000-A to a plate current value of 150 MA. This is exactly one half the value under section (E) above.
- H) Speaking into the microphone, adjust the Audio Gain Control Knob on the 51SB-B until the plate current on L-1000-A barely moves in a positive direction. Overmodulation with distortion will result if plate current kicks up in excess of 5%. Either upper or lower sideband with carrier may be selected by means of the sideband selector switch on 51SB-B.

Paragraph II -- Amplitude Modulation - Carrier with Double Sidebands

- A) Repeat steps b, c, d, e, and f under Paragraph I above.
- B) Remove the balanced modulator tube, V101, in the 51SB-B from its socket, then repeat step "G" under Paragraph I above, except that in this case, the left hand balancing pot is adjusted.
- C) Repeat step "H" under Paragraph I above. The equipment is now adjusted for emitting an amplitude modulated signal.

Paragraph III -

Any straight AM Transmitter may also be used to drive the L-1000-A as a linear amplifier provided it has a maximum power output of 80 watts which may be reduced to approximately 20 watts for linear operating conditions.

Tuning procedure is as follows -

- A) Turn Power Switch to "Operate" position and adjust Bias Control on L-1000-A so that meter reads 40 mils. when meter switch is in "Plate" position. Return Power Switch to "Fils." position.
- B) Turn Meter Switch on L-1000-A to "Grid" position, then proceed to tune and load the AM Transmitter, so as to feed carrier to the L-1000-A. Adjust loading and tuning of AM transmitter for a "Grid Current" value of 90-100 mils. as read on Meter of L-1000-A.
- C) Turn Meter Switch on L-1000-A to "Plate" position. Turn Power Switch on L-1000-A to "Tune" position. Adjust Amp. Loading and



- 3 - LINEAR AM OPERATION

Tuning Controls on L-1000-A for a plate current value of 150 mils. Make sure to adjust Tuning Control for minimum dip each time Loading Control is adjusted.

- E) Place Power Switch on L-1000-A to "Operate" position and readjust Amp. and Tuning Controls for a plate current value of 300 mils., with tuning control indicating minimum dip.
- F) Next, reduce the power output of the AM driving Transmitter in a normal manner, until the Plate Current on L-1000-A reads 150 mils. This is exactly half the value of plate current given under sub-paragraph (E) above. Resistive swamping may be required to sufficiently reduce driving power.
- H) Speaking into the microphone connected to AM transmitter, adjust the Audio Gain Control Knob to a point where the plate current on L-1000-A barely moves in a positive direction. Overmodulation with distortion will result if plate current kicks up in excess of 5%.

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SUPPLEMENT #2 TO MODEL L-1000-A INSTRUCTION MANUAL

MODEL L-1001-A LINEAR R.F. AMPLIFIER

The Model L-1001-A is essentially the same R.F. Section as the one used in the Model L-1000-A, except that it does not employ a blower. Exhaustive laboratory tests have proved that the 813 type tubes do not require forced air-cooling, under the normal service to which they are subjected in the Models L-1000-A and L-1001-A.

The chassis has been provided with air vent holes directly under the tube sockets, for the purpose of providing ventilation. Installation of the chassis in a cabinet or rack should permit air space directly under the bottom of the chassis. The chassis is not to be allowed to rest on a flat surface, thus cutting off the air vent holes on bottom of chassis.

In all respects, operation and tuning of the L-1001-A are the same as given for the L-1000-A. Reference, covering information on loading, tuning, operation on CW, SSB and linear AM phone, is to be found in the L-1000-A manual furnished with each Model L-1001-A. Linear AM operation is covered by Supplement #1 to the L-1000-A manual, included with each manual furnished. Particular emphasis is made to bias adjustments as covered by the manual. Please note that setting of bias control is not similar for CW and SSB operation. Strict adherence to the manual instructions on the bias adjustment and loading conditions versus SSB and CW cannot be emphasized too strongly.

POWER SUPPLY REQUIREMENTS

The L-1001-A Linear R.F. Amplifier will provide satisfactory operation with a supply voltage ranging from 1750 volts to 3000 volts D.C. The current required of the power supply will depend on the mode of operation. Minimum values of current required for various modes of operation for 1 KW peak power input are as follows:

<u>Voltage</u>	<u>1750 V</u>	<u>2000V</u>	<u>3000 V</u>
AM	250 mas	200 mas	150 mas
SSB	250 mas	200 mas	150 mas
CW/NBFM/FSK	600 mas	500 mas	350 mas

NOTE: The above current values do not include current delivered to the bleeder resistor. Therefore, the plate transformer must be capable of delivering the above current plus bleeder current.

Any of the power supply circuits described in the ARRL Amateur Handbook will be adequate for use with the L-1001-A.

DUE TO THE METERING CIRCUITS OF THE L-1001-A, THE NEGATIVE RETURN IN THE POWER SUPPLY MUST BE FLOATING ABOVE CHASSIS GROUND. THIS MEANS THAT THE CENTER TAP OF PLATE TRANSFORMER, FILTER CAPACITORS AND BLEEDER RESISTOR MUST NOT BE TIED DOWN TO CHASSIS GROUND.

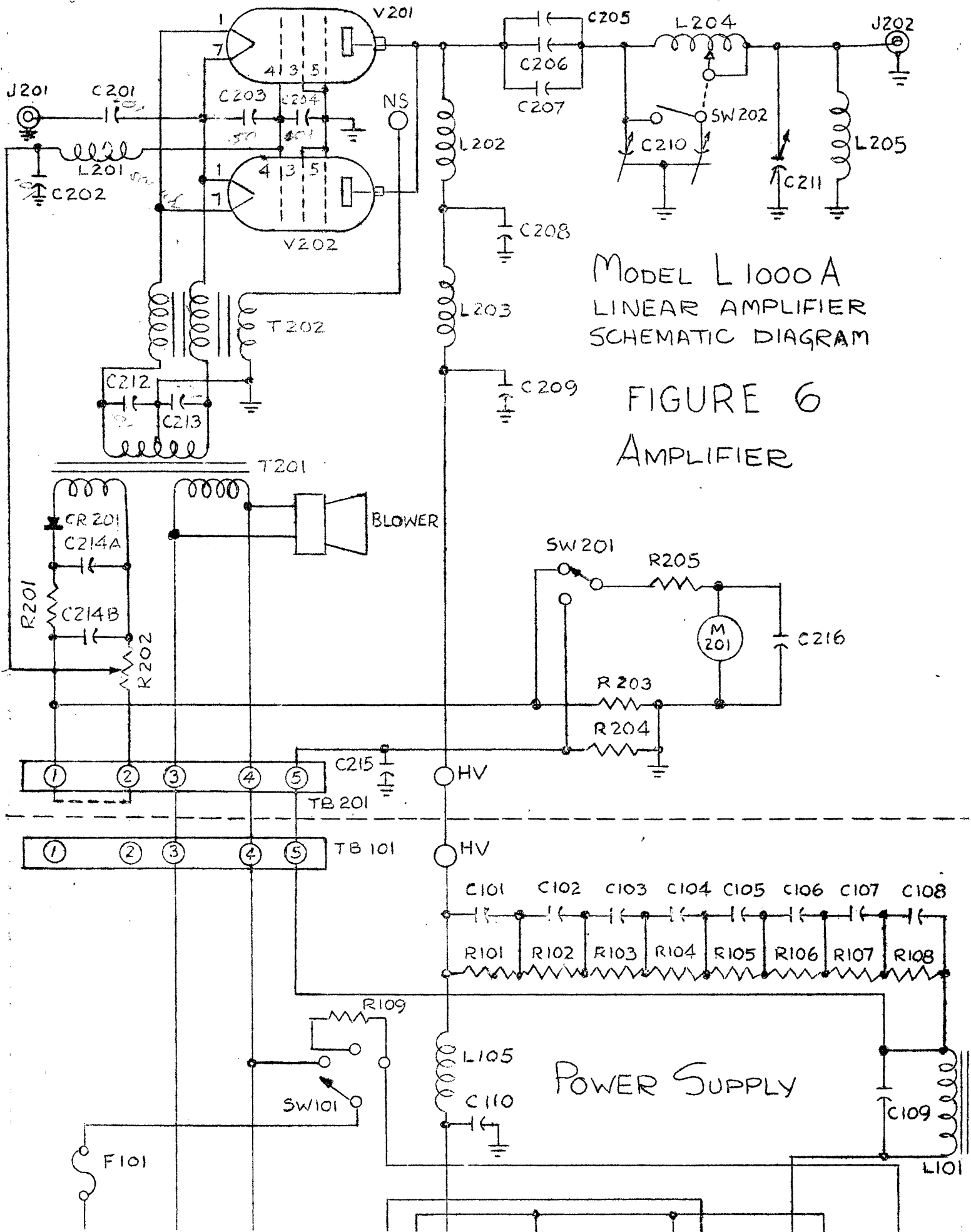
The negative lead of the power supply must be terminated at the terminal board of the L-1001-A. This is terminal 5. A ground strap must be connected between the L-1001-A chassis and the power supply chassis.

Provisions should be made for lowering plate voltage for tune-up purposes. A variac or heater type resistor placed in the primary circuit of the plate transformer will suffice.

Other pertinent operating and maintenance information will be found in the L-1000-A manual furnished.

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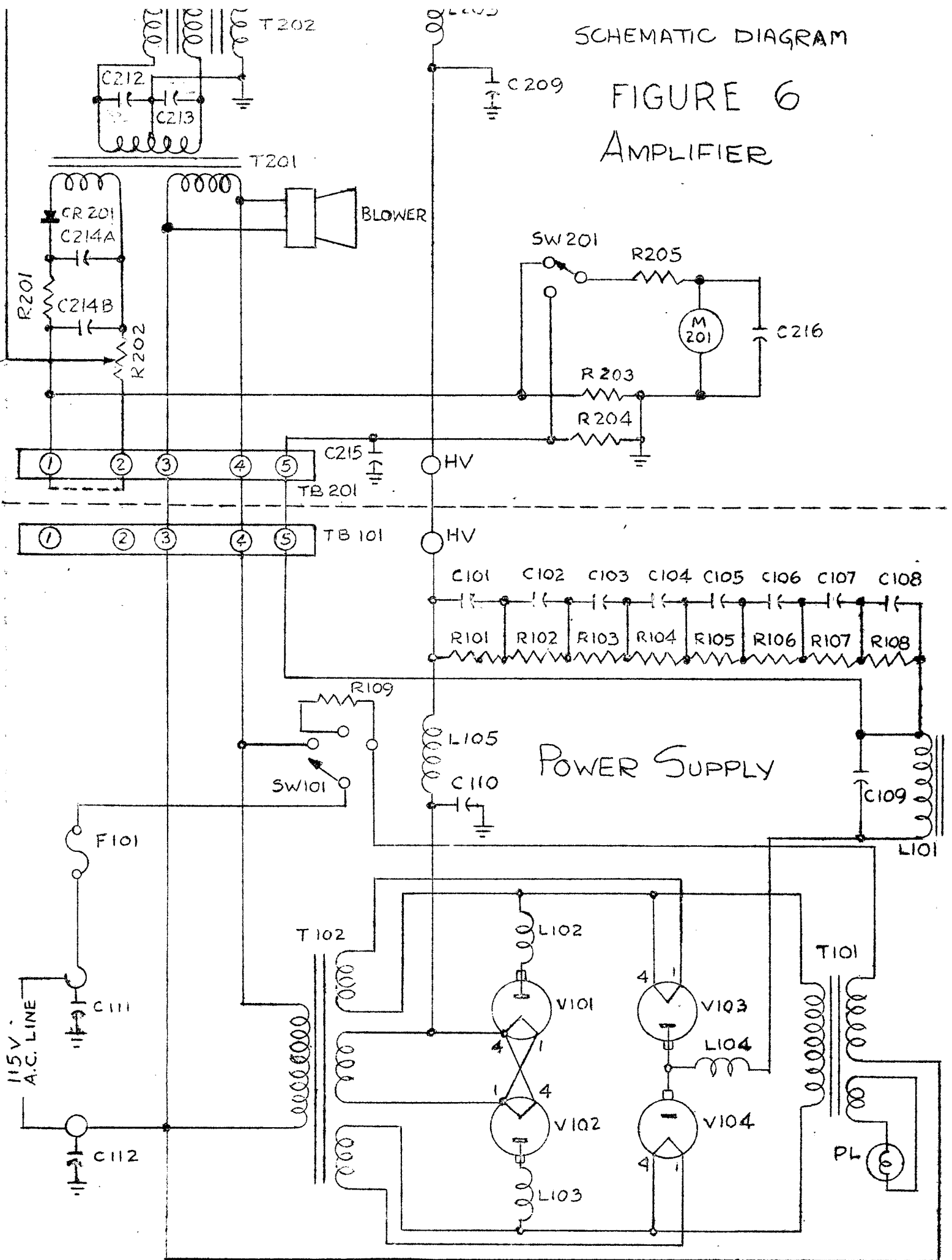


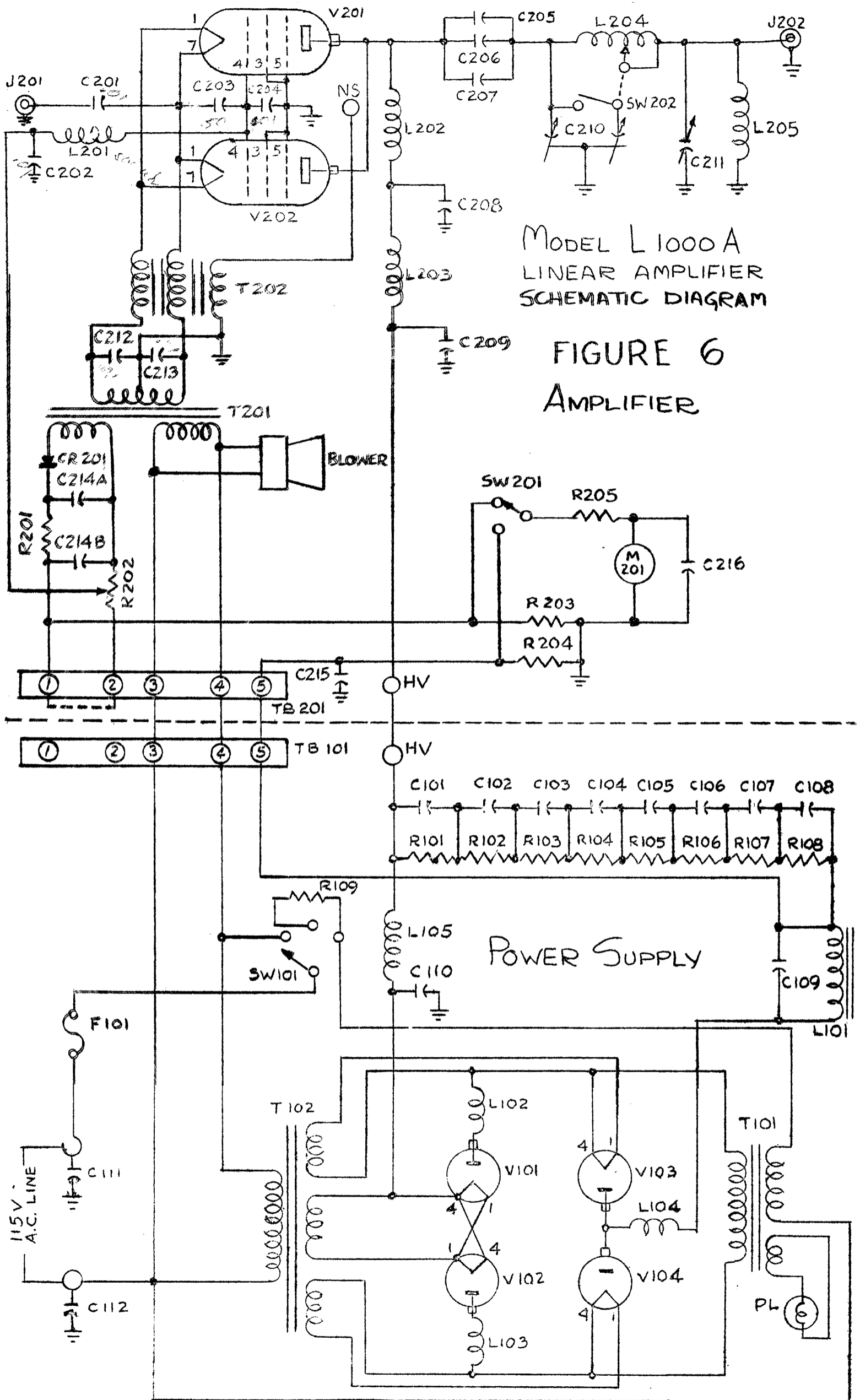
MODEL L1000A  
 LINEAR AMPLIFIER  
 SCHEMATIC DIAGRAM

FIGURE 6  
 AMPLIFIER

SCHEMATIC DIAGRAM

FIGURE 6  
AMPLIFIER





MODEL L1000A  
LINEAR AMPLIFIER  
SCHEMATIC DIAGRAM

FIGURE 6  
AMPLIFIER