Electro-Voice®

ELECTRO-VOICE, INC.
BUCHANAN, MICHIGAN

Specifications and Instructions
Model A100 Amplifier and Power Supply
100-watt Circlotron High-Fidelity Power Amplifier

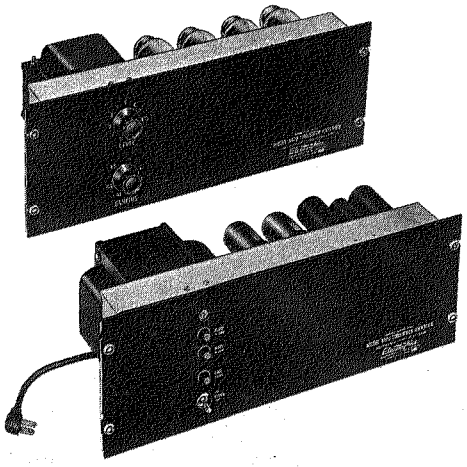


Fig. 1 — Model A100 Amplifier

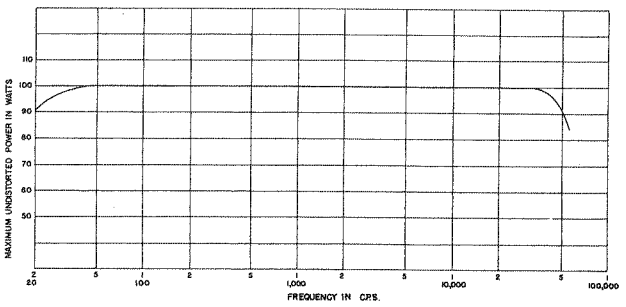


Fig. 2 — Maximum Undistorted Power vs. Frequency

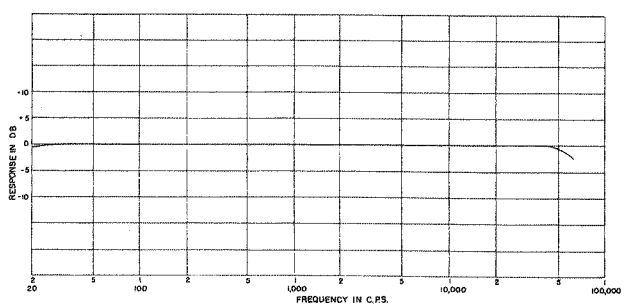


Fig. 3 — Frequency Response at 35-watt Level

GENERAL DESCRIPTION — The Electro-Voice Model A100 amplifier is a high quality, rack mounting 100-watt power amplifier. The matte black and gold panels present an attractive appearance. Model A100 consists of two units; one chassis contains the amplifier section, the other is the power supply.

FEATURES — The Model A100 employs the new Wiggins Circlotron circuit. DC output current is removed from the output transformer through the use of a bridge circuit. All switching transients are eliminated through unity coupling between output tubes. The primary impedance of the output transformer is one quarter of that found in conventional amplifier output circuits, allowing an increase in power output at extremes of the frequency spectrum.

A damping factor control permits perfect coupling between the amplifier and loudspeaker system eliminating the usual loss of bass from overdamping or hangover due to underdamping. For the first time, through the use of this control, optimum operation of any speaker system is assured.

SPECIFICATIONS

Power Output:	100 watts rated, 200 watts on peaks See Fig. 2 "Maximum Undistorted Power vs. Frequency"
Frequency Response:	±0.5 db 20 to 50,000 cps See Fig. 3 "Frequency Response"
Harmonic Distortion:	Less than 0.5% at rated output
Intermodulation Distortion:	Less than 1.2% at rated output See Fig. 4 "Power vs. Intermodulation Distortion"
Hum and Noise:	85 db below rated output
Speaker Output:	4 ohms, 8 ohms, 16 ohms unbalanced, 70 volts balanced; 600 ohms balanced available in chassis
Feedback:	Loop feedback: 14 db negative Drive plate: 2 db positive Output circuit: 17 db negative Total 29 db negative
Damping factor:	Adjustable between 0.1 and 10. See table for critical damping factors of all E-V speakers.
Input Impedance:	250,000 ohms
Sensitivity:	1.25V RMS for rated output
Controls:	
Amplifier Unit:	a. Gain b. Damping Factor c. Balance (on rear of chassis)
Power Unit:	d. Power On-Off
Tubes:	Total of 8 as follows: 1 12AX7 1 12BH7A 4 6550 2 5U4GB
Power Consumption:	117V 60 cycle AC at 3.25 amps max.
Size:	19 in. wide x 8 in. deep x 7 in. high, each unit
Weight:	64 lb net, 73 lb shipping

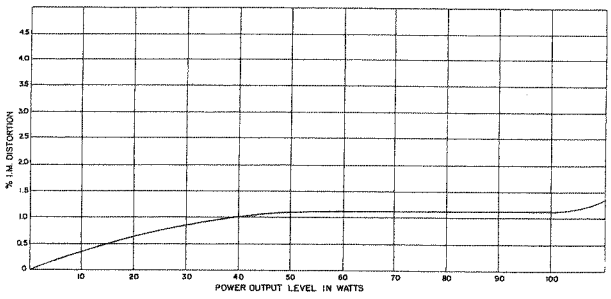


Fig. 4 — Power vs. Intermodulation Distortion

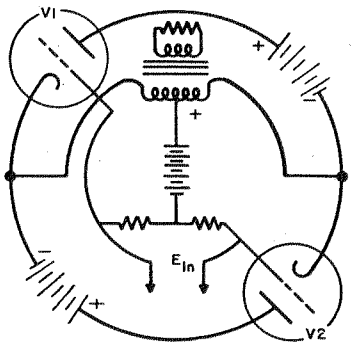


Fig. 5 — Simplified Diagram Circlotron Circuit

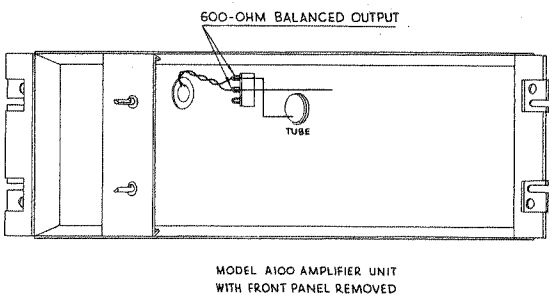


Fig. 6 — Diagram of 600-ohm Output Connection

THEORY OF OPERATION

THE OUTPUT TRANSFORMER AND CIRCUIT — One requirement of a quality high-fidelity amplifier is that it has an output transformer with negligible leakage reactance. This leakage reactance must be low to avoid the transient distortion ordinarily resulting from collapsing currents, in class AB or B operation, when either output tube is driven past cut-off. The transient distortion will appear as a parasitic oscillation in the wave form at the instant of cut-off. A high value of leakage reactance also will cause the output transformer of a conventional amplifier to lose efficiency at high frequencies. The distributed capacity of the output transformer should be very low in order to minimize high-frequency attenuation and phase shift. The Circlotron circuit configuration avoids many of the limitations imposed by the output transformer and overcomes the inherent disadvantages of conventional push-pull output circuits.

Figure 5 is a simplified version of the Wiggins Circlotron circuit. Two power supplies are used and are indicated as batteries. Each power supply is connected from the plate of one tube to the cathode of the other. The plate current of each tube circulates through both power supplies *without traversing the windings of the output transformer.* Because any pair of opposite points in this configuration is equipotential, the circuit is a balanced bridge under "no-signal" conditions.

The total primary winding of the output transformer presents a load to each of the two output tubes. One half of this load is in the cathode circuit, the other half in the plate circuit; the plate load of one tube is the cathode load of the other. Because each tube looks into the same load as the other, the result is unity coupling between the tubes. Despite the residual leakage reactance in the transformer, no switching transients can occur during the operation of the amplifier, for both halves of the transformer primary have the same signal current flowing through them. Thus, through the use of this circuit, troublesome switching transients, normally found in even high-quality amplifiers, are completely eliminated.

The impedance of the primary winding of the output transformer is one fourth that of the transformers in usual amplifiers. Therefore, the Circlotron transformer has much less distributed capacity and leakage reactance, so that a wide frequency response range is much more easily attained.

Low quiescent current in the Circlotron circuit results in higher efficiency and produces more power without exceeding the dissipation ratings of the tubes.

THE DRIVER CIRCUIT — The gain of the Circlotron output stage is almost unity, thus requiring a high drive voltage. This higher voltage is obtained by means of technique called "boot strapping". By this method the B+ supply to the driver stage is dynamically changed as signal voltage changes allowing linear operation over a much wider range.

VARIABLE DAMPING FACTOR — It is necessary for the amplifier to present the correct effective impedance to the speaker for optimum acoustic performance at low frequencies. This value of critical damping resistance varies widely with different speakers, and is dependent upon flux density, type of enclosure, length of conductor in the air gap, and to some extent, the position of the enclosure in the room. The Electro-Voice damping factor control is variable over a wide range so that an optimum match can be made between the amplifier and any speaker or system. Varying amounts of voltage and current feedback are combined to match the effective impedance while maintaining the *total* feedback at a constant value. The maximum power available from the amplifier is independent of the damping factor, remaining constant at all settings of the control.

INSTRUCTIONS FOR SET-UP AND OPERATION

Immediately upon unpacking the amplifier carefully inspect it for physical damage. If damage is evidenced, notify the dealer from whom the unit was purchased, or the transportation company if the unit was shipped to you. Responsibility for shipping damage lies with the carrier and claim should be made for recovery.

MOUNTING — The A100 is designed for standard rack mounting; four pan-head screws for each chassis are supplied for this purpose. Use the elongated slots located on the chassis flanges to secure the chassis to the rack. The round holes in the flanges are clearance holes for the front panel mounting screws. Secure the front panels to the rack with the cup washers and oval head screws provided. The knobs are then placed on the amplifier unit control shafts. Interconnect both units with the cable provided.

PREPARATION FOR USE — Make certain that all tubes are firmly seated in the proper sockets as marked. Connect the loudspeaker or other load to the amplifier. Matching to any load between approximately 3 and 20 ohms may be obtained from the screw terminals on the amplifier unit. Use the terminal marked COMMON and either 4, 8, or 16, whichever is nearest the load impedance. *It is not permissible to connect either of the output terminals to any chassis-ground; to do so will short out the critical damping control.* If a ground connection is required it should be made directly to the chassis. When using either the 70-volt balanced termination or the 600-ohm connections, the damping factor control must be set at full clockwise position for proper constant voltage operation.

Connect the input signal to the jack marked "SIGNAL" on the rear apron of the amplifier. The Electro-Voice PC1 or PC2 preamplifier is recommended for use with the A100 amplifier.

CONTROLS — Two knobs are located to the left on the front panel of the amplifier unit. The gain control adjusts the sensitivity of the amplifier to match the associated equipment. The damping control is an Electro-Voice development designed to permit precise matching of the A100 to any existing speaker system. Consult the table for correct settings for Electro-Voice speaker systems. Adjust for most pleasing sound if no data is available for other loads. For maximum damping (low internal impedance), turn knob completely clockwise.

A tube balancing control is provided for use when output tubes are replaced. To balance the output stage, place a 2000-ohm-per-volt voltmeter or VTVM across the 70-volt output winding and adjust for 0 volts potential difference. If a voltmeter is not available, connect a loudspeaker to the 16-ohm tap and vary the balance adjustment. Note that the loudspeaker will "breathe" at a rather high amplitude at the ends of the potentiometer adjustment. There will be an arc of travel of the control where the speaker does not "breathe". The adjustment should be made midway between the extremes of this arc.

The power switch is located on the power supply unit.

SERVICE — The 4-ampere fuse located on the amplifier is of the "slo-blo" 3AG type and in the event of a component failure, should be replaced with an identical 4-ampere type. Two ¾-amp 3AG plate fuses are located in the power supply unit for output tube protection. The fuses will not blow in normal operation. In the event of repeated failure: (a) make certain amplifier is mounted and connected in accordance with these instructions, (b) check tubes for possible shorts and replace if necessary, (c) replace bias rectifier plug-in, or (d) refer to the dealer from whom purchased for instructions. The bias rectifier for the output tubes is supplied as a plug-in unit on the power supply chassis. Do not remove this plug-in with power on. A spare rectifier is supplied with the A100. Do not attempt to operate the amplifier without all tubes in place. In the event that the amplifier is returned to the factory for service, please include a note stating the nature of the defect.

CAUTION NOTES

1. Do not operate amplifier in an overloaded condition for a period of time, since this will substantially shorten the life of the output tubes.
2. Do not attempt to operate the amplifier from a power source other than 105-125V 60 cycle AC.
3. Do not apply power to amplifier unless *all* tubes are in sockets.
4. Do not attempt to check fuses with power on.
5. Do not remove bias plug with power on.

OPTIONAL ACCESSORIES — Model PC1 or PC2 Preamplifiers.

CRITICAL DAMPING FACTOR CONTROL SETTINGS

Model	Inf. Baffle	Skylark	Baronet	Aristocrat	Empire	Regency	Centurion	Georgian	Patrician	Klipsch
SP8B	1.0		2.0							
SP8C		5.0								
SP12B	2.5			4.0						
SP12	1.0			2.0						
12TRXB	2.5			4.0						
12TRX	1.0			2.0						
12BW	2.5			4.0						
12W	1.0			2.0						
12WK										10.0
SP15B	1.0				2.0	2.0				
SP15	.5				1.0	1.0				
15TRXB	1.0				2.0	2.0				
15TRX	.5				1.0	1.0				
15BW	1.0				2.0	2.0				
15W	.5				1.0	1.0				
15BWK							10.0			10.0
15WK							10.0	10.0		10.0
18W	1.0									
18WK									10.0	10.0

PARTS LIST

POWER SUPPLY UNIT

Key	Description	Part No.
C1	Capacitor, 0.047 MFD, 400 V, Plastic Tubular	4243
C2	Capacitor, 0.047 MFD, 400 V, Plastic Tubular	4243
C3	Capacitor, 50 MFD, 100 V, Electrolytic	4242
C4A C4B	Capacitor, 40-40 MFD, 500 V, Electrolytic	4247
C5A C5B	Capacitor, 40-40 MFD, 500 V, Electrolytic	4247
C6	Capacitor, 20 MFD, 450 V	4246
R1	Resistor, 220 OHM, ½W, Carbon	4664
R2	Resistor, 56K, ½W, Carbon	4652
R3	Resistor, 56K, ½W, Carbon	4652
V1	Tube, 5U4GB	4338
V2	Tube, 5U4GB	4338
*T1	Transformer, Power	1585
L1	Choke, Filter	1586
L2	Choke, Filter	1586
*SR1	Rectifier, Selenium, Plug-In	8694
F1	Fuse, 4A, 3AG Slo-Blo	20218
F2	Fuse, ¾A, 3AG	20221
F3	Fuse, ¾A, 3AG	20221

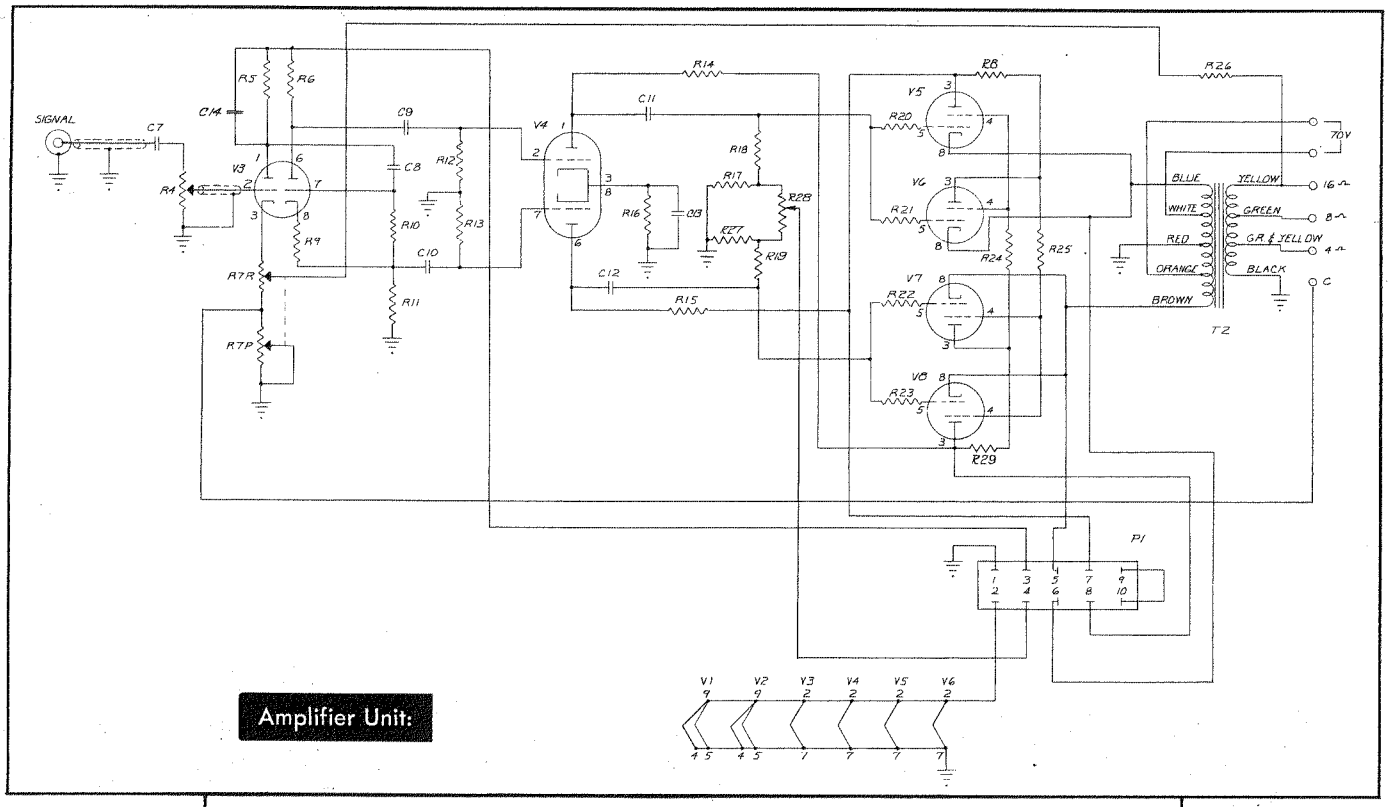
AMPLIFIER UNIT

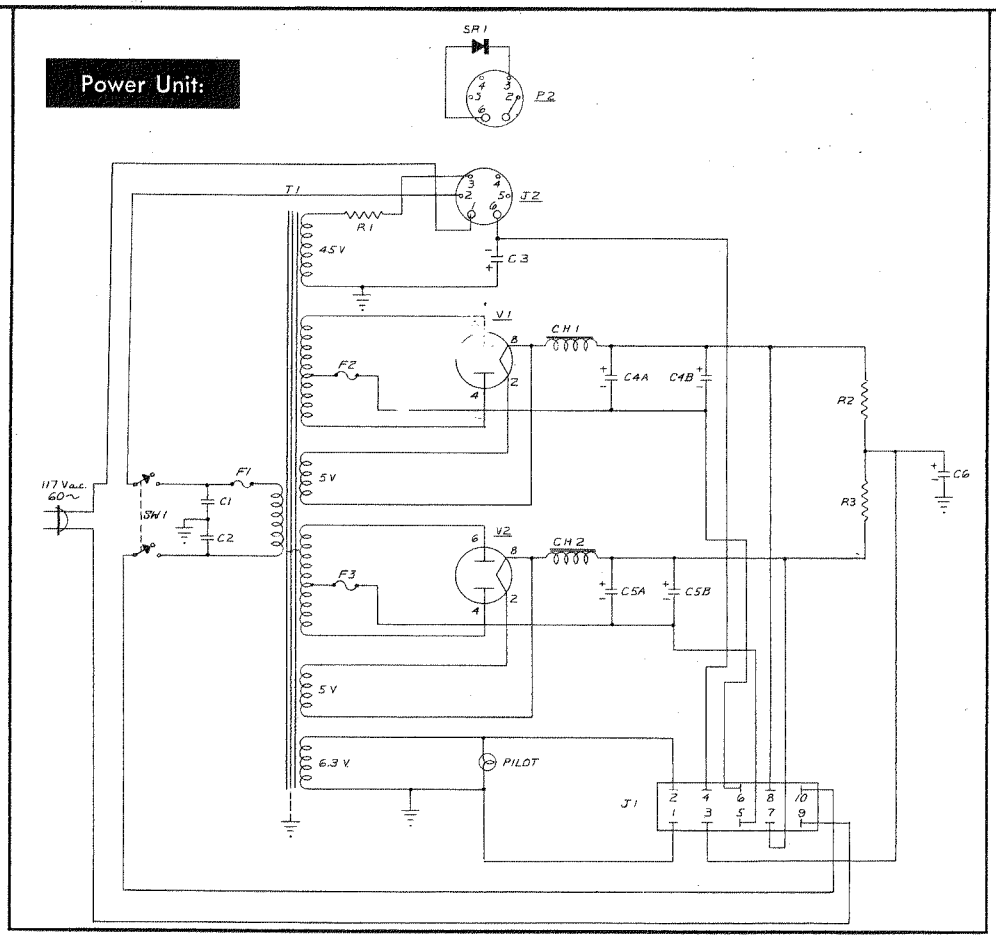
C7	Capacitor, 0.1 MFD, 200 V, Plastic Tubular	4265
C8	Capacitor, 0.022 MFD, 400 V, Plastic Tubular	4260
C9	Capacitor, 0.047 MFD, 400 V, Plastic Tubular	4243
C10	Capacitor, 0.047 MFD, 400 V, Plastic Tubular	4243
C11	Capacitor, 0.1 MFD, 600 V, Plastic Tubular	4241
C12	Capacitor, 0.1 MFD, 600 V, Plastic Tubular	4241
C13	Capacitor, 0.01 MFD, 500 V, Ceramic	4257
C14	Capacitor, 100 MMFD, 500 V, Ceramic	4281
R4	Potentiometer, 250K, Audio Taper, Carbon	L4686
R5	Resistor, 270K, ½W, Carbon	4669
R6	Resistor, 27K ½W, Carbon	4651
*R7R *R7P	Potentiometer, Dual ½ OHM — 1.8K, W.W.	M4686
R8	Resistor, 33 OHM, 1W, Carbon	46047
R9	Resistor, 470 OHM, ½W, Carbon	4654
R10	Resistor, 1.2 MEG, ½W, Carbon	4656
R11	Resistor, 27K, ½W, Carbon	4651
R12	Resistor, 470K, ½W, Carbon	4650
R13	Resistor, 470K, ½W, Carbon	4650
R14	Resistor, 12K, 2W, Carbon	4679
R15	Resistor, 12K, 2W, Carbon	4679
R16	Resistor, 1.2K, ½W, Carbon	4658
R17	Resistor, 82K, ½W, Carbon	4696
R18	Resistor, 470K, ½W, Carbon	4650
R19	Resistor, 470K, ½W, Carbon	4650
R20	Resistor, 120 OHM, ½W. Carbon	4607
R21	Resistor, 120 OHM, ½W. Carbon	4607
R22	Resistor, 120 OHM, ½W, Carbon	4607
R23	Resistor, 120 OHM, ½W, Carbon	4607
R24	Resistor, 1000 OHM, 2W, Carbon	46018
R25	Resistor, 1000 OHM, 2W, Carbon	46018
R26	Resistor, 68K, ½W, Carbon	46019
R27	Resistor, 82K, ½W, Carbon	4696
R28	Potentiometer, 10K, Linear Taper, Carbon	S4686
R29	Resistor, 33 OHM, 1W, Carbon	46047
V3	Tube, 12AX7	4311
V4	Tube, 12BH7	4312
V5	Tube, 6550	4337
V6	Tube, 6550	4337
V7	Tube, 6550	4337
V8	Tube, 6550	4337
*T2	Transformer, Output	1584

Note: 1K = 1,000 OHMS 1 MEG = 1,000,000 OHMS

These parts are available from electronic parts dealers, excepting those marked with an asterisk (*) which may be ordered from Electro-Voice.

Schematic Diagram Model A100 Power Amplifier





WARRANTY

The Electro-Voice Model A100 amplifier is guaranteed against defects in workmanship and material.

ELECTRO-VOICE, INC. / BUCHANAN, MICHIGAN

Part No. 53240

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