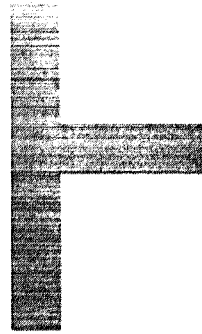


# Electro-Voice®

ELECTRO-VOICE, INC.  
BUCHANAN, MICHIGAN



## Specifications and Instructions Model A50 Amplifier 50-watt Circlotron High-Fidelity Power Amplifier

**GENERAL DESCRIPTION**—The Electro-Voice Model A50 amplifier is a high quality 50-watt power amplifier. The brushed-brass and rich brown baked enamel finish presents an attractive appearance which will blend with contemporary room decors.

**FEATURES**—The Model A50 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.

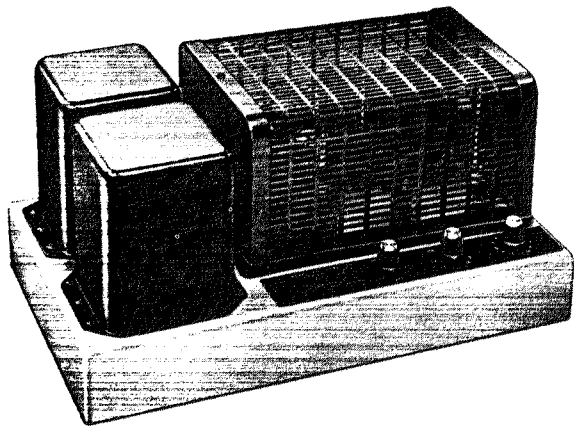


Fig. 1— Model A50 Amplifier

### SPECIFICATIONS

Power Output:	50 watts rated, 100 watts on peaks See Fig. 2 "Maximum Undistorted Power vs. Frequency"
Frequency Response:	$\pm 0.5$ db 20 to 75,000 cps See Fig. 3 "Frequency Response"
Harmonic Distortion:	Less than 0.5% at rated output
Intermodulation Distortion:	Less than 1% 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; 70 volts balanced
Feedback:	Loop feedback: 15 db negative Drive plate: 2 db positive Output circuit: 17 db negative Total: 30 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:	a. Gain b. Damping Factor c. Power On-Off
Tubes:	Total of 6 as follows: 1 12AX7 1 12BH7A 2 6550 2 5U4GB
Power Consumption:	117V 60 cycle AC at 2.2 amps max.
Size:	16½ in. wide x 10½ in. deep x 8½ in. high
Weight:	41 lb net, 45 lb shipping

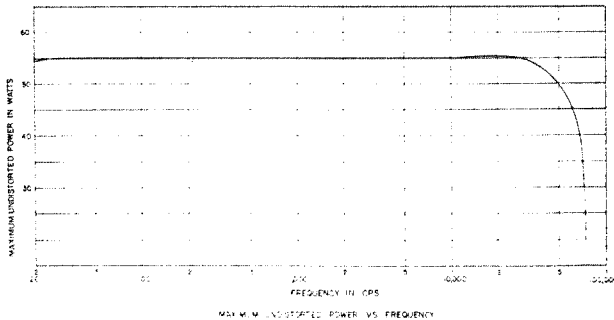


Fig. 2— Maximum Undistorted Power  
vs. Frequency

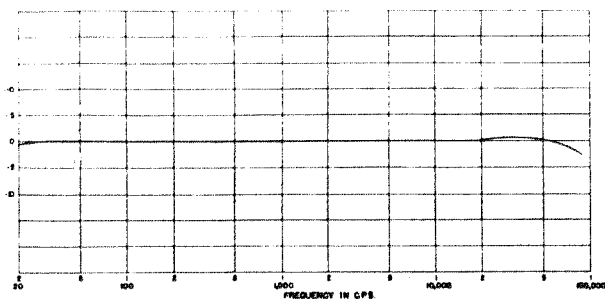


Fig. 3 — Frequency Response at 16-watt Level

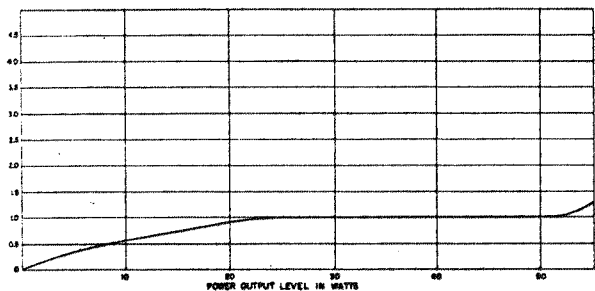


Fig. 4 — Power vs. Intermodulation Distortion

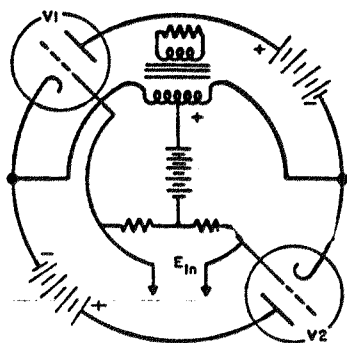


Fig. 5 — Simplified Diagram Circlotron Circuit

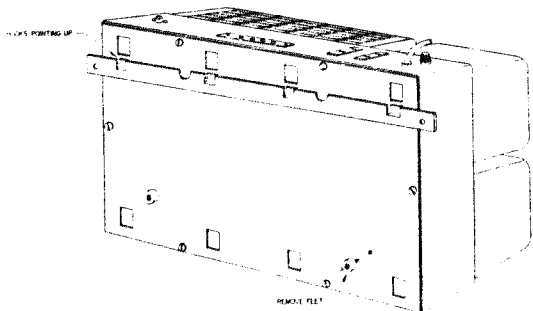


Fig. 6 — Affixing Mounting Brackets

## 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 A50 may be mounted in any position. The amplifier is supplied with rubber feet to prevent marring of the surface on which it is placed. For mounting in a vertical position or for fixed upright mounting (See Fig. 6 "Affixing Mounting Brackets") remove these feet by extracting the screws located in the center of each rubber foot. Install one mounting bracket in the desired location on supporting wall or surface with the hooks pointing up. Install the second mounting bracket on the lower end of the bottom plate with the hooks facing down. Place the amplifier so that the hooks on mounted bracket engage the four cutouts on the bottom plate nearest the top and fasten the second mounting bracket to the supporting wall or surface. Reasonable ventilation is required, and the unit should not be operated in small, completely enclosed spaces. Brackets may also be used for permanent horizontal mounting and are designed to permit mounting in a standard rack. Under unusual conditions of very restricted ventilation, the tube and component cover may be removed to assist cooling.

**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 rear apron of the amplifier. 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. Two 70-volt balanced output terminals also are provided for constant-voltage systems. *When using the 70-volt output, the damping control must be set to "15" (full clockwise position).* This places the "COMMON" terminal at chassis ground and the terminal then may be used as the balanced line center tap. The Electro-Voice PC1 or PC2 preamplifier is recommended for use with the A50 amplifier. Connect the input signal to the jack marked "SIGNAL" on the rear apron of the amplifier.

**CONTROLS** — Three knobs are located near the right front corner on top of the amplifier. 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 A50 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. The power switch functions as the A50 "On-Off" switch when power control is desired at the amplifier location.

**LINE-POWER SERVICE FOR OTHER EQUIPMENT** — Two line-power outputs are provided on the rear apron of the amplifier. The one marked "HOT" supplies the power whenever the amplifier is plugged in regardless of the power switch position. Such an outlet is commonly used for devices having their own on-off switch. Use of this outlet will permit a record changer to complete a change cycle before complete shutoff. The outlet marked "SWITCHED" is live only when the amplifier is turned on and may be used to control the tuner, TV set, etc.

**SERVICE** — The 3-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 3-ampere type. Two 3/8-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. 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	Skyark	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

Key	Description	Part No.
C1	Capacitor, 0.1 MFD, 200 V, Plastic Tubular	4265 ✓
C2	Capacitor, 100 MMF, 500 V, Ceramic	4281 ✓
C3	Capacitor, 20 MFD, 450 V, Electrolytic	4246 ✓
C4	Capacitor, 0.022 MFD, 400 V, Plastic Tubular	4260 ✓
C5	Capacitor, 0.022 MFD, 400 V, Plastic Tubular	4260 ✓
C6	Capacitor, 0.022 MFD, 400 V, Plastic Tubular	4260 ✓
C7	Capacitor, 0.1 MFD, 600 V, Plastic Tubular	474241 ✓
C8	Capacitor, 0.1 MFD, 600 V, Plastic Tubular	474241 ✓
C9	Capacitor, 50 MFD, 100 V, Electrolytic	4242 ✓
C10A } C10B }	Capacitor, 40-40 MFD, 500 V, Electrolytic	4247 ✓
C11A } C11B }	Capacitor, 40-40 MFD, 500 V, Electrolytic	4247 ✓
C12	Capacitor, 0.01 MFD, 500 V, Ceramic, GMV	4252 ✓
C13	Capacitor, 0.047 MFD, 400 V, Plastic Tubular	4243 ✓
C14	Capacitor, 0.047 MFD, 400 V, Plastic Tubular	4243 ✓
*R1	Potentiometer, 250K, Audio Taper, Carbon	J4686 ✓
R2	Resistor, 270K, 1/2W, Carbon	4669 ✓
R3	Resistor, 27K, 1/2W, Carbon	4651 ✓
*R4P } *R4R }	Potentiometer, Dual, 1800 OHMS—1 OHM, 2W	K4686 ✓
R5	Resistor, 2.7 OHM, 1W, W.W.	4680 ✓
R6	Resistor, 33K, 1/2W, Carbon	100K 4665 ✓
R7	Resistor, 470 OHM, 1/2W, Carbon	4654 ✓
R8	Resistor, 27K, 1/2W, Carbon	4651 ✓
R9	Resistor, 1.2 MEG, Carbon	4656 ✓
R10	Resistor, 56K, 1/2W, Carbon	4652 ✓
R11	Resistor, 56K, 1/2W, Carbon	4652 ✓
R12	Resistor, 470K, 1/2W, Carbon	4650 ✓
R13	Resistor, 470K, 1/2W, Carbon	4650 ✓
R14	Resistor, 12K, 2W, Carbon	4679 ✓
R15	Resistor, 12K, 2W, Carbon	4679 ✓
R16	Resistor, 1200 OHM, 1/2W, Carbon	820 4658 ✓
R17	Resistor, 47K, 1/2W, Carbon	4668 ✓
R18	Resistor, 470K, 1/2W, Carbon	82K 4650 ✓
R19	Resistor, 470K, 1/2W, Carbon	82K 4650 ✓
R20	Resistor, 220 OHM, 1/2W, Carbon	4664 ✓
R21	Resistor, 120 OHM, 1/2W, Carbon	4607 ✓
R22	Resistor, 120 OHM, 1/2W, Carbon	4607 ✓
R23	Resistor, 2.2K, 2W, Carbon	46016 ✓
R24	Resistor, 2.2K, 2W, Carbon	46016 ✓
V1	Tube, 12AX7	4311 ✓
V2	Tube, 12BH7	4312 ✓
V3	Tube, 6550	4337 ✓
V4	Tube, 6550	4337 ✓
V5	Tube, 5U4GB	4338 ✓
V6	Tube, 5U4GB	4338 ✓
*T1	Transformer, Power	1582 ✓
*T2	Transformer, Output	1581 ✓
*L1	Choke, Filter	1583 ✓
*L2	Choke, Filter	1583 ✓
*SR1	Rectifier, Selenium, Plug-in	8694 ✓
F1	Fuse, 3AG, 3 Amp Slo-Blo	20144
F2	Fuse, 3AG, 3/8 Amp	20217
F3	Fuse, 3AG, 3/8 Amp	20217

Tolerances: Capacitors ±20%, Resistors ±10% unless otherwise indicated.

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.

