

Electro-Voice

ELECTRO-VOICE, INC.
BUCHANAN, MICHIGAN

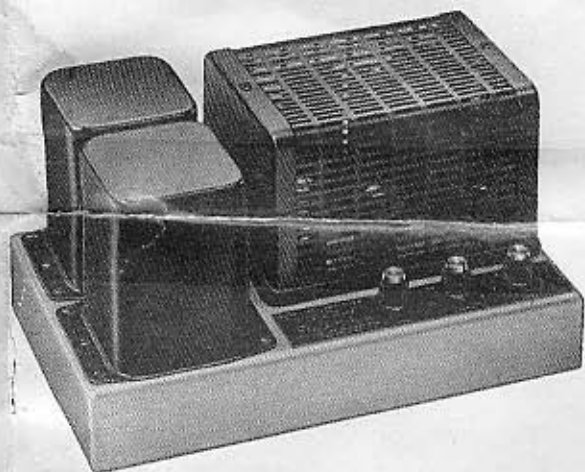


Fig. 1 — Model A20 Amplifier

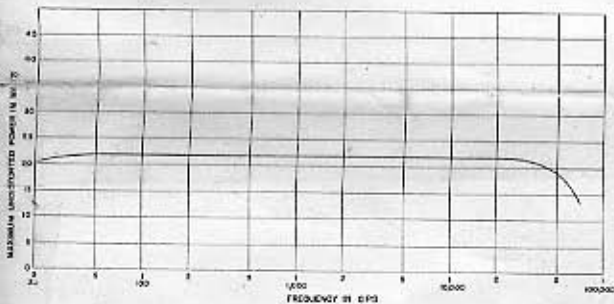


Fig. 2 — Maximum Undistorted Power vs. Frequency

Specifications and Instructions

Model A20 Amplifier

20-watt Circlotron High-Fidelity Power Amplifier

GENERAL DESCRIPTION — The Electro-Voice Model A20 amplifier is a high quality 20-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 A20 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:	20 watts rated, 40 watts on peaks See Fig. 2 "Maximum Undistorted Power vs. Frequency"
Frequency Response:	± 1 db 20 to 60,000 cps at rated output 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.
Feedback:	Loop feedback: 16 db negative Drive plate: 2 db positive Output circuit: 19 db negative Total 33 db negative
Damping factor:	Adjustable between 0.1 and 15. 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 6V6GT 2 6X4
Power Consumption:	117V 60 cycle AC at 1.05 amps max.
Size:	12¼ in. wide x 8¼ in. deep x 6¾ in. high
Weight:	18½ lb. net, 20 lb. shipping
Net Price:	\$85.00, zone 1; \$86.70, zone 2*

*Zone 2 includes: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming and the following counties in West Texas: Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, Pecos, Presidio, Reeves, Terrell.

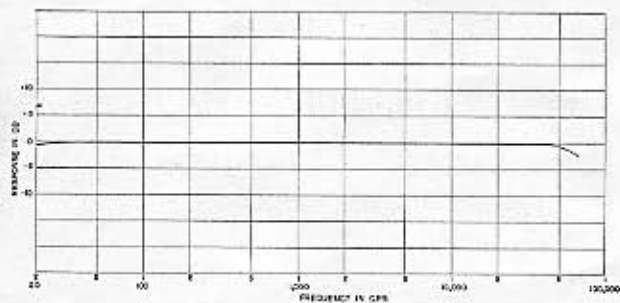


Fig. 3 - Frequency Response at 7-watt Level

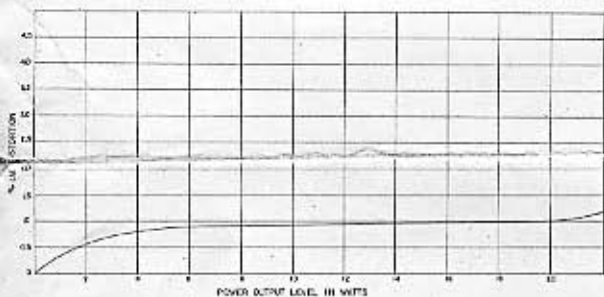


Fig. 4 - Power vs. Intermodulation Distortion

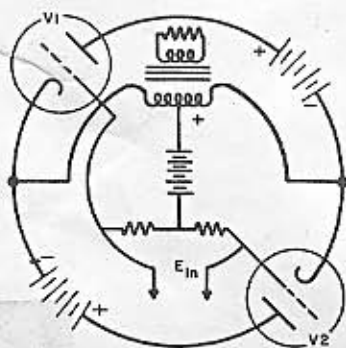


Fig. 5 - Simplified Diagram Circlotron Circuit

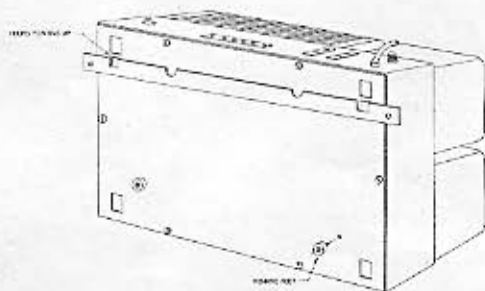


Fig. 6 - Affixing Mounting Brackets

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.

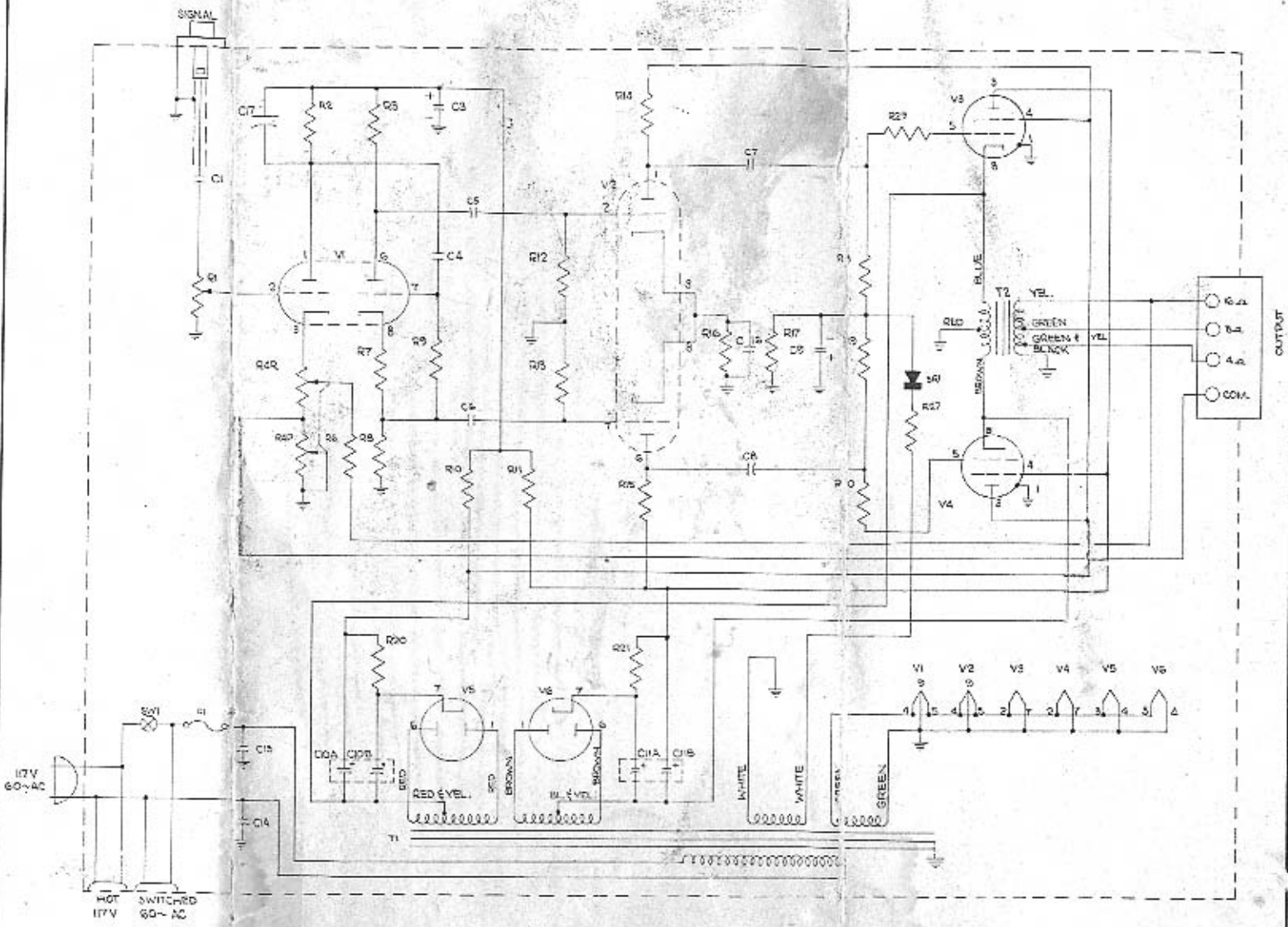
VARIABLE DAMPING FACTOR—It is necessary for the amplifier to present the correct effective impedance to the speaker for optimum acoustic performance at low frequencies. This value of critical damping resistance varies widely with different speakers, and is dependent upon flux density, type of enclosure, 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 A20 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 three 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. Under unusual conditions of very restricted ventilation, the tube and component cover may be removed to assist cooling.

Schematic Diagram Model A20 Power Amplifier



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. The Electro-Voice PC1 or PC2 preamplifier is recommended for use with the A20 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 A20 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 A20 "On-Off" switch when power control is desired at the amplifier location.

LINE-POWER SERVICE FOR OTHER EQUIPMENT — A line-power output is provided on the rear apron of the amplifier. This outlet, which is switched and live only when the amplifier is turned on, may be used to control a tuner, TV set, etc.

SERVICE — The 1½-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 1½-ampere type. The fuse 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, or (c) refer to the dealer from whom purchased for instructions. Access to tubes may be gained by removing the two screws located on either side of the top of the protective cage. This cage may then be removed. 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.

OPTIONAL ACCESSORIES — Model PC1 or PC2 Preamplifiers.

CRITICAL DAMPING FACTOR CONTROL SETTINGS

Model	Inf. Eaffle	Skylark	Baronet	Aristocrat	Empire	Regency	Constitution	Georgian	Tuxedo	Bipack
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
C3	Capacitor, 20 MFD, 450 V, Electrolytic	4246
C4	Capacitor, 0.022 MFD, 400 V, Plastic Tubular	4260
C5	Capacitor, 0.047 MFD, 400 V, Plastic Tubular	4243
C6	Capacitor, 0.047 MFD, 400 V, Plastic Tubular	4243
C7	Capacitor, 0.1 MFD, 600 V, Plastic Tubular	4241
C8	Capacitor, 0.1 MFD, 600 V, Plastic Tubular	4241
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
C13	Capacitor, 0.047 MFD, 400 V, Plastic Tubular	4243
C14	Capacitor, 0.047 MFD, 400 V, Plastic Tubular	4243
C16	Capacitor, 0.01 MFD, 500 V, Ceramic	4257
C17	Capacitor, 100 MMF, 500 V, Ceramic	4281
*R1	Potentiometer, 250K, Audio Taper, Carbon	44686
R2	Resistor, 270K, ½W, ±10%, Carbon	4669
R3	Resistor, 27K, ½W, ±10%, Carbon	4651
*R4R *R4P	Potentiometer, 1800 OHM-1 OHM, Dual, W.W. Linear	K4686
R6	Resistor, 27K, ½W, ±10%, Carbon	4651
R7	Resistor, 470 OHM, ½W, ±10%, Carbon	4654
R8	Resistor, 27K OHM, ½W, ±10%, Carbon	4651
R9	Resistor, 1.2 MEG, ½W, ±10%, Carbon	4656
R10	Resistor, 56K, ½W, ±10%, Carbon	4652
R11	Resistor, 56K, ½W, ±10%, Carbon	4652
R12	Resistor, 470K, ½W, ±10%, Carbon	4650
R13	Resistor, 470K, ½W, ±10%, Carbon	4650
R14	Resistor, 12K, 2W, ±10%, Carbon	4679
R15	Resistor, 12K, 2W, ±10%, Carbon	4679
R16	Resistor, 1.2K, ½W, ±10%, Carbon	4658
R17	Resistor, 47K, ½W, ±10%, Carbon	4668
R18	Resistor, 470K, ½W, ±10%, Carbon	4650
R19	Resistor, 470K, ½W, ±10%, Carbon	4650
R20	Resistor, 100 OHM, 2W, ±10%, Carbon	4655
R21	Resistor, 100 OHM, 2W, ±10%, Carbon	4655
R27	Resistor, 1K, ½W, ±10%, Carbon	4693
R29	Resistor, 120 OHM, ½W, ±10%, Carbon	4607
R30	Resistor, 120 OHM, ½W, ±10%, Carbon	4607
C01	Resistor, Selenium, 10 MA, Half-Wave	5014
V1	Tube, 12AX7	4311
V2	Tube, 12BH7A	4312
V3	Tube, 6V6GT	4313
V4	Tube, 6V6GT	4313
V5	Tube, 6X4	4336
V6	Tube, 6X4	4336
*SW1	Rotary On-Off Switch	B5641
*T1	Transformer, Power	1580
*T2	Transformer, Output	1579
F1	Fuse, 1 ½A, 3 AG, Slo-Blo	20171

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.

