

Electro-Voice®

ELECTRO-VOICE, INC.
BUCHANAN, MICHIGAN

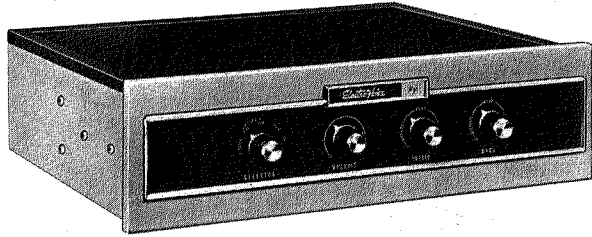


Fig. 1—Model A15CL Lowboy Amplifier

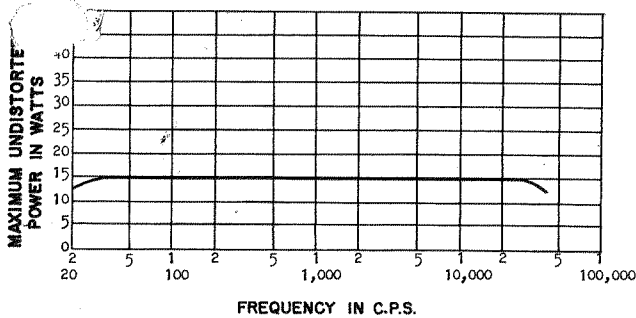


Fig. 2—Maximum Undistorted Power vs. Frequency

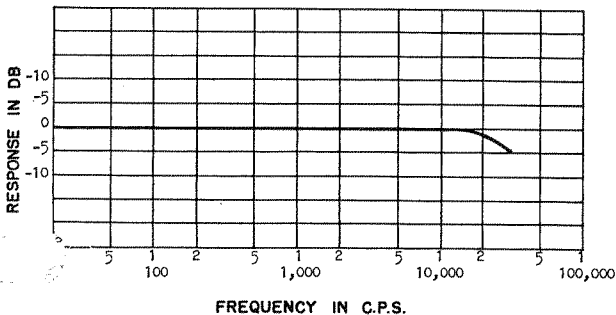


Fig. 3—Frequency Response at 5-watt Level

Specifications and Instructions

Model A15CL Lowboy Amplifier 15-watt Circlotron High-Fidelity Amplifier with Controls

GENERAL DESCRIPTION — The Electro-Voice Model A15CL is a lowboy styled, self-powered preamplifier, amplifier and music control center for use with ultra-linear ceramic phonograph cartridges, crystal phonograph cartridges, low and high-level magnetic phonograph cartridges, tuner, television, and tape reproducers.

The A15CL is designed with a basic modular height and thus may be stacked in equal height with the Electro-Voice Model A20CL lowboy amplifier and Models 3305 and 3306 lowboy tuners or double stacked to match Models 3303 and 3304 stereophonic tuners. The brushed-brass and rich brown baked enamel finish presents an attractive appearance which will blend with contemporary room decors.

FEATURES — The Model A15CL power amplifier 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 hang-over due to underdamping. For the first time, through the use of this control, optimum operation of any speaker system is assured.

The music control center of the A15CL has available a number of fixed and variable frequency response curves. Many features of this unit have been patterned after precepts laid down in the design of professional equipment.

The phono-equalizer switch is effective on both the magnetic and ceramic (high-impedance) phono channels. A recording signal, available at the record output jack, is affected by the equalizer circuits, but not the volume and response varying controls.

SPECIFICATIONS

- Power Output:** 15 watts rated, 30 watts on peaks
See Fig. 2 "Maximum Undistorted Power vs. Frequency"
- Frequency Response:** ± 1.5 db 20 to 20,000 cps at rated output
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:** 75 db below rated output at maximum volume setting
60 db below rated output through magnetic preamplifier
- Speaker Output:** 4 ohms, 8 ohms, 16 ohms
- Record Output:** 0.5 V RMS rated, 3 V RMS, max. from RECORD OUT jack
- Record Output Imp.:** 50K ohms (to work into 250K ohms minimum load)
- Feedback:**
 - Loop feedback: 15 db negative
 - Drive plate: 2 db positive
 - Output circuit: 25 db negative
 - Total: 38 db negative
- Damping factor:** Adjustable between 0.1 and 15. See table for critical damping factors of all E-V speakers.



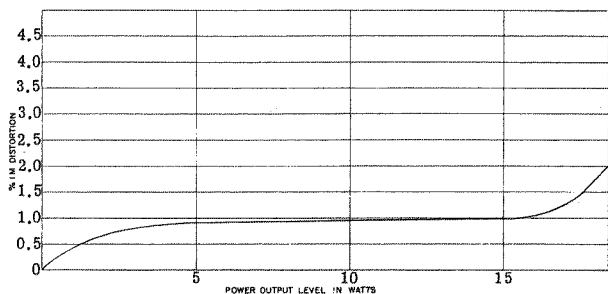
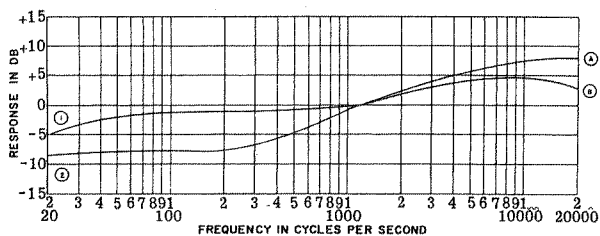


Fig. 4—Power vs. Intermodulation Distortion



KEY: 1A RIAA
2B European 300 cycle crossover

Fig. 5—Record Equalizer Positions

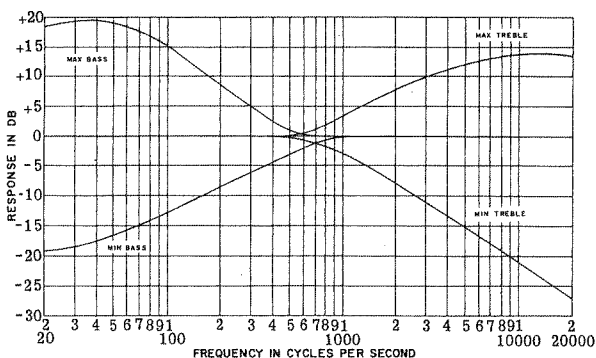


Fig. 6—Tone Control Curves

Inputs:	Sensitivity	Impedance	Maximum Input
High-impedance Phono	0.5 V	6.5 MEG	4 V
Magnetic Phono	12 MV at 1 kc	47K	150 MV at 1 kc
Tuner	1.0 V	270K	4 V
Tape	1.0 V	270K	4 V
TV	1.0 V	270K	4 V

Controls:
Rear Chassis:

Magnetic-Ceramic Phono Switch
2 Hum adjustments

Front Panel:

a. Selector-Record Compensator (5 position)
Phono-Equalizer Positions
RIAA
European 300 cycle crossover
See Fig. 5 "Phono-Equalizer Positions"

b. Volume

c. Treble

d. Bass—Power switch

See Fig. 7 "Tone Control Curves"

Tone Control Range:

Treble: +15 db to -20 db at 10 kc
Bass: +20 db to -15 db at 50 cycles

Tubes:

Total of 8 as follows:

3 12AX7
1 12BH7A
2 EL84
2 6X4

Power Consumption:

117V 60 cycle AC at 0.85 amps max.

Size:

15 in. wide x 12 in. deep x 4 1/8 in. high

Weight:

15 1/2 lb. net, 18 lb. shipping

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 8 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 at an optimum match can be made between the amplifier and any speaker or combination. 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 A15CL lowboy 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 A15CL is designed to operate in either horizontal or vertical position and is supplied with felt feet to prevent marring the surface on which it is placed. Because the A15CL is designed for convenient front installation, no knob extensions are required for panel mounting. The panel cutout should be approximately $14\frac{3}{8}$ " by $3\frac{1}{16}$ ". Small variations of these dimensions are permissible for they will be covered by the $\frac{3}{16}$ " overhang of the A15CL front panel. Remove the felt feet from the A15CL bottom plate before installation. For permanent mounting, the four mounting clips provided may be used. The clips are engaged in the slots on the A15CL bottom plate as shown in Fig. 10. Then, after placing the A15CL in position, use a screwdriver to rotate the clips 90° and fasten to the mounting board with the screws provided. Reasonable ventilation is required, and the unit should not be operated in small, completely enclosed spaces. The clips 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.

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 by using 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 A15CL has available a RECORD OUT jack unaffected by tone and volume controls for connection to tape recorders. The impedance of this output is 50K ohms, and should work into a minimum load of 250K ohms for flat response down to 20 cycles. Maximum shielded cable length for this connection is 5 ft.; longer cables will result in slight attenuation of high frequencies. Connect input devices to the appropriate jacks on the rear of the amplifier.

To use this unit with a magnetic tape mechanism without employing the tape machine electronic components, connect the tape head directly to the magnetic input. Place the compensator in the RIAA position and turn the bass control to the "3 o'clock" position. This will provide a playback curve flat $\pm 1\frac{1}{2}$ db for tape speeds of $7\frac{1}{2}$ and 15 inches per second. If the tape machine incorporates a preamplifier, connection should be made to the tape input jack.

ADJUSTMENTS — The hum balance controls on the A15CL should be adjusted with the power amplifier connected, the input selector on phono and the phono pickup connected to the proper input. Adjust the ceramic hum control for minimum hum with the volume control advanced to the extreme clockwise position and the MAGNETIC-CERAMIC phono switch in the CERAMIC position. Then place the switch in the MAGNETIC position and adjust the magnetic hum control to minimum hum. Because the ceramic hum adjustment affects all channels, it should be made regardless of the type of cartridge to be used. The magnetic adjustment need be made only if a magnetic cartridge is used.

OPERATION — The A15CL has a power receptacle on the rear of the chassis which has power available at all times. This socket is not fused.

Complete equalization for any phonograph cartridge is included in the A15CL amplifier. Therefore, *no external load resistance should be placed across the magnetic cartridge terminals.* The magnetic preamplifier has been designed to accommodate either low or high-voltage output magnetic pickups.

The damping control is an Electro-Voice development designed to permit precise matching of the A15CL 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.

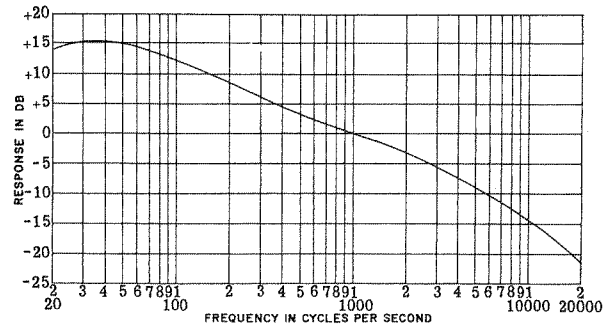


Fig. 7—Magnetic Channel Response in RIAA Position

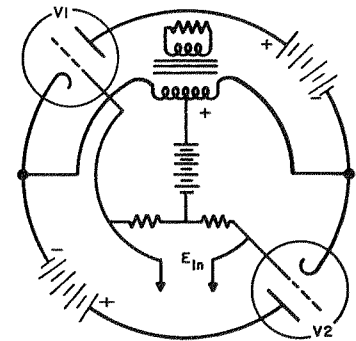


Fig. 8—Simplified Schematic Circlotron Circuit

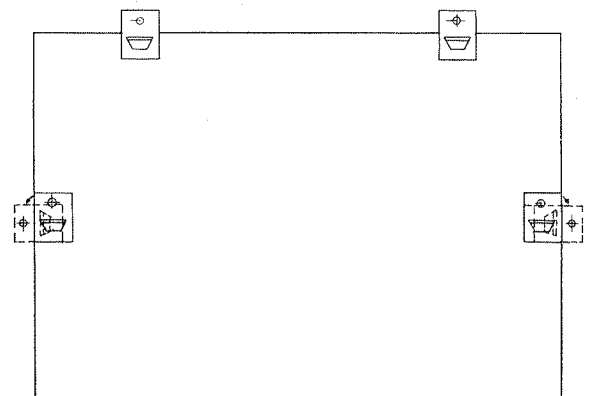


Fig. 9—Affixing Mounting Clips

MICROPHONE INPUT — To use the A15CL with any *Hi-Z dynamic* microphone, connect the microphone to the phono input with the magnetic-ceramic switch set in the magnetic position. Turn the playing selector to EUR, the bass control to the "11 o'clock" position, and the treble control to maximum clockwise rotation. This will result in reproduction flat ± 3 db with a sensitivity of 7 millivolts.

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 three screws located on the back flange of the top cover assembly. This cover may then be removed. **Caution:** Disconnect line cord from 115-volt source before removing top assembly as high voltage is present in chassis when unit is energized. 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 remove top or bottom covers without first removing line cord from power source.

RECORD EQUALIZATION

Most microgroove records produced since 1954, as well as many prior to that time, have been recorded using the standard RIAA compensation characteristic and should be played with the selector set accordingly. The following records should be played with EUR compensation:

American Recording Society
 Arizona (pre 1955 only)
 Blue Note Jazz (pre 1955 only)
 Canyon (up to No. C6160 only)
 Capitol (pre 1955 only)
 Capitol Certia (pre 1955 only)
 Contemporary (No. 2001, -2; 2501, -2, -5, -7; 3501 only)
 Electra (No. 17, 22 only)
 Esoteric (No. ES500, 517; EST5, -6 only)
 Good Time Jazz (No. 3, 9-19 only)
 Mercury (pre Oct. 1954 only)
 Nocturne (No. LP 1-3, 5; XP1-10 only)
 Pacific Jazz (No. 1-13 only)
 Philharmonia
 Riverside (pre 1955)
 Urania (No. 224, 603, 7059, -63, -65, -66, -69 only)

For most 78 RPM records, set selector to RIAA. The following recordings require EUR position:

Columbia (pre 1954 only)
 Capitol (pre 1954 only)
 All English and most European 78 RPM records prior to 1954.

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

Key	Description	Part No.	
C1	Capacitor, .01 MFD, 500 V, Ceramic	4252	
C2	Capacitor, .005 MFD, 500 V, Ceramic	42002	
C3	Capacitor, .002 MFD, 500 V, Ceramic	4259	
C4	Capacitor, .01 MFD, 500 V, Ceramic	4252	
C5A } C5B } C5C }	Capacitor, 20-20-20 MFD, 350 V, Electrolytic	42045	Use Mallory FP 343.6A
C6	Capacitor, 500 MMF, 500 V, Ceramic	42003	
C7	Capacitor, 500 MMF, 500 V, Ceramic	42003	
C8	Capacitor, .1 MFD, 400 V, Plastic Tubular	42047	
C9	Capacitor, .01 MFD, 500 V, Ceramic	4252	
C10	Capacitor, .022 MFD, 400 V, Plastic Tubular	4260	
C11	Capacitor, .047 MFD, 400 V, Plastic Tubular	4243	
C12	Capacitor, 100 MMF, 500 V, Ceramic	4281	
C13	Capacitor, .022 MFD, 400 V, Plastic Tubular	4260	
C14	Capacitor, .022 MFD, 400 V, Plastic Tubular	4260	
C15	Capacitor, .022 MFD, 400 V, Plastic Tubular	4260	
C16	Capacitor, .1 MFD, 600 V, Plastic Tubular	4241	
C17	Capacitor, .1 MFD, 600 V, Plastic Tubular	4241	
C18	Capacitor, .01 MFD, 500 V, Ceramic	4252	
C19	Capacitor, 50 MFD, 100 V, Electrolytic	4242	
C20	Capacitor, .001 MFD, 500 V, Ceramic	4258	
C21	Capacitor, .01 MFD, 500 V, Ceramic	4257	
C22	Capacitor, 200 MMF, 500 V, Ceramic	4256	
C23	Capacitor, .002 MFD, 500 V, Ceramic	4259	
C24	Capacitor, .047 MFD, 400 V, Plastic Tubular	4243	
C25	Capacitor, .047 MFD, 400 V, Plastic Tubular	4243	
C26A } C26B }	Capacitor, 40-40, MFD, 400 V, Electrolytic	4208	Use Mallory FP 238A
C27A } C27B }	Capacitor, 40-40 MFD, 400 V, Electrolytic	4208	
R1	Resistor, 22 MEG, Carbon	4606	
R2	Resistor, 270K, Carbon	4669	
R3	Resistor, 270K, Carbon	4669	
R4	Resistor, 120K, Carbon	4670	
R5	Resistor, 120K, Carbon	4670	
R6	Resistor, 47K, Carbon	4668	
R7	Resistor, 2.2K, Carbon	4676	
R8	Resistor, 1.2 MEG, Carbon	4656	
R9	Resistor, 120K, Carbon	4670	
R10	Resistor, 12 MEG, Carbon	4272	
R11	Resistor, 1.2 MEG, Carbon	4656	
R12	Resistor, 22K, Carbon	4678	
R13	Resistor, 330K, Carbon	4685	
R14	Resistor, 390K, Carbon	46028	
R15	Resistor, 47K, Carbon	4668	
R16	Resistor, 1.8 MEG, Carbon	4673	
R17	Resistor, 56K, Carbon	4652	
R18	Resistor, 1.2K, Carbon	4658	
R19	Resistor, 4.7K, Carbon	4675	
R20	Resistor, 120K, Carbon	4670	
*R21	Potentiometer, 1 MEG, A Taper	Q4686	
R22	Resistor, 120K, Carbon	4670	
R23	Resistor, 12K, 2W, Carbon	4679	
*R24	Potentiometer, 1 MEG, A Taper	Z4686	
R25	Resistor, 180K, Carbon	4671	
R26	Resistor, 1.8K, Carbon	4677	
R27	Resistor, 22K, Carbon	4678	
*R28	Potentiometer, 250K, A Taper	B46086	
R29	Resistor, 22K, Carbon	4678	
R30P } R30R }	Potentiometer, Dual, 1 OHM, 2W, Linear 1.8K Carbon	D46086	
R31	Resistor, 270K, Carbon	4669	
R32	Resistor, 27K, Carbon	4651	
R33	Resistor, 1.2 MEG, Carbon	4656	
R34	Resistor, 470 OHM, 2W, Carbon	4654	
R35	Resistor, 27K, Carbon	4651	
R36	Resistor, 470K, Carbon	4650	
R37	Resistor, 470K, Carbon	4650	
R38	Resistor, 12K, 2W, Carbon	4679	
R39	Resistor, 12K, 2W, Carbon	4679	
R40	Resistor, 1.2K, Carbon	4658	
R41	Resistor, 47K, Carbon	4668	
R42	Resistor, 470K, Carbon	4650	
R43	Resistor, 470K, Carbon	4650	
R44	Resistor, 120 OHM, Carbon	4607	
R45	Resistor, 120 OHM, Carbon	4607	
R46	Resistor, 270 OHM, Carbon	46034	
R47	Resistor, 15K, Carbon	5653	
R48	Resistor, 15K, Carbon	4653	
R49	Resistor, 100 OHM, 2W, Carbon	4655	
R50	Resistor, 100 OHM, 2W, Carbon	4655	
*R51	Potentiometer, 500 OHM, Linear	R4686	
*R52	Potentiometer, 500 OHM, Linear	R4686	
R53	Resistor, 470K, Carbon	4650	
F1	Fuse, 1½ AMP, 3AG, Slo-Blow	20171	
V1	Tube, 12AX7	4311	
V2	Tube, 12AX7	4311	
V3	Tube, 12AX7	4311	
V4	Tube, 12BH7A	4312	
V5	Tube, EL84	4339	
V6	Tube, EL84	4339	
V7	Tube, 6X4	4336	
V8	Tube, 6X4	4336	
*T1	Transformer, Power	15024	
*T2	Transformer, Output	15025	
*SR1	Rectifier, Selenium	5914	

Tolerances: Capacitors $\pm 20\%$, Resistors $\pm 10\%$, unless otherwise indicated. Resistors are $\frac{1}{2}$ watt unless indicated.

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

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

Schematic Diagram Model A15CL Lowboy Amplifier

Model A15CL Tube Voltage Chart

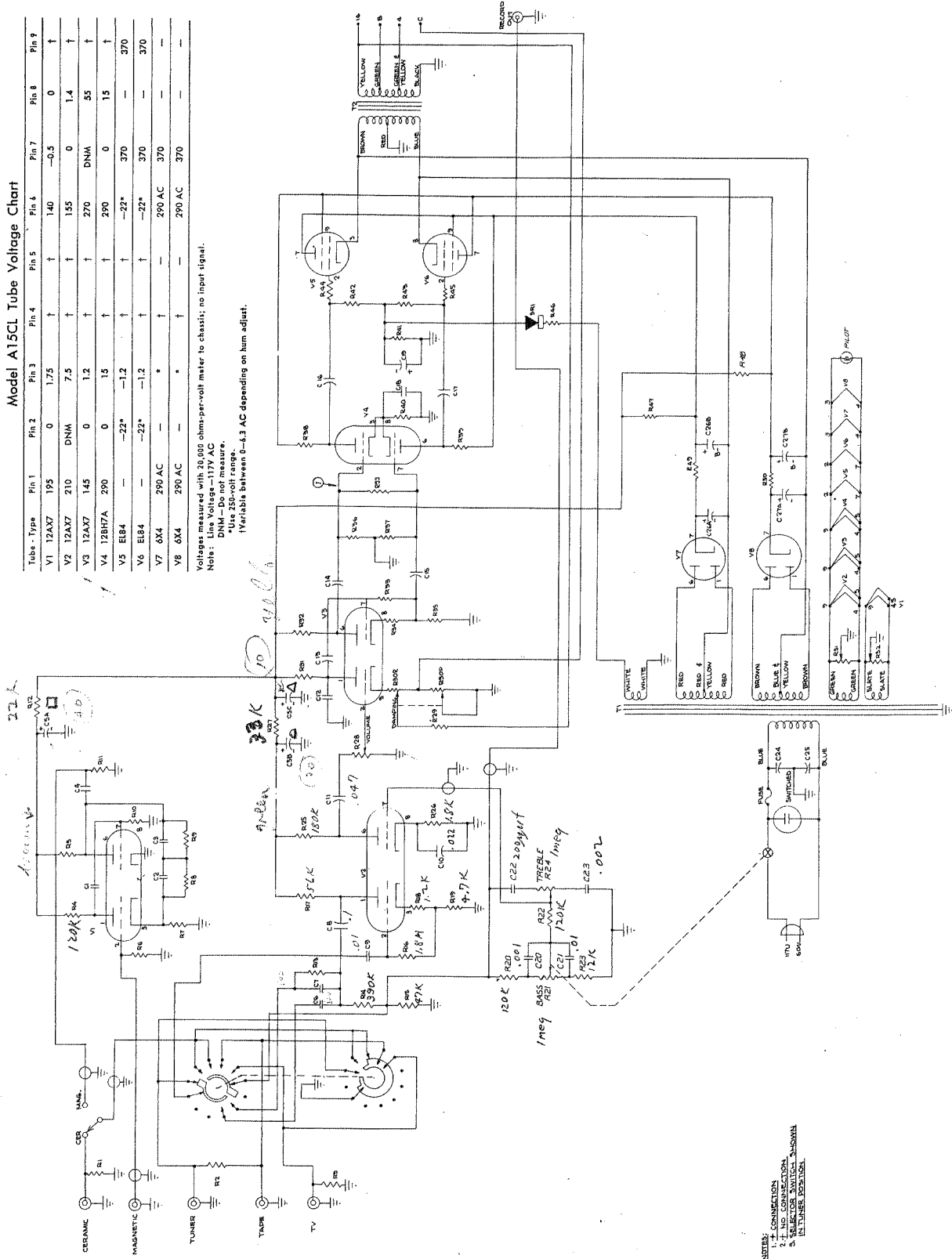
Tube - Type	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1 12AX7	195	0	1.75	†	140	-0.5	0	†	†
V2 12AX7	210	DNA	7.5	†	155	0	1.4	†	†
V3 12AX7	145	0	1.2	†	270	DNA	55	†	†
V4 12BH7A	290	0	15	†	290	0	15	†	†
V5 EL84	-	-22*	-1.2	†	-22*	370	-	370	†
V6 EL84	-	-22*	-1.2	†	-22*	370	-	370	†
V7 6X4	290 AC	-	*	†	-	290 AC	370	-	-
V8 6X4	290 AC	-	*	†	-	290 AC	370	-	-

† Voltages measured with 20,000 ohm-per-volt meter to chassis; no input signal.

Note: Line Voltage—117V AC
DNN—Do not measure.

*Use 250-volt range.

†Variable between 0—4.3 AC depending on hum adjust.



WARRANTY

The Electro-Voice Model A15CL Lowboy amplifier is guaranteed against defects in workmanship and material.

ELECTRO-VOICE, INC. / BUCHANAN, MICHIGAN