

**LANG** ELECTRONICS Inc.



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INSTRUCTION MANUAL  
FOR  
LANG PROGRAM EQUALIZER  
MODEL PEQ-2

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## PEQ-2 PROGRAM EQUALIZER

### F E A T U R E S

NON-DRIFT STABLE EQUALIZER COMPONENTS  
HIGH Q TOROIDAL EQUALIZER COILS  
PRECISION BRIDGE - SELECTED CAPACITORS  
LOW HUM AND NOISE  
LOW POWER CONSUMPTION  
HERMETICALLY SEALED EQUALIZER COMPONENTS  
STAINLESS STEEL ENGRAVED CONTROL PANEL  
STANDARD 19 INCH RACK PANEL MOUNTING  
EQUALIZATION AND POWER ON INDICATOR  
EQUALIZATION IN - OUT KEY  
BROADCAST QUALITY POTTED TRANSFORMERS  
SCREW TERMINAL AUDIO CONNECTING STRIP  
HIGH OUTPUT, LOW DISTORTION CAPABILITY  
OVERRATED COMPONENTS  
CONTINUOUS DUTY OPERATION  
STABLE AMPLIFIER GAIN  
ZERO INSERTION LOSS  
BALANCED, UNBALANCED OR UNGROUNDED OPERATION  
MULTI-POSITION EQUALIZATION FREQUENCY SELECTORS  
EQUALIZATION CURVE SHAPING  
SILICON TRANSISTOR AMPLIFIER  
PLUG-IN SOLID STATE REGULATED POWER SUPPLY  
PLUG-IN AMPLIFIER AND POWER SUPPLY BOARDS

## MODEL PEQ-2 PROGRAM EQUALIZER

### SPECIFICATIONS

EQUALIZATION: HIGH FREQUENCY PEAK BOOST 0 to plus 18db at 2500, 3750, 5000, 7500, 10,000, 12,000, 15,000, or 20,000 cycles per second.

High FREQUENCY SHELF DROOP 0 to minus 16db at 2500, 5000, 7500, 10,000, 15,000 or 20,000 cycles per second.

LOW FREQUENCY SHELF BOOST 0 to plus 12db at 20, 30, 40, 60, 80, 120, 160 or 240 cycles per second.

LOW FREQUENCY SHELF DROOP 0 to minus 18db at 25, 50, 100 or 200 cycles per second.

INPUT IMPEDANCE: 150/600 ohms Terminating, Transformer, Primary, BALANCED or UNBALANCED.

OUTPUT LOAD IMPEDANCE: 150/600 ohms, Transformer Secondary, BALANCED or UNBALANCED

FREQUENCY RESPONSE: Plus or minus 1/2db 20 to 20,000 CFS.  
(in flat position)

NORMAL OPERATING RANGE: Minus 20dbm to plus 14dbm

MAXIMUM OUTPUT LEVEL: Plus 30dbm into 600 ohms

DISTORTION: Less than 1/2% from 20 HZ to 20 KHZ at plus 24dbm.

NEGATIVE FEEDBACK: 40db

INSERTION LOSS: ZERO

NOISE AND HUM: Minus 80dbm absolute value - measuring all noise components over a bandwidth of 20 to 20000 HZ  
  
Equivalent input noise - 105dbm

MODEL PEQ-2 PROGRAM EQUALIZER

SPECIFICATIONS

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TRANSISTORS:	1-2N3054 1-40319 2-1N2859A 4-2N3053
INDICATORS:	POWER ON Lamp (Red) EQUALIZATION ON Lamp (Amber)
POWER:	117 Volts 50-60 CFS 10 Watts
MOUNTING:	Standard EIA Rack Mounting
PANEL SIZE:	5-1/4" X 19"
PANEL FINISH:	Stainless Steel, Engraved Black Lettering
OVERALL DIMENSIONS:	3-1/2" X 19" X 9"
NET WEIGHT:	14 lbs.

LIST OF CONTROLS AND INDICATORS

<u>NAME</u>	<u>FUNCTION</u>	<u>AMPLITUDE</u>
LOW FREQUENCY BOOST SELECTOR SWITCH	SELECTS FREQUENCY AT WHICH MAXIMUM BOOST OCCURS	20, 30, 40, 60, 80, 120, 160, 240, HZ
LOW FREQUENCY DROOP SELECTOR SWITCH	SELECTS FREQUENCY AT WHICH MAXIMUM DROOP OCCURS	25, 50, 100, 200 HZ
LOW FREQUENCY BOOST CONTROL	ADJUSTS DEGREE OF LOW FREQUENCY BOOST	0 -to +12db
LOW FREQUENCY DROOP CONTROL	ADJUSTS DEGREE OF LOW FREQUENCY DROOP	0 -to -18db
HIGH FREQUENCY BOOST SELECTOR SWITCH	SELECTS FREQUENCY AT WHICH MAXIMUM BOOST OCCURS	25, 3.75, 5.0, 7.5, 10, 12, 15, 20 HZ
HIGH FREQUENCY DROOP SELECTOR SWITCH	SELECTS FREQUENCY AT WHICH MAXIMUM DROOP OCCURS	2.5, 5.0, 7.5, 10, 15, 20 HZ
HIGH FREQUENCY BOOST CONTROL	ADJUSTS DEGREE OF HIGH FREQUENCY BOOST	0 -to+18db
HIGH FREQUENCY DROOP CONTROL	ADJUSTS DEGREE OF HIGH FREQUENCY DROOP	0 to minus 16db
HIGH FREQUENCY BAND- WIDTH CONTROL	ADJUSTS SHAPE OF PEAK BOOST CURVE	B BROAD TO SHARP
POWER SWITCH	CONTROLS AC POWER TO EQUALIZER	-----

LIST OF CONTROLS AND INDICATORS

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<u>NAME</u>	<u>FUNCTION</u>	<u>FREQUENCY OR AMPLITUDE</u>
EQUALIZATION -IN/OUT KEY SWITCH	CUTS OFF ALL EQUALIZATION PERMITTING CONTROLS TO REMAIN AT NORMAL SETTINGS	-----
EQUALIZATION LAMP (AMBER)	LIGHTS WHEN -IN OUT KEY IS IN "ON" POSITION	-----
POWER LAMP (RED)	LIGHTS WHEN AC POWER IS APPLIED	-----

## INSTALLATION

- MECHANICAL:** The PEQ-2 mounts into a standard 19" EIA rack cabinet. A panel space of 3 1/2 inches is required. Mount the equalizer into a rack by using four rack screws, usually 10-32 X 1/2", through slots in panel edges.
- ELECTRICAL:** The PEQ-2 utilizes 115 volt, 60 cycle single phase power, and is provided with a six foot power cord equipped with a standard two prong plug. Plug the cord directly into a standard 115 Volt AC outlet.
- AUDIO:** The PEQ-2 input and output connections are made on a single terminal strip. Six screw terminals are used: two input, two output and two chassis ground. Refer to rear view parts location drawing.

The PEQ-2 is generally inserted into a line level (plus 4dbm) circuit. However, due to its low noise and hum, it may be operated at mixer level of 20 dbm with a 60 db s/n ratio. Conversely, the PEQ-2 may be inserted into a high level line (plus 14 dbm) since the output capabilities of the amplifier permit operation with low distortion, up to plus 24 dbm. When inserted into high level lines, keep in mind that program peaks cause operation from 6 to 15 decibels above average level and that at least a 10 decibel reserve should be allowed.

FOR BALANCED OPERATION on either or both input and output connections, connect the input signal to input terminals, and output leads to output terminals. Shield drain wires connect to either ground terminal.

FOR UNBALANCED OPERATION on either or both input and output connections, it is necessary to strap one input terminal and or one output terminal to chassis ground terminals.

The equalizer input and output windings are fully isolated from ground. Center taps are available on 150 and 600 ohm windings, and may be grounded to achieve an actual balanced-to-ground termination. This requires a strap from center tap to ground on either or both input or output transformers. Refer to impedance chart and diagrams for actual connections.

The PEQ-2 equalizer terminates its source into 600 ohms. Do not feed the equalizer with a source unable to drive a 600 ohm termination.

Two indications of too high driving source impedance are poor low frequency and distorted output. A roll-off in low frequencies may be due to a too small value of coupling capacitor when using cathode follower or emitter follower drive circuits. High distortion may be due to the sources inability to deliver adequate undistorted output level when attempting to feed a 600 ohm load.

Therefore, when connecting the PEQ-2 into an existing circuit, verify the ability of preceding equipment to deliver at least 10db higher signal level into a 600 ohm termination.



## OPERATION

Flip POWER toggle switch to ON position. The red neon power indicator will light. Allow five seconds for transistor regulator to stabilize.

Operate EQUALIZATION key switch to IN. The amber neon indicator will light. Equalizer is now in the circuit.

The EQUALIZATION key switch cuts off all equalization without the necessity of rotating controls to zero. This permits the equalizer to be preset and instantly be available by flipping key switch to IN.

Select the frequencies at which maximum boost or droop is desired by means of four rotary switches on the front panel. Refer to list of controls and indicators for function and frequency range of each control.

Front panel calibrations indicate frequencies at which maximum boost and droop occurs. Low frequency boost and droop are shelf equalizations, as is high frequency droop. High frequency boost is a peak equalization. The spread or range of the peak may be adjusted by means of the BAND WIDTH control. Refer to the complete set of curves provided at the rear of this manual for actual measurements of equalization.

The degree or amount of equalization is continuously adjustable by four separate vernier controls, each located above its corresponding equalization frequency selector switch. See control taper drawings for decibel vs. rotational positions. All controls may be operated independently and simultaneously.

A special feature of the PEQ-2 Program Equalizer is low frequency peak boost. When the low frequency boost and droop selector switches are properly set and their respective controls correctly adjusted, a low frequency peak boost occurs in place of shelf boost. To demonstrate peak boost, set the low frequency boost switch to 40 cycles and the low frequency droop switch to 100 cycles. Rotate the low frequency boost control to maximum position and listen to program material containing low frequencies. Then slowly advance the low frequency droop control; the effect of peak boost is heard as a dropping out of middle low frequency. The frequency of the peak is determined by the positions of the individual low frequency selector switches.

## INPUT AND OUTPUT IMPEDANCES

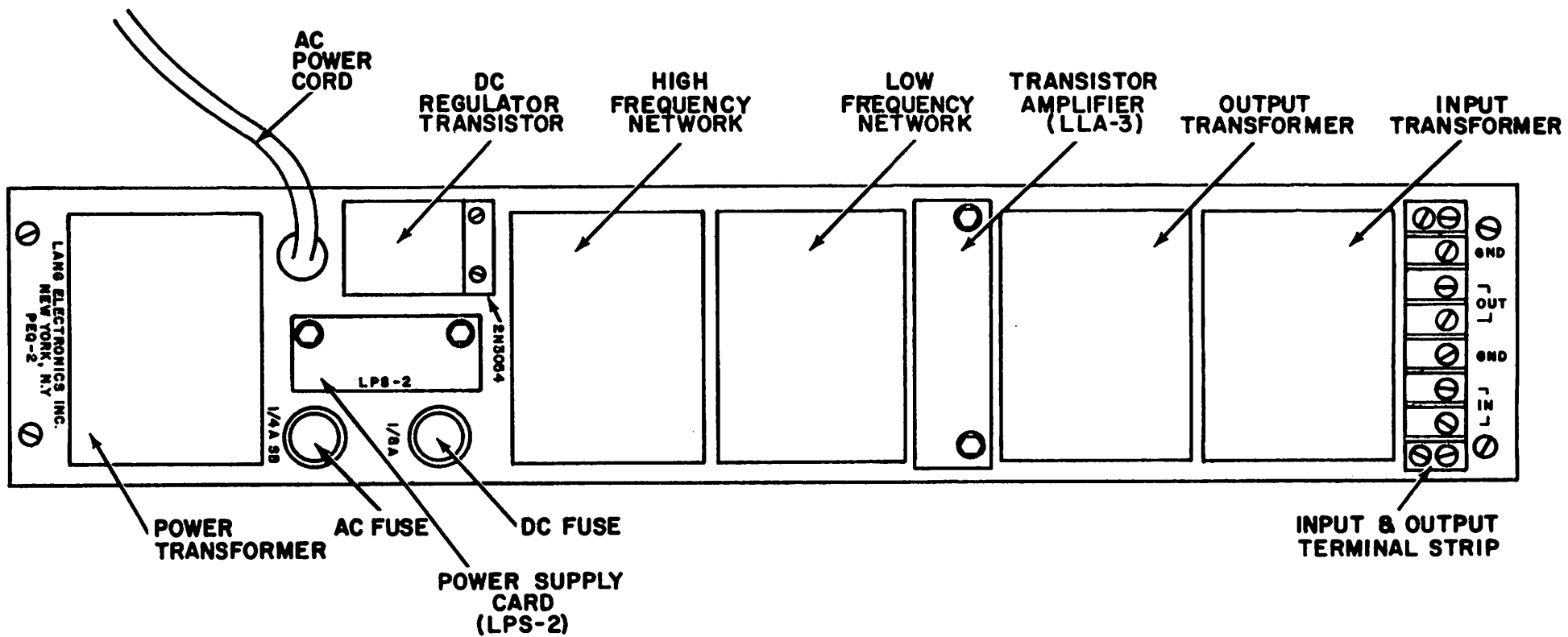
The PEQ-2 Program Equalizer is shipped strapped for use in 600 ohm circuits. Circuits may be operated balanced or unbalanced due to isolated transformer windings on input and output transformers. If it is desired to operate from 150 ohm circuits, the equalizer transformers may be restrapped as shown on chart.

### INPUT TRANSFORMER

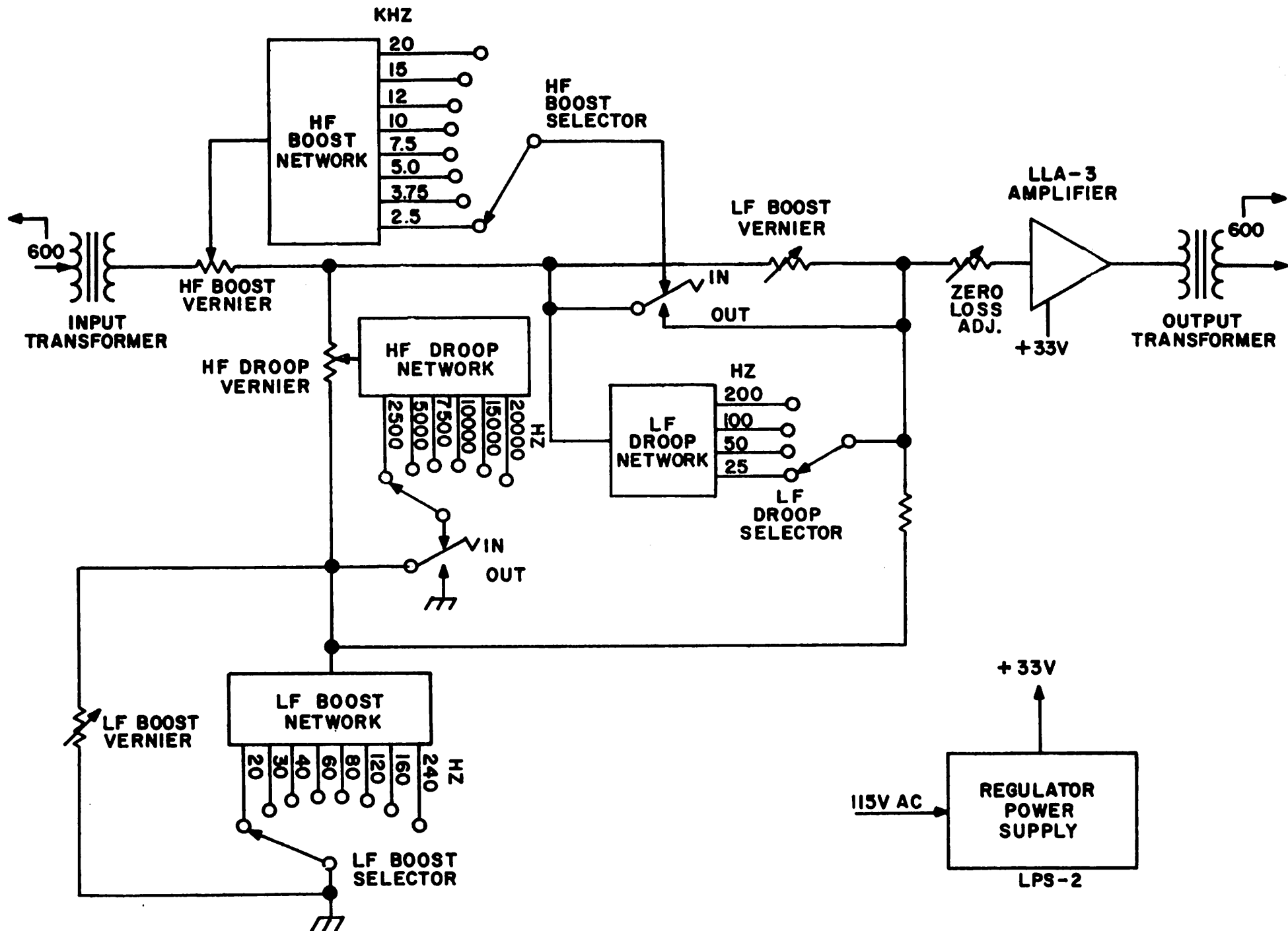
Impedance	Strap	Connect to	CT
600	3 & 4	1 & 5	3 & 4
150	1 & 4 3 & 5	1 & 5	2

### OUTPUT TRANSFORMER

Impedance	Strap	Connect to	CT
600	7 & 8	5 & 9	7 & 8
150	5 & 8 7 & 9	5 & 9	6



PEQ-2 PROGRAM EQUALIZER  
REAR VIEW



PEQ-2 PROGRAM EQUALIZER  
BLOCK PROGRAM ANALYSIS

MODEL PEQ-2

PROGRAM EQUALIZER

PARTS LIST

T1	TRANSFORMER	FREED 38165
T2	TRANSFORMER	FREED 38166
T3	TRANSFORMER	FREED 38167
EQ1	NETWORK	FREED 37727
EQ2	NETWORK	FREED 37744
R1	CONTROL, LF Boost	AB JA 1N056P103UA
R2	CONTROL, LF Droop	AB JA 1N056P104AA
R3	CONTROL, HF Boost	AB JA 1N056P103AA
R4	CONTROL, HF Droop	AB 1N056P103UA
R5	CONTROL, BANDWIDTH	AB 1N056P252UA
R6	CONTROL, Gain Trim	RV4LAYSAL03A
R7	RESISTOR	10 K 1/2W 5%
R8	RESISTOR	1 K 1/2W 5%
R9	RESISTOR	47 1/2W 5%
R10	RESISTOR	100 K 1/2W 5%
R11	RESISTOR	620 1W 5%
R12	RESISTOR	22 K 1/2W 5%
R13	RESISTOR	22 K 1/2W 5%
C1	CAPACITOR	500 uf 75V
C2	CAPACITOR	.01 uf 1KV
P1	CONNECTOR, AMP. CARD	Amphenol 143-012-01
P2	CONNECTOR, P.S. CARD	Amphenol 143-006-01

PARTS LIST CONTINUED:

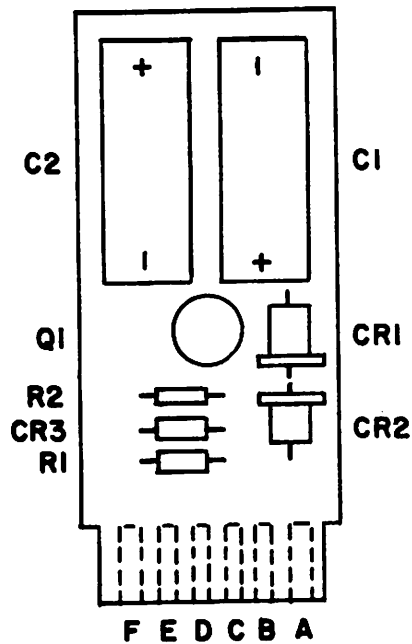
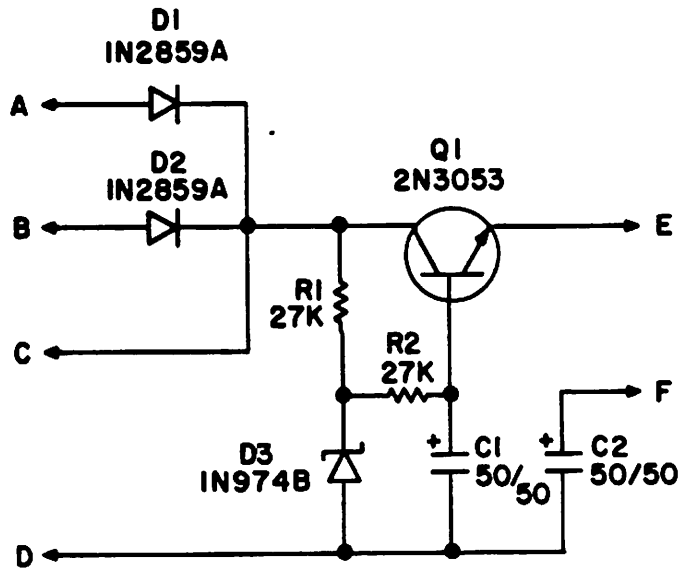
F1	FUSE	SB 1/4A 3AG
F2	FUSE	1/8A 3AG
XF1	FUSE HOLDER	Littlefuse 342012
XF2	FUSE HOLDER	Littlefuse 342012
	POWER CORD & PLUG	Cornish 3519
	CORD STRESS RETAINER	Heyco 6P1
	TERMINAL STRIP	C.J. 140-6Y
	SWITCH TOGGLE	H.H. 20994
	SWITCH , KEY	Mossman 4703
	LAMP , RED	Drake H 116-603
	LAMP , AMBER	Drake H 116-603
	HANDLE	H.H. Smith 1623
	SWITCH ,LF BOOST SELECT	CRL PA-2000
	SWITCH ,LF DROOP SELECT	CRL PA-2000
	SWITCH ,HF BOOST SELECT	CRL PA-2000
	SWITCH ,HF DROOP SELECT	CRL PA-2000
	POWER SUPPLY CARD	LANG LPS-2
	AMPLIFIER CARD	LANG LLA-3
	KNOB ,LF BOOST SELECT	Raytheon 70-4-2
	KNOB ,LF BOOST CONTROL	"
	KNOB ,HF BOOST SELECT	"
	KNOB , HF BOOST CONTROL	"
	KNOB , LF DROOP SELECT	"
	KNOB , LF DROOP CONTROL	"
	KNOB , HF DROOP SELECT	"

PARTS LIST CONTINUED:

KNOB , HF DROOP CONTROL	Raytheon 70-4-2
KNOB , BANDWIDTH	"
SOCKET , TRANSISTOR	Augat 8112-AG-1
TRANSISTOR	RCA 2N3054
POWER SUPPLY CARD COVER	LANG LEC-1
AMPLIFIER CARD COVER	LANG LEC-2
POWER TRANSISTOR COVER	LANG LEC-3



LETTERS REFER TO AMPHENOL 143-006-01 P.C CARD CONTACTS



A AC 50V  
 B AC 50V  
 C DC +62V  
 D AC and -COM.  
 E REG DC +33V  
 F OUTPUT FILTER

RESISTORS IN OHMS  
 1/2 W ± 10%  
 CAPACITOR IN UFD

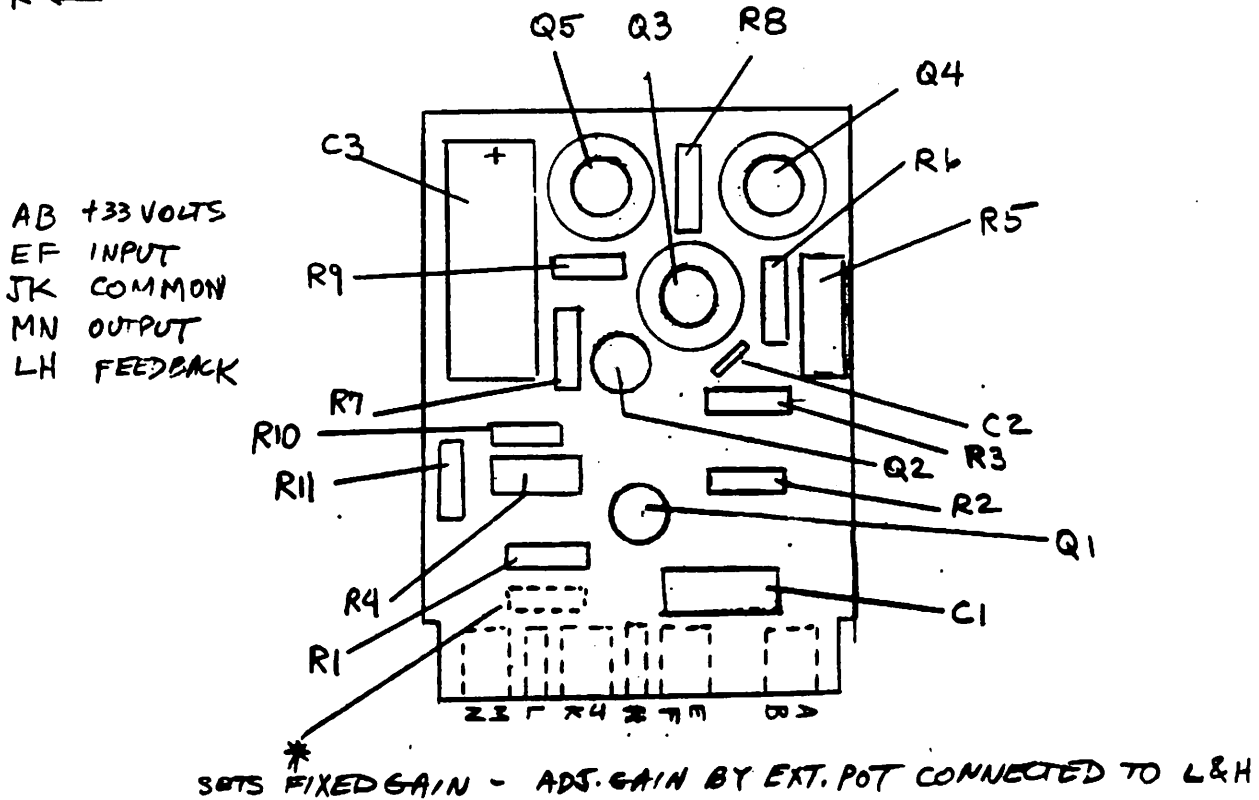
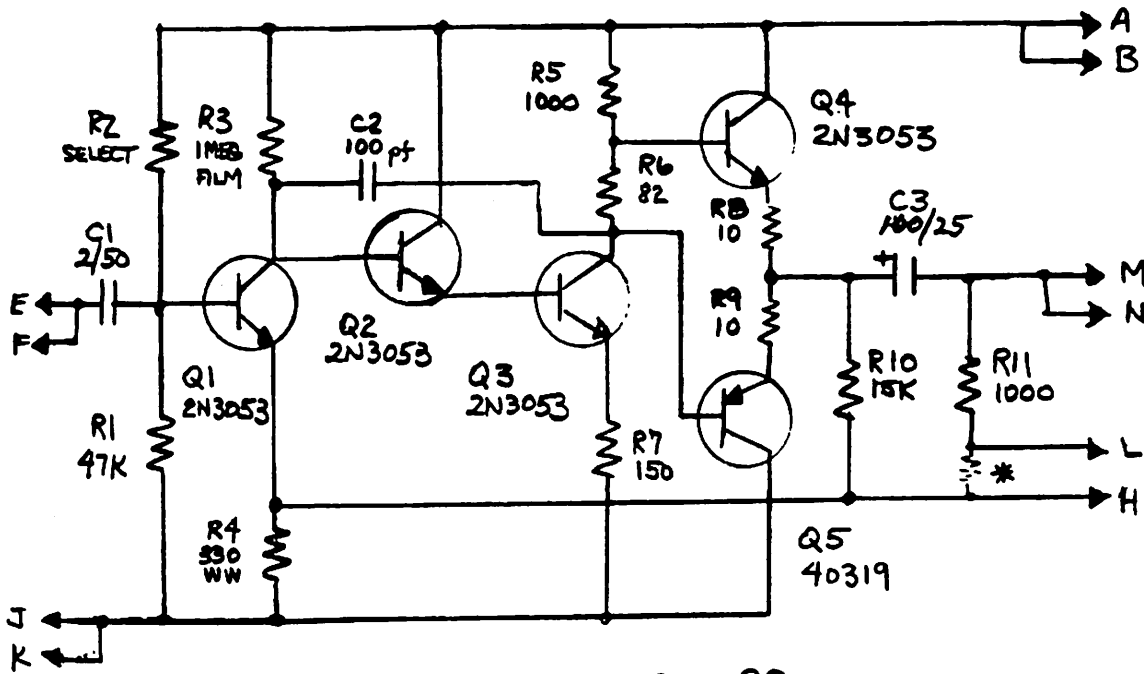
POWER SUPPLY-PS-2  
 SCHEMATIC & PARTS LAYOUT

POWER SUPPLY BOARD LPS-2

D1	DIODE	RCA 1N2859
D2	DIODE	RCA 1N2859
D3	ZENER DIODE	Motorola 1N974B
Q1	TRANSISTOR	RCA 2N3053
R1	RESISTOR	27 K 1/2W 5%
R2	RESISTOR	27 K 1/2W 5%
C1	CAPACITOR	50 uf 50V
C2	CAPACITOR	50 uf 50V

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LETTER DESIGNATIONS REFER TO AMPHENOL 143-012-01  
PRINTED CIRCUIT CONNECTORS

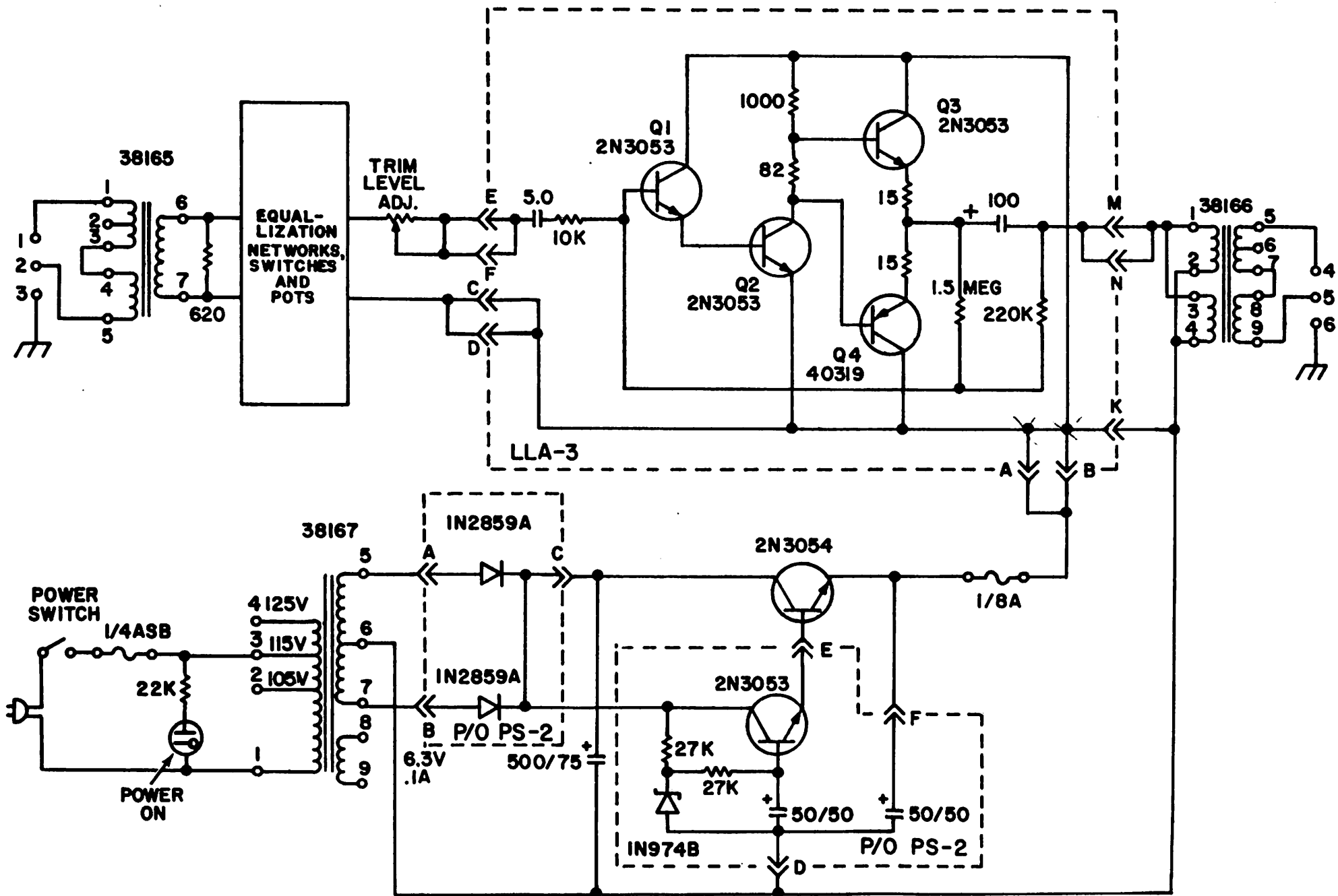


LINE AMPLIFIER LLA-4  
SCHEMATIC AND COMPONENT LOCATIONS

AMPLIFIER BOARD LLA-4

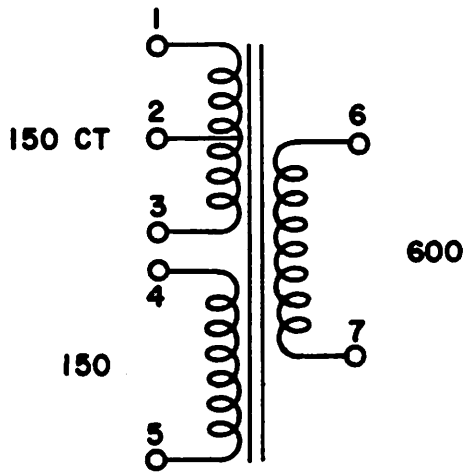
R1	RESISTOR	47 K 1/2W 10%
R2	RESISTOR	Nominal 1 Meg 1/2W 10%
R3	RESISTOR	1 Meg Dep. Film, 1%
R4	RESISTOR	330-340 ohm 1/2W 1%
R5	RESISTOR	1 K, 1 W, 10%
R6	RESISTOR	82 ohm 1/2W 10%
R7	RESISTOR	150 ohm 1/2W 10%
R8	RESISTOR	10 ohm 1/2W 10%
R9	RESISTOR	10 ohm 1/2W 10%
R10	RESISTOR	15 K 1/2W 10%
R11	RESISTOR	1 K 1/2W 10%
C1	CAPACITOR	2 ufd, 50 WVDC,Elect.
C2	CAPACITOR	18 pfd 200 WVDC,Disc.
C3	CAPACITOR	100 ufd 25 WVDC,Elect.
Q1	TRANSISTOR	2 N 3053
Q2	TRANSISTOR	2 N 3053
Q3	TRANSISTOR	2 N 3053
Q4	TRANSISTOR	2 N 3053
Q5	TRANSISTOR	RCA 40319
HEAT SINK	3 Ea.	THERM ALLOY 2211

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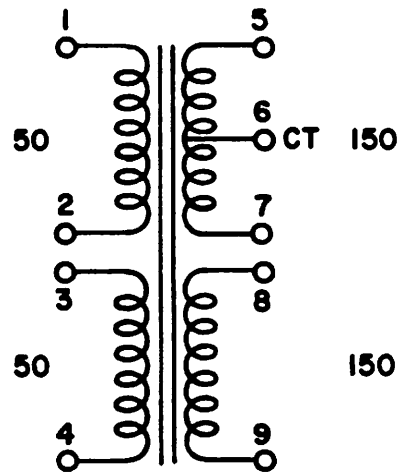


PEQ-2 SCHEMATIC DIAGRAM

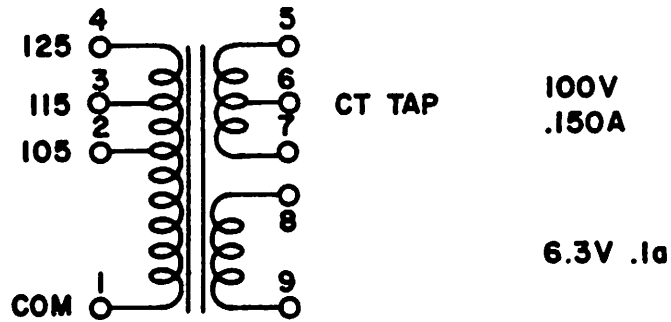
38165



38166



38167



TRANSFORMER CONNECTIONS

## VOLTAGE MEASUREMENTS

### AMPLIFIER

CARD TERMINAL	READING
A	+33.0 VDC
B	+33.0 VDC
C	0
D	0
E	0
F	0
H	-
J	-
K	0
L	-
M	0
N	0

### POWER SUPPLY

CARD TERMINAL	
A	50 V AC
B	50 V AC
C	+62 V DC
D	0
E	+33.5V DC
F	+33.0V DC

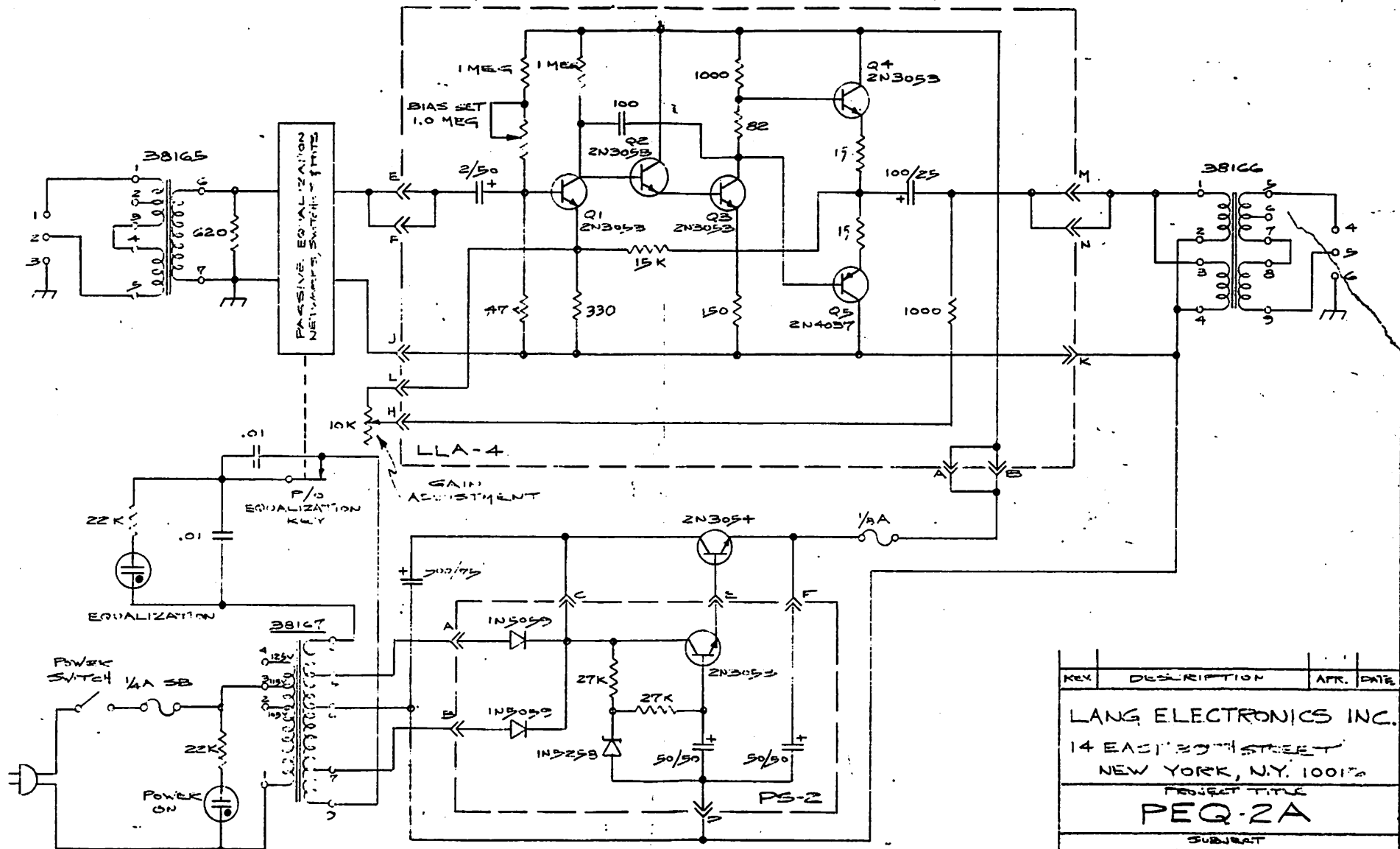
Line Voltage 115 Volts

All voltages measured to chassis

DC voltages measured with 20,000 ohm per volt meter

AC voltages measured with 5,000 ohm per volt meter

Readings taken with NO SIGNAL and equalization controls  
set at zero position.



REV.	DESCRIPTION	APP.	DATE
	LANG ELECTRONICS INC.		
	14 EAST 30TH STREET		
	NEW YORK, N.Y. 10012		
	PROJECT TITLE		
	<b>PEQ-2A</b>		
	SUBJECT		
	PROGRAM EQUALIZER		
	SCHEMATIC DIAGRAM		
ENG. A.F. MARKS	CXD		
DVN. STEVEN 7-15-69	APR		
SCALE	PROJ. NO.		
/	<b>LP 1430</b>		
	(E3 1420)		