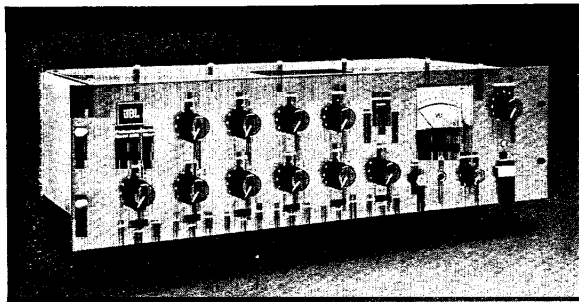


JBL 5302 INSTALLATION AND SERVICE MANUAL



Owners Instructions

Architectural Specifications

The mixer shall be a solid-state unit capable of combining six microphone and two line level inputs, or five microphone, two line level and one pair of phono inputs and shall be capable of delivering +18 dBm with less than 0.2% THD. It shall have a frequency response of 20 Hz - 20 kHz, ± 1 dB (unbalanced input), 35 Hz - 20 kHz, +1 dB, -2 dB (balanced input), at +18 dBm or less.

Each of the six microphone inputs shall accommodate an unbalanced high impedance microphone or a balanced low impedance microphone. The microphone input circuits shall be equipped with 9-pin sockets for mounting optional plug-in transformers to permit the use of low impedance microphones. Three-pin female XL-type sockets with positive latch locking devices shall be provided for the microphone channels. Each microphone input shall be equipped with an input pad switch on the front panel, selectable from 0, 15, or 30 dB attenuation.

The two line level inputs shall accommodate an unbalanced high impedance input, or a balanced high or low impedance input. The line level inputs shall be equipped with 9-pin sockets for mounting optional plug-in transformers. A five screw terminal board shall be provided for connecting each line input.

One microphone input shall alternatively accommodate a magnetic phonograph cartridge input. A dual RCA-type phono jack shall be provided to allow program input from a stereo source.

The mixer shall have individual low and high frequency tone controls. The low frequency control shall affect output below 500 Hz (± 3 dB reference point) and the high frequency control shall affect the output above 2.5 kHz (± 3 dB reference point).

A 6.3 mm ($\frac{1}{4}$ inch) phone jack shall be provided on the face panel to allow headset monitoring or connection to an auxiliary amplifier. The monitor output shall be affected by both the master level control and the tone controls and shall be provided with a separate gain control. A **CUE IN/OUT** switch shall be provided to allow the mixer output to be switched off.

For a balanced 600 Ω output, an optional accessory output transformer shall be available.

The mixer shall occupy three standard EIA rack spaces and shall operate on 120/240 V AC, 50/60 Hz.

The mixer shall be the JBL Model 5302.

JBL continually engages in research related to product improvement. New materials, production methods and design refinements are introduced into existing products without notice as to a routine expression of that philosophy. For this reason, any current JBL product may differ in some respect from its published description, but will always equal or exceed the original design specifications unless otherwise stated.

Product Specifications

Accessories	Model 5195 Matching/bridging Transformer
	Model 5901 Microphone Input Transformer
	Model 5902 Output Transformer
Connectors	
Line Input (2)	Screw terminal board
Monitor Headphone	Standard 6.3 mm (1/4 in.) phone jack
Microphone Input (6)	Female XL-type socket, positive latch locking
Output	Screw terminal board
Phono (2)	RCA type jack
Controls	
Cue	Push-lock/push-release mechanical reflecting indicator button
Line (2)	Linear taper pot ³
Master Level	Audio taper pot
Meter Range	3-position slide switch +8 dBm, +4 dBm, 0 dBm
Microphone (6)	Linear taper pot ³
Microphone Attenuator Pads (6)	3-position slide switch 0 dB, -15 dB, -30 dB
Power	Push-lock/push-release switch
Tone Controls	
Bass	$\cong \pm 14$ dB @ 50 Hz
Treble	$\cong \pm 10$ dB @ 10 kHz
Dimensions	
Front Panel	483 mm x 133 mm 19" x 5 7/32"
Depth of Controls	19 mm 3/4"
Depth Behind Panel	191 mm 7 1/2"
Equivalent Input Noise	
Direct Input	
Phono	-68 dB (ref. 10 mV input @ 1 kHz)
Balanced Input	
Microphone with 5901 Transformer ²	-124 dB
Line with 5195 Transformer ³	-90 dBm
Frequency Response	
Direct Output	
Direct Input	
Microphone ²	± 1 dB, 20 Hz-20 kHz
Line ³	± 1 dB, 20 Hz-20 kHz
Phono	± 1 dB, 20 Hz-20 kHz
Balanced Input	
Microphone with 5901 Transformer ²	+1 dB, -2 dB, 30 Hz-20 kHz
Line with 5195 Transformer ³	+1 dB, -2 dB, 30 Hz-20 kHz
Balanced Output with 5902 Transformer	
Direct Input	
Microphone ²	± 1 dB, 20 Hz-20 kHz
Line ³	± 1 dB, 20 Hz-20 kHz
Balanced Input	
Microphone with 5901 Transformer ²	+1 dB, -2 dB, 30 Hz-20 kHz
Line with 5195 Transformer ³	+1 dB, -2 dB, 30 Hz-20 kHz

Gain	
Direct Input (unbalanced)	
Microphone	60 dB, high Z
Line	29 dB, high Z
Phono	53 dB @ 1 kHz, high Z
Balanced Input	
Microphone with 5901 Transformer	80 dB, low Z
Line with 5195 Transformer	28 dB, high Z
Headphone Output Level	+14 dBm
Input Overload ⁶	
Direct Input (unbalanced)	
Microphone ²	
Input Pad 0	79.8 mV
Input Pad -15	450 mV
Input Pad -30	2.5 V
Line ³	8.4 V
Phono	152 mV
Balanced Input	
Microphone ²	
Input Pad 0	4.43 mV
Input Pad -15	24.96 mV
Input Pad -30	139 mV
Line ³	9.0 V
Intermodulation Distortion ⁴ (SMPTE)	< 0.03%
Input Impedance	
Direct Input (unbalanced)	
Microphone	82 k Ω
Line	15 k Ω
Phono	47 k Ω
Balanced Input	
Microphone with 5901 Transformer	800 Ω
Line with 5195 Transformer	15 k Ω
Maximum Ambient Temperature	60°C 140°F
Mounting	3 EIA standard rack spaces
Net Weight	7.2 kg 15 3/4 lb
Output Impedance	
Direct	40-80 Ω , unbalanced (20 Hz-20 kHz)
Balanced with 5902 Output Transformer	400-600 Ω , (20 Hz-20 kHz)
Headphone	500-600 Ω , unbalanced (20 Hz-20 kHz)
Output Level	> +18 dBm
Panel Finish	Semi-gloss baked enamel, dark gray
Power Requirements	
Line Voltage	120/240 V AC, 50/60 Hz
Wattage	7 W
Shipping Weight	9 kg 20 lb
Total Harmonic Distortion	< 0.2%, 20 Hz-20 kHz @ rated output

- NOTES: 1. Requires 20 Hz-20 kHz equivalent bandwidth filter.
2. 150 Ω input source.
3. 600 Ω input source.
4. At +18 dBm.
5. Equivalent audio taper.
6. Measured at 0.5% THD.

Installation

The 5302 is suitable either for rack mounting in three

EIA rack spaces without additional bracing or ventilation, or for counter-top placement. A full set of mounting hardware is packaged with each unit. All external connections are made on the rear panel, Figure 2.

Operating Temperature

The minimum recommended clearance when stacking the unit is one EIA standard panel space. The maximum allowable ambient temperature for the mixer is 60°C (140°F).

Operating Controls

All operating switches, meter and level controls are located on the front panel, Figure 1.

Input Connections

Input connections to the mixer may be either direct-coupled or transformer-isolated at the XL-type sockets or the screw terminal boards, Figure 2.

Direct coupling is accomplished by connecting the center conductor of a shield cable to **DIRECT** (line input) and the shield to **GND**, the center conductor of a shield cable to pin #2 (XL-type connector) and the shield to pin #1, or the center conductor of a shield cable to the center pin of an RCA-type phono plug and the shield to the shell.

For transformer-isolated inputs, a 5901 universal microphone transformer (for microphone inputs) or a 5195 matching/bridging transformer (for line inputs), Figures 3A and 3B, may be used. Transformer-isolation is accomplished by connecting the clear conductor of a two conductor shield cable to the **HI** (line input), the black conductor to the **LO** and the shield to **GND**, or the clear conductor of a two conductor shield cable to pin #3 (XL-type connector), the black conductor to pin #2 and the shield to pin #1.

Output Connections

Output connections to the mixer may be either direct-coupled or transformer-isolated at the screw terminal board, Figure 2.

Direct coupling is accomplished by connecting the center conductor of a shield cable to **DIRECT** and the shield to **GND**.

Transformer-isolated output requires a 5902 optional accessory output transformer.

Warning: Addition of 5902 accessory transformer requires internal modification by a qualified service technician.

Transformer-isolated output is accomplished by connecting the clear conductor of a two conductor shield cable to the **HI**, the black conductor to the **LO** and the shield to **GND**.

NOTE: Direct output of the mixer is not possible when the 5902 optional output transformer is installed.

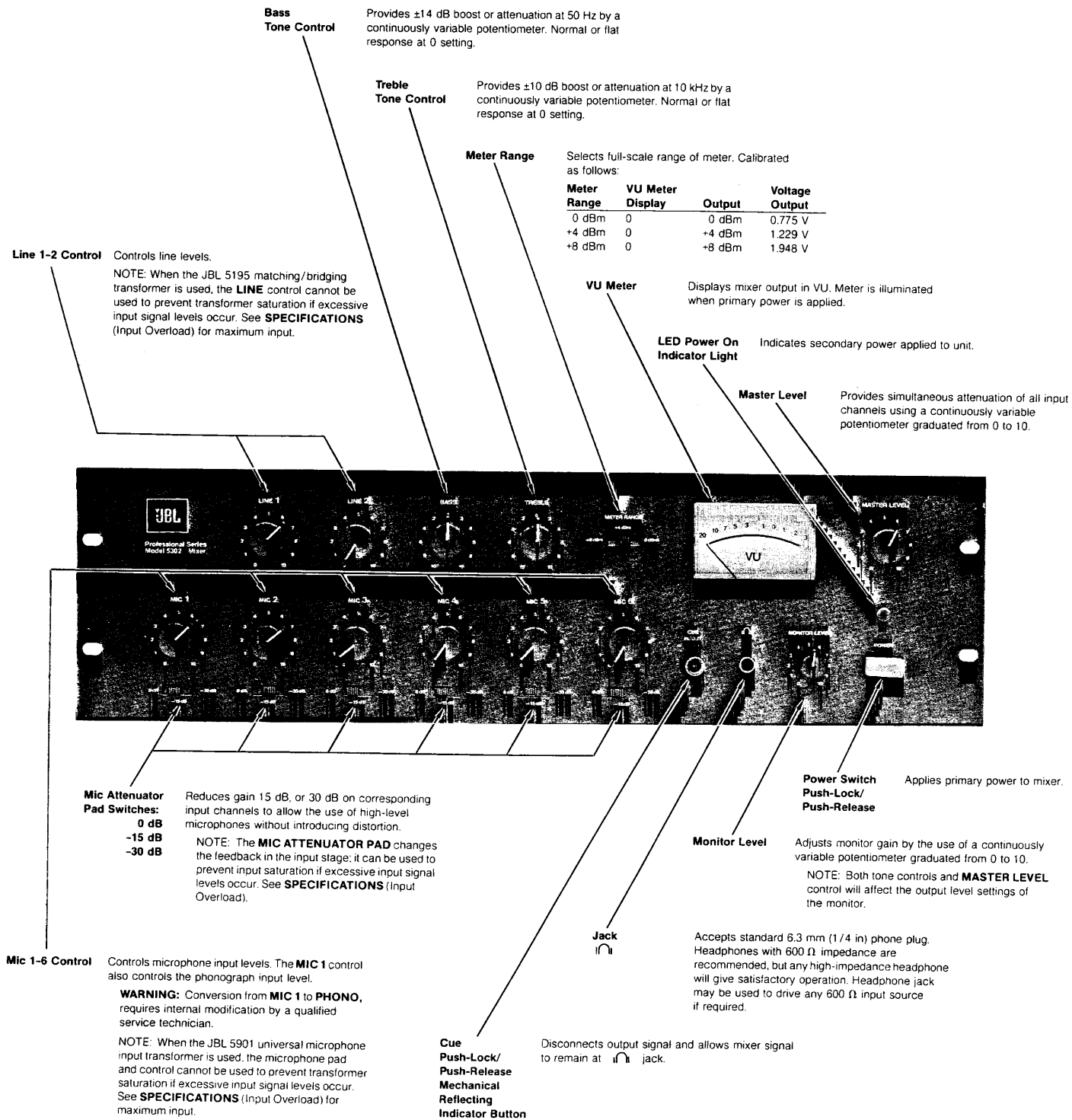


FIGURE 1

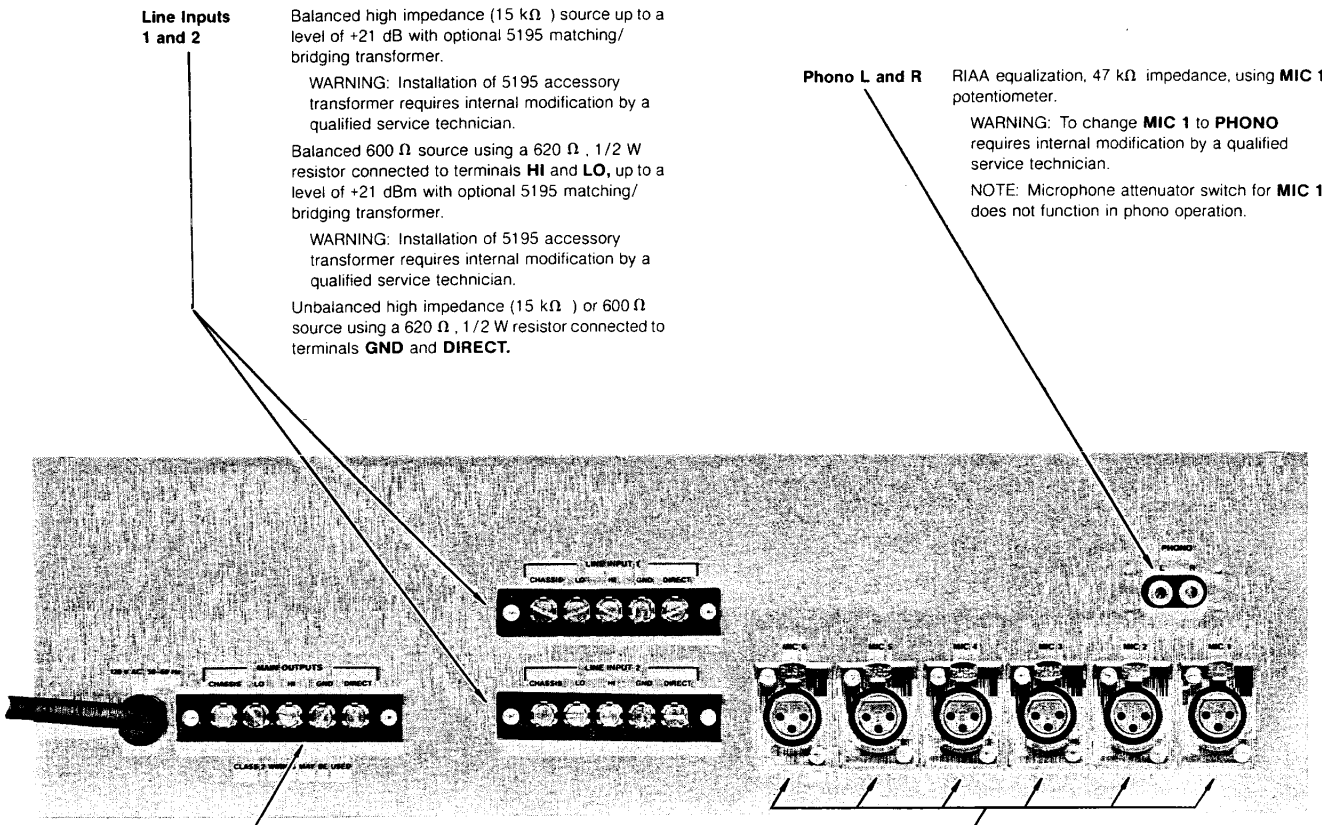


FIGURE 2

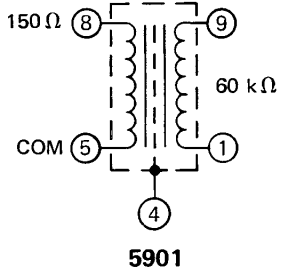


FIGURE 3A

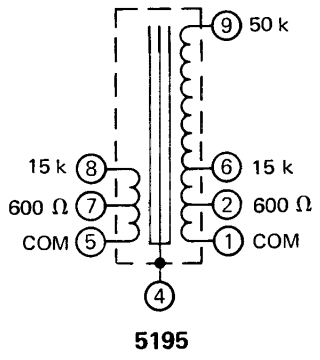


FIGURE 3B

Service and Maintenance Instructions

The following procedures are designed to assist in the isolation of malfunctions. The operations described should be undertaken only after an investigation of all external connections and adjustments has indicated, beyond reasonable doubt, that the problem is actually internal.

WARNING: Disconnect the 5302 mixer from the power source before performing service operations or replacing components.

Voltage Conversion

The 5302 mixer can be operated from either a 120 V AC or 240 V AC, 50/60 Hz source. The line voltage selector terminal strip, TB1, Figure 4, changes the primary connections of the power transformer. Use the following procedure to change the voltage range:

1. Remove the 12 screws which hold the top cover to the chassis.
2. To convert from 120 V AC to 240 V AC, remove the two terminal strip jumpers, Figure 5A. Install one jumper only, per Figure 5B.
3. Change the line cord and/or attaching plug to match the supply source receptacle, or use a 120 V to 240 V AC adapter (not provided). The adapter as well as the power supply cord and/or attachment plug used for the 240 V AC mode in the U.S., Canada and Japan shall be both UL listed and CSA Certified for use with said power source receptacle and wired per Table 1. For use in other countries, adapter, line cord and/or attachment plug selection shall be based on local regulations governing 240 V AC, 50/60 Hz supply source.

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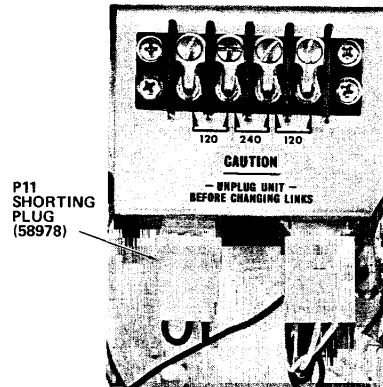


FIGURE 4

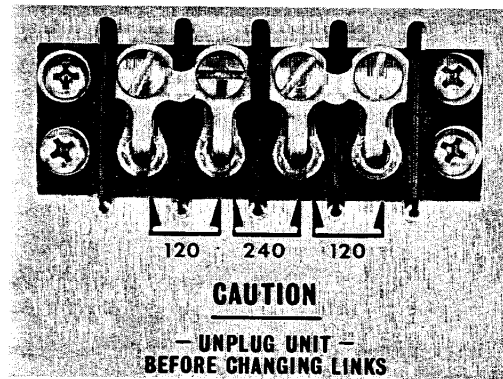


FIGURE 5A

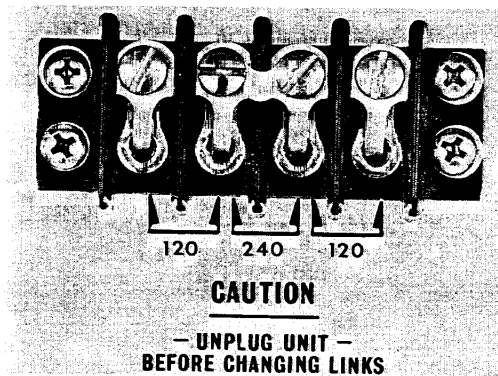


FIGURE 5B

TABLE 1

Country	Wire Color Code	Line Cord Connections		
		Terminal Strip (TB 1-4)	J 12-1	Ground Lug (E 2)
U.S., Canada and Japan	Black	—	Attached	—
	White	Attached	—	—
	Green	—	—	Attached
Europe	Blue	—	Attached	—
	Brown	Attached	—	—
	Green/Yellow	—	—	Attached

Installation of Output Transformer

To install the optional transformer, Figure 6A, (Model No. 5902):

1. Remove the top cover.
2. Place the optional output transformer in the corner of the chassis, per Figure 11, and secure it at the two holes in the bottom of the chassis with the hardware provided, per Figure 6B.
3. Remove the Molex shorting plug, P11, JBL part No. 58978 from the termination bracket, Figure 4.
4. Attach the Molex male connector from the output transformer to J11 on the termination bracket per Figure 6C.
5. Recalibrate VU meter per **METER CALIBRATION PROCEDURE.**

NOTE: If meter calibration procedure is not performed, output level will be a minimum of +2 dBm higher than indicated on the Vu meter.

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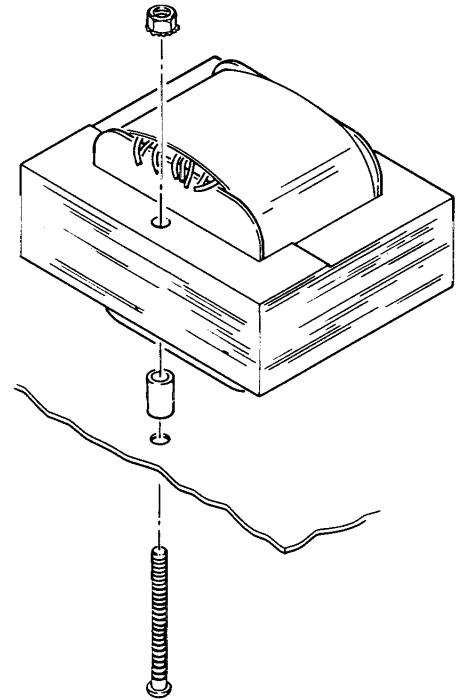


FIGURE 6B

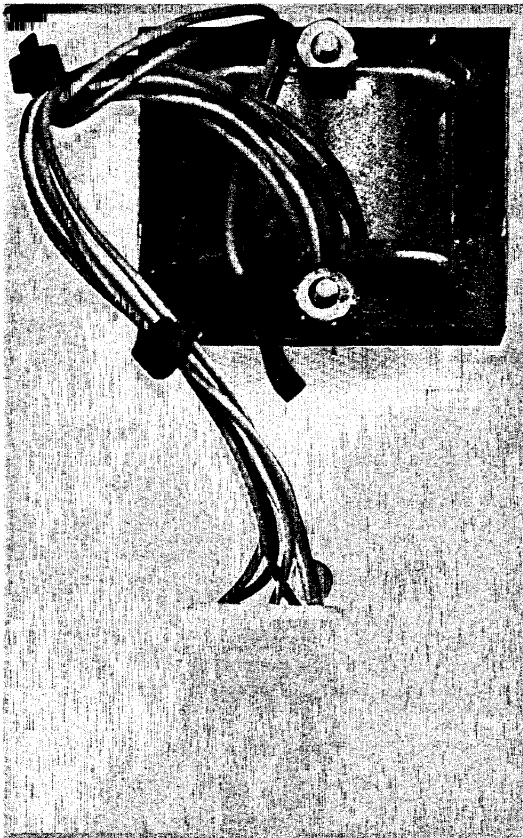


FIGURE 6A

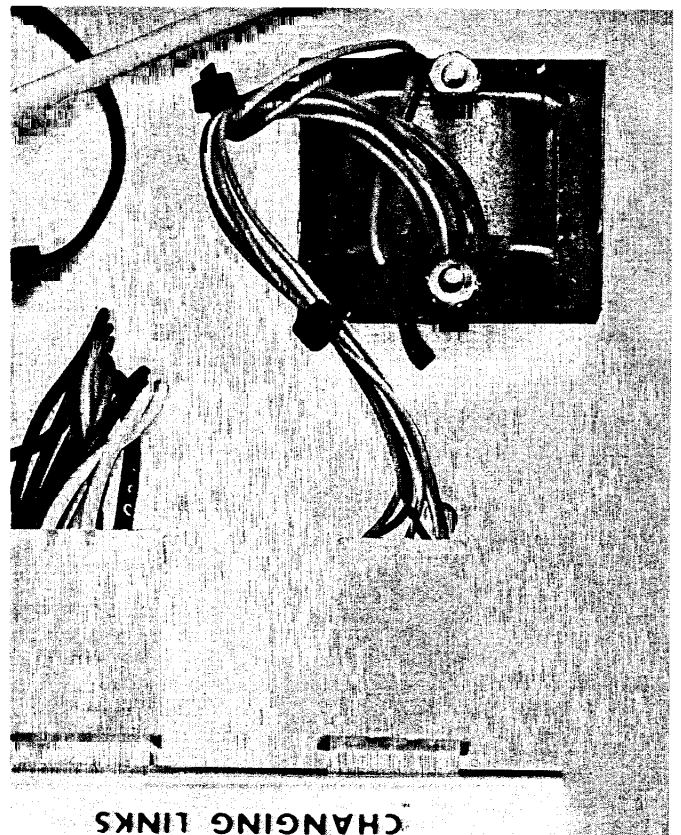


FIGURE 6C

Installation of Microphone Transformers

To install the optional microphone transformer, Figure 7A, (Model No. 5901):

1. Remove the top cover.
2. Remove the two copper jumpers between terminal **8 & 9** and **4 & 5** of **XT1-XT6**, Figure 7B.

NOTE: Remove only those jumpers from the 9-pin sockets in which optional microphone transformers are to be used.

3. Install the optional transformers per Figure 7C.



FIGURE 7A

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JUMPER
(PINS 4 & 5)

JUMPER
(PINS 8 & 9)

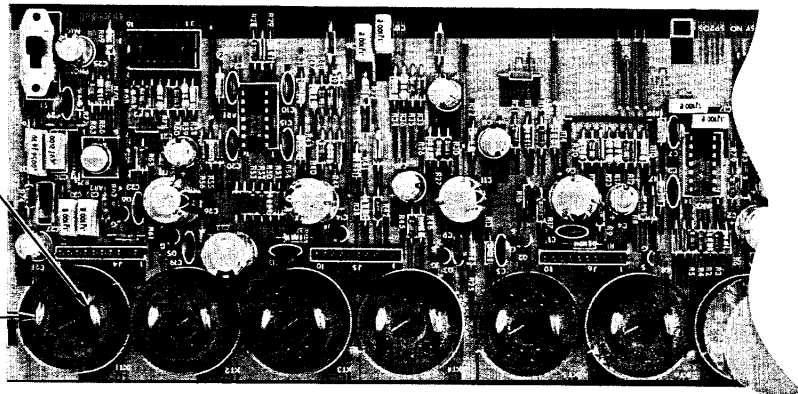


FIGURE 7B

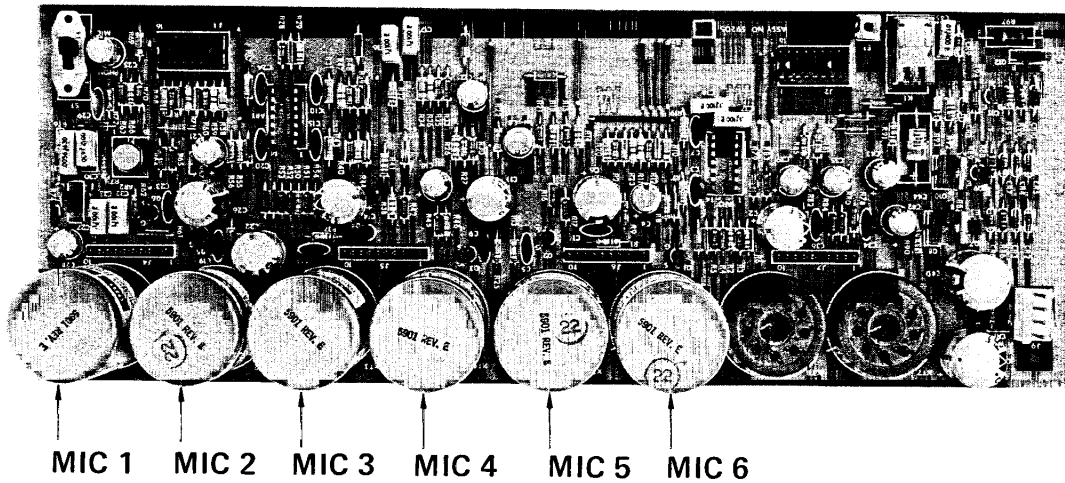


FIGURE 7C

Installation of Line Transformers

To install the optional matching/bridging transformer, Figure 8A, (Model No. 5195):

1. Remove the top cover.
2. Install the optional matching/bridging transformer as follows:
 - A. Line 1 — **XT7** (Figure 8B)
 - B. Line 2 — **XT8** (Figure 8C)

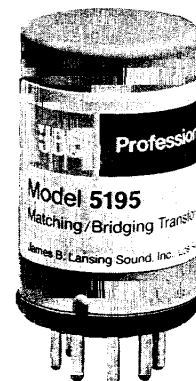


FIGURE 8A

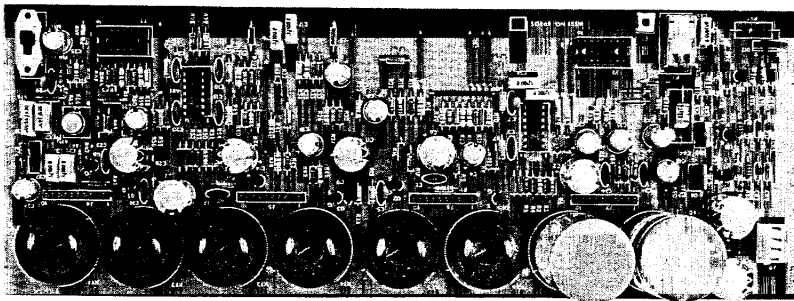


FIGURE 8B

LINE 1

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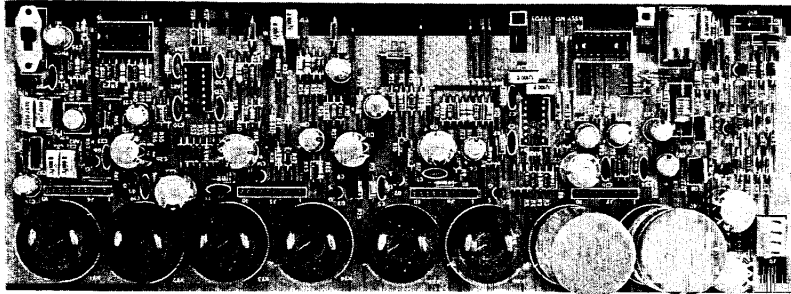


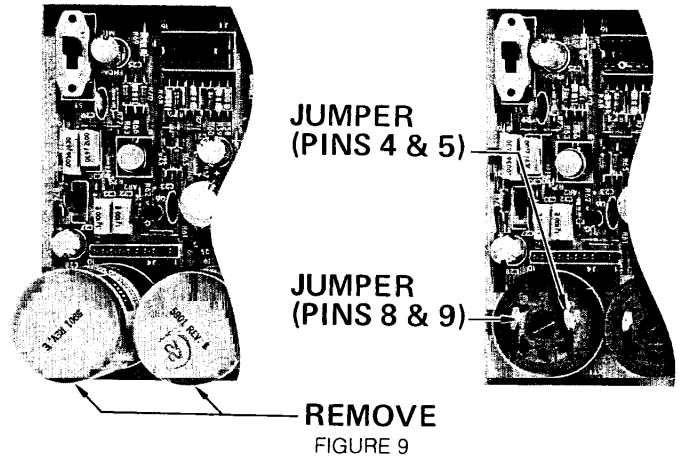
FIGURE 8C

LINE 2

Jumper Installation

To install microphone jumpers, Figure 7B :

1. Remove the top cover.
2. Remove the optional microphone transformer, (Model No. 5901) from the appropriate 9-pin socket and install two #12 AWG copper jumpers per Figure 9.



JUMPER
(PINS 4 & 5)

JUMPER
(PINS 8 & 9)

REMOVE
FIGURE 9

Conversion to MIC #1 to PHONO

1. Remove the top cover.
2. Adjust the slide switch per Figure 10.

SWITCH SHOWN IN
PHONO POSITION

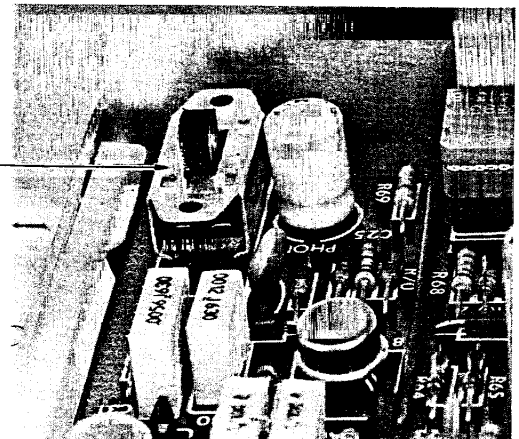


FIGURE 10

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Item	JBL Part No.	Qty.	Description
1	55630	11	knob
2	10630	10	nut
3	59026	1	ribbon cable assy.
4	59039	1	front panel
5	52886	1	knob
6	54969	1	knob
7	55098	1	VU meter
8	59874-01	1	potentiometer
9	59893	1	LED mounting lens clip
10	89508	2	Keps nut, 6-32
11	54953	1	power switch
12	59292	1	#10 flat washer
13	59894	1	green LED
14	59031	1	switch
15	57807	2	Phillips-head, 4-40 x 1-1/4
16	59848	4	type B screw, 6 x 3/8
17	59848	11	type B screw, 6 x 3/8
18	*59160	1	chassis
19	10699	2	Phillips-head, 6-32 x 5/16
20	59848	2	type B screw, 6 x 3/8

Item	JBL Part No.	Qty.	Description
21	*59190	1	PC assembly
22	58745-02	1	cable
23	58745-02	1	cable
24	*59024	1	mounting control bracket
25	59065	1	accessory output transformer, 5902
26	11496	2	4-40 nut
	12267	2	#4 washer
27	57807	2	spacer
28		2	accessory line transformer, 5195
29		6	accessory mic transformer, 5901
30	*59205	1	PC assembly
31	59875	1	bracket
32	54727	2	Phillips-head screw, 4-40 x 3/16
33	59027	1	cover
34	59060	2	spacer, 1/4 OD x 1/2
35	59029	1	monitor jack
36	59180-02	1	master volume control
37	note 1	4	meter mounting set ¹
38	*59009	1	termination bracket
39	59139	1	power transformer
40	59848	12	type B screw, 6 x 3/8

Note: 1. No JBL replacement, 3 mm set.

*Part No. shown for reference only, not available from JBL as a complete assembly.

VU Meter Calibration Procedure

1. Meter calibration without accessory output transformer 5902.
 - A. Remove the top cover.
 - B. Connect an AC VTVM to the **MAIN OUTPUT** screw terminal board, **DIRECT** and **GND** and terminate with a 600 Ω load.
 - C. Connect test oscillator 600 Ω output, terminated in 600 Ω load to the **LINE INPUT 1** screw terminal board **DIRECT** and **GND**.
 - D. Set the 5302 controls as follows:
 - MASTER LEVEL MAX.
 - LINE 1 MAX.
 - METER RANGE 0 dBm
 - BASS 0
 - TREBLE 0
 - E. Set test oscillator frequency to 1 kHz at an amplitude of -30.4 dBm.
 - F. Adjust the meter calibration control, VR11, through the access hole on the top of the front panel per Figure 11, for 0 VU indication, 0 dBm out.
2. Meter calibration with accessory output transformer 5902.
 - A. Remove the top cover.
 - B. Connect an AC VTVM to the **MAIN OUTPUT** screw terminal board, **HI** and **LO** and terminate with a 600 Ω load.
 - C. Connect test oscillator 600 Ω output, terminated in 600 Ω load to the **LINE INPUT 1** screw terminal board **DIRECT** and **GND**.
 - D. Set the 5302 controls as follows:
 - MASTER LEVEL MAX.
 - LINE 1 MAX.
 - METER RANGE 0 dBm
 - BASS 0
 - TREBLE 0
 - E. Set test oscillator frequency to 1 kHz at an amplitude of -31.6 dBm.
 - F. Adjust the meter calibration control, VR11, through the access hole on the top of the front panel per Figure 11, for 0 VU indication, 0 dBm out.

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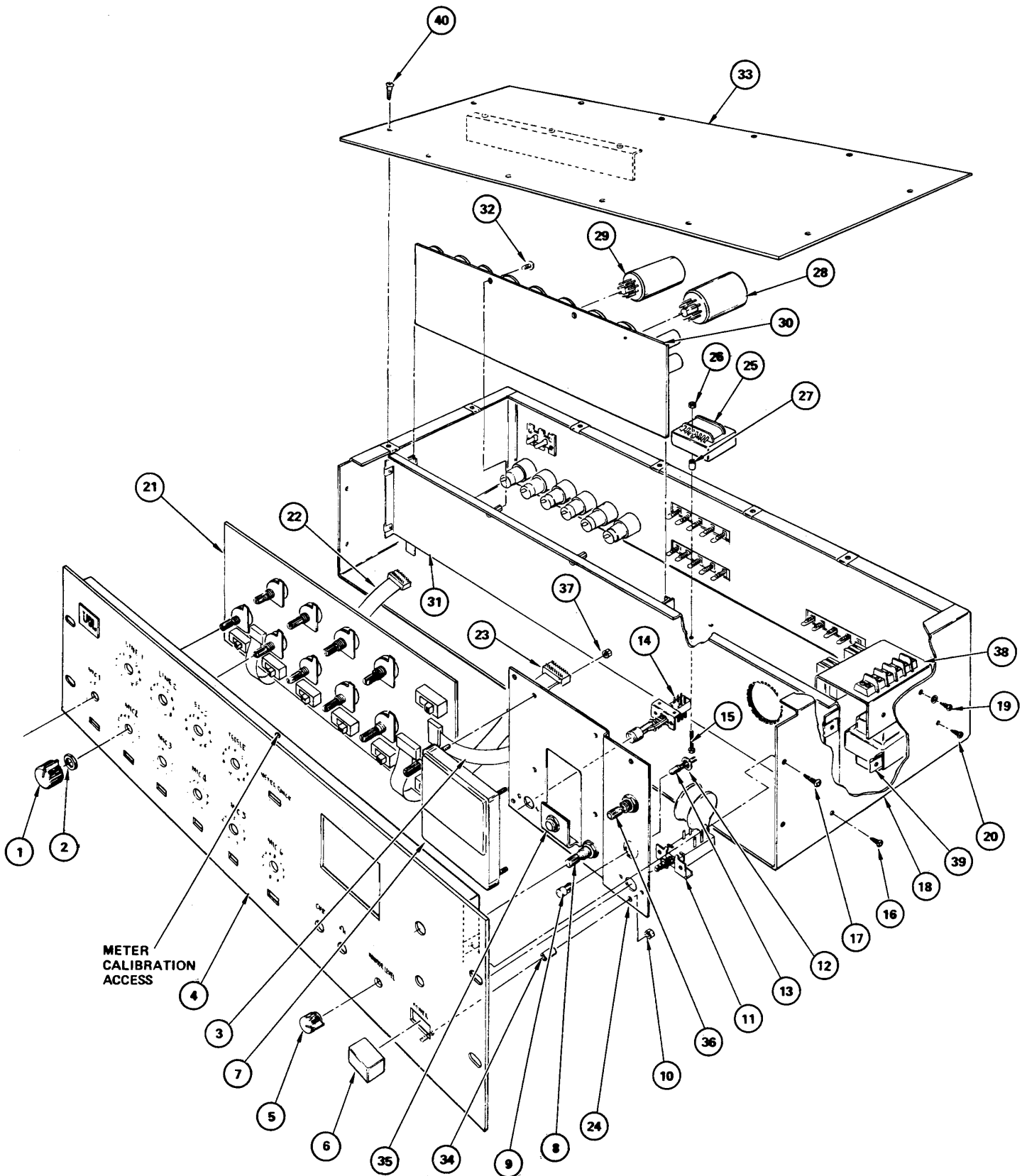
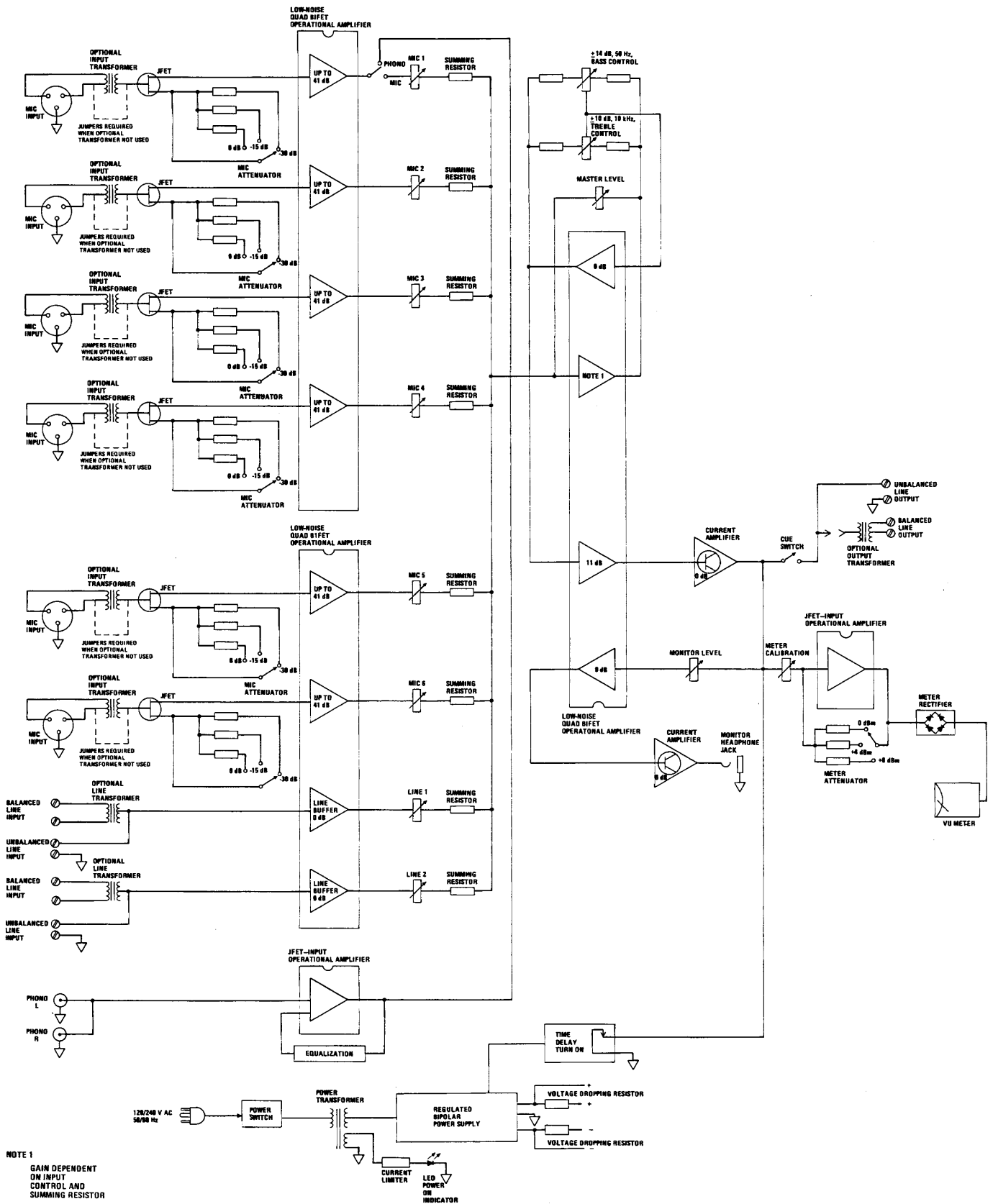


FIGURE 11

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NOTE 1
 GAIN DEPENDENT
 ON INPUT
 CONTROL AND
 SUMMING RESISTOR

Block Diagram

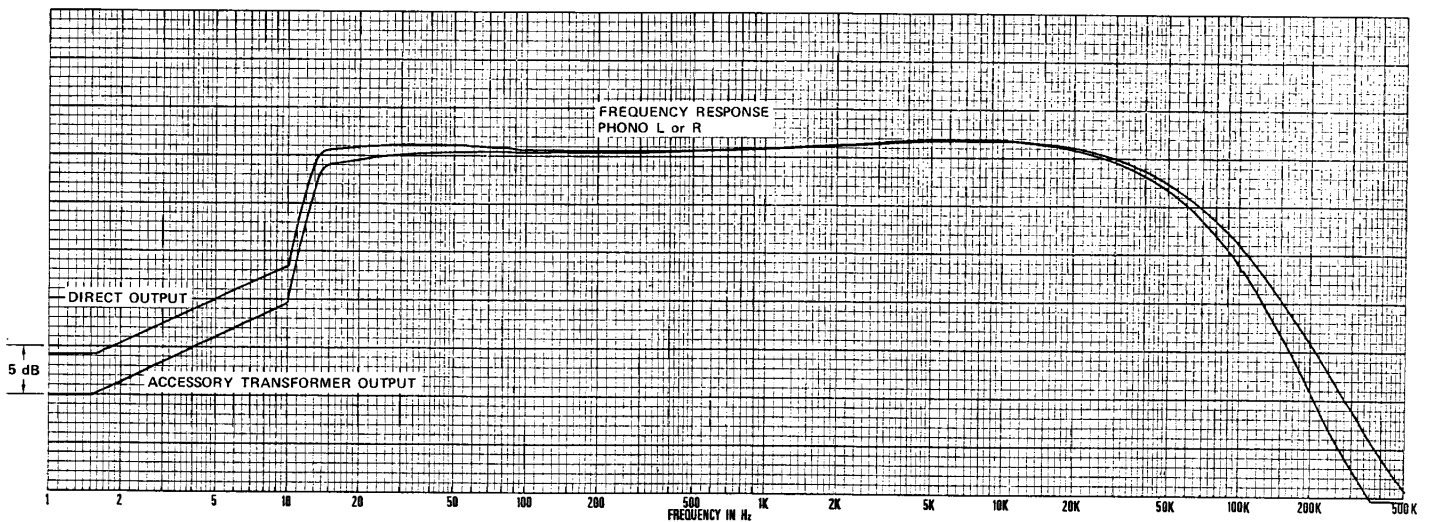
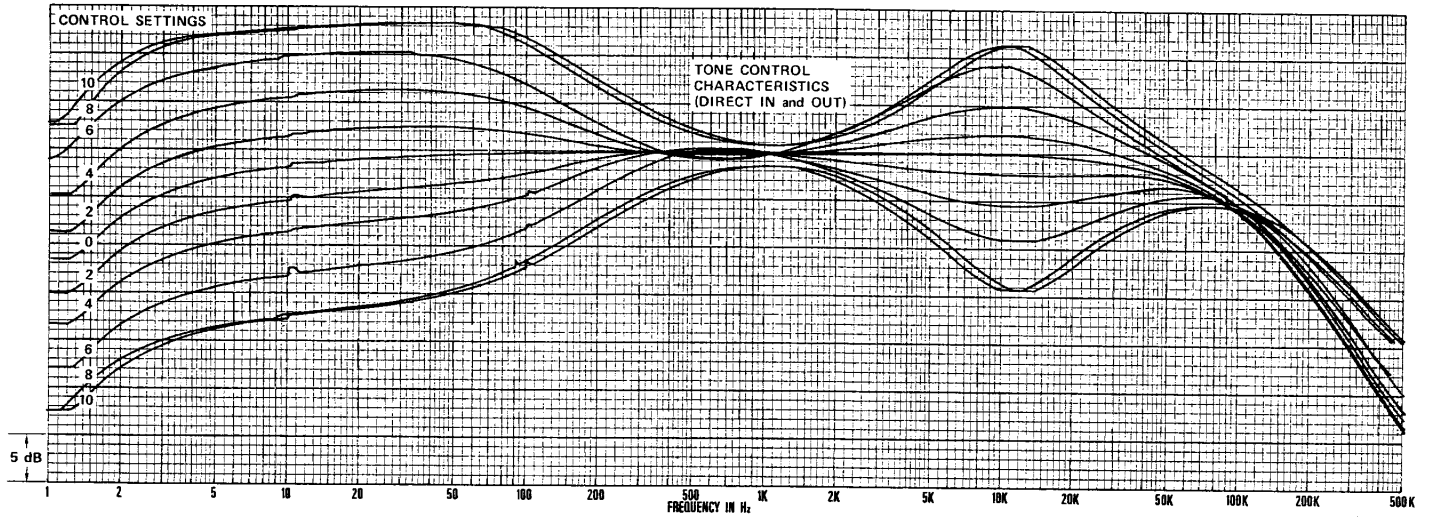
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Test Equipment required to meet Proof of Performance:¹

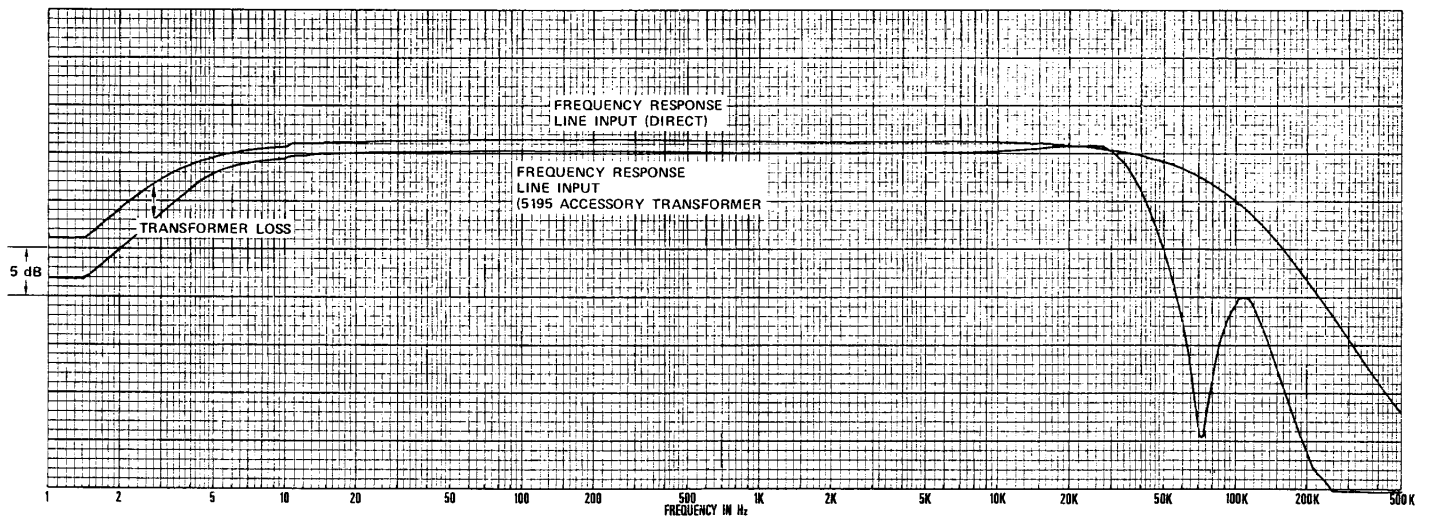
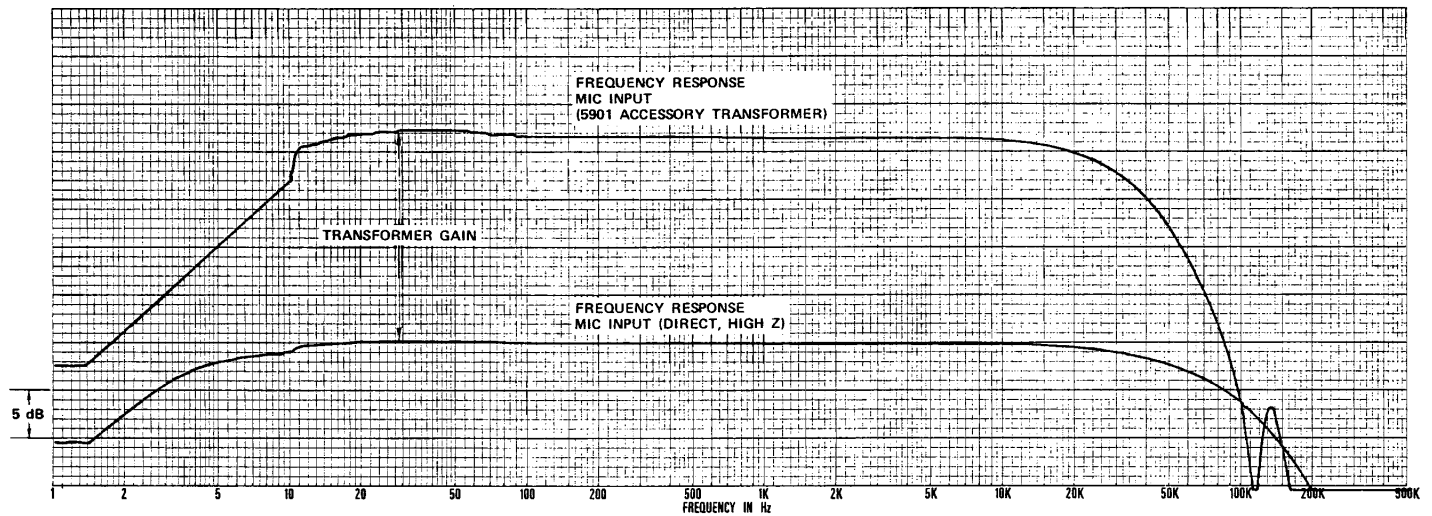
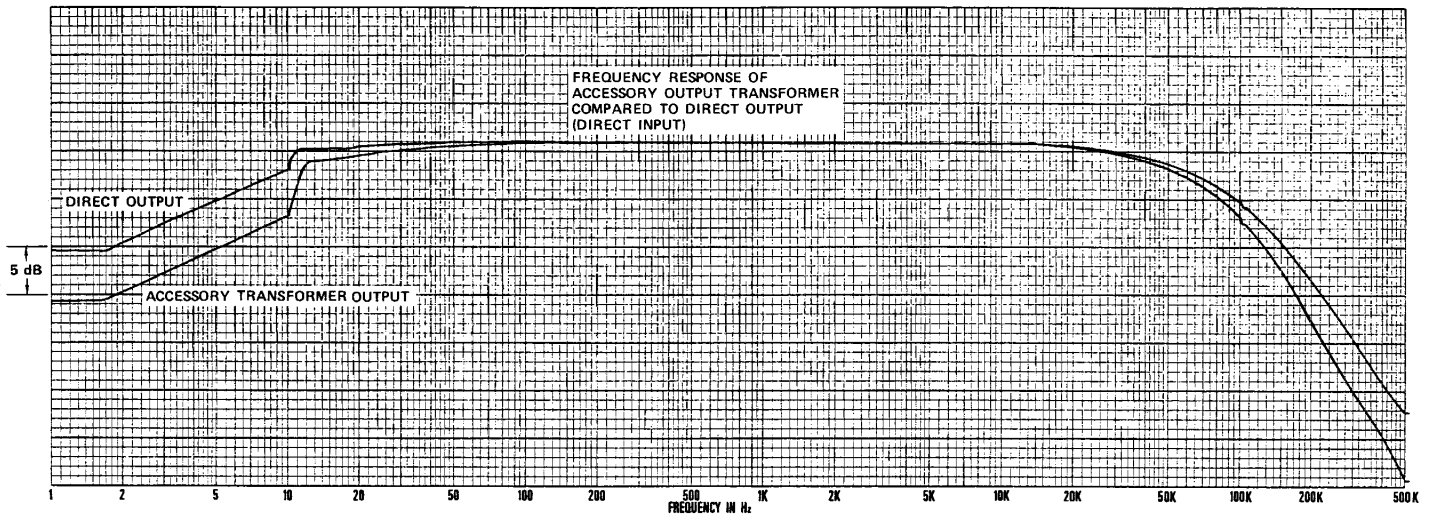
Clarostat 240C Decade resistor box
 Dana 170 Amplifier
 Fluke 8000A DVM
 GenRad W5MT3W Variac autotransformer
 GenRad 1523/1523-P2 ... Graphic level recorder set
 GenRad 1840-A Output power meter
 HP 350B Attenuator set
 HP 339A Distortion measurement set

HP 400FL AC voltmeter
 Krohn-Hite 3202 Filter²
 Philips PM3262 Dual trace scope
 Sound Technology
 1700 B IM distortion measurement
 system

NOTES: 1. Equivalent test equipment may be substituted.
 2. 20 kHz equivalent bandwidth filter



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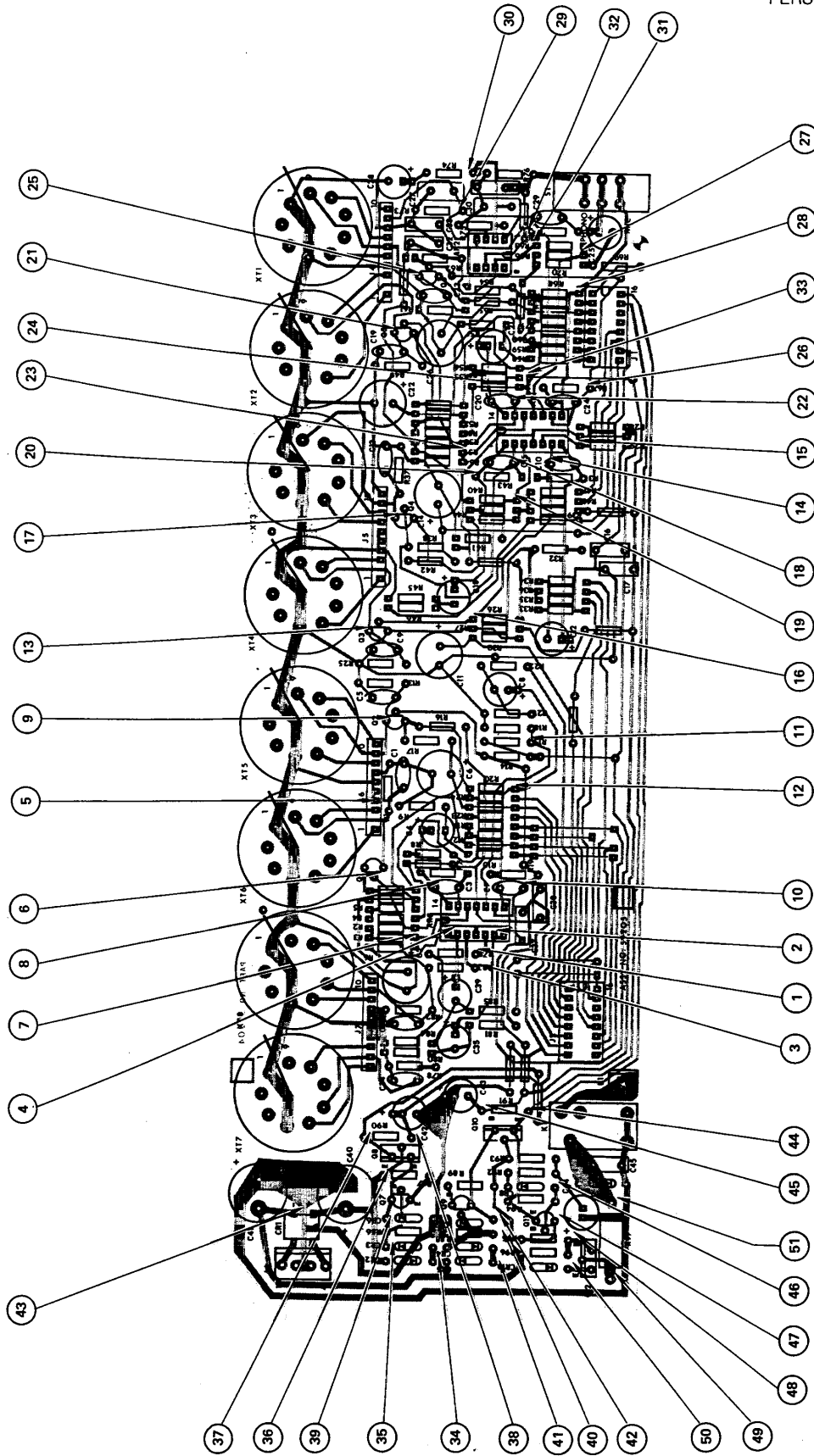


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A2 - TRANSFORMER BOARD

C11	500V P.F.
C10	120V P.F.



- 6. O indicates voltage test points found on P.C. assembly.
 - 5. --- denotes circuit board.
 - 4. All resistors are in ohms.
 - 3. All capacitors are in microfarads.
 - 2. Voltage measurements made with a Fluke DVM, no signal applied, negative lead of DVM to ground, 120 V AC line voltage. Voltage tolerance $\pm 10\%$.
 - 1. Line 1 and MIC 1 shown with accessory transformers for reference only. Unit shipped with copper jumpers on MIC 1 through MIC 6, pins 4 & 5 and 8 & 9.
- Notes: Unless otherwise specified

Circuit Description	JBL Part No.	Description		
AMPMODU INTERCONNECTION SYSTEM (MOD. IV — SHORT VERSION RECEPTACLE TO MATE)				
P4	—	86427-2	10 position AMP	
P5	—	86427-2	10 position AMP	
P6	—	86427-2	10 position AMP	
P7	—	86427-2	10 position AMP	
CABLE				
W1	82477	power cord		
W4	59026	ribbon cable assy.		
W12	58745-02	ribbon cable assy.		
W13	58745-02	ribbon cable assy.		
CAPACITORS				
All capacitors in μ F unless otherwise noted.				
C1	13189	0.01	1.4 kV	
C2	13189	0.01	1.4 kV	
CHASSIS JACKS				
PH1	84126	RCA type		
PH2	59029	phone jack		
DIODES				
CR1	52544	1N914B		
CR2	59894	green LED		
METER				
M1	55098	VU		
MOLEX STANDARD NYLON CONNECTORS				
J10	—	03-09-1022	2 circuit receptacle	
P10	—	03-09-2022	2 circuit plug	
J11	—	03-09-1062	6 circuit receptacle	
P11	—	03-09-2062	6 circuit plug	
J12	—	03-09-1092	9 circuit receptacle	
P12	—	03-09-2092	9 circuit plug	
MOLEX MODEL 2139 CONNECTOR HOUSING				
P9	—	09-50-3041	4 circuit	
RECEPTACLES				
MIC 1	47600	XLR type		
MIC 2	47600	XLR type		
MIC 3	47600	XLR type		
MIC 4	47600	XLR type		
MIC 5	47600	XLR type		
MIC 6	47600	XLR type		
RESISTOR				
R1	36420	30 Ω	$\frac{1}{4}$ W	5%
SCREW TERMINAL STRIPS				
TB1	55110	terminal block		
TB2	82706			
TB3	82706			
TB4	82706			
SWITCHES				
S1	54953	power switch		
S2	59031	cue		
TERMINAL STRIP				
TB5	51597			
TRANSFORMER				
T1	59139	power		
VARIABLE RESISTORS				
VR1	59180-02	50 k Ω		
VR2	59180-01	10 k Ω		
OPTIONAL OUTPUT TRANSFORMER				
	5902	150/600 Ω split (4 identical windings)		
P11		MOLEX 03-09-2062 (6 circuit plug)		

5302 System Schematic and Parts List

61006 - 20 SS & PL 7/80 Printed in U.S.A.

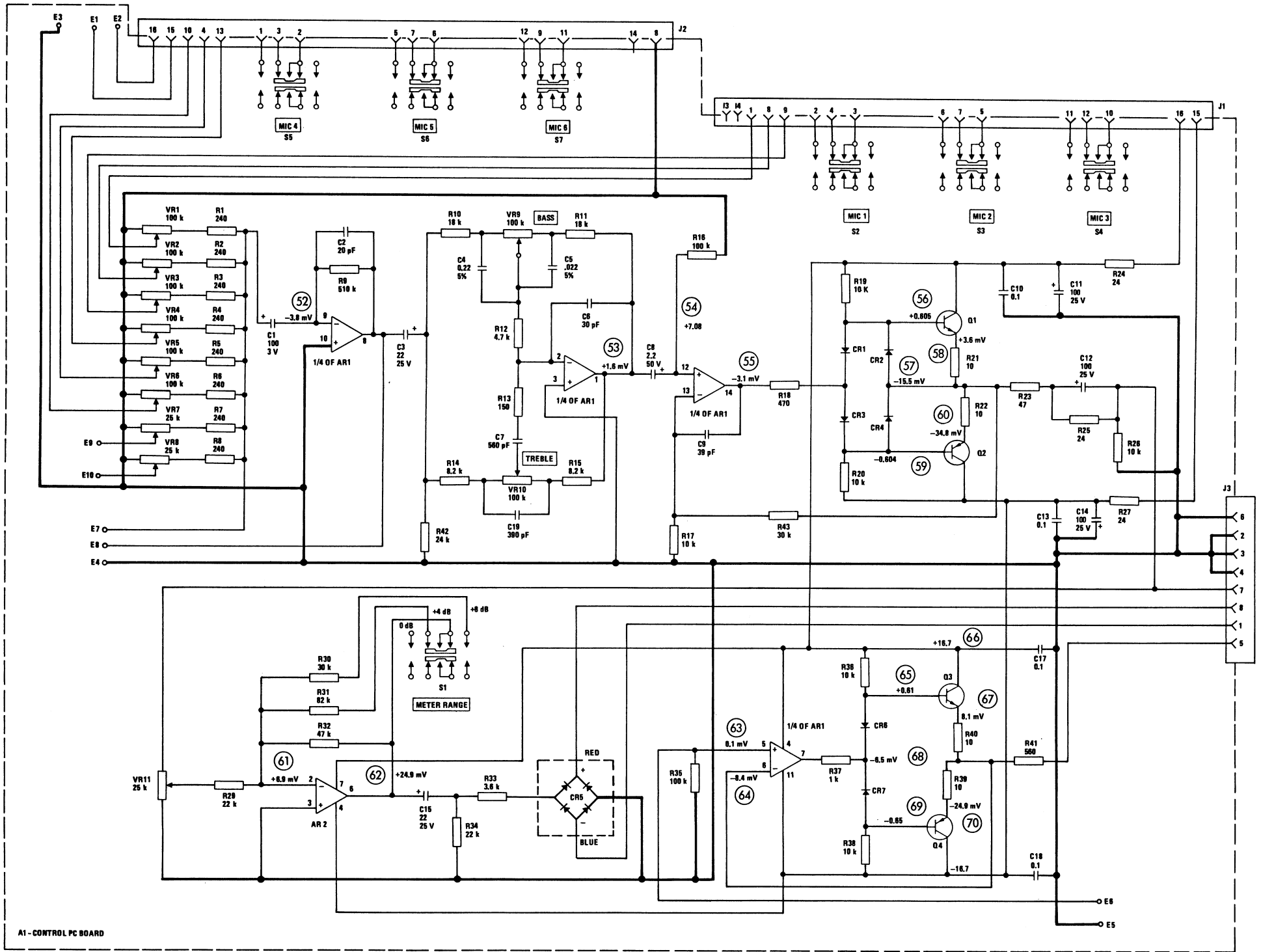
Circuit Description	JBL Part No.	Description			
CAPACITORS					
All capacitors are in μ F unless otherwise noted.					
C1	56823	100		3 V	
C2	48433	20 pF	Mica	500 V	5%
C3	58730	22		25 V	
C4	59107	0.022		250 V	5%
C5	59107	0.022		250 V	5%
C6	48437	30 pF	Mica	500 V	5%
C7	48471	560 pF	Mica	500 V	5%
C8	36180	2.2		50 V	
C9	48440	39 pF	Mica	500 V	5%
C10	58690	0.1		100 V	
C11	48504	100		25 V	
C12	48504	100		25 V	
C13	58690	0.1		100 V	
C14	48504	100		25 V	
C15	36188	22		25 V	
C16	—				
C17	—				
C18	—				
C19	48466	390 pF	Mica	500 V	5%

Circuit Description	JBL Part No.	Description
POTENTIOMETERS		
VR1	59179-02	100 k
VR2	59179-02	100 k
VR3	59179-02	100 k
VR4	59179-02	100 k
VR5	59179-02	100 k
VR6	59179-02	100 k
VR7	59179-01	25 k
VR8	59179-01	25 k
VR9	59179-02	100 k
VR10	59179-02	100 k
RESISTORS		
Resistors are fixed, carbon-film, $\frac{1}{2}$ W, 5% unless otherwise indicated.		
R1	36442	240
R2	36442	240
R3	36442	240
R4	36442	240
R5	36442	240
R6	36442	240
R7	36442	240
R8	36442	240
R9	36522	510 k
R10	36487	18 k
R11	36487	18 k
R12	36497	47 k
R13	36437	150
R14	36479	8.2 k
R15	36479	8.2 k
R16	35621	100 k
R17	36481	10 k
R18	36449	470
R19	36481	10 k
R20	36481	10 k
R21	36410	10
R22	36410	10
R23	36425	47
R24	35549	100
R25	35549	100
R26	36481	10 k
R27	35549	100
R28	—	
R29	35605	22 k
R30	36492	30 k
R31	36503	82 k
R32	36497	47 k
R33	36470	3.6 k
R34	35605	22 k
R35	35621	100 k
R36	36481	10 k
R37	36457	1 k
R38	36481	10 k
R39	36410	10
R40	36410	10
R41	36451	560
R42	36490	24 k
R43	36492	30 k

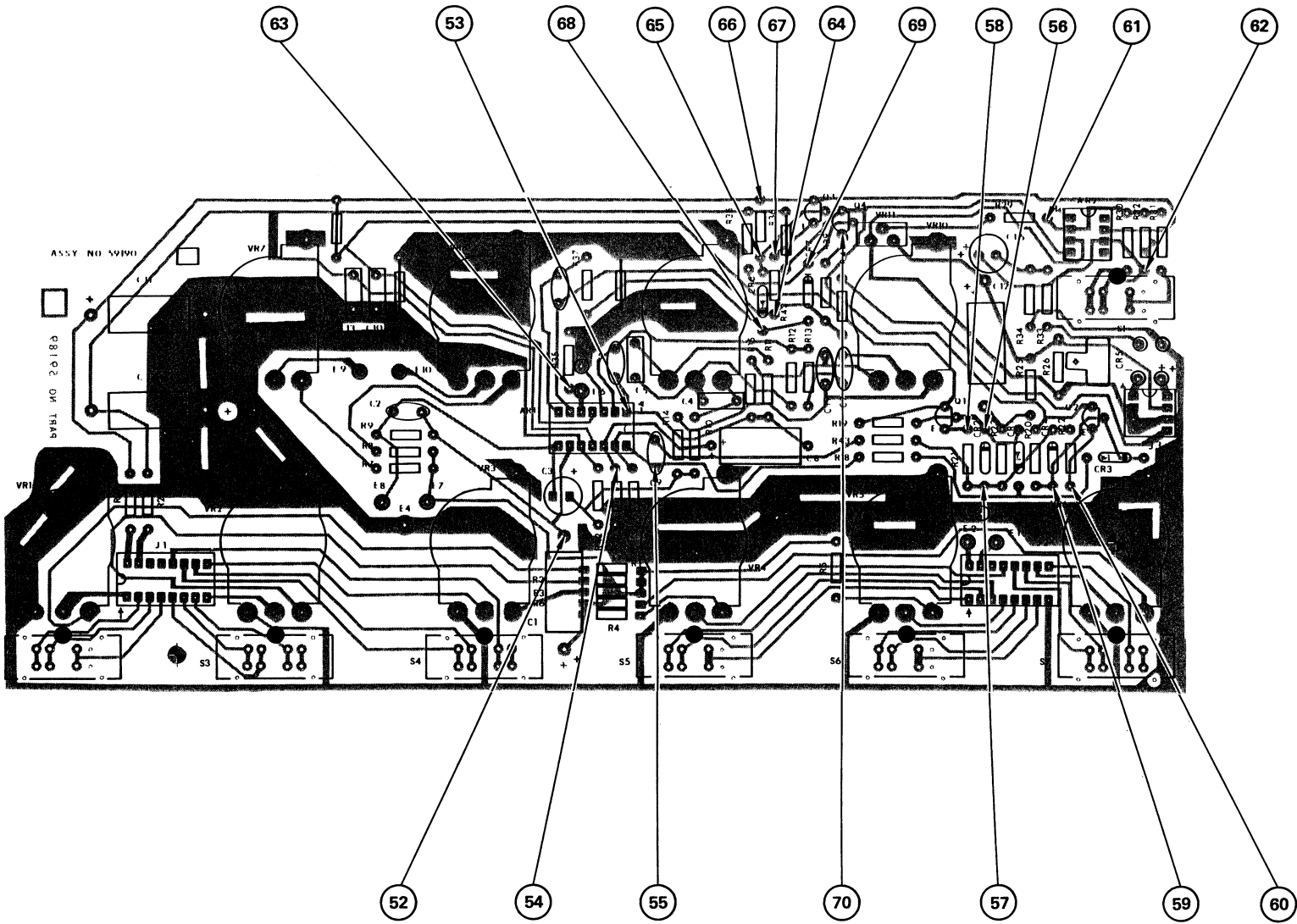
Circuit Description	JBL Part No.	Description
SEMICONDUCTORS		
CR1	52544	1N914B
CR2	52544	1N914B
CR3	52544	1N914B
CR4	52544	1N914B
CR5	47611	(Bridge rectifier, meter)
CR6	52544	1N914B
CR7	52544	1N914B
AR1	59028	TL074CN
AR2	59876	TL081CP
Q1	48340	MPS-A06
Q2	55201	MPS-4356
Q3	48340	MPS-A06
Q4	55201	MPS-4356
SOCKETS		
J1	59021-03	IC
J2	59021-03	IC
SWITCHES		
S1	58407	
S2	58407	
S3	58407	
S4	58407	
S5	58407	
S6	58407	
S7	58407	

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5302 A-1 Control P.C. Board and Parts List
61006-01 C/P.C.B. & PL 9/80 Printed in U.S.A.

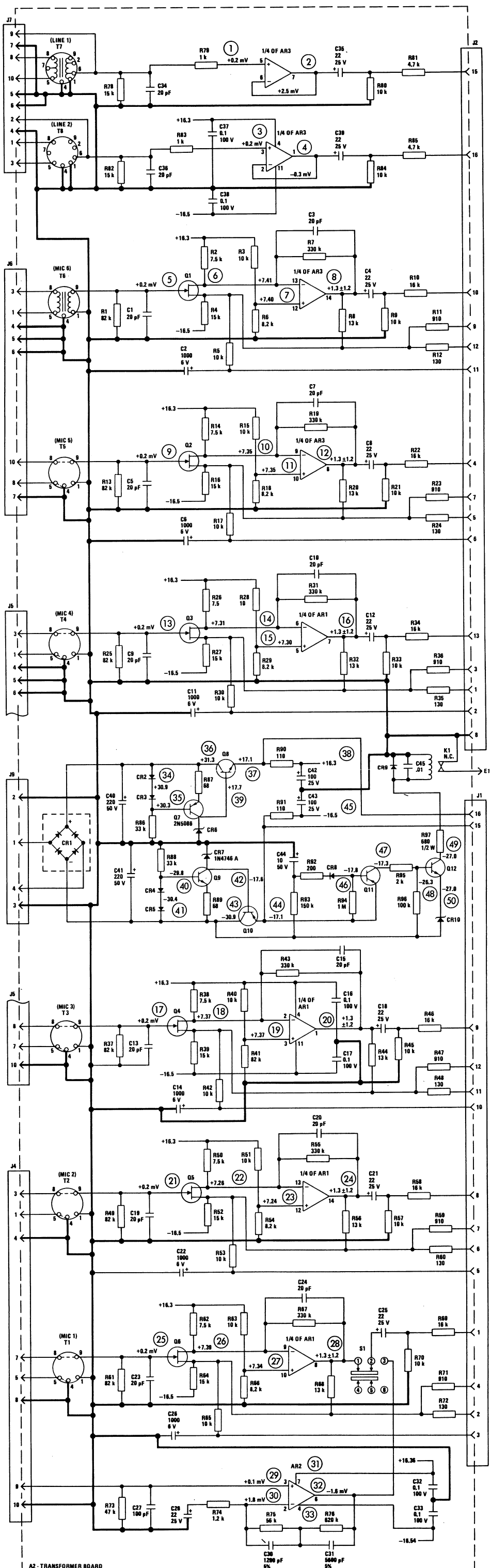


A1 - CONTROL P.C. BOARD



- 5. O indicates voltage test points found on P.C. assembly.
 - 4. --- denotes circuit board.
 - 3. All resistors are in ohms.
 - 2. All capacitors are in microfarads.
 - 1. Voltage measurements made with a Fluke DVM, no signal applied, negative lead of DVM to ground, 120 V AC line voltage. Voltage tolerance $\pm 10\%$.
- Notes: Unless otherwise specified

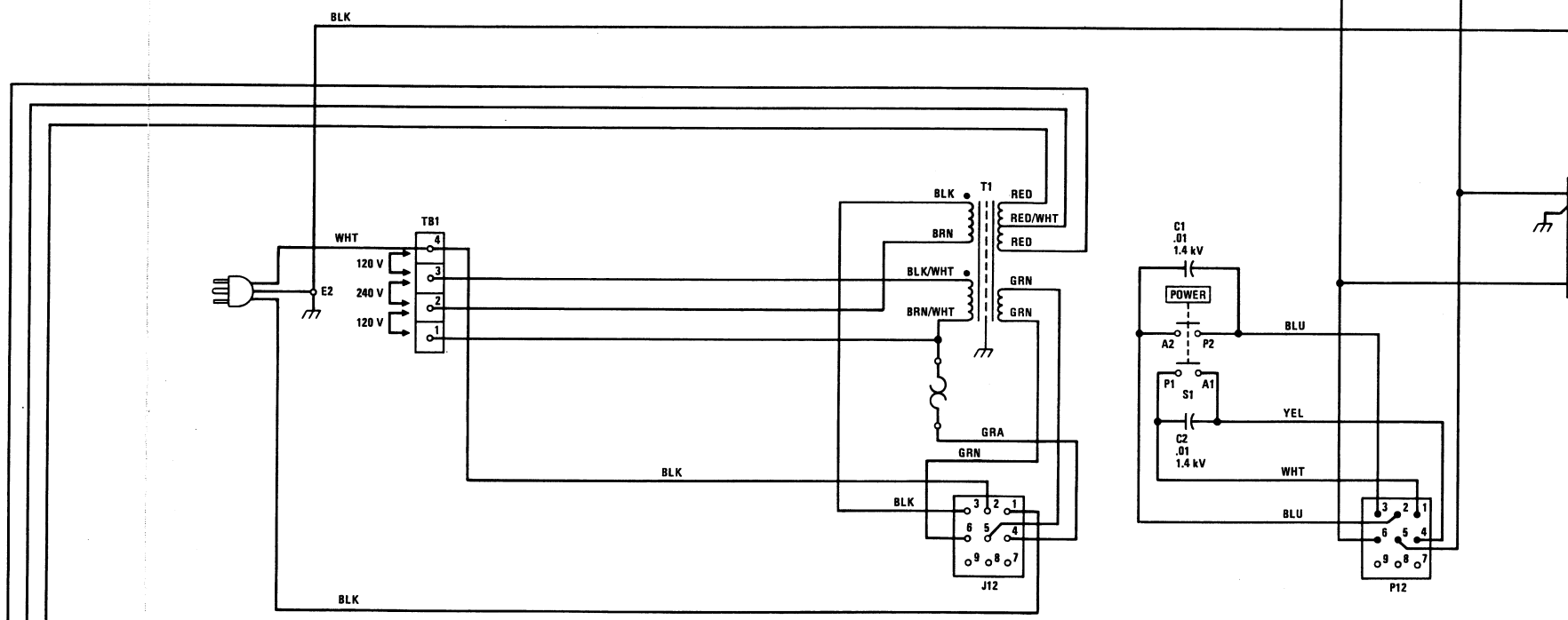
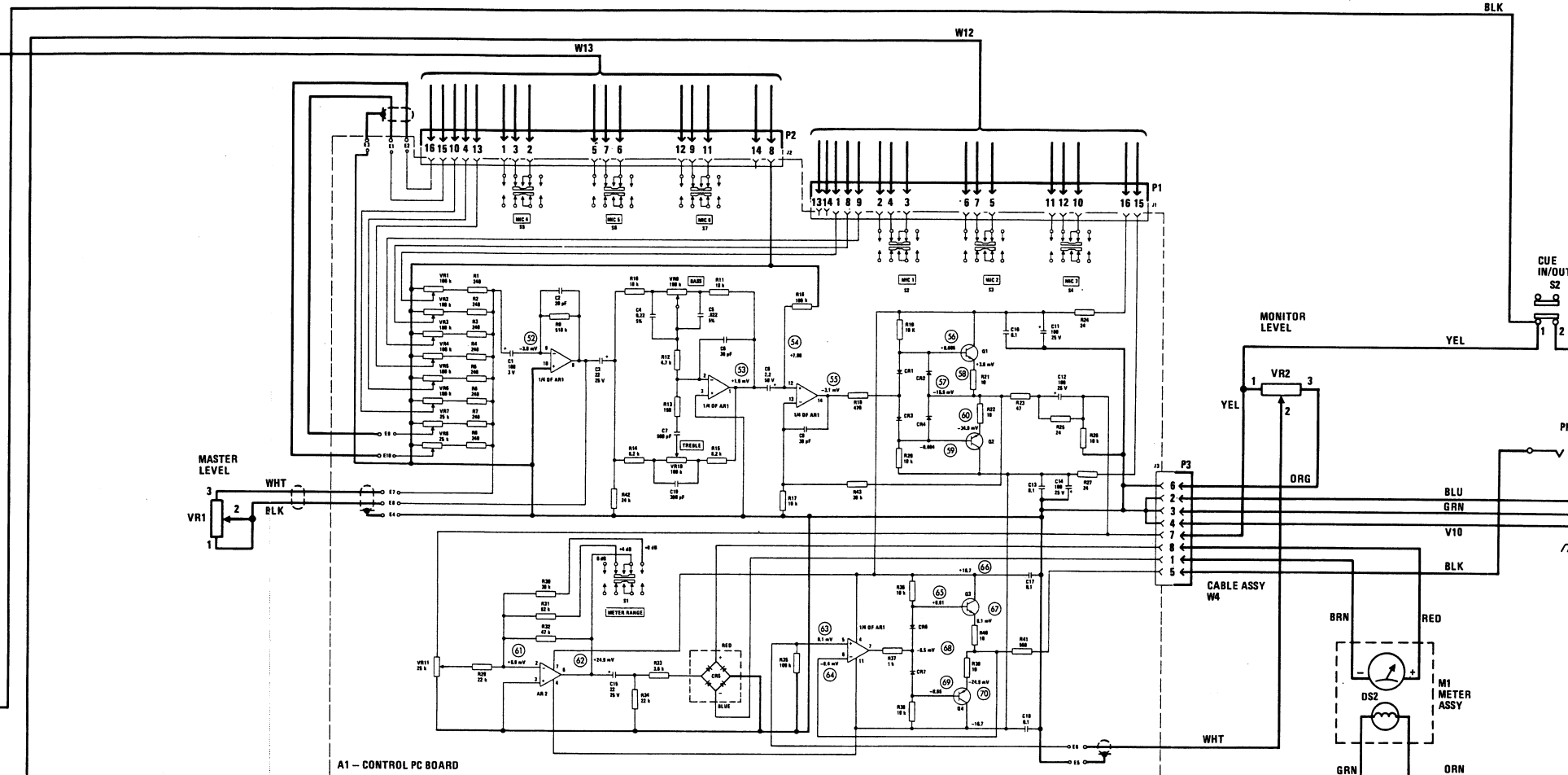
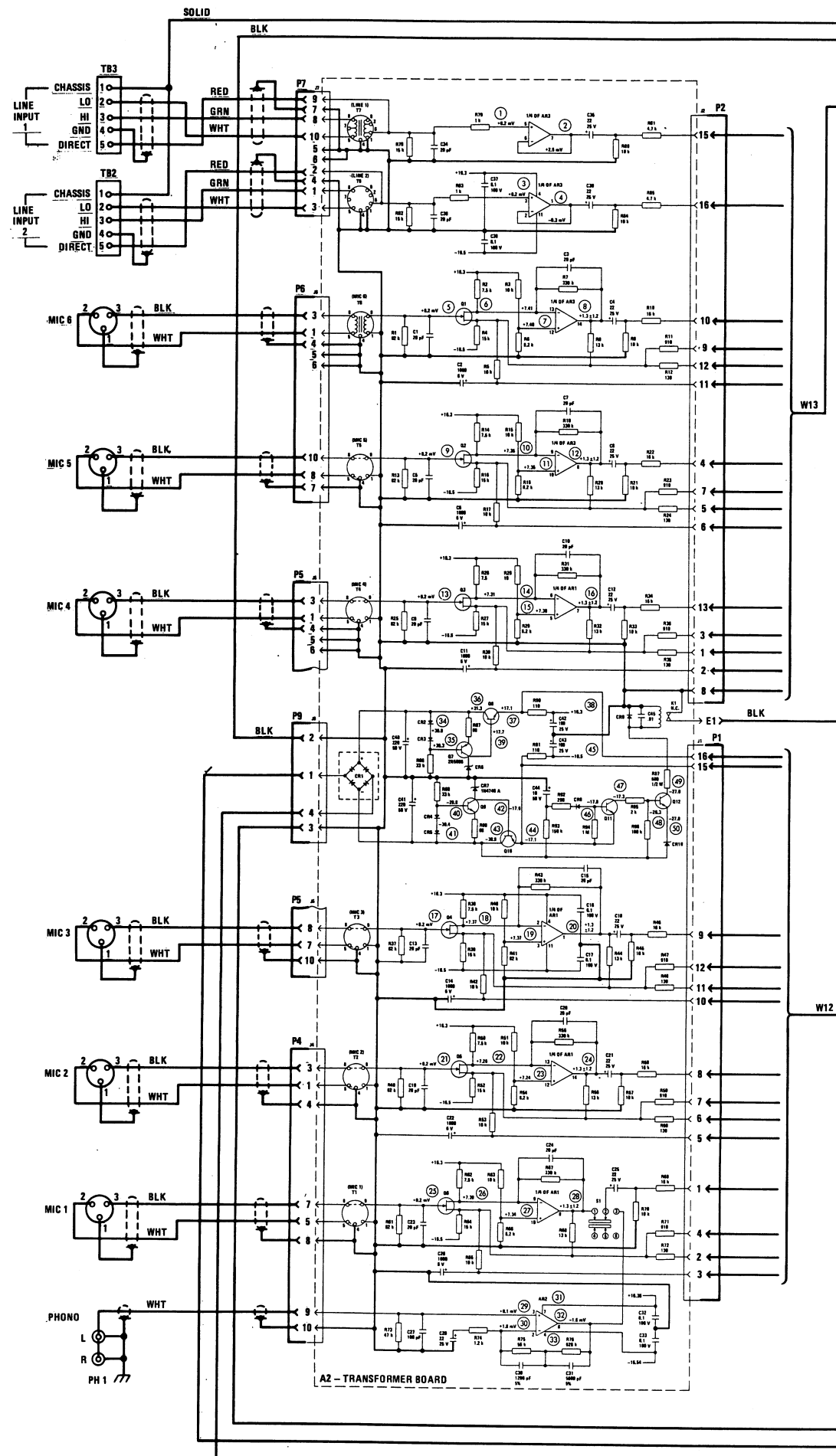
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AZ - TRANSFORMER BOARD

5302 A-2 Transformer Board and Parts List

61006-02 TB & PL 9/80 Printed in U.S.A.



5302 System Schematic and Parts List

61006-20 SS & PL 7/80 Printed in U.S.A.

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