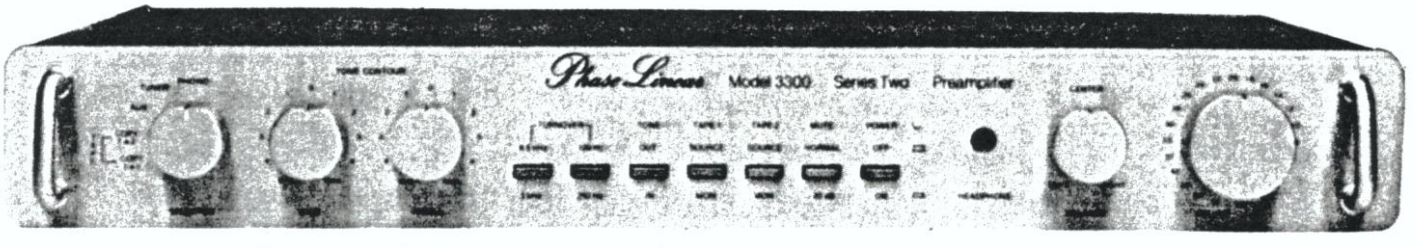
3300 SERIES TWO PREAMPLIFIER

Service Manual



Phase Linear®

3300 SERIES TWO

PREAMPLIFIER

SERVICE MANUAL

Contents

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CAUTION: THIS MANUAL IS INTENDED FOR USE ONLY BY QUALIFIED SERVICE PERSONNEL. HAZARDOUS VOLTAGES MAY BE ENCOUNTERED IN THE SERVICING OF THE 3300 SERIES TWO PREAMPLIFIER. USE EXTREME CAUTION; READ ALL INSTRUCTIONS CAREFULLY.

1-0. SPECIFICATIONS

Rated Output Voltage:
2.0 volts RMS(0.5 volts RMS,IHF)

THD @ Rated Output: less than 0.003%(20Hz–20kHz)

Frequency Response: Phono RIAA deviation: ±0.25dB. High level: 10Hz-135kHz +0,-3dB

Signal-To-Noise Ratio:
Phono: 92dB below 2.0v RMS, A-weighted(-80dB,IHF).
High level: 98dB below 2.0v RMS, A-weighted(-86dB,IHF)

Intermodulation Distortion:
SMPTE(60Hz,7kHz @ 4:1): less than 0.002%
IHF(two frequencies 200Hz apart sweep from 200Hz–200kHz): less than 0.008%

Input Impedance:
Phono: 47k-ohms shunted by 100pF
Hihg level: 35k-ohms

Input Sensitivity for Rated Output:
Phono: 2.2mV(0.55mV IHF)
High level: 225mV(56mV IHF)

Maximum Output at Clipping:
greater than 10 volts into 10k-ohms @ 1kHz

Phono Overload Level(1kHz): 100mV

Volume Control Tracking: ±0.5dB

Slew Factor(IHF): 60

Slew Rate: 10 volts/microsecond

Channel Separation: 80dB @ 1kHz; 50dB @ 20kHz

Tone Controls:
Maximum range: ±14dB
Bass turnover points: 100Hz and 250Hz
Treble turnover points: 3kHz and 6.5kHz

Headphone Amplifier:
Rated power output: 90mW into 8 ohms with less than 0.05% THD from 20Hz–20kHz, both channels driven.
Frequency response: 20Hz–20kHz, +0,-0.9dB
Load impedance: 2–2000 ohms

General Specifications:

Power Requirements: 90-132VAC, 50/60Hz(USA, Canadian and selected export models).
180-264VAC, 50/60Hz(general export model).

Power Consumption: 10 watts

AC Outlets: 2 switched rated 600 watts(VA)maximum each.

1 unswitched rated 1200 watts (VA)maximum.

Maximum combined power of all outlets cannot exceed 1200 watts(VA).

Unit:

Dimensions: 19"w x 2½"h x 95/8"d (48.3cm x 6.4cm x 25.6cm)

Weight: 9 lbs. (4kg)

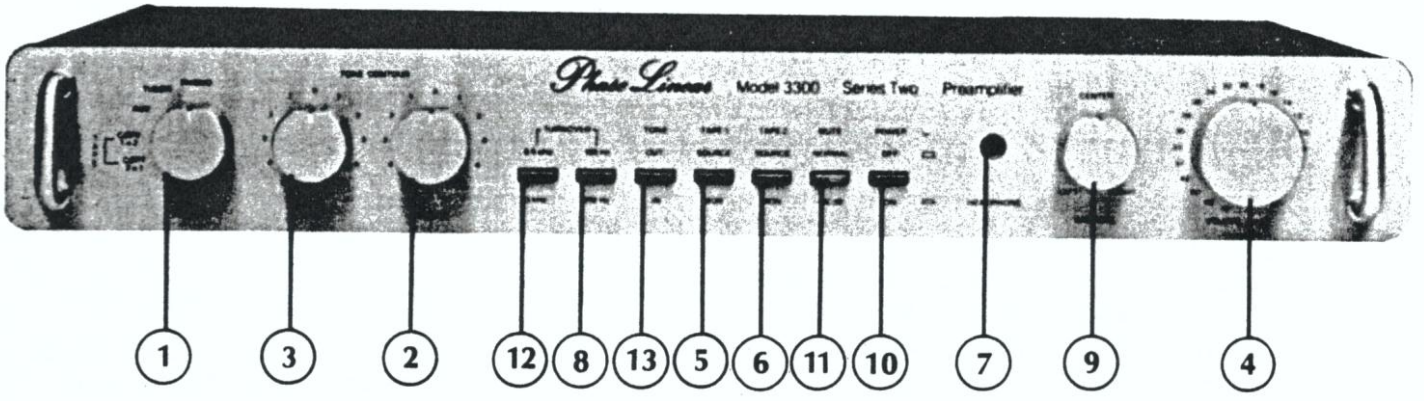
Shipping:

Dimensions: 22"w x 6½"h x 123/4"d (55.9cm x 16.5cm x 32.4cm)

Weight: 11.5 lbs. (5.2kg)

NOTE: Specifications and design subject to change without notice due to improvements or modifications.

2-0. FRONT PANEL FACILITIES

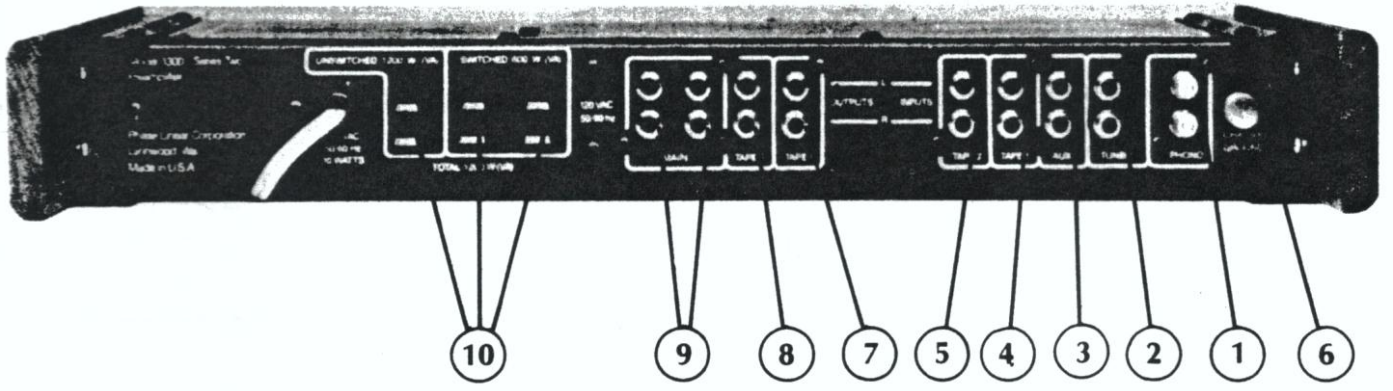


1. SELECTOR SWITCH: determines the source to be played through the 3300II.
2. TREBLE TONE CONTOUR: clockwise rotation boosts treble, counterclockwise cuts treble.
3. BASS TONE CONTOUR: clockwise rotation boosts bass, counterclockwise cuts bass.
4. VOLUME CONTROL: stepped attenuator featuring 22 positive detented positions. Clockwise rotation increases volume. Control is accurately calibrated in dB attenuation as shown.
5. TAPE 1 MONITOR SWITCH: out for source; in for monitor or playback of TAPE 1.
6. TAPE 2 MONITOR SWITCH: out for source; in for monitor or playback of TAPE 2.
7. HEADPHONE JACK: stereo jack for either low or high impedance headphones; also controls switching of SW OUTPUT. SW OUTPUT automatically mutes when headphones are installed while UNSW OUTPUT is unaffected.
8. BASS TURNOVER SWITCH: in for 250Hz turnover; out for 100Hz turnover.
9. BALANCE CONTROL: use to shift stereo image to the right (CW), or to the left (CCW). The center position is identified by a positive detent.
10. POWER SWITCH: push in to turn unit on and activate AC switched outlets. Amber LED indicator illuminates upon power up.
11. MUTE SWITCH: push in to engage the -20dB attenuator network. Used to expand the range of the VOLUME control at low listening levels and for quick reduction of overall sound level.

12. TREBLE TURNOVER SWITCH: in for 3kHz turnover; out for 6.5kHz turnover.

13. TONE CONTOUR SWITCH: push in to activate tone contour circuits. With button out, tone contour circuits are bypassed, providing flat frequency response.

3-0. REAR PANEL FACILITIES



1. PHONO INPUT: for conventional moving-magnet phono cartridges with nominal minimum outputs of 2mV.
2. TUNER INPUT: input from AM/FM tuner.
3. AUX INPUT: input from any line level auxiliary component.
4. TAPE 1 INPUT(Tape Play): from outputs of first tape machine.
5. TAPE 2 INPUT(Tape Play): from outputs of second tape machine.
6. CHASSIS GROUND: chassis ground termination for connection of turntable ground and/or earth ground.
7. TAPE 1 OUTPUT(Tape Record): to inputs of first tape machine.
8. TAPE 2 OUTPUT(Tape Record): to inputs of second tape machine.
9. MAIN OUTPUTS(switched or unswitched): the SW outputs are turned off when a headphone is plugged in. This allows headphone listening without speaker background sound. The UNSW outputs are not affected by headphone operation. Both outputs may be used at the same time if desired.
10. AC OUTLETS: three outlets are provided: one unswitched, fated 1200 watts(VA)and two switched, rated 600 watts(VA) each(5 amps continuous, 80amps surge). Maximum combined power of all outlets is 1200 watts(VA).

4-0. CIRCUIT DESCRIPTIONS

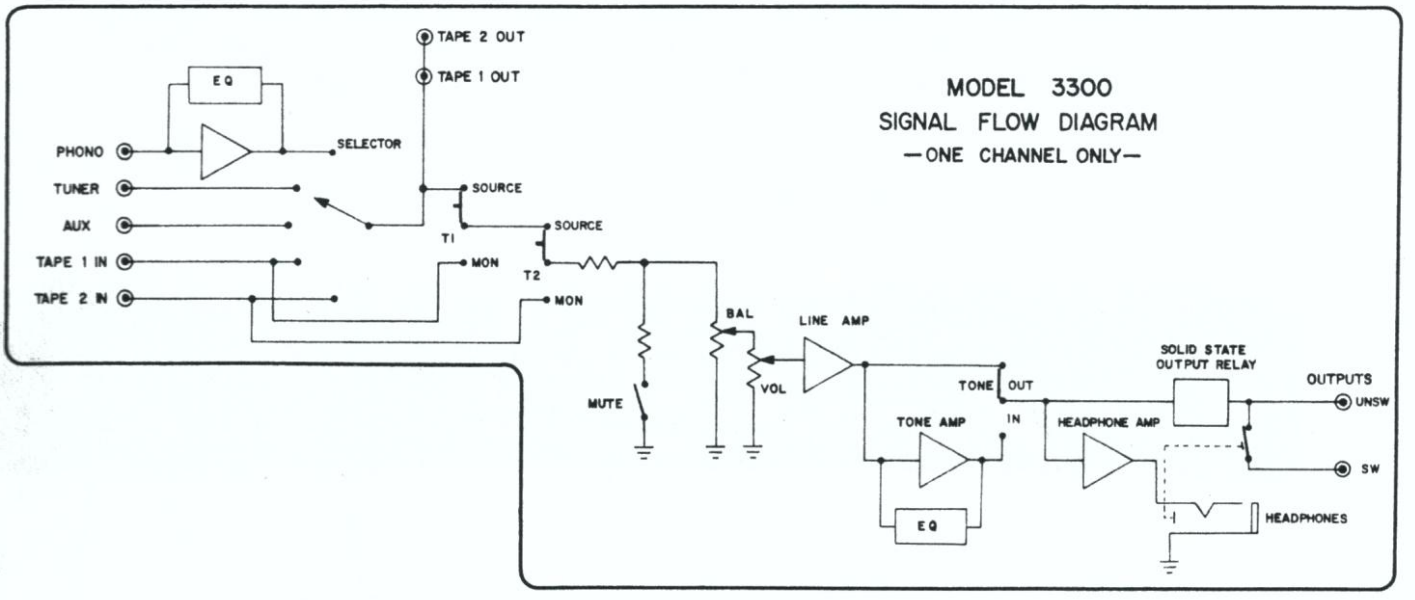


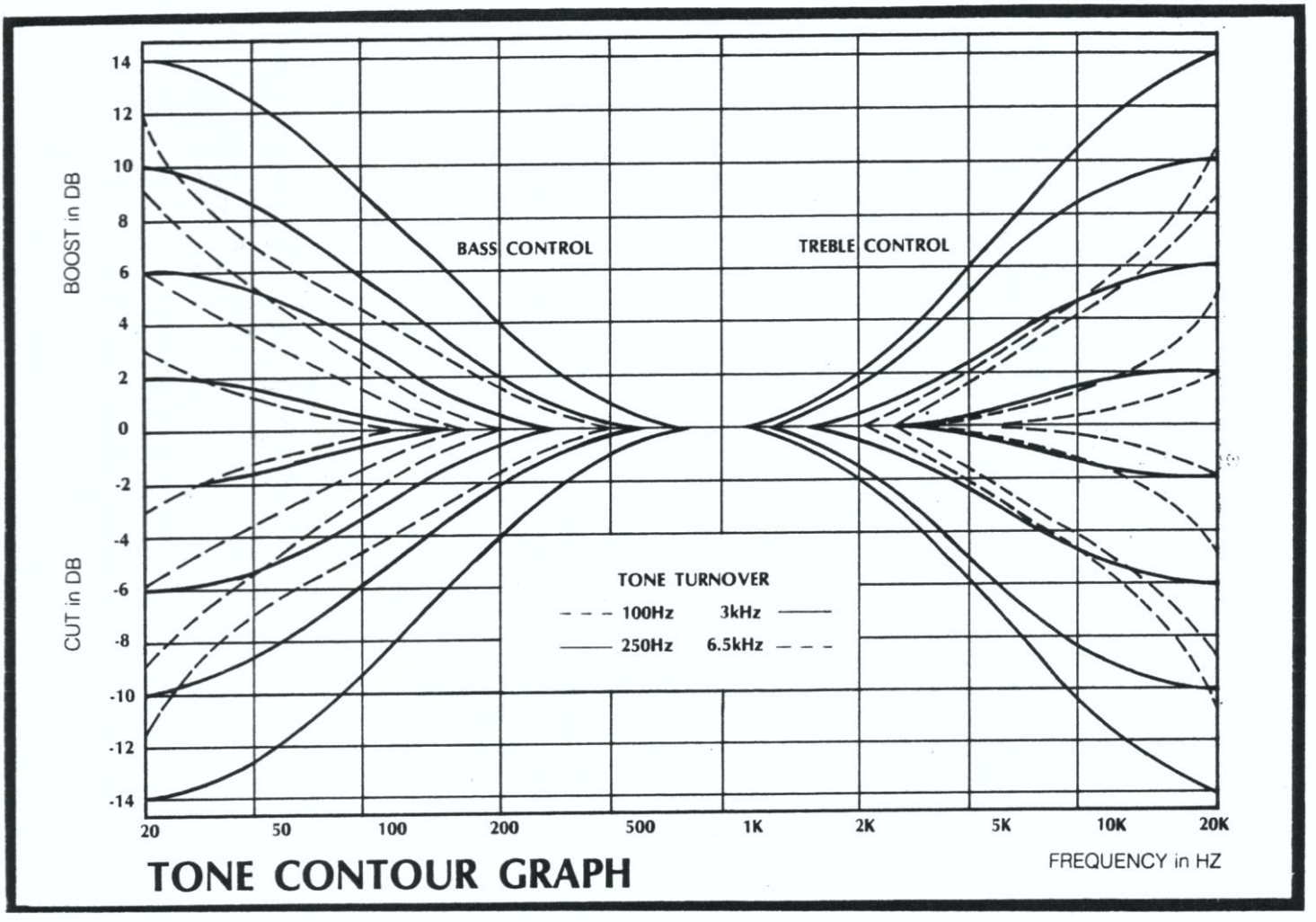
Fig. 4-1

A block diagram of the model 3300II appears in fig.4-1 above and is provided as a quick reference for connection and operation purposes.

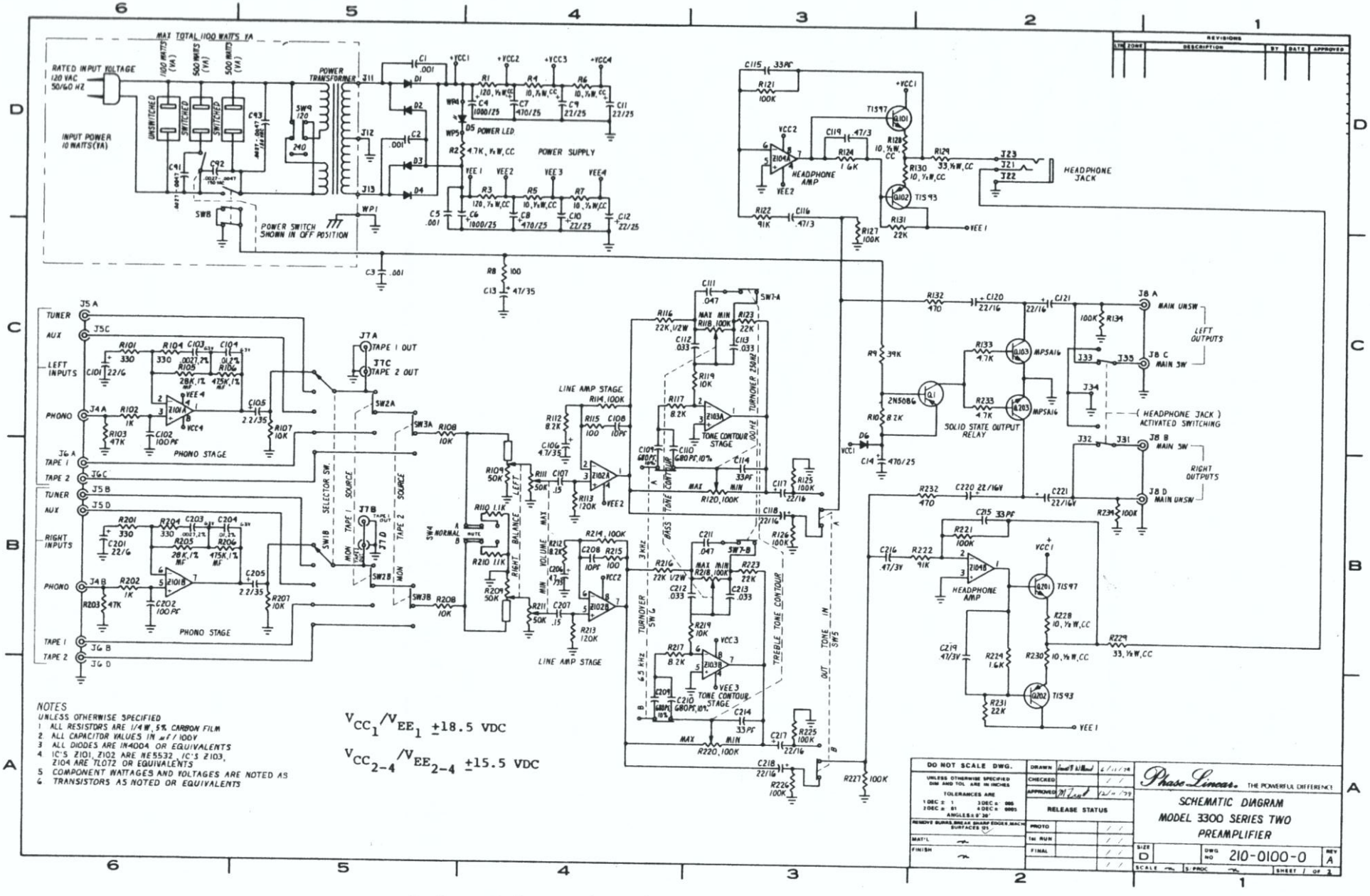
4-1. Input Stage: The preamplifier phono input connects directly to a non-inverting, 40dB @ 1kHz, RIAA equalized, low distortion, high speed gain stage. This signal is presented along with all other inputs to a duplicate contact mechanical 5-position switch. The output of this switch provides signal for the tape outputs and one side of the TAPE 1 SOURCE/MONITOR switch. The other side of the TAPE 1 switch is connected to the TAPE 1 input. This provides switching between the input and output of the TAPE 1 recording machine. TAPE 2 connects following TAPE 1. Leaving TAPE 2, the signal passes through the muting switch, balance control and volume control. The line amp is a wide band high speed 20dB gain stage capable of driving loads as low as 1000 ohms.

4-2. Tone Controls/Headphone Amp: Tone controls are provided using dual pots in conjunction with a high speed gain stage. Turnover selection is provided by addition of appropriate capacitors. The tone control switch selects either line amp output or tone control output. The selected signal goes to a low distortion headphone amplifier using complementary output. Upon insertion of the headphone jack the main switched outputs open. At the same time the signal from the tone control switch deives the solid-state output muting circuit.

4-3. Output Controller: On actuation of the power switch, the output controller starts timing and after about ten seconds, the controller deactivates the circuit allowing main and switched outputs to be driven. On power off, the main outputs are immediately shunted to ground, thus preventing output supply discharge "thumps".



TONE CONTOUR GRAPH



NOTES
UNLESS OTHERWISE SPECIFIED
1 ALL RESISTORS ARE 1/4 W, 5% CARBON FILM
2 ALL CAPACITOR VALUES IN µF / 100V
3 ALL DIODES ARE IN4004 OR EQUIVALENTS
4 IC'S Z101, Z102 ARE NE5532, IC'S Z103, Z104 ARE TL072 OR EQUIVALENTS
5 COMPONENT WATTAGES AND VOLTAGES ARE NOTED AS
6 TRANSISTORS AS NOTED OR EQUIVALENTS

V_{CC_1}/V_{EE_1} ±18.5 VDC

$V_{CC_{2-4}}/V_{EE_{2-4}}$ ±15.5 VDC

REVISIONS

LTR	ZONE	DESCRIPTION	BY	DATE	APPROVED

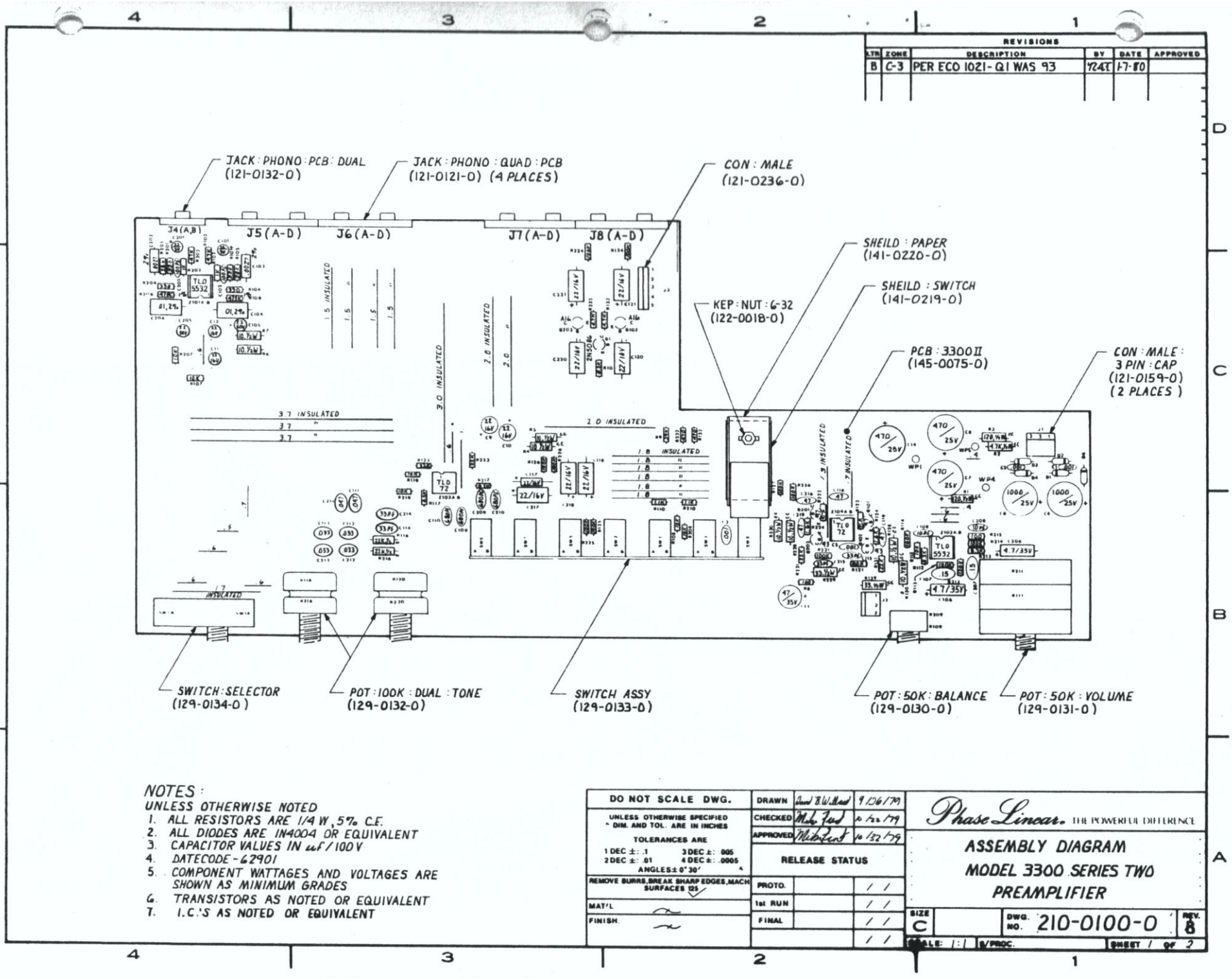
DO NOT SCALE DWG.
UNLESS OTHERWISE SPECIFIED DIM AND TOL ARE IN INCHES
TOLERANCES ARE
RELEASE STATUS

Phase Linear THE POWERFUL DIFFERENCE

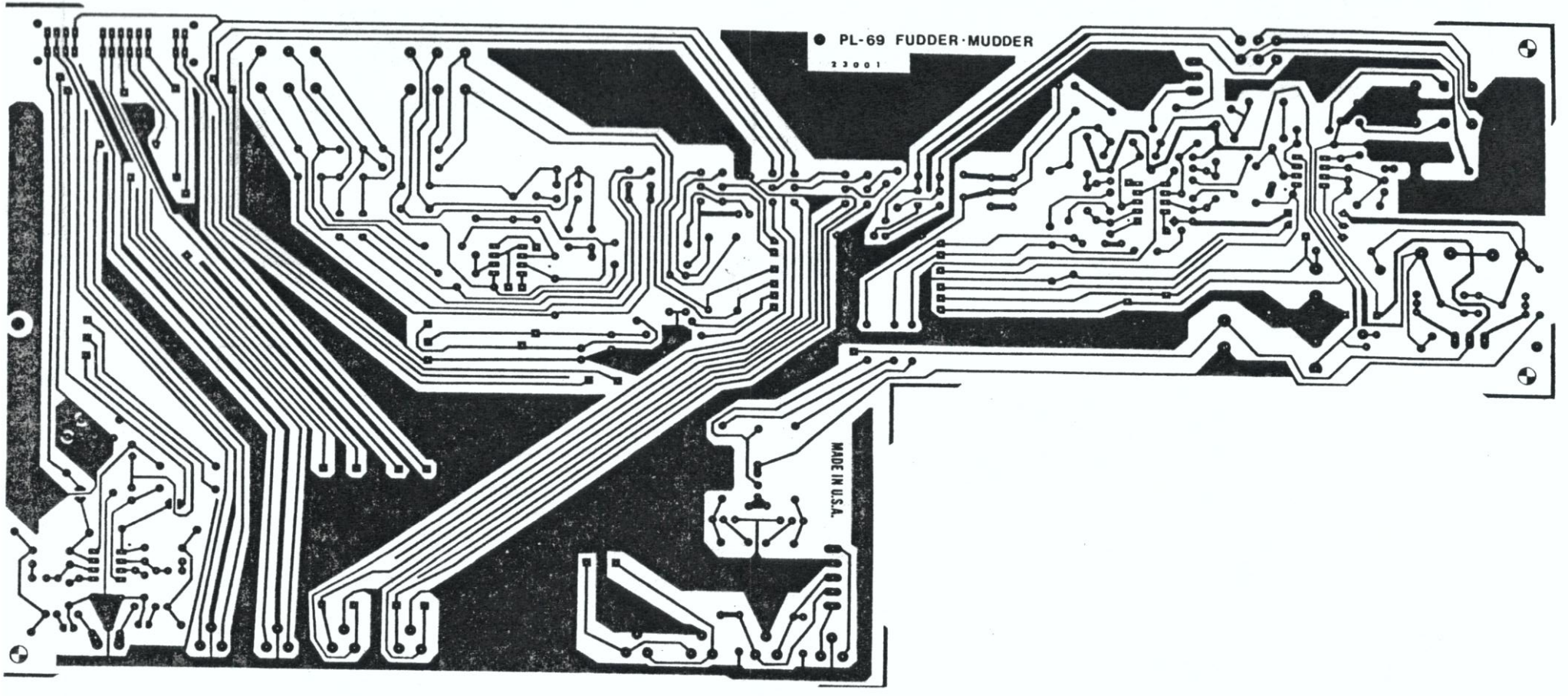
SCHEMATIC DIAGRAM
MODEL 3300 SERIES TWO
PREAMPLIFIER

SIZE D | DWG NO 210-0100-0 | REV A | SHEET 1 OF 2

5-1. Schematic Diagram, Model 3300II



5-2. Assembly Diagram, 3300II Main PCB



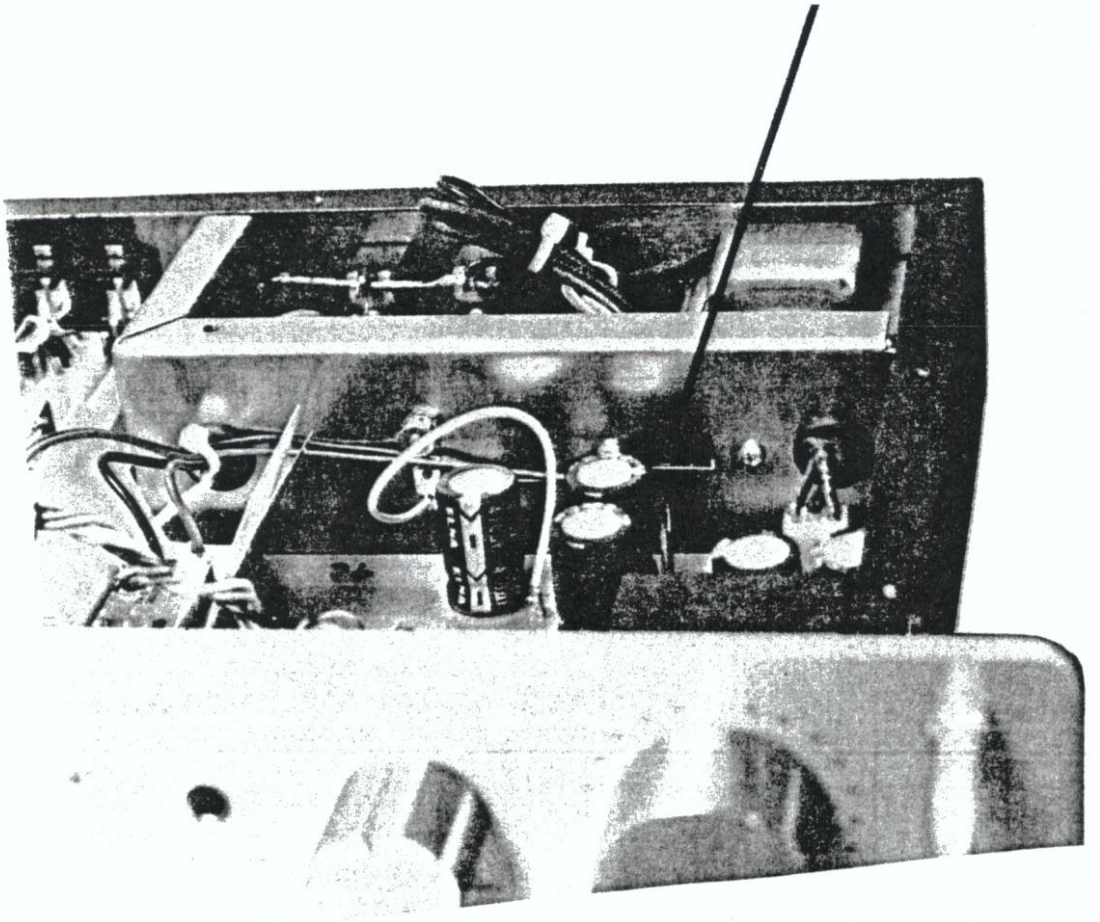
5-3. Foil Pattern, PL69 Fudder Mudder PCB

6-0. AC LINE VOLTAGE CONVERSION

The model 3300II is equipped with an internal line voltage selector switch. In the low voltage position the unit will operate on a line voltage of 90 to 132 VAC, 50/60Hz. In the high voltage position the unit will operate on a line voltage of 180 to 265 VAC, 50/60Hz.

To change the line voltage selector, remove the top cover and locate the voltage selector switch on the front side of the power supply metal shield(see fig.6-1). The power supply is located at the right rear of the 3300II.

Simply move the switch to the appropriate voltage select position. No other changes or alterations are necessary.



7-0. TEST PROCEDURE

Required Test Equipment:

Dual-trace oscilloscope
AC Voltmeter(VTVM) x2
Low-distortion sine wave generator
Harmonic distortion analyzer

NOTE: Unless otherwise specified all tests are to be performed with all auxiliary circuits(tone,mute,tape monitors) switched "out" and balance control centered.

7-1. Energizing: Plug the 3300 line cord into the proper line voltage source. Push POWER switch to ON and verify that the power LED illuminates immediately.

7-2. Input Functions and Tape Monitor: Using each of the following inputs verify a signal at the corresponding indicated output. Proper switch positions are determined by reading across the chart. High level inputs should be driven by a 250mV 2kHz sine wave signal; phono inputs should be driven by a 10mV 2kHz signal.

Input	Output	Selector	Tape Mon 1	Tape Mon 2
Phono	Main	Phono	OUT	OUT
Aux	Main	Aux	OUT	OUT
Tuner	Main	Tuner	OUT	OUT
Tape 1	Main	Tape 1	OUT	OUT
Tape 2	Main	Tape 2	OUT	OUT
Tape 2	Main	Aux	OUT	IN
Tape 1	Main	Aux	IN	OUT

7-3. Volume Tracking: Select and drive the AUX intpus with a 250mV 2kHz signal and monitor the main outputs with scope and voltmeters. With the balance pot at 12 o'clock turn the volume control fully clockwise and then slowly turn the volume control slowly counterclockwise while observing the voltmeters. Verify that the left and right channels track within 0.5dB of each other. Return the volume control to the reference position. Rotate the balance control fully clockwise, then fully counterclockwise. Verify that the proper corresponding channdl becomes fully attenuated.

7-4. Separation: Select and drive the AUX inputs with a 250mV 2kHz signal and obtain a 0dB reference reading on the voltmeters (set on the 1-volt scale). Short the left input and verify that the left output is not present. Turn down the left channel voltmeter scale(sensitivity)and verify that any signal present in the left channel is 65dB or more below the right channel output.

7-5. Tone Controls: All of the following readings have a tolerance of ±1dB:

Freq.	Turnover	Boost/Cut
20kHz	6.5kHz	±11dB
20kHz	3kHz	±14dB
20Hz	100Hz	±11dB
20Hz	250Hz	±14dB

7-6. Phono THD and S/N Ratio: Select and drive the PHONO inputs with a 10mV 1kHz signal. Connect the distortion analyzer inputs to the tape output and verify less than 0.005% THD. Remove the phono input and verify that phono output noise is approximately 77dB(unweighted) below 1 volt.

7-7. High Level THD and S/N Ratio: Select and drive the AUX inputs with a 250mV 1kHz signal and obtain a 2 volt output. Using one channel at a time connect the distortion analyzer to each main output and verify less than 0.003% THD. Remove the inputs and verify that noise is approximately 90dB(unweighted) below 2 volts.

7-8. Headphone Amplifier: Select and drive any input and monitor the headphone outputs with scope and AC voltmeters. Attach an 8-ohm load resistor in parallel with each headphone output and drive these to just short of the clipping level. Verify at least 850mV before clipping with the volume control fully clockwise. Verify that with the headphone jack plugged in that the signal is removed from the SW(switched)main output but remains through the UNSW(unswitched)main outputs.

8-0. TROUBLESHOOTING AND ALIGNMENT

Contents:

8-1. Power Supply/Switched Outlets:

8-1.1. Power LED dim or will not illuminate.

(a) Check 120/240VAC line switch for proper selection (see section 6-0, page 11).

(b) Check continuity of power switch contacts. Replace power switch as necessary.

(c) Check continuity of line cord.

(d) Disconnect power transformer secondary wires and with line cord connected to proper AC line and power switch ON, measure each secondary wire to ground and verify 26VAC ±2V. Replace power transformer as necessary.

8-1.2. Switched AC outlets inoperable or intermittent.

(a) Check continuity of power switch and replace switch if necessary.

NOTE: Be sure the .0027uF disc capacitors(C91–C93) are across the switched outlet wiring since this greatly extends the life of the power switch contacts.

(b) Check for loose or broken wiring around the switched outlets.

8-2. Input/Tape Monitors:

8-2.1. Loss of one or both channels.

(a) Check output of Z102(NE5532) and replace as necessary.

(b) Since the tape monitor switches override the input selector, the loss of one or both channels may be caused by a defective tape monitor switch. Check switch continuity and replace the defective switch assembly as required.

NOTE: Since the switch assembly is supplied as a complete assembly replacement part, the entire assembly must be replaced if only one switch becomes defective(PL part no. 129-0133).

8-3. Volume Control Mistracking/Balance Control:

Perform volume control tracking and balance tests as outlined in section 7-3, page 12. Replace the volume control if both channels do not track to within 0.5dB of each other. If channels track within specification over the entire volume control sweep with respect to each other, but the balance control is more than 0.5dB off of the center(12 o'clock)position, replace the balance pot.

8-4. Separation:

Perform channel separation test as outlined in section 7-4, page 12. If the unit fails to meet separation sepcifications, check supply voltages and ground connections to all IC's.

8-5. Headphone Amplifier:

8-5.1. No output or distorted output from headphone jack.

(a) Check the output of headphone amp Z104 at pin 6. If there is none, or it is badly distorted, turn the unit off and check and/or replace Q101/Q201 and Q102/Q202. If these measure good, replace Z104(TLO72).

(b) Check for burned emmitter resistors R128, R130, R228, and R230. Replace as necessary with resistors of the same value.

8-5.2. Insufficient output from headphone circuit.

(a) Verify $\pm$18.5VDC at power supply output(V_{cc1}/V_{ee1}) and at collectors of Q101/Q201 and Q102/Q202.

(b) Replace Q101/Q201 and/or Q102/Q202. Verify proper resistance of R129 and R229.

8-6. Tone Controls:

Loss of one or both channels when tone circuit is "in".

(a) Replace Z103(TLO72).

(b) Clean and lubricate switch assembly contacts.

(c) Replace switch assembly.

8-7. Phono THD & S/N Ratio:

8-7.1. Excessive distortion or noise in phono circuit.

(a) Check test bench grounding for noise injection.

(b) Replace phono IC Z101(NE5532).

(c) Check foil pattern in area of the phono circuit for solder bridges, broken or cold solder joints.

8-8. High Level THD & S/N Ratio:

6-8.1. Excessive distortion or noise in high level input functions.

(a) Replace Z102(NE5532).

(b) Check input/output jacks and clean and adjust or replace as necessary.

8-9. Main Preamp Output Malfunctions:

8-9.1. Loss of one channel. Check solid state relay drive transistors Q103/Q203 and replace as necessary.

8-9.2. Loss of both channels.

(a) Check Q1(2N5086)and replace as necessary.

(b) Check D6(1N4148) for open; replace as necessary.

(c) If using main SW(switched)outputs, check headphone jack continuity to insure that contacts are not open or intermittent(may cause one or both channels to malfunction).

9-0. DISASSEMBLY PROCEDURE

9-1. Component parts on the main circuit board can be accessed by removing the top cover.

9-2. Foil patterns and component parts solder connections can be accessed by removing the bottom cover.

9-3. The front panel can be removed by first removing the top cover(it is not necessary to remove the bottom cover). Remove the control knobs by pulling straight off. Remove the rack-mount handles. Remove the ½" control shaft nuts.
The front panel can now be partially pulled away from the chassis. Carefully pull the power LED away from the front panel; this will have to be reglued into place upon reassembly. Locate and remove the headphone jack wire harnass connectors. The front panel can now be completely removed from the chassis. If front panel replacement is required, unscrew the headphone jack from the front panel and install in the new front panel.

* * * * * *

NOTES

10-0. PARTS LIST - 3300II

Transistors:	PL Part No.
GES 97	126-0033
GES 93	126-0009
MPS A16	126-0117
Integrated Circuits:	
NE5532	126-0115
TL072	126-0116
Diodes:	
1N4004	126-0003
LED:amber	126-0065
Capacitors:[1]	
1000/25v:lytic:rad	127-0098
470/25v:lytic:rad	127-0120
22/16v:lytic:rad	127-0117
22/16v:lytic:ax	127-0108
2.2/50v:lytic:rad	127-0119
4.7/35v:lytic:ax	127-0037
47/35v:lytic:rad	127-0032
.15/100v:mylar	127-0097
.047/100v:mylar	127-0058
.033/100v:mylar	127-0025
.01/63v:poly	127-0113
.0027/63v:poly	127-0112
22/6v:tant	127-0118
.0027/150v:disc	127-0049
.47/3v:disc	127-0018
680pF/100v:disc	127-0064
100pF/100v:disc	127-0088
33pF/100v:disc	127-0002
10pF/100v:disc	127-0001
SWITCHES:	
Sw.ass'y:8-station	129-0133
Selector:rotary	129-0134
Switch:2P2T:117-220v	129-0137
Printed Circuit Boards:	
PL69 Main PCB	210-0100

Potentiometers:	PL Part No.
Volume:50k:dual	129-0131
Balance:50k:NM	129-0130
Tone:100k:dual:B	129-0132
Transformer:	
117-220v/26v:CT	125-0041
Front Panel Components:	
Knob:1.42" dia	142-0048
Knob:1.11" dia	142-0047
Pushbutton ass'y	129-0142
Jack:headphone	121-0246
Handle:rack-mount	142-0045
Handle end ferrule	143-0019
Metalwork:	
Front panel	220-0093
Chassis	220-0094
Cover:top	220-0092
Cover:bottom	141-0216
Shield:power switch	141-0219
Shield:AC power supl	141-0221
Hardware:	
Screw:handle	122-0003
Screw:top,btm.cvr	122-0123
Nut:kep:hex:6-32	122-0018
Nut:pot shaft	122-0042
Miscellaneous:	
Jack:phono:quad:PCB	121-0121
Jack:phono:dual:PCB	121-0132
Grommet:rubber:½"	121-0166
Line cord:16-2	121-0021
Strain relief	121-0029
Grounding post ass'y	121-0019
AC outlet	121-0009
Plug:phono:shorting	121-0119

[1] All values in microfarrads unless otherwise noted.

NOTE: When ordering parts please specify model and serial number of unit.

NOTICE TO AUTHORIZED SERVICE OUTLETS: Use only replacement parts issued or authorized by the factory service department. A unit will not be considered under factory warranty if unauthorized substitute replacement parts have been installed.

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THE POWERFUL DIFFERENCE

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