

**COUNTERPOINT
SA-2000 DUAL CHANNEL
LINE-LEVEL CONTROL AMPLIFIER
SERVICE MANUAL**

**COUNTERPOINT ELECTRONIC SYSTEMS, INCORPORATED
AUDIO COMPONENTS DIVISION
VISTA, CA 92083
USA**

**MANUAL REVISION: A
PRINTED June 27, 1990**

APPLIES TO SERIAL NUMBERS STARTING: 2k100

**For Technical Support:
Telefax: 619 598 9418 (U.S.A.)
Atten: Technical Support**

This document contains proprietary information. It is intended for use only by authorized Counterpoint Distributors and/or their agents for the purpose of servicing products manufactured by Counterpoint Electronic Systems, Inc. It may not be reproduced or transferred to any other documents or disclosed to others or used for manufacturing or any other purpose without prior written agreement from Counterpoint Electronic Systems, Inc.

Copyright (C) 1990 Counterpoint Electronic Systems, Inc.

COUNTERPOINT SA-2000 SERVICE MANUAL

CONTENTS

GENERAL DESCRIPTION.....	SECTION 1
SPECIFICATIONS.....	SECTION 2
BLOCK DIAGRAMS.....	SECTION 3
SCHEMATICS.....	SECTION 4
OPERATING VOLTAGES AND SIGNAL LEVELS.....	SECTION 5
CIRCUIT DESCRIPTIONS.....	SECTION 6
TRANSFORMER WIRING.....	SECTION 7
INTERNAL ADJUSTMENTS.....	SECTION 8
CIRCUIT BOARD LAYOUTS.....	SECTION 9
PARTS LISTS.....	SECTION 10
REPAIR PROCEDURES.....	SECTION 11
SERVICE BULLETINS.....	SECTION 12
REVISION NOTES.....	SECTION 13

COUNTERPOINT SA-2000 SERVICE MANUAL

SECTION 1
GENERAL DESCRIPTION

Section 1 General Description

GENERAL DESCRIPTION

The SA-2000 is a stereo high-fidelity line-level only control center.

Audio Voltage Amplifier ("line stage"). The SA-2000 is intended for use with unbalanced line-level audio signals typical in a home stereo system. Its controls permit selection between various line-level audio sources, and control of listening parameters such as balance and volume.

The audio amplification stage is a voltage amplifier. It uses a p-channel field-effect transistor (''FET'') to drive the cathode of a vacuum-tube triode. The FET is used as a source-follower and offers no voltage gain, but its low output impedance is a good match for the low impedance load of the triode's cathode. This mode of operation results in reduction of all forms of distortion by factors ranging from 10 to as much as 100 without feedback. In addition, high-frequency response is greatly improved due to the elimination of ''Miller Effect''.

The tube triode is operated as a common-grid voltage amplifier. Its output impedance is moderately high, so it is buffered with an FET video buffer. The low impedance output of the buffer is used to drive high-fidelity power amplifiers with unbalanced line-level signals at very low distortion levels.

For specific circuit descriptions, refer to the included schematics and circuit descriptions.

SECTION 2
SPECIFICATIONS

Section 2 Specifications

SPECIFICATIONS

Tube Complement

1-6CA4, High-voltage full-wave rectifier, V1.

1-6DJ8, Dual-triode audio Amplifier, V2.

Typical Electrical Specifications

Gain. @ 1kHz.

Input to Main Out: 25dB.

Frequency Response (per IHF).

+0.0/-3.0dB: < 2Hz to 620kHz.

+0.0/-0.1dB: < 10Hz to 100kHz.

Distortion (per IHF) 20 to 20kHz

< 0.005% T.H.D. Max.

Signal to Noise.

86dB (ref. 0.5V, EIA-weighted noise: 23uV, 10 to 500kHz).

Sensitivity (measured at Main Outs).

28mV.

Input Impedance.

Main Inputs: Selected: 33k ohms.

Unselected: 100 ohms.

Tape Returns: Selected: 33k ohms.

Output Impedance.

Main Outputs: 100 ohms.

Tape Outputs: unbuffered,
per source device output impedance.

Maximum Input Levels (1% thd, 1kHz, gain control at maximum).

All Inputs: 850 mVrms.

Line Stage Maximum Output Level.

38V peak-to-peak @ 1% thd, 20-20kHz.

Polarity.

Non-inverting.

Power Requirements.

88 to 133 Volts, 50/60Hz (Domestic version).

176 to 266 Volts, 50/60Hz (U.K. and European version)

Standby: 14 Watts.

Operate: 25 Watts.

COUNTERPOINT SA-2000 SERVICE MANUAL

Section 2 Specifications

Replacement Fuse Value.

100V/120V and 200/260V Versions: Use 1 Amp AGC Fast Blow type fuse.

Dimensions.

Front Panel: 19 inches (480 cm) wide, 4.46 inches (11.3 cm) tall.

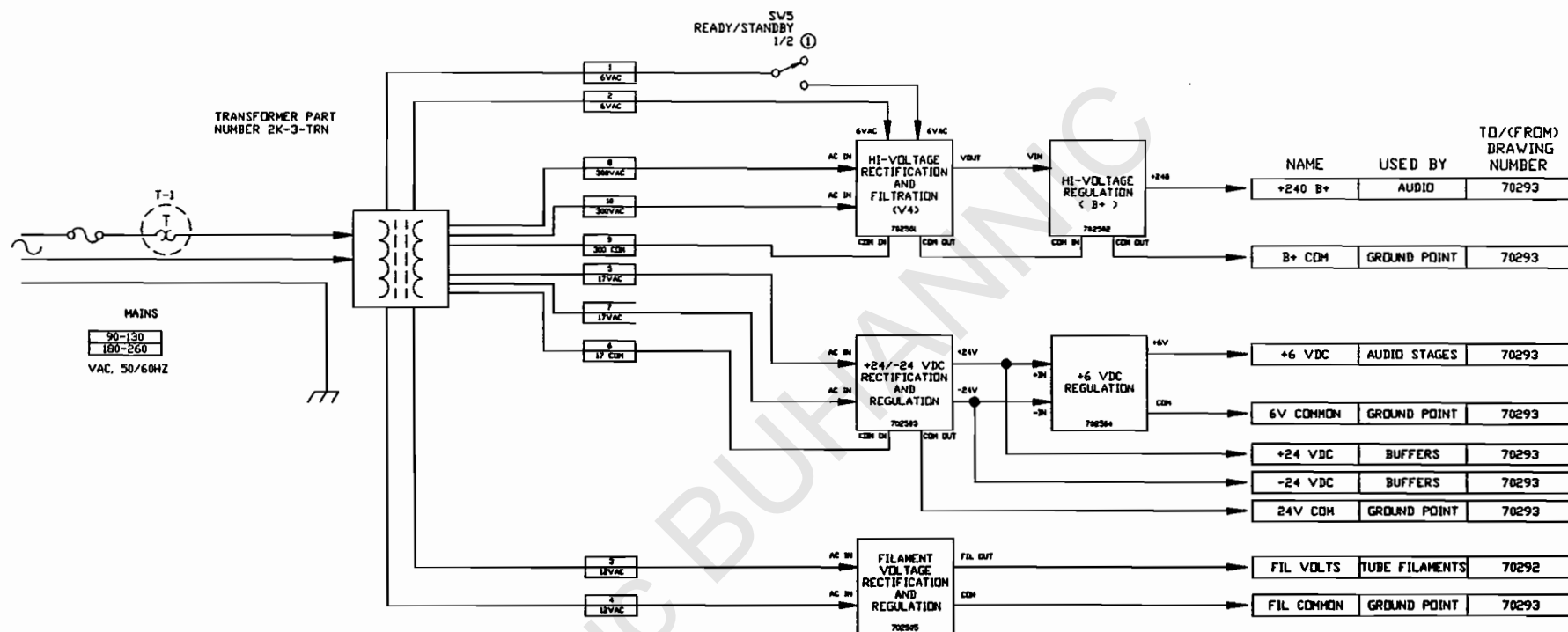
Front-to-rear dimension: 12.68 inches (32.2 cm), including connectors.

Weight.

14 Lbs (6.4 kg).

COUNTERPOINT SA-2000 SERVICE MANUAL

SECTION 3
BLOCK DIAGRAMS



CONTROL FUNCTIONS

REF.	DESCRIPTION	AS SHOWN	TYPE	CPTP/N	SPECIFICATION
1	STANDBY/READY	OFF (STANDBY)	DPDT TOGGLE	SV-DPDT-RA	NONE

OTHER APPLICABLE DRAWINGS

DRAWING TITLE	DESCRIPTION	CAD FILENAME	DRAWING NUMBER
CIRCUIT BOARD LAYOUT PVA 2K-3-PCB	COMPONENT LAYOUT DIAGRAM	NONE	NONE
TRANSFORMER PRIMARY WIRING DETAILS	NORMAL TRANSFORMER PRIMARY CONNECTION DETAILS	7027.DWG	7027
TRANSFORMER SECONDARY WIRING DETAILS	NORMAL TRANSFORMER SECONDARY CONNECTION DETAILS	7028.DWG	7028
MATERIALS, SA-2000	LIST OF FIELD-REPLACEABLE COMPONENTS	7023.DWG	7023

APPLICABLE SCHEMATIC DETAIL DRAWINGS

DRAWING TITLE	CAD FILENAME	DRAWING NUMBER
HIGH VOLTAGE RECTIFICATION AND FILTRATION	HVRF.DWG	702501
HIGH VOLTAGE REGULATION	HVR.DWG	702502
+24/-24 VDC RECTIFICATION AND REGULATION	24RF.DWG	702503
+6 VDC REGULATION	6REG.DWG	702504
FILAMENT VOLTAGE RECTIFICATION AND REGULATION	FILRF.DWG	702505

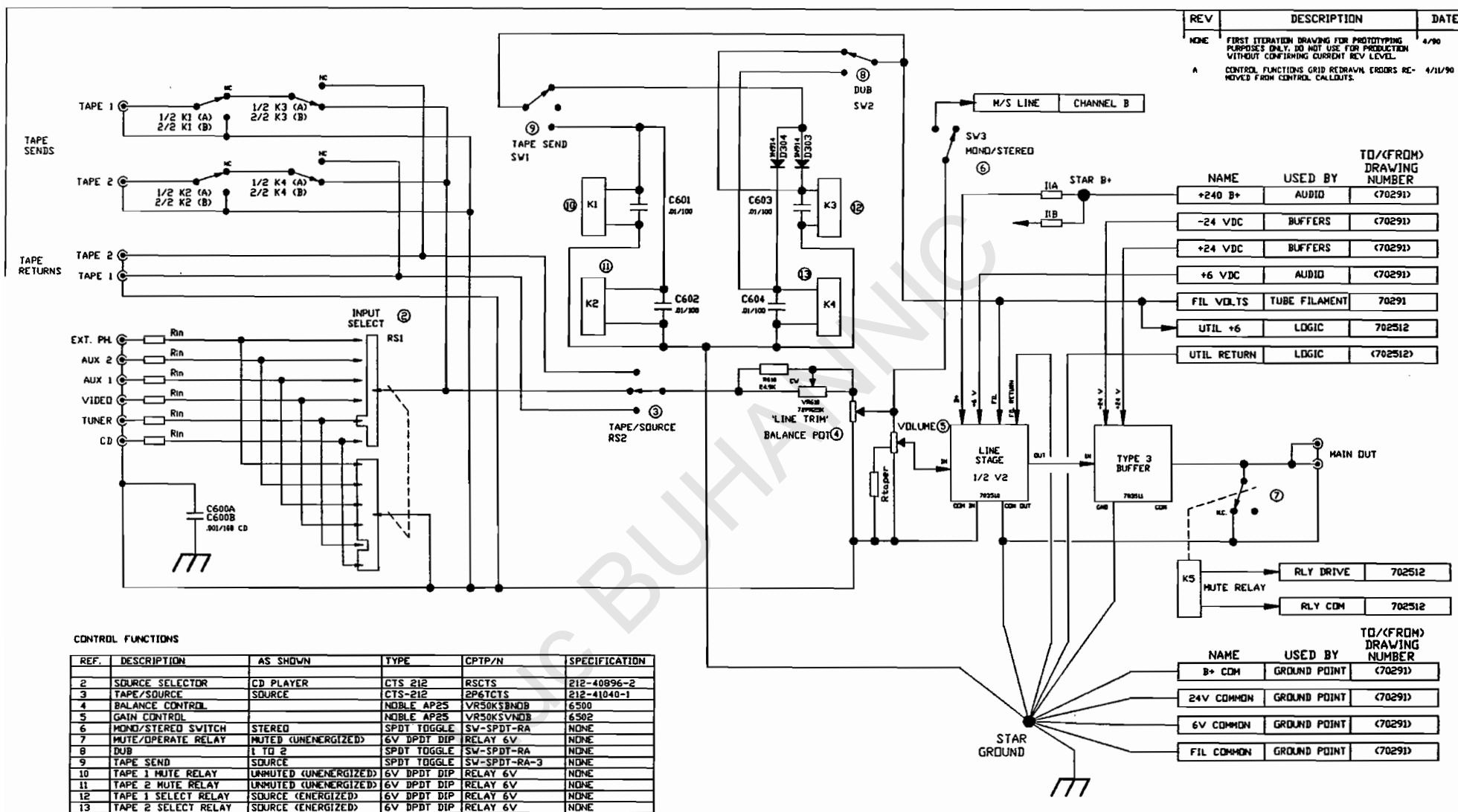
NOTES:

1. FOR TYPICAL AC AND DC OPERATING VOLTAGES, SEE APPLICABLE DETAIL SCHEMATIC DRAWINGS.

DRAWN REVISION

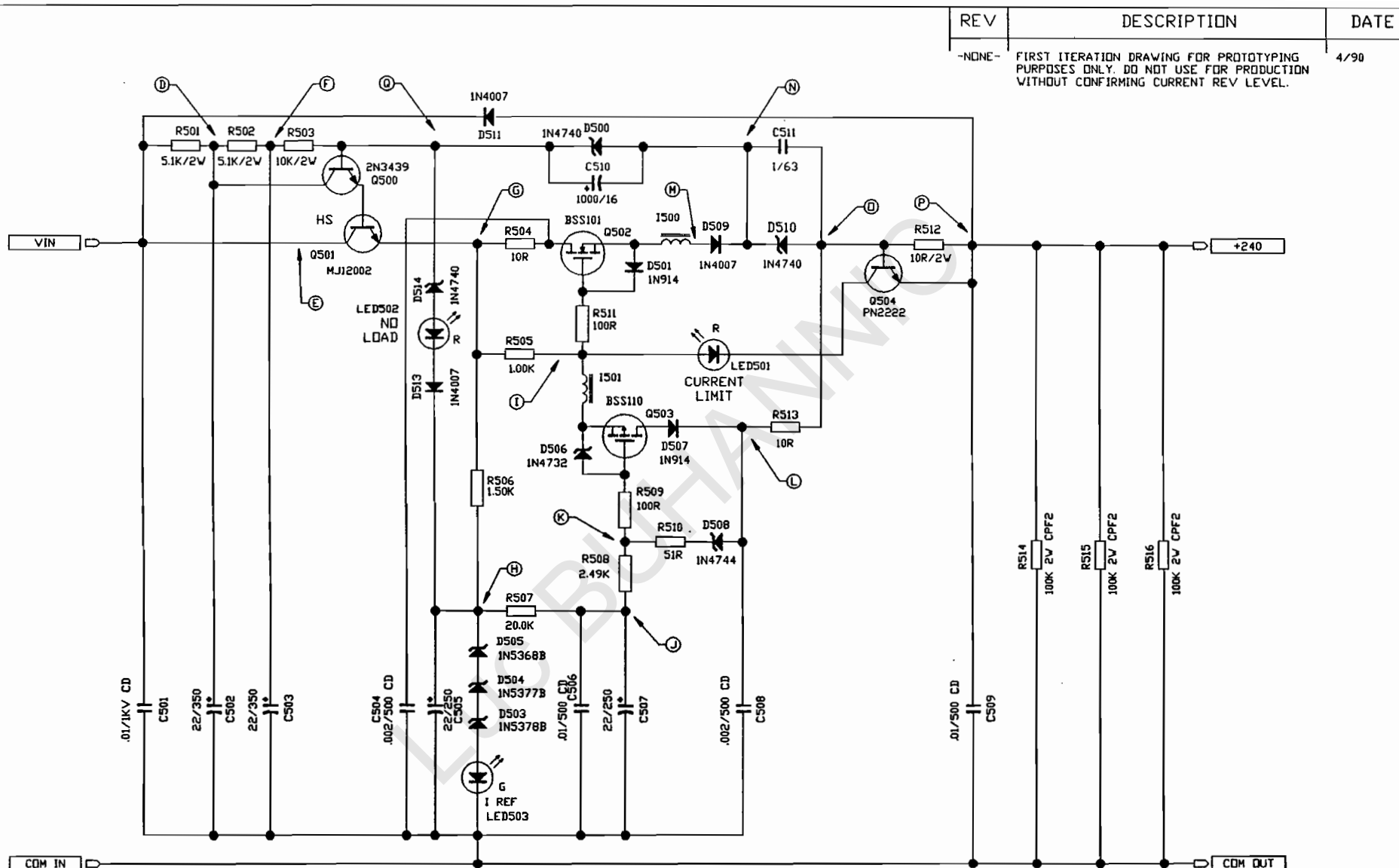
J.M.E.

COUNTERPOINT
SA-2000 POWER SUPPLY
BLOCK DIAGRAM
CAD FILE: 2KPSB82K51.DWG: 70291



NOTES:
1. CHANNEL "A" (LEFT CHANNEL) SHOWN ONLY. COMPONENTS USED IN CHANNEL "B" HAVE "100-" PREFIX.
2. FOR TYPICAL SIGNAL LEVELS AND DC OPERATING VOLTAGES, SEE APPLICABLE DETAIL SCHEMATIC DRAWINGS.

SECTION 4
SCHEMATICS



SCHEMATIC DETAIL DRAWING FROM BLOCK DIAGRAM		
THIS IS DETAIL DRAWING FROM BLOCK DIAGRAM TITLED:	CAD FILENAME	DRAWING NUMBER
SA-2000 POWER SUPPLY BLOCK DIAGRAM	2KPSBLK.DWG	70291

NOTES:

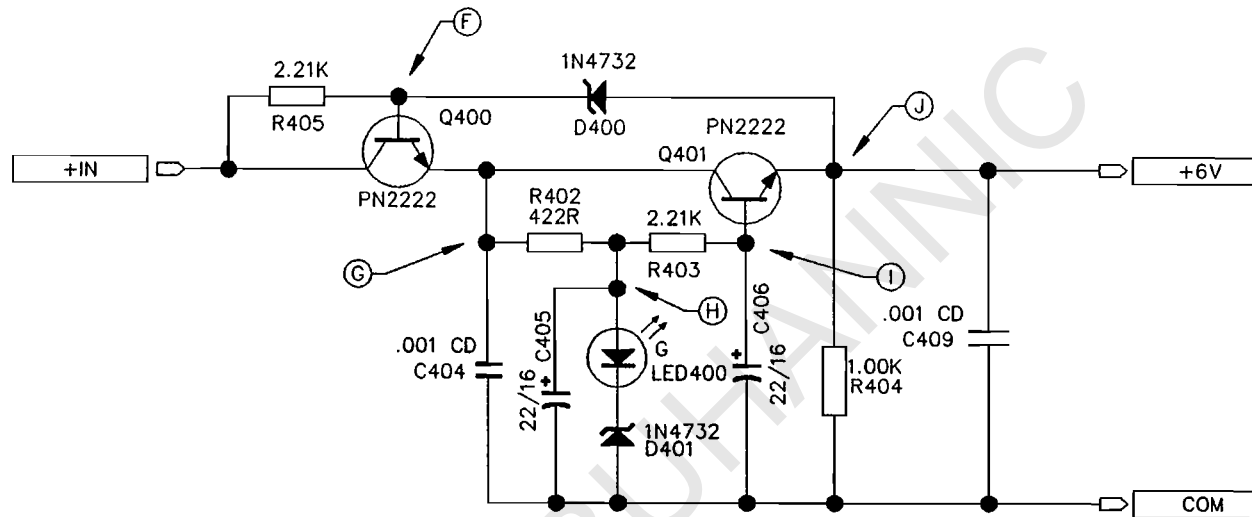
1. REFERENCED VOLTAGES ① THROUGH ⑩ REFER TO NORMAL DC OPERATING VOLTAGES AS SHOWN ON DRAWING NUMBER 702102 "OPERATING VOLTAGES, HIGH VOLTAGE SUPPLY."
2. FOR DESCRIPTION OF CIRCUIT, REFER TO DRAWING NUMBER 702202 "CIRCUIT DESCRIPTION, HIGH VOLTAGE SUPPLY."

DRAWN	JME	REVISION
ON DATE 4/8/90	PRODUCT: SA-2000	

COUNTERPOINT	
HIGH VOLTAGE REGULATION	
CAD FILE	DWG: 702502
REV: 82K51	

COUNTERPOINT
+24/-24 VDC RECTIFICATION
AND REGULATION
CAD FILE: exp@cpu73@hotmail.com
S&P REF: DWG: 702503

REV	DESCRIPTION	DATE
-NONE-	FIRST ITERATION DRAWING FOR PROTOTYPING PURPOSES ONLY DO NOT USE FOR PRODUCTION WITHOUT CONFIRMING CURRENT REV LEVEL.	4/90



SCHEMATIC DETAIL DRAWING FROM BLOCK DIAGRAM		
THIS IS DETAIL DRAWING FROM	CAD	DRAWING
BLOCK DIAGRAM TITLED:	FILENAME	NUMBER
SA-2000 POWER SUPPLY	2KPSBLK.DWG	70291
BLOCK DIAGRAM		

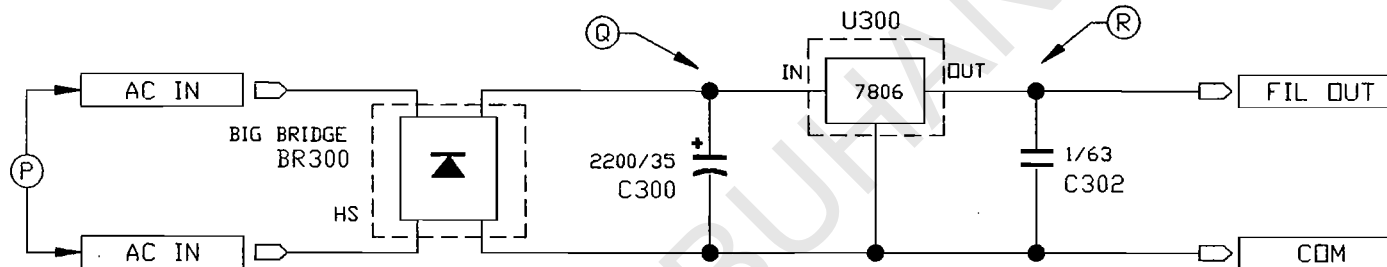
NOTES:

1. REFERENCED VOLTAGES (F) THROUGH (J) REFER TO NORMAL DC OPERATING VOLTAGES AS SHOWN ON DRAWING NUMBER 7023103 "OPERATING VOLTAGES, LOW VOLTAGE CIRCUITS."
2. FOR DESCRIPTION OF CIRCUIT, REFER TO DRAWING NUMBER 7023203 "CIRCUIT DESCRIPTION, LOW VOLTAGE CIRCUITS."

DRAWN	JME	REVISION
ON DATE 4/8/90		PRODUCT: SA-2000

COUNTERPOINT	
+6 VDC REGULATION	
watsou73@hotmail.com	
CAD FILE:	DWG: 702504
Serno: 82K51	

REV	DESCRIPTION	DATE
-NONE-	FIRST ITERATION DRAWING FOR PROTOTYPING PURPOSES ONLY. DO NOT USE FOR PRODUCTION WITHOUT CONFIRMING CURRENT REV LEVEL.	4/90



SCHEMATIC DETAIL DRAWING FROM BLOCK DIAGRAM		
THIS IS DETAIL DRAWING FROM BLOCK DIAGRAM TITLED:	CAD FILENAME	DRAWING NUMBER
SA-2000 POWER SUPPLY BLOCK DIAGRAM	2KPSBLK.DWG	70291

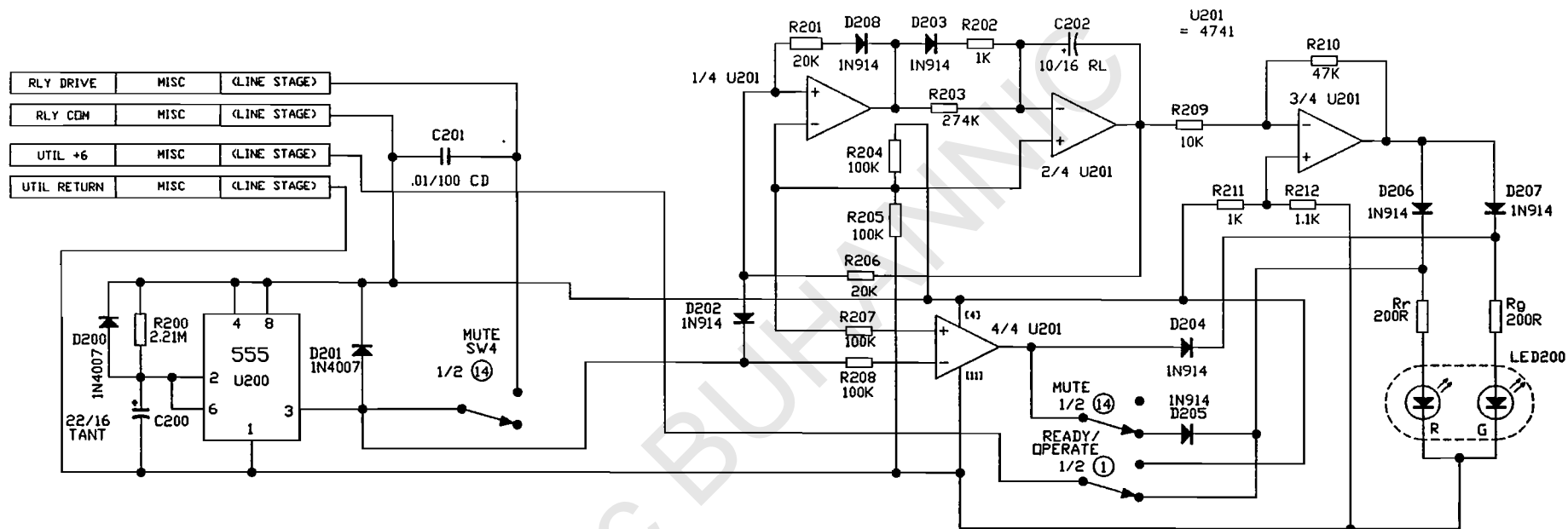
NOTES:

1. REFERENCED VOLTAGES (Q) THROUGH (R) REFER TO NORMAL OPERATING VOLTAGES AS SHOWN ON DRAWING NUMBER 702103 "OPERATING VOLTAGES, LOW VOLTAGE CIRCUITS."
2. FOR DESCRIPTION OF CIRCUIT, REFER TO DRAWING NUMBER 702203 "CIRCUIT DESCRIPTION, LOW VOLTAGE CIRCUITS."

DRAWN	JME	REVISION
ON DATE 4/8/90		PRODUCT: SA-2000

COUNTERPOINT	
FILAMENT VOLTAGE RECTIFICATION	
WATSON73@HOTMAIL.COM	
CAD FILE 82K51	
FILTR	DWG: 702505

REV	DESCRIPTION	DATE
-NONE-	FIRST ITERATION DRAWING FOR PROTOTYPING PURPOSES ONLY. DO NOT USE FOR PRODUCTION WITHOUT CONFIRMING CURRENT REV LEVEL.	4/90



CONTROL FUNCTIONS

REF.	DESCRIPTION	AS SHOWN	TYPE	CPTP/N	SPECIFICATION
1	STANDBY/READY	OFF (STANDBY)	DPDT TOGGLE	SW-DPDT-RA	NONE
14	MUTE/OPERATE	MUTE	DPDT TOGGLE	SW-DPDT-RA	NONE

SCHEMATIC DETAIL DRAWING FROM BLOCK DIAGRAM

THIS IS DETAIL DRAWING FROM BLOCK DIAGRAM ITEM: SA-2000 AUDIO STAGE BLOCK DIAGRAM	CAD FILE NAME: 2KAUDIO	DRAWING NUMBER: 70253
--	------------------------------	-----------------------------

NOTES:

1. FOR DESCRIPTION OF CIRCUIT, REFER TO DRAWING NUMBER 702204 "CIRCUIT DESCRIPTION, CONTROL CIRCUIT."

DRAWN	JME	REVISION
ON DATE 4/8/90		PRODUCT: SA-2000

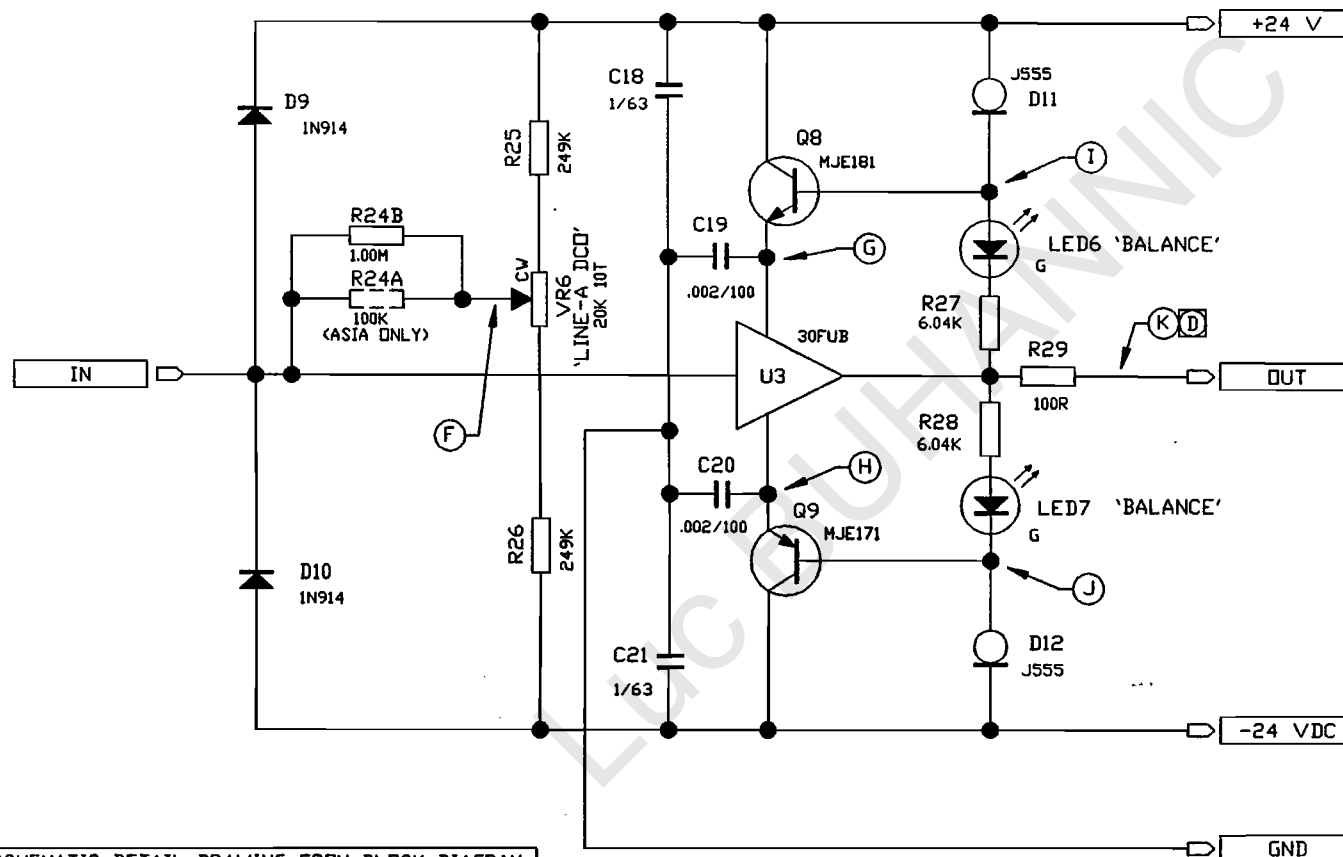
COUNTERPOINT
CONTROL FUNCTIONS

watsou73@hotmail.com
CAD FILE: 82K51.DWG: 702512

1. CHANNEL "A" SHOWN ONLY. "B" CHANNEL COMPONENTS RECEIVE "100-" PREFIX
REFERENCE DESIGNATOR.
2. REFERENCED VOLTAGES (A) THROUGH (C) REFER TO NORMAL DC OPERATING VOLTAGES AS SHOWN ON DRAWING NUMBER 702101 "DC OPERATING VOLTAGES, SA-2000 AUDIO CIRCUIT."
3. REFERENCED VOLTAGES (A) THROUGH (C) REFER TO NORMAL SIGNAL LEVELS AS SHOWN ON DRAWING NUMBER 702401 "SIGNAL LEVELS, SA-2000 AUDIO CIRCUIT."
4. FOR DESCRIPTION OF CIRCUIT, REFER TO DRAWING NUMBER 702201 "CIRCUIT DESCRIPTION, SA-23000 AUDIO."

COUNTERPOINT
AUDIO GAIN STAGE
SYNTHETIC
CAD FILE: watsbut3@hotmail.com
Serno: 82101 DWG: 702510

REV	DESCRIPTION	DATE
-NONE-	FIRST ITERATION DRAWING FOR PROTOTYPING PURPOSES ONLY. DO NOT USE FOR PRODUCTION WITHOUT CONFIRMING CURRENT REV LEVEL.	4/90



SCHEMATIC DETAIL DRAWING FROM BLOCK DIAGRAM		
THIS IS DETAIL DRAWING FROM BLOCK DIAGRAM TITLED:	CAD FILENAME	DRAWING NUMBER
SA-2000 AUDIO STAGE BLOCK DIAGRAM	2KLINE.DWG	70293

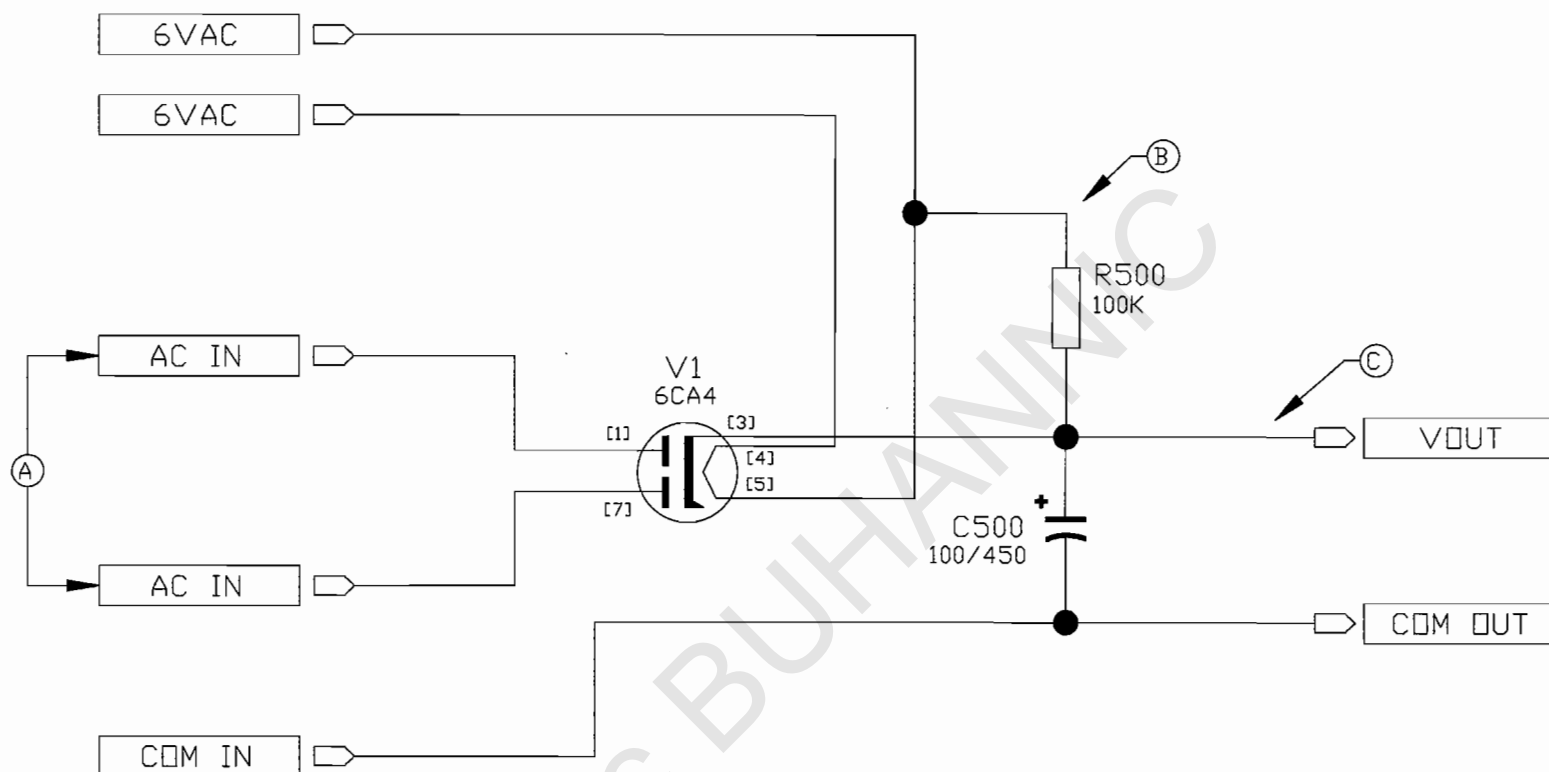
NOTES:

1. CHANNEL "A" SHOWN ONLY. "B" CHANNEL COMPONENTS RECEIVE "100--" PREFIX REFERENCE DESIGNATOR.
2. REFERENCED VOLTAGES (F) THROUGH (K) REFER TO NORMAL DC OPERATING VOLTAGES AS SHOWN ON DRAWING NUMBER 702101 "DC OPERATING VOLTAGES, SA-2000 AUDIO CIRCUIT."
3. REFERENCED VOLTAGE (D) REFERS TO NORMAL SIGNAL LEVELS AS SHOWN ON DRAWING NUMBER 702401 "SIGNAL LEVELS, SA-2000 AUDIO CIRCUIT."
4. FOR DESCRIPTION OF CIRCUIT, REFER TO DRAWING NUMBER 702201 "CIRCUIT DESCRIPTION, SA-2000 AUDIO."

DRAWN	JME	REVISION	A
ON DATE	4/8/90	PRODUCT:	SA-2000

COUNTERPOINT
AUDIO STAGE OUTPUT BUFFER
DUAL IN LINE DYNAMIC
CAB FILE 82K51
3rd BRIDGE DWG: 702511

SECTION 5
OPERATING VOLTAGES AND
SIGNAL LEVELS



SCHEMATIC DETAIL DRAWING FROM BLOCK DIAGRAM

THIS IS DETAIL DRAWING FROM BLOCK DIAGRAM TITLED: SA-2000 POWER SUPPLY BLOCK DIAGRAM	CAD FILENAME 2KPSBLK.DWG	DRAWING NUMBER 70291
---	--------------------------------	----------------------------

NOTES:

1. REFERENCED VOLTAGES (A) THROUGH (C) REFER TO NORMAL OPERATING VOLTAGES AS SHOWN ON DRAWING NUMBER 702102 "OPERATING VOLTAGES, HIGH VOLTAGE SUPPLY."
2. FOR DESCRIPTION OF CIRCUIT, REFER TO DRAWING NUMBER 702202 "CIRCUIT DESCRIPTION, HIGH VOLTAGE SUPPLY."

DRAWN	JME	REVISION
ON DATE 4/8/90		PRODUCT: SA-2000
COUNTERPOINT		
HIGH VOLTAGE RECTIFICATION AND FILTRATION		

REV	DESCRIPTION	DATE
NONE	FIRST ITERATION DRAWING BASED UPON FIRST PRODUCTION RUN SERIAL NUMBERS 12K00 THROUGH 12K99.	6/26/89

REF.	DRAWING	VOLTAGE	RIPPLE	NOISE	NOTES
A	702501	604 VAC 1%			SEE NOTE 2
B	702501	359 VDC 2%	1V P-P	--	
C	702501	360 VDC 2%	1V P-P	--	
D	702502	330 VDC 2%	4.2mV	200uV	
E	702502	360 VDC 2%	340mV	2.6mV	
F	702502	306 VDC 2%	60uV	3.0uV	
G	702502	261 VDC 2%	6uV	5.0uV	
H	702502	254 VDC 2%	22uV	14uV	
I	702502	256 VDC 2%	2.9uV	2.1uV	
J	702502	254 VDC 2%	2.1uV	1.5uV	
K	702502	254 VDC 2%	3.8uV	3.5uV	
L	702502	244 VDC 2%	7.0uV	3.4uV	
M	702502	254 VDC 2%	6.1uV	4.4uV	
N	702502	253 VDC 2%	9.0uV	4.9uV	
O	702502	244 VDC 2%	7.6uV	3.4uV	
P	702502	244 VDC 2%	5.0uV	3.0uV	
Q	702502	263 VDC 2%	7.5uV	5.0uV	

NOTES:

- ALL VOLTAGES WITH AC MAINS AT
NOMINAL VOLTAGE, ALL TUBES INSTALLED,
AND SA-2000 IN "READY" MODE.

MEASUREMENT CONDITIONS FOR RIPPLE
AND NOISE:

RIPPLE: 22 TO 20kHz, 18dB/OCTAVE
BANDPASS, RMS.

NOISE: 400Hz TO 20kHz,
18dB/OCTAVE BANDPASS, RMS.

- AC VOLTAGE MEASURED BETWEEN POINTS
SPECIFIED ON APPLICABLE
SCHEMATIC.

DRAWN	JME	REVISION
ON DATE 6/26/90	PRODUCT: SA-2000	
COUNTERPOINT		
OPERATING VOLTAGES, HIGH VOLTAGE SUPPLY		
DWG: 702102		

REV	DESCRIPTION	DATE
NONE	FIRST ITERATION DRAWING BASED UPON PRODUCTION RUN, SERIAL NUMBERS 12K00 THROUGH 12K99.	6/26/90

REF.	DRAWING	VOLTAGE	RIPPLE	NOISE	NOTES
A	702503	34 VDC 1%	0.2V P-P	--	
B	702503	-35 VDC 1%	0.15V P-P	--	
C	702503	54 VAC	--	--	SEE NOTE 2
D	702503	24 VDC 2%	175uV	85uV	
E	702503	-24 VDC 2%	265uV	200uV	
F	702504	10.4 VDC 5%	8uV	2.7uV	
G	702504	9.8 VDC 5%	8uV	2.7uV	
H	702504	6.5 VDC 5%	3.6uV	1.4uV	
I	702504	6.5 VDC 5%	5.7uV	1.6uV	
J	702504	5.9 VDC 5%	3.4uV	1.4uV	
P	702505	10.7 VAC	--	--	SEE NOTE 2
Q	702505	11.7 VDC 1%	1.1V P-P	--	
R	702505	6.0 VDC 1%	53uV	22uV	

NOTES:

- ALL VOLTAGES WITH AC MAINS AT NOMINAL VOLTAGE, ALL TUBES INSTALLED AND SA-2000 IN "READY" MODE.

MEASUREMENT CONDITIONS FOR RIPPLE AND NOISE:

RIPPLE: 10 TO 20kHz, 18dB/OCTAVE BANDPASS, RMS.

NOISE: 400Hz TO 20kHz, 18dB/OCTAVE BANDPASS, RMS.

- AC VOLTAGE MEASURED BETWEEN POINTS SPECIFIED ON APPLICABLE SCHEMATIC.

DRAWN	JME	REVISION
ON DATE 6/26/90	PRODUCT: SA-2000	
COUNTERPOINT		
OPERATING VOLTAGES, LOW VOLTAGE CIRCUITS		
COUNTERPOINT		
702103	DWG: 702103	

REV	DESCRIPTION	DATE
NONE	FIRST ITERATION DRAWING BASED UPON FIRST PRODUCTION RUN, SERIAL NUMBERS FROM 12K00 THROUGH 12K99.	6/26/90

AUDIO STAGE SIGNAL LEVEL

REF	DRAWING	SIGNAL VOLTAGE	dBR	NOTES
A	702510	100mV	0	
B	702510	86mV	-1.3	
C	702510	1.7V	+24	
D	702511	1.8V	+25	

NOTES:

1. CAUTION: VOLTAGES AT SOME TEST POINTS MAY EXCEED MAXIMUM DC VOLTAGE RATINGS OF SOME AUDIO TEST EQUIPMENT. REFER TO DRAWING 702101 FOR TYPICAL DC VOLTAGES. IF IN DOUBT, CONTACT THE MANUFACTURER OF YOUR TEST EQUIPMENT.

2. TEST CONDITIONS:GENERAL.

ALL VOLTAGES WITH AC MAINS AT NOMINAL VOLTAGE, ALL TUBES INSTALLED AND SA-2000 IN "READY" MODE. VOLUME CONTROL FULLY CLOCKWISE, BALANCE CONTROL CENTERED, SA-2000 BIASED IN ACCORDANCE WITH INSTRUCTIONS IN OWNER'S MANUAL.

INPUT LEVELS.

100mV RMS, 1kHz SINE WAVE
APPLIED TO APPLICABLE LINE INPUT.

TEST POINT VOLTAGE.

VALUE SHOWN IS RMS, dBR REFERENCED
TO INPUT SIGNAL LEVEL.

3. SIGNAL LEVELS MAY VARY APPRECIABLY FROM THE VALUES SHOWN DUE TO VARIATIONS IN TUBES.
4. SIGNAL LEVELS MAY ALSO VARY AS A FUNCTION OF "LINE TRIM" CONTROLS VR610 (A AND B) AS SHOWN ON SA-2000 AUDIO STAGE BLOCK DIAGRAM (DRAWING NUMBER 70293), WHICH ARE USED TO ASSURE EQUAL SIGNAL LEVELS FROM THE TWO CHANNELS.
5. INPUT Z OF AUDIO VOLTMETER ASSUMED TO BE 100K OHMS.

DRAWN	JME	REVISION
ON DATE 6/26/90		PRODUCT: SA-2000

COUNTERPOINT	
SIGNAL LEVELS	
SA-2000 AUDIO CIRCUIT	
CAB FILE: 82K51	DWG: 702401
702401	

REV	DESCRIPTION	DATE
-NONE-	FIRST ITERATION DRAWING BASED ON FIRST RUN OF PRODUCTION, SERIAL NUMBERS 12K00 THROUGH 12K99.	6/26/90

AUDIO STAGE TYPICAL D.C. VOLTS

REF	DRAWING	DC VOLTAGE	NOTES
A	702510	3 V 50%	SEE NOTE 2
B	702510	3 V 50%	SEE NOTE 3
C	702510	0.4V LESS THAN TP-B	SEE NOTE 2
D	702510	30 TO 60 V	SEE NOTE 2
E	702510	1.8 V 5%	
F	702511	0 V $\pm 0.2V$	
G	702511	11.7 V $\pm 3.7 V$	
H	702511	-11.7 V $\pm 3.7V$	
I	702511	12.2 V $\pm 3.7V$	
J	702511	-12.2 V $\pm 3.7V$	
K	702511	0.000V $\pm 10mV$	SEE NOTE 4

NOTES:

- ALL VOLTAGES WITH AC MAINS AT NOMINAL VOLTAGE, ALL TUBES INSTALLED AND SA-2000 IN "READY" MODE.
- VOLTAGE IS A FUNCTION ON LS BIAS POT (VR5), AND IS SET IN ACCORDANCE WITH AUDIO STAGE BIASING INSTRUCTIONS IN OWNER'S MANUAL.
- VOLTAGE AT POINT B REQUIRES HIGH INPUT IMPEDANCE (>100 MEG OHM) METER TO READ ACCURATELY.
- USE VR6 TO ADJUST TO 0.000.

DRAWN	JME	REVISION
ON DATE 6/26/90	PRODUCT: SA-2000	

COUNTERPOINT	
DC OPERATING VOLTAGES	
SA-2000 AUDIO CIRCUIT	
CAD FILE	DWG: 702101
702101	

SECTION 6
CIRCUIT DESCRIPTIONS

Description of Audio Circuit, SA-2000 Control Amplifier

GENERAL

The SA-2000 has one stage of voltage amplification and one stage of buffering per channel. This document will describe the Left channel (channel "A") only. All descriptions apply to channel B.

Refer to the individual Schematic Detail drawings for the following descriptions.

For List of Materials, refer to Drawing 7023.

POWER SUPPLIES

All DC supplies for the audio stages are described on Drawing 70291 "SA-2000 POWER SUPPLY BLOCK DIAGRAM" and its accompanying Schematic Detail drawings.

AUDIO STAGE

The Audio Voltage Gain Stage and buffer, are shown on Drawing 70393 "SA-2000 AUDIO STAGE BLOCK DIAGRAM."

The Audio Stages are located near the center of the circuit board in the audio chassis.

Audio Voltage Gain Stage, Drawing 702510

The output of the gain control is applied to the Gate

of JFET Q5, a P-channel device. The Source of Q5 is connected to the Cathode of half of dual-triode tube V2. The signal at Q5's Source has no voltage gain, but is of sufficiently low impedance to properly drive V2's cathode.

Trim pot VR5 ("LS BIAS") supplies proper operating voltage to the Gate of JFET Q5 through resistor R12. The Grid of tube V2 is biased to +1.8V by voltage reference LED5, whose operating current is supplied by R13. Tube V1 acts as a cathode-driven stage and amplified signal from V2's Plate is output to the audio stage output buffer.

Audio Stage Output Buffer, Drawing 702511.

Amplified signal at the Plate of V2 is applied to the input of buffer U3, a unity-gain JFET current amplifier. To increase linearity of U3, transistors Q8 and Q9 supply U3's + and - operating voltages, and are connected to "swing" U3's voltages with the output signal. Reference resistors R27 & R28 plus LED6 and LED7 set the emitters of Q8 and Q9 approximately 12 volts above and below the output signal voltage. Trimmer VR6 ("DCO") is

used to adjust the output of U3 to 0.000 volts.

DRAWN: JME	REVISION: A
ON DATE: 27JUNE 1990	PRODUCT: SA-2000
COUNTERPOINT	
CIRCUIT DESCRIPTION SA-2000 AUDIO	
EP FILE: 702201.EPD	DWG: 702201

Description of High Voltage Supply, SA-2000 Control Amplifier

GENERAL

The SA-2000 has a single high-voltage power supply as shown on Drawing 70291 "SA-2000 POWER SUPPLY BLOCK DIAGRAM." The high voltage supply is located on the right section of the circuit board in the audio chassis.

The high-voltage supply is turned on by applying filament voltage to the rectifier tube. Should the side heatsink temperature exceed approximately 75 degrees C, thermal switch T-1 opens, removing AC Mains voltage to the transformer. Refer to the individual Schematic Detail drawings for the following descriptions.

For List of Materials, refer to Drawing 7023.

TRANSFORMER

All AC for the SA-2000 power supplies is supplied by the transformer (CPTP/N 2K-4-TRN) located in the mains chassis. Refer to Drawing 7027 "TRANSFORMER PRIMARY WIRING DETAILS, SA-2000" for information on correct connections to the transformer primary for various AC Mains voltages.

HIGH VOLTAGE RECTIFICATION AND FILTRATION, Drawing 702501.

604VAC from the transformer is rectified by full-wave rectifier V1 as soon as 6VAC has been applied to its filaments. The rectified voltage is smoothed by capacitor C500. Resistor R500 "floats" the filaments up to the cathode voltage to prevent cathode-to-filament arcing inside

V1.

HIGH VOLTAGE REGULATION, Drawing 702502.

The operation of the high voltage regulator is similar to the +6/-6 VDC regulators described on Drawing 702203.

Reference voltage components D503, D504, D505 and LED503 (point "H") establish MOSFET Q503's Source voltage at approximately 250 VDC. MOSFET Q502's Gate voltage follows this voltage, and consequently Q502's Source. Q502 and Q503 are connected as an "enhanced Darlington" where Q503's Vds remains constant due to the action of D510. Transistors Q500 and Q501 are connected as a conventional Darlington pair. The voltage on Q500's Base controls the voltage of Q501's Emitter. Since this voltage follows Q502's Source voltage, Q502's Vds remains constant and small (approximately 8 VDC, set by D500). The constant Vds across Q502 permits Q502 to be a small, fast MOSFET.

Zener reference current for D503-D505 is set by R503, and remains constant due to the constant voltage presented by the Emitter of Q501. LED503 ("Iref") lights when current is flowing through the Zener string.

If the current through resistor R512 exceeds approximately 50mA, transistor Q504 will conduct, reducing the voltage at Q502's Gate. A current-limited condition will be indicated by a low output voltage from the supply, and the lighting of LED501 ("CURRENT LIMIT").

Resistor R507 and capacitor C507 decouple the Gate of Q503

from Zener noise in reference string D503-D505. This type of supply requires a certain amount of current to regulate properly. Resistor load bank R514, 515 and 516 present a constant minimum load and assure proper operation of the circuit. However, NEVER OPERATE THE SA-2000'S HIGH VOLTAGE SUPPLY WITHOUT AUDIO TUBE V2. An unloaded condition will cause the voltage at point "Q" to rise uncontrollably. Zener diode D514 will conduct and cause LED502 ("NO LOAD") to light. Refer to Drawing 702102 for Normal Operating Voltages.

DRAWN: JME	REVISION: A
ON DATE: 27 JUNE 1990	PRODUCT: SA-2000
COUNTERPOINT	
CIRCUIT DESCRIPTION SA-2000 HIGH VOLTAGE SUPPLY	
EP FILE: 702202.EPD	DWG: 702202

Description of Low-Voltage Supplies, SA-2000 Control Amplifier

GENERAL

The SA-2000 has three individual low-voltage power supplies as shown on Drawing 70391 "SA-2000 POWER SUPPLY BLOCK DIAGRAM." The regulators are located on the rear portion of the circuit board in the audio chassis.

All Low-voltage supplies operate as soon as the SA-2000 is connected to AC Mains.

Refer to the individual Schematic Detail drawings for the following descriptions.

For List of Materials, refer to Drawing 7023.

TRANSFORMER

All AC for the SA-2000 power supplies is supplied by the transformer (CPTP/N 2K-4-TRN) located in the external transformer box. Refer to Drawing 7027 "TRANSFORMER

PRIMARY WIRING DETAILS, SA-2000" for information on correct connections to the transformer primary for various AC Mains voltages.

+24/-24 VDC Rectification and Regulation, Drawing 702503.

54 VAC from the transformer is rectified by full-wave bridge BR400 and

smoothed by capacitors C400 and C401. Regulation is performed by U400 and U401, fixed + and - 24 volt regulators. U400 and U401 are mounted to the side heat sink bracket. Refer to Drawing 702103 for Normal Operating Voltages. When replacing U400 or U401, always be certain that the cases of these devices are electrically insulated from the heat sink bracket.

+6 Vdc Bias Regulation, Drawing 702504.

Reference voltage components D401 and LED400 (point "J") establish Q401's Emitter voltage at approximately 6 VDC. Q400's Emitter voltage follows this voltage, raised by approximately 4.7 V by Zener diode D400. This configuration causes Q401's Vce to remain constant. Reference current for D401 and LED400 is set by R402 and remains constant due to the constant voltage at Emitter of Q400. R405 supplies Zener current for D400 and Base current for Q400. R403 and C406 decouple Zener noise from the Base of Q401. C405 reduces Zener noise in the mid to high frequencies. C404 is required to prevent possible VHF parasitic oscillations due to

phase shift in the loop formed by components Q401, D400 and Q400. R404 assures that the power supply pulls enough current to allow Zenering of D400.

Refer to Drawing 703103 for Normal Operating Voltages.

Filament Voltage Rectification and Regulation, Drawing 702505.

10.7 VAC from the transformer is rectified by full-wave bridge BR300 and smoothed by capacitor C300.

Regulation is performed by U300, a fixed 6-volt TO-3 regulator. U300 is mounted to the side heat sink bracket.

Refer to Drawing 702103 for Normal Operating Voltages. When replacing U300, always be certain that the case of this device is electrically insulated from the heat sink bracket. The regulator is designed to shut off if its temperature exceeds a pre-set limit. Be certain that the rear heatsink of the SA-2000 receives adequate ventilation.

DRAWN: JME	REVISION: A
ON DATE: 27 JUNE 1990	PRODUCT: SA-2000
COUNTERPOINT	
CIRCUIT DESCRIPTION SA-2000 LOW VOLTAGE SUPPLIES	
EP FILE: 702203.EPD	DWG: 702203

Description of Control Circuitry, SA-2000 Control Amplifier

GENERAL

The control functions as shown in drawing 702512, are performed by a timer (U200), and a quad OP-AMP (U201). U200 provides a delay from the moment the STANDBY/OPERATE switch is placed in the operate position, until approximately seventy seconds later. This insures that the tubes are warmed up, that everything is settled and that the control selections have been implemented before unmuting.

During this warm-up period, an amber LED blinks on the front panel. This and other front panel indications are accomplished by U201 and LED 200. The 6VDC supply is turned on as soon as the SA-2000 is connected to the AC Mains. Refer to individual Schematic Detail Drawing 702512 for the following description. For List of Materials, refer to drawing 7023.

WARM-UP TIMER U200

U200 is a 555 timer configured as a monostable (one-shot) flip-flop. When the STANDBY/OPERATE (S/O) switch is in the STANDBY position, no power is provided to the timer and diode D200 insures that timing capacitor C200 is discharged. When the S/O switch is set to OPERATE, power (+6Vdc) is applied to U200 (along with U201 and Relay Common). The 555 trigger input is held low by C200 until it charges to approximately 4Vdc through resistor R200. The 555 output is positive from just after turn on until the rising trigger voltage reaches the reset point. It then switches to low where it remains until S/O is turned to STANDBY then to READY, initiating another

warm-up cycle. This low output state is logic function NOT ON – an active low enable signal that tells other circuitry in the SA-2000 that the warm-up period has expired, including Mute Relay K1 which is pulled in (able to unmute) when NOT ON is active low. INDICATOR LED AND U201 Quad Op-Amp U201, LED200 and the surrounding circuitry, perform service as Standby, Warm-up, Operate, and Muted/Unmuted indicator and driver.

The LED states and colors have the following meanings:

- Steady Red: SA-2000 is in Standby,
- Blinking Yellow: warming up:
- Steady Yellow: Unit is operational but muted
- Steady Green: Unit is operational and unmuted.

When the S/O switch is in the STANDBY position, no power is available to run U201. LED200 is glowing red because the S/O switch provides power to the red half of LED200 only. Diodes D205 and D206 block this power from all other circuitry. When S/O is set to OPERATE, the connection to the power is removed from LED200 red and connected to the other circuitry which then controls operation. Sections one and two of U201 form an astable multivibrator with a cycle time around 1.5 sec (.66 hz). Section one is the comparator with R201 providing necessary hysteresis, and R204-R205 providing 3Vdc reference to sections one, two and four. Section two is the integrator with two time constants. One, provided by R203 and C202, sets a long rising ramp at the output.

The other made up of R202 and C202 and enabled by D203, provides a quick falling ramp at the output giving a saw tooth wave form. Section three is an inverting amplifier which boosts the signal output of section two and drives both sections of the bi-color (red and green) LED200. The output of this section is offset slightly below 3 Vdc by R211 and R212 for improved appearance of the blink quality.

During "Initializing" while the 555 timer output is high, diode D202 is reversed biased and has no effect on the circuit. This allows the Op-Amps to cycle continuously, lighting both the red and green halves of LED200 (red and green together make yellow).

When U200 times out and NOT ON goes low, D202 couples this through to section one and forces its output low. This is inverted at the output of section two and again at section three such that section three's output is low. Because of D206 and D207, this effectively disconnects these elements from the circuit until the next warm-up cycle.

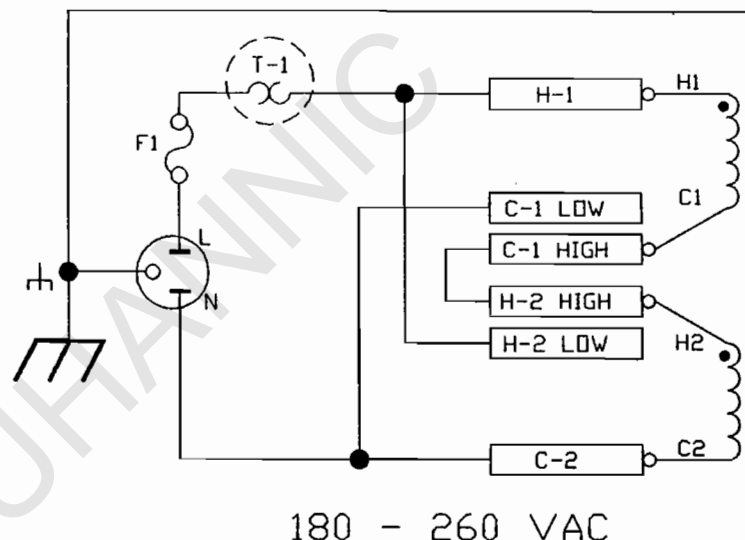
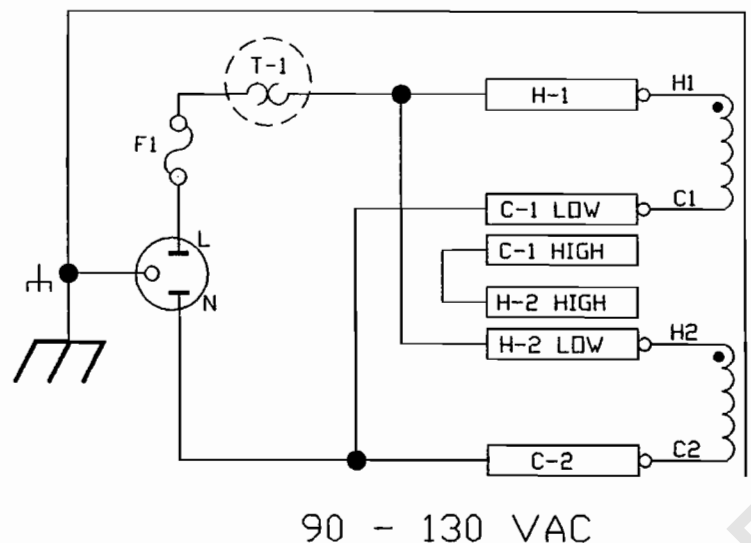
U201 section four acts as a comparator. While U200's output is high, section four's output is low and because of D204 and D205, does nothing. When NOT ON goes low, the output of section four goes high and turns LED200 green on through D204. Thus the LED is green during unmuted operation.

If, however, the SA2000 is in a muted condition, the mute switch will also connect the high output of section four through D205 to the red half of LED200 producing a yellow color.

DRAWN: JME	REVISION: A
ON DATE: 27 JUNE 1990	PRODUCT: SA-2000
COUNTERPOINT	
CIRCUIT DESCRIPTION SA-2000 CONTROL CIRCUITRY	
EP FILE: 702204.EPD	DWG: 702204

SECTION 7
TRANSFORMER WIRING

REV	DESCRIPTION	DATE
-----	-------------	------

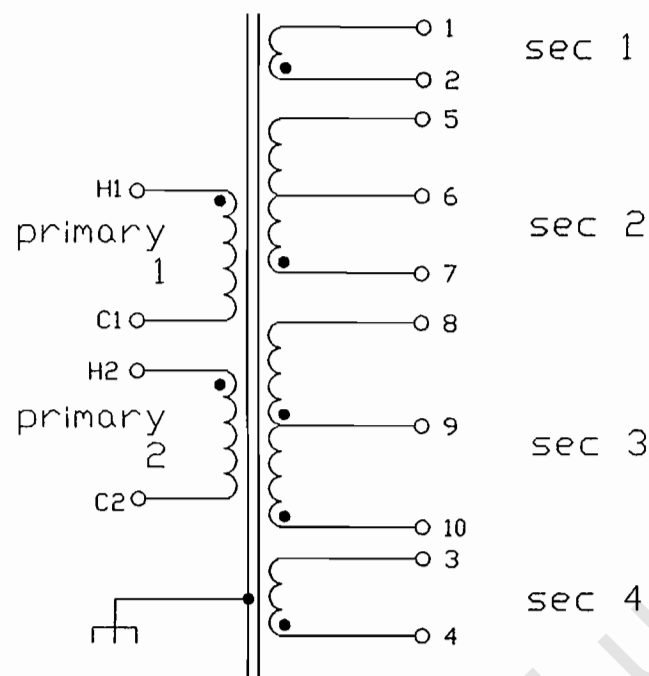


NOTES: UNLESS OTHERWISE SPECIFIED

1. DRAWING SHOWS PRIMARY CIRCUIT WIRING FOR SA-2000 TRANSFORMER. SA-2000 TRANSFORMER CPTP/N : 2K-4-TRN. TRANSFORMER IS HOUSED IN MAIN AUDIO CHASSIS. DRAWING SHOWS TRANSFORMER PRIMARY LEADS, LEAD DESIGNATIONS, AC PLUG AND AC PLUGSET WIRE COLORS.
2. NOTE THAT AC PLUGSET GREEN ('EARTH' OR 'GROUND') WIRE REQUIRES GOOD LOW RESISTANCE CONNECTION TO CHASSIS AND TRANSFORMER FRAME.
3. TWO AC MAINS VOLTAGE WIRINGS SHOWN.
4. NOTE THAT AC MAINS ARE NOT SWITCHED; TRANSFORMER REMAINS CONNECTED TO AC MAINS AT ALL TIMES. ALL LOW-VOLTAGE CIRCUITS (FILAMENTS, ETC.) ARE ALWAYS IN POWER-ON CONDITION. SWITCHING SA-2000 TO 'OPERATE' MODE SWITCHES ON HIGH VOLTAGE ONLY. REFER TO DRAWING # 702202 "CIRCUIT DESCRIPTION, HIGH VOLTAGE SUPPLY" FOR HIGH VOLTAGE SWITCHING METHOD.

DRAWN	JME	REVISION
DN DATE 4/25/90	PRODUCT: SA-2000	
COUNTERPOINT		
TRANSFORMER PRIMARY WIRING DETAILS		
CAD FILE	DWG: 7027	
7027.DWG		

REV	DESCRIPTION	DATE
-----	-------------	------

GENERAL DESCRIPTION.

The SA-2000 has a single transformer (CPTP/N 2K-4-TRN) located in the main enclosure. This drawing describes Secondary wiring details and nominal Secondary voltages. For Primary wiring details, refer to Drawing 7027 "TRANSFORMER PRIMARY WIRING DETAILS."

SECONDARY SECTION. Transformer 2K-4-TRN has four Secondaries, terminated in wire leads. Details as follows (all voltages are with 110 Vac/60hz applied to domestic connection of primary. all voltages are rms, DC resistance and voltages measured from coil start to finish, DC resistance measured at 25°C).

SECONDARY NUMBER	DC RESISTANCE	LOADED VAC	UNLOADED VAC	TERMINAL NUMBER
1	0.81	6.1 V	7.36	1 2
2	8.54	54 V	56.4	5 6 7
3	1316	604 V	634	8 9 10
4	1.35	10.7 V	11.9	3 4
PRI 1	29.4			H1 L1
PRI 2	32.0			H2 L2

DRAWN	JME	REVISION
ON DATE	5/25/90	PRODUCT: SA-2000

COUNTERPOINT
TRANSFORMER SECONDARY
WIRING DETAILS
7028.DWG | DWG: 7028

SECTION 8
INTERNAL ADJUSTMENTS

Section 8 Internal Adjustments

INTERNAL ADJUSTMENTS

Tube replacement. When replacing a tube in an SA-2000, be certain that you replace it with the exact RETMA type as indicated in Specifications section of this Service Manual.

Recommended Adjustments after Replacing Tubes. After replacing tubes in an SA-2000, the following procedures should be performed to assure operation within specification.

Power Supply Tube (V1). The high voltage rectifier tube is quite reliable. No special adjustments need to be made if this tube is replaced.

Audio Tube (V2). If replacement of any of these audio tubes becomes necessary, it is recommended that the bias adjustments in the SA-2000 be checked to confirm that the device is operating in accordance with its published gain and distortion specifications. However, new tubes should be used for at least a week to allow them to burn-in and settle to their long-term characteristics. After burn-in the following procedures should be performed:

V2: Bias the Audio Stage, and match the gains of the two channels.

Top Cover Removal. All of the Internal Adjustments described in this section require removing the top cover of the SA-2000. **Be aware that the voltages within can be LETHAL!** Any adjustments made with a screwdriver should be done with one that has an insulated handle. Always unplug the SA-2000 from the AC wall outlet before removing or replacing the top cover. A screw falling onto the circuit board may cause substantial damage.

Biasing the Audio Stage Tube. If tube V2 has been replaced, it will be necessary to check the line stage bias. The following procedure will describe the process.

1. Set up the SA-2000:

Remove the top cover from the Audio Chassis.

Connect the SA-2000 to an AC outlet and apply nominal AC Mains voltage.

2. Set the Front Panel Controls:

- * Set toggle switches: select Tape Send ``off,`` ``stereo,`` ``operate`` and ``ready.``
- * Set the ``source select`` knob to the ``CD`` setting.
- * Set the ``tape 1 monitor`` knob to the ``source`` setting.
- * Set the ``balance`` knob to the center.
- * Set the ``gain`` knob to fully clockwise.

Section 8 Internal Adjustments

3. Make Signal Connections:

Connect a 1kHz, 100mV rms low distortion sine-wave signal to the channel A "CD" input on the rear of the SA-2000.

Connect a distortion analyser to the channel A "main output" jack on the rear of the SA-2000.

4. When the unit has warmed, you should read a signal of about 2 volts rms.

5. Locate "LS BIAS" Trimmer VR5.

6. Use this Trimmer to adjust the stage for lowest distortion. When adjusted properly, gain should be about 25dB (1.7 to 1.8 vrms output) and distortion should be less than 0.008%. Stage plate voltage measured on the Right side of capacitor C14 will be in the 35 to 60 volts DC range.

7. Return to Step 3 and repeat the procedure for the "B" channel line stage. This stage is laid out identically to the "A" channel line stage. Use trimmer VR105 to trim this stage.

8. This completes the line stage bias procedure.

Balancing the Line Stage Channel-to-channel Gain. If you replace the audio gain tube (V2), you may wish to balance the line stage. Located on the circuit board, next to the front panel "balance" control, are two small screwdriver-adjust LINE TRIM trimpots marked "VR610A" and "VR610B." These controls may be used to fine-tune the input level of the two channels.

Adjusting Line Stage D.C. Offset. Popping noises associated with the use of the Mute/Operate switch indicate the presence of either Line stage D.C. Offset or a large amount of low-frequency noise in the Line stage. Please contact the factory if the following Line stage DCO adjustment procedure does not correct the problem.

1. Unplug the SA-2000 from the AC Mains and remove the top cover.

2. Remove tube V1 (located at the right rear of the circuit board) and set it aside. This will prevent V2 from amplifying any noises and overpower the DC Offset adjustments you are trying to perform.

3. Set the SA-2000 to the "standby" mode and plug it back in.

4. Turn the "gain" control to minimum, set the "standby/ready"

COUNTERPOINT SA-2000 SERVICE MANUAL

Section 8 Internal Adjustments

switch to "ready," and set the "mute/operate" switch to "operate."

5. Connect a multimeter to either of the top "main output" jacks.

6. When the SA-2000 unmutes (green light), any voltage shown is the DC Offset of the channel A Line stage.

7. Adjust channel A's "LINE OFFSET" trimmer, VR6, (located near the center of the board) to reduce the indicated voltage to as close to 0.000 volts as possible.

8. In a similar manner, check the DCO of channel B and adjust as required.

This completes the process. You may wish to leave the unit on for an hour or so and re-check both voltages in order to trim out any drifts caused by component heating.

9. Unplug the SA-2000, install tube V1 and replace the top cover.

Luc BUHANNIC

20 rue des plantes
92500 Rueil-Malmaison
France

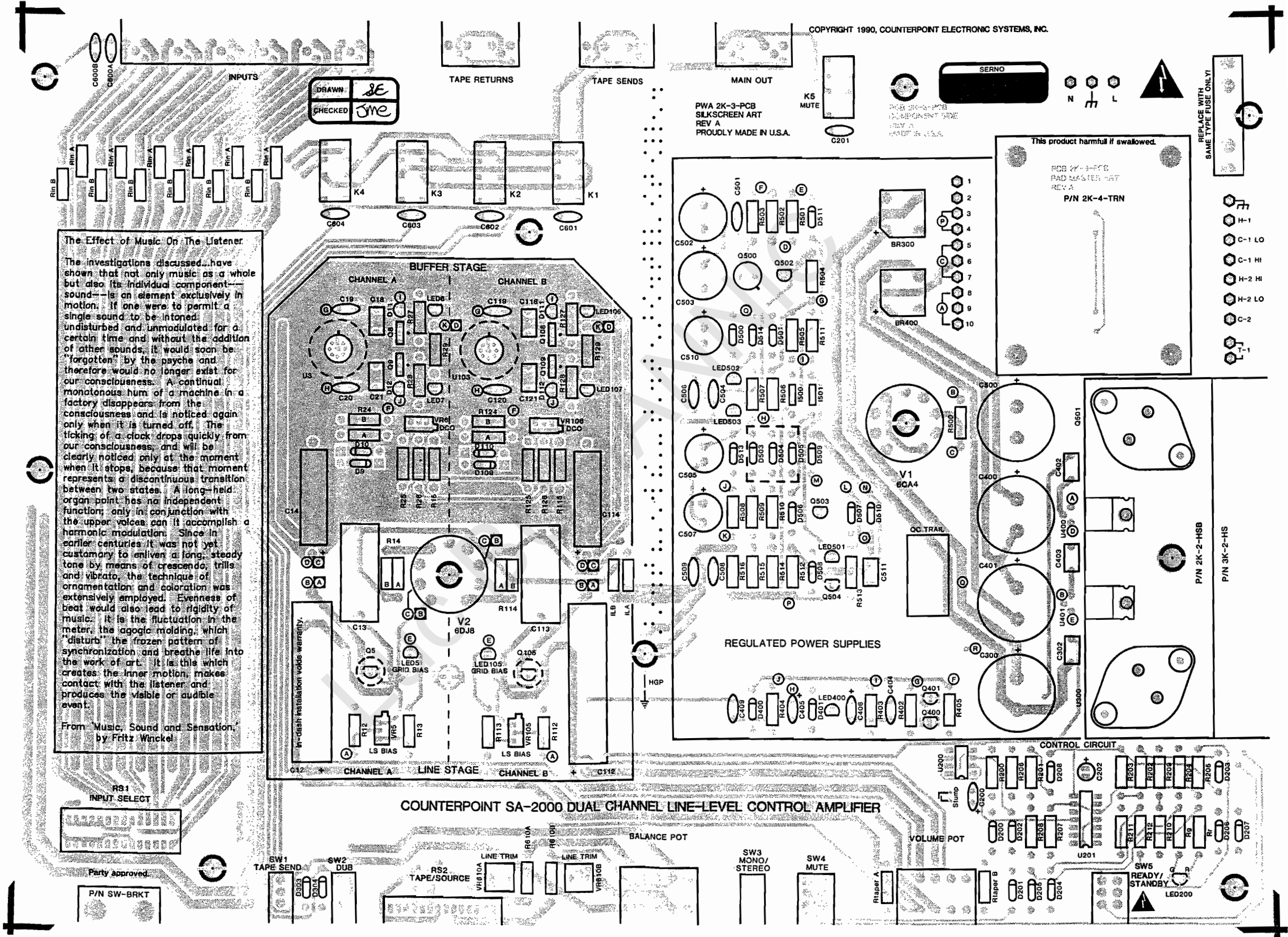
watsou73@hotmail.com
Serno: 82K51

SECTION 9
CIRCUIT BOARD LAYOUTS

Luc BUHANNIC

20 rue des plantes
92500 Rueil-Malmaison
France

watsou73@hotmail.com
Serno: 82K51





SECTION 10

PARTS LISTS

LIST OF MATERIALS

DRAWING NUMBER: 7023
 PRODUCT: SA-2000
 ASSEMBLY LEVEL: ALL

PAGE 1 OF 6

REFERENCE	PART VALUE	DESCRIPTION
BR300,400	FWB-DBPC610	1000V 6A FULL-WAVE BRIDGE
C12,112	.47/425 PP	
C13,113	1/250 PP	
C14,114	.1/425 PP	
C18,118,21,121, C202,302,402,403, C511	1/63 PP	
C19,119,20,120	.002/100 CD	
C200,405,406	22/16 TANT	
C201	.01/100 CD	
C202	10/16 RADIAL EL	
C300	2200/35 SNAP EL	
C400,401	2200/50 SNAP EL	
C404,409,600A,600B	.001/100 CD	
C500	100/450 SNAP EL	
C501,506,509	.01/1000 CD	
C502,503	22/350 RADIAL EL	
C504,508	.002/500 CD	

LIST OF MATERIALS

DRAWING NUMBER: 7023

PAGE 2 OF 6

PRODUCT: SA-2000

ASSEMBLY LEVEL: ALL

REFERENCE	PART VALUE	DESCRIPTION
C505,507	22/250 RADIAL EL	
C510	1000/16 RADIAL EL	
C601,602,603,604	.01/100 CD	
D11,111,12,112	J555	1.6mA CURRENT DIODE
D9,109,10,110	D1N914	
D201,202,203,204, D205,206,207,208 D303,304,501,507		
D400,401,506	D1N4732	
D500,510,514	D1N4740	
D503	D1N5378B	
D504	D1N5377B	
D505	D1N5368B	
D508	D1N4744	
D200,511,513,509	D1N4007	
lla,llb	R10.0R	
K1	RELAY 5V	5V DPDT
K2,3,4,5	RELAY 6V	6V DPDT

Luc BUHANNIC

20 rue des plantes
92500 Rueil-Malmaison
France

DRAWING NUMBER:

7023

watsou73@hotmail.com
Serno: 82K51

REV

NONE

DISK FILE:

2KLM2.DWG

TITLE:

LIST OF MATERIALS, SA-2000

LIST OF MATERIALS

DRAWING NUMBER: 7023

PAGE 3 OF 6

PRODUCT: SA-2000

ASSEMBLY LEVEL: ALL

REFERENCE	PART VALUE	DESCRIPTION
LED200	LED2COLOR	T1-3/4 RED/GREEN
LED5,6,105,106 7,107,400,503	LED GREEN PIN	T-1
LED501,502	LED RED PIN	T-1
Q400,401,504	PN2222	ANY
Q5,105	P1087	P-CHANNEL JFET
Q500	2N3439	NPN
Q501	MJ12005	NPN
Q502	BSS101	MOSFET, SIEMENS
Q503	BSS110	MOSFET, SIEMENS
Q8,108	MJE182	NPN
Q9,109	MJE172	PNP
R12,112	R499K	
R13,113,403,405	R2.21K	
R14A,14B,114A,114B R514,515,516	R100K CPF2	2-WATT METAL FILM
R15,115,29,129	R100R	

Luc BUHANNIC

LIST OF MATERIALS

DRAWING NUMBER: 7023
 PRODUCT: SA-2000
 ASSEMBLY LEVEL: ALL

PAGE 4 OF 6

REFERENCE	PART VALUE	DESCRIPTION
R509,511,Rin(12)	R100R	
R200	R2.21M	
R201,206,507	R20.0K	
R202,211,404,505	R1.00K	
R203	R274K	
R204,205,207,208	R100K	
R500		
R24A,124A	R100K	ASIA OPTION ONLY
R209	R10.0K	
R210	R47.5K	
R212	R1.10K	
R24B,124B	R1.00M	
R25,125,26,126	R249K	
R27,127,28,128	R6.04K	
R402	R422R	
R501,502	R5.11K CPF2	2-WATT METAL FILM
R503	R10.0K CPF2	2-WATT METAL FILM
R504,513	R10.0R	

Luc BUHANNIC

 DISK FILE:
 2KLM4.DWG

 TITLE:
 LIST OF MATERIALS, SA-2000

 20 rue des plantes
 92500 Rueil-Malmaison
 France

 DRAWING NUMBER:
 7023

 watsou73@hotmail.com
 Serno: 82K51

 REV
 NONE

LIST OF MATERIALS

DRAWING NUMBER: 7023
PRODUCT: SA-2000
ASSEMBLY LEVEL: ALL

PAGE 5 OF 6

REFERENCE	PART VALUE	DESCRIPTION
R506	R1.50K	
R508	R2.49K	
R510	R51.1R	
R512	R10.0R CPF2	2-WATT METAL FILM
R610,1610	R24.9K	
Rr,Rg	R200R	
Rtaper,Rtaper	R4.75K	
T1	2K-4-TRN	TRANSFORMER
U200	ICLM555	
U201	IC4741CP	
U3,103	IC30FUB	
U300	IC7806CK	
U400	IC7824CT	
U401	IC7924CT	
VR5,105	VR254	250K 10-TURN
VR6,106	VR253	25K 10-TURN
VR610A,610B	VR72PR25K	25K SINGLE-TURN

Luc BUHANNIC

20 rue des plantes
92500 Rueil-Malmaison
France

DRAWING NUMBER:

7023

watsou73@hotmail.com
Serno: 82K51

REV

NONE

DISK FILE:

2KLM5.DWG

TITLE:

LIST OF MATERIALS, SA-2000

LIST OF MATERIALS

DRAWING NUMBER: 7023
PRODUCT: SA--2000
ASSEMBLY LEVEL: ALL

PAGE 6 OF 6

REFERENCE	PART VALUE	DESCRIPTION	
BALPOT	VR50KSBNOB	50K BALANCE CONTROL	
VOLPOT	VR50KSVNOB	50K VOLUME CONTROL	
RS1	SW-CTS2		
RS2	SW-CTS		
SW1	SW-SPDT-RA-TB-3		
SW3,SW2	SW-SPDT-RA-TB		
SW4,SW5	SW-DPDT-RA-TB		

SECTION 11
REPAIR PROCEDURES

Section 11 Repair Procedures

REPAIR PROCEDURES

General. All the components in the SA-2000 are of the highest quality and should have a long trouble-free life since they are operated well below their manufacturer's rating. The following procedure may facilitate locating the source of trouble if the SA-2000 does not function properly.

The likeliest source of failure are the solid-state components since they are inherently more fragile and susceptible to failure in the high-voltage/high temperature environment of the SA-2000.

Another common problem is a failure of an electron tube since these devices have a shorter life than the passive parts. Check first to see if all the tubes are inserted securely in the sockets. Check also to see if the tubes are located in the proper sockets, and that they are the correct RETMA type as specified in the Specifications Section of this manual.

Fuses

There is one fuse in the SA-2000, located at the right rear of the main circuit board. For SA-2000 amplifiers operated at 100 to 240 VAC, the replacement value of this fuse is 1 Amp "fast blow." Use of a larger or slower fuse is not recommended.

Same Problem in Both Channels. If the SA-2000 suffers from a simultaneous type failure in both channels, check the following shared circuitry: Proper operation of Control Functions, failure of any of the four shared power supplies: B+ (used by all the audio tubes), +24/-24 VDC (used by both the buffers), +6 VDC (used for bias functions), Filament Voltage (used by all audio tube heaters and the Control Functions).

Visual Inspection of Power Supply Operation. Visual inspection can be used to check operation of the tube filaments: V2 tube heater should light whenever the SA-2000 is connected to AC Mains. V1 tube heater should light whenever the "standby/ready" switch is in the "ready" position.

Check DC Operating Voltages. Section 5 of this manual gives nominal DC Operating voltages of selected Test Points in the circuits in the SA-2000. Careful use of the Schematic Diagrams (Section 4) and Circuit Board Layouts (Section 9) permit troubleshooting all the SA-2000's circuitry. If a test point's voltage differs significantly from the correct voltage, all of the components wiring and voltage and resistance readings to ground associated with that circuitry and the circuitry preceding the test point should be made.

Always refer to the Notes section of the specific DC Operating Voltage drawings for specific information on measurement techniques.

COUNTERPOINT SA-2000 SERVICE MANUAL

Section 11 Repair Procedures

Please note that Plate and Cathode voltages in the audio circuit are dependent upon adjustable bias settings and should be used as a rough guide only due to the variations in different brands of electron tubes.

Check AC Signal Levels. Section 5 of this manual gives nominal AC Signal Levels of selected Test Points in the circuits in the SA-2000. Signal tracing techniques can be used to localize a problem in the audio circuit. If a test point's signal level differs significantly from the correct voltage, all of the components wiring and voltage and resistance readings to ground associated with that circuitry and the circuitry preceding the test point should be made.

Always refer to the Notes section of the specific AC Signal Level drawings for specific information on signal amplitudes, injection and measurement points.

Totally Dead SA-2000. A cartridge fuse, located at the right rear of the circuit board, is used in the primary circuit of the power transformer to protect the power supply components from short circuits. The rating of this fuse was selected for proper protection of the SA-2000 and should be replaced with the same type and rating.

If a failure is detected the following procedure is recommended before replacing the fuse.

- (a) Check for proper connection of power transformer Primarys for your AC Mains voltage. Refer to Transformer Wiring (Section 7) of this manual for more information. All of the leads from the Primarys are connected on the circuit board and may be easily inspected.
- (b) Check for failed power transformer: Section 7 gives information on transformer Primary and Secondary characteristics and connections. If the transformer still draws too much current with all secondaries disconnected, the transformer has failed and must be replaced.
- (c) If the transformer has not failed, re-connect the secondaries one at a time until the problem occurs. Use trouble-shooting techniques to determine the failed components responsible for the excess current.

Luc BUHANNIC

20 rue des plantes
92500 Rueil-Malmaison
France

watsou73@hotmail.com
Serno: 82K51

SECTION 12
SERVICE BULLETINS

Luc BUHANNIC

20 rue des plantes
92500 Rueil-Malmaison
France

watsou73@hotmail.com
Serno: 82K51

SECTION 13
REVISION NOTES