

Service Manual

OBX

Polyphonic Synthesizer

First Edition
September 1979

Oberheim Electronics, Inc.
1455 19th Street
Santa Monica, Ca 90404

CALIBRATION PROCEDURES

- Control Board Calibration
- Voice Card Replacement and Calibration
- Power Supply Calibration
- Mother Board Calibration

DIAGRAMS

- Wiring Block Diagram
- Sub-Assembly and Connector Placement Diagram
- Control Board and Voice Card Trimmer Placement Diagram
- Power Supply and Mother Board Trimmer Placement Diagram

SCHEMATICS

- Power Supply Schematic
- Processor, Control, Pots and Keyboard Schematic (4 Sheets)
- Mother Board Schematic
- Voice Card Schematic
- Bend Assembly Schematic
- Rear Panel Schematic

PRINTED CIRCUIT COMPOSITES

- Control Board Composite
- Processor Board Composite
- Mother Board Composite
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ENGINEERING CHANGE ORDERS (5 Sheets)

INTERCONNECT LISTS

- Control Board Interconnect List
- Power Supply Board Interconnect List
- Pot Board Interconnect List
- Mother Board Interconnect List

CONTROL BOARD CALIBRATION

This document describes the procedure for calibrating the OB-X Control board. The following equipment is required:

Digital voltmeter (4 1/2 digits minimum)
Oscilloscope
Audio amplifier with speaker or headphones
(Note: Headphones may be plugged directly into the OB-X providing they are wired monophonically and have an input impedance of at least 600 ohms.)

This procedure makes reference to notes C0 through C4. C0 is low C on the keyboard, and C4 is high C. Refer to the Control Board and Voice Card Trimmer Placement Diagram for locations of trimmers to be adjusted.

Set the following front panel controls as indicated:

Manual	- On
Unison	- On
Portamento	- Minimum (full CCW)
VCO1 Frequency	- Minimum (full CCW)
VCO2 Frequency	- Minimum (full CCW)
VCO2 Detune	- Center (LED off)
Volume	- As desired

All voltage measurements should be referenced to ground at connector pin A8.

DAC CALIBRATION

Using the DVM, monitor KEYCV1 at connector pin M9. Depress key C0 and note the voltage; this is the offset voltage and it should be 0.000 v +/- 15 mv. Depress C1 and adjust trimmer T9 so that KEYCV1 is 1.000 v +/- 2 mv more than the offset voltage. Repeat this procedure for each octave (C2, C3, and C4) to obtain KEYCV1 voltages of 2.000 v, 3.000 v, and 4.000 v +/- 2 mv more than the offset.

BEND CIRCUIT CALIBRATION

Turn Unison off, and set the switches on the Bend assembly as follows:

Up Octave/Down Octave	- Down Octave
Narrow/Broad	- Broad
VCO2 Only/Both	- Both

Monitor the voltage at pin 1 of the 324 at location A1, and adjust trimmer T4 for 0.000 v +/- 20 mv.

-1-

Measure the VCO1 Frequency control voltage, VCO1F, at connector pin N1. This voltage, which should be 0.000 v +/- 25 mv, is the Bend pot offset voltage. This offset voltage must be added to (or subtracted from) the voltages stated for the following Bend circuit adjustments; e. g., if the offset voltage is -20 mv, T1 would be adjusted for 0.980 v and T2 would be adjusted for -1.020 v.

Move the Bend lever fully towards the front of the unit, and adjust trimmer T1 for 1.000 v +/- 2 mv.

Move the Bend lever fully towards the rear of the unit, and adjust trimmer T2 for -1.000 v +/- 2 mv.

Set the Narrow/Broad switch to Narrow, move the Bend lever fully to the front, and adjust trimmer T3 to 0.167 v +/- 2 mv.

Set the Octave switch to its center position, and adjust trimmer T6 for 1.000 v +/- 2 mv.

Set the Octave switch to the Up position, and adjust trimmer T7 for 2.000 v +/- 2 mv.

LFO RATE CALIBRATION

Set the LFO Rate pot to maximum (full CW). Observe the triangle wave with an oscilloscope at pin 7 of the 324 at location A11, and adjust trimmer T5 to obtain a period of 50 +/- 5 msec.

PORAMENTO CALIBRATION

Set the Portamento pot to maximum (full CW). While alternately playing two keys one octave apart, adjust trimmer T8 to obtain maximum portamento; i. e., the maximum time period for the oscillators to change from one pitch to the other after a key is depressed. With T8 adjusted for maximum portamento, this time period may be anywhere from 1 to 2 1/2 seconds for a one octave change, and the variation among voices may be as much as a 2 to 1 ratio between the shortest and longest periods.

-2-

VOICE CARD REPLACEMENT AND CALIBRATION PROCEDURE

This document describes the procedure for replacing and calibrating voice cards in the OB-X. The following equipment is necessary for calibration:

Digital voltmeter (3 1/2 digits minimum)
Oscilloscope (optional)
Audio amplifier with speaker or headphones
(Note: Headphones may be plugged directly into the OB-X provided they are wired monophonically and have an input impedance of at least 600 ohms.)

This procedure makes reference to notes C0 through C4. C0 is low C on the keyboard, and C4 is high C. Refer to the Control Board and Voice Card Trimmer Placement Diagram for locations of the trimmers to be adjusted.

VOICE CARD REPLACEMENT AND PRELIMINARY CONTROL SETTINGS

Locate the defective voice card, and replace it with a new card.

CAUTION: A.C. POWER MUST BE OFF DURING CARD REMOVAL AND REPLACEMENT.

As an aid in determining which card in a unit is defective, it should be realized that touching the "tempco" resistors (refer to the Trimmer Placement Diagram) on a voice card which is gated on will cause a significant change in pitch of the oscillators on that card. With Unison off, a defective card can thus be located by stepping through the voices, using the keyboard, until the defective voice is gated on. While holding this voice on, touch the tempco resistors on each card until a pitch change is heard, thus identifying the bad card.

With a new voice card installed, close the cover, turn on power, and wait 15 minutes to allow the unit to warm up. Plug the amplifier or headphones into the Left Output jack. Set the following switches and controls as indicated:

Manual - On
Unison - On
Volume - As desired
Master Tune - Center (dead zone)
Test 1 - Down (the Test switches are located inside the unit at the bottom of Pot Board No. 2)
Set the Pan pots on the Mother Board to full Left (full CCW) position for the new voice and for one known, calibrated voice to be used as a reference; set all other Pan pots to full Right. (Refer to the Power Supply & Mother Board Trimmer Placement Diagram for locations of the Pan pots.)

VC01 CALIBRATION

Initial Frequency Adjustment

Set switches and controls as follows:

VC01	- On
VC02	- Off
VC01 Waveform	- Pulse
VC02 Waveform	- Pulse
VC02 Detune	- Center (LED off)
Filter Frequency	- Maximum (full CW)
Loudness Sustain	- Center or more CW
All other parameters not otherwise set	- Full CCW or Off

Hold note C3 and adjust trimmer T4 until the frequency of the new voice is beatless with the reference voice.

NOTE: The following two adjustments, Volt/Octave and Hi-Track, are performed at the factory and normally do not require readjustment upon installation of the card in a unit. However, they should be performed if the voice does not sound right after the rest of the adjustment procedure has been performed.

Volt/Octave Adjustment

Hold note C0 and adjust trimmer T8 until the voice is beatless with the reference. Hold note C3 and determine if still beatless; if not, repeat the Initial Frequency adjustment. It is sometimes necessary to repeat the Initial Frequency and Volt/Octave adjustments a few times in order to obtain proper tracking of the voice card to the keyboard.

Hi-Track Adjustment

Hold note C5 and adjust trimmer T5 until beatless. Recheck the Initial Frequency and Volt/Octave adjustments, and repeat if necessary.

Pulse Width Adjustment

Set the Pulse Width pot on the front panel to full CCW, and adjust trimmer T6 for a 50% duty cycle. If an oscilloscope is available, the voice output can be monitored at connector pin G2; if the adjustment is being made by ear, adjust T6 for the most "hollow" sound. (The reference voice can be eliminated during this adjustment by turning its Pan pot fully CW.)

VC02 CALIBRATION

VC02 is calibrated by repeating the above procedure, with VC01 off and VC02 on, and adjusting the following trimmers:

Initial Frequency	- T1
Volt/Octave	- T7
Hi-Track	- T2
Pulse Width	- T3

FILTER CALIBRATION

Set the front panel controls and switches as follows:

VC01	- Off
VC02	- Off
Noise	- Full
KBD Track	- On
Filter Frequency	- Minimum (full CCW)
Modulation	- Minimum (full CCW)
Resonance	- Maximum (full CW)

Initial Frequency Adjustment

Hold note C3 and, using the Pan pots to control the audio, listen to the two voices (new card and reference) alternately. Adjust trimmer T9 to tune the card being calibrated to the same pitch as the reference.

Volt/Octave Adjustment

Hold note C2 and adjust trimmer T10 until the voice is the same pitch as the reference. Hold note C3 and check the Initial Frequency adjustment; repeat these two adjustments as necessary. Hold note C4 and again adjust trimmer T10 until the two voices have the same pitch. Recheck the Initial Frequency at C3 and readjust as necessary. (Note: the filter will track the keyboard over only an approximately three octave range.)

VCA OFFSET

With both oscillators off, gate the voice on (depress any key). Measure the voltage at pin 6 of the TL081 at location A17 with a DVM, and adjust trimmer T11 for 0.000 v +/- 10 mv.

**CAUTION: AT THE CONCLUSION OF THIS PROCEDURE
BE SURE TO DO THE FOLLOWING:**

TURN OFF THE TEST 1 SWITCH (SET TO THE UP POSITION)

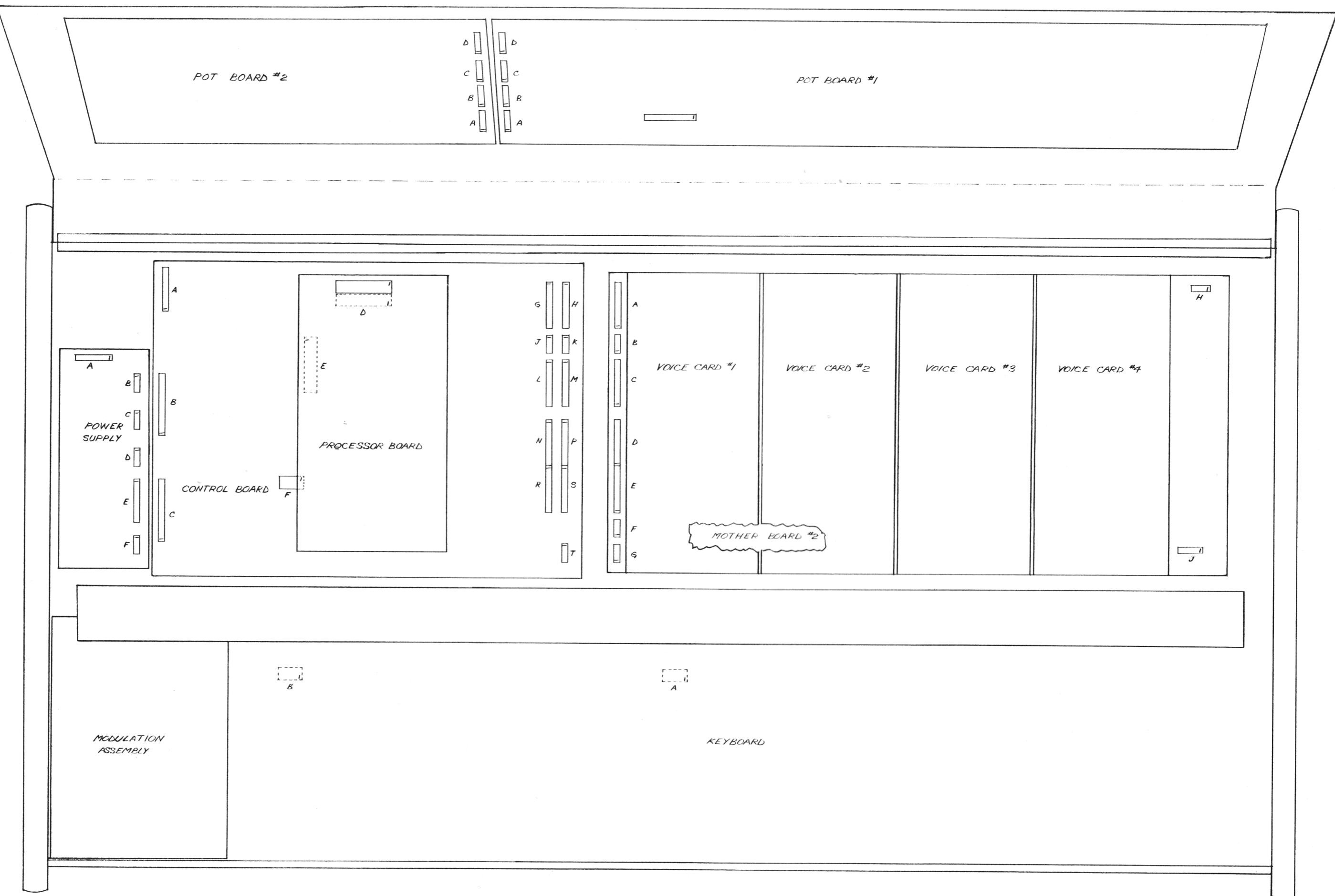
RETURN THE PAN POTS TO THEIR ORIGINAL POSITIONS

ON 6- AND 8-VOICE UNITS, RECONNECT THE CABLES TO MOTHER BOARD NO. 2 AND REINSTALL THE RETAINING SCREWS

This document describes the procedure for calibrating the OB-X Mother board. Calibration consists of adjusting the two distortion trimmers, T201 and T202. For this procedure the front panel Volume pot must be set to maximum (full CW), and no keys on the keyboard should be depressed.

Using a DVM, monitor the output (pin 6) of the final TL081 in the right channel and adjust trimmer T201 for 0.00 v +/- 20 mv. Repeat this procedure for the left channel, adjusting trimmer T202.

As an alternative, an audio method of calibration can be used. Plug an amplifier with a speaker or headphones into the Right Output jack, hold down the Auto Tune switch on the front panel, and adjust T201 for minimum loudness of the "thump". Repeat for the left channel.

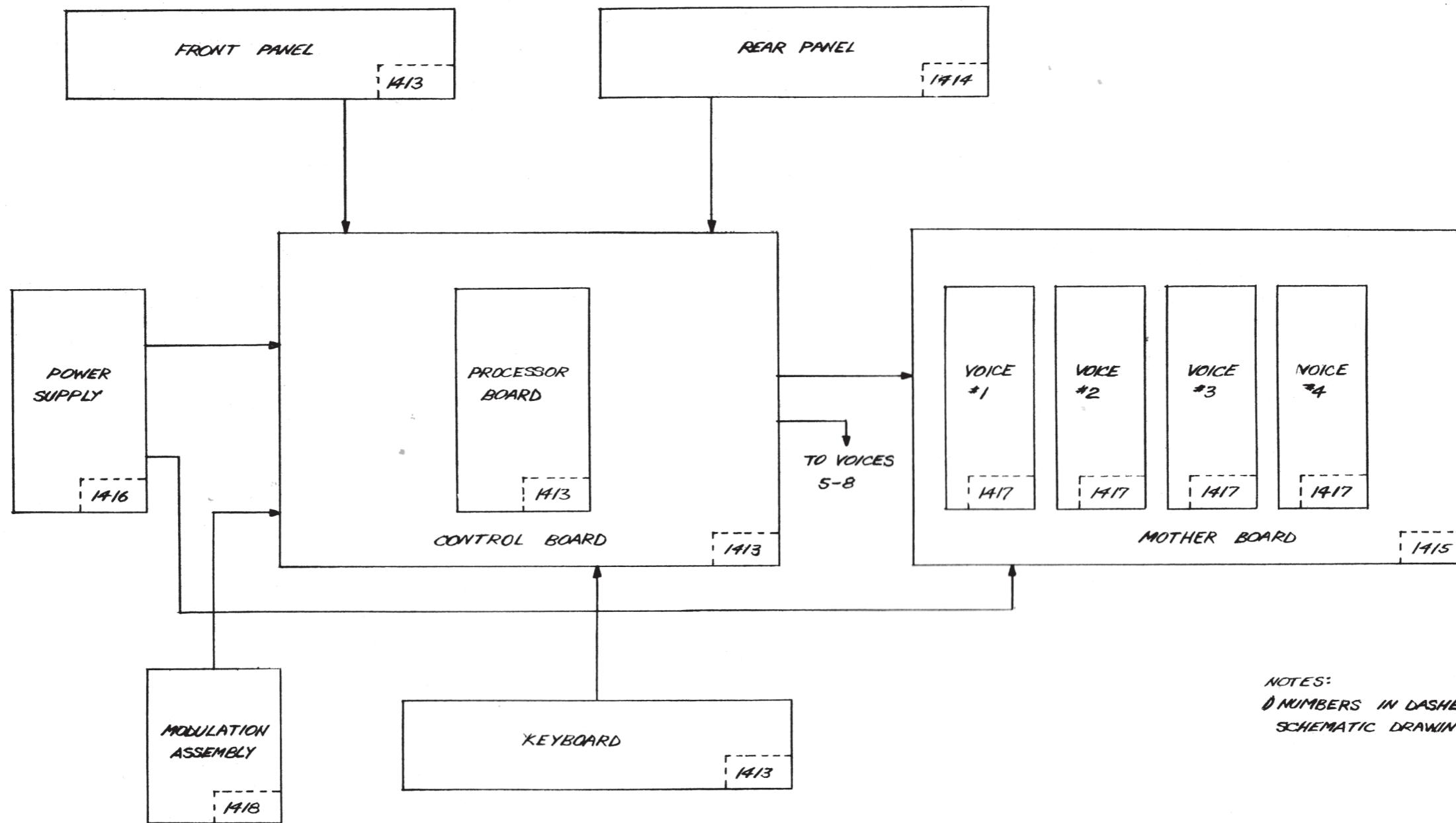


NOTE: MOTHER BOARD #2
& VOICES #5 THRU
*8 NOT SHOWN

DE-X SUB-ASSEMBLY & CONNECTOR
PLACEMENT DIAGRAM

9-17-79

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NOTES:

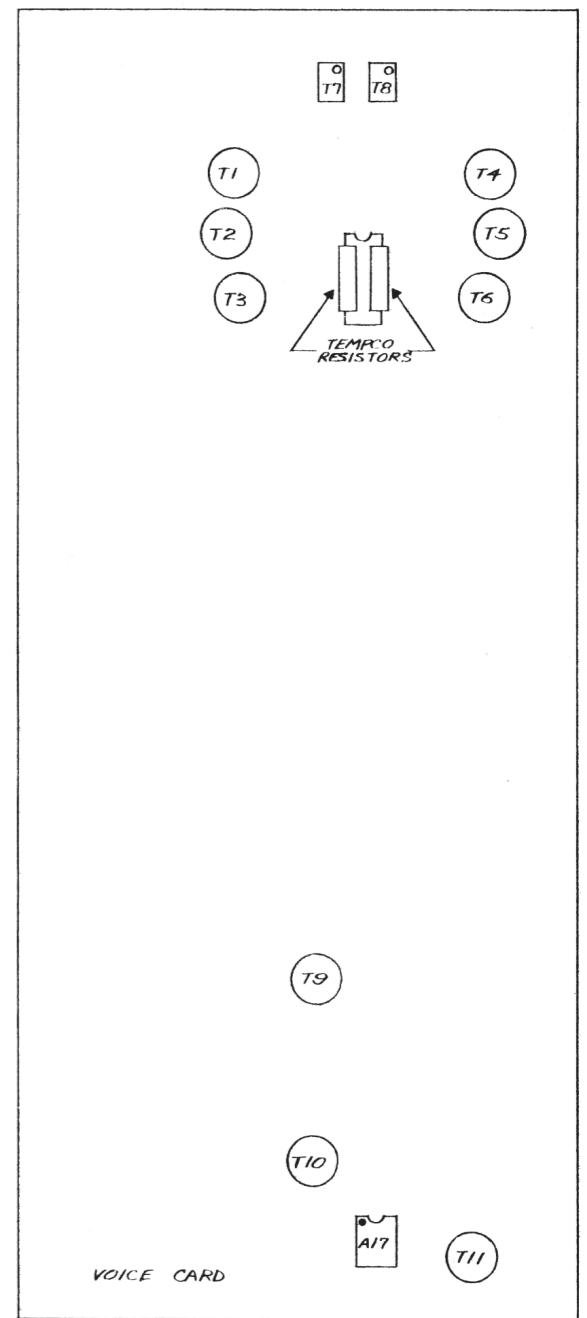
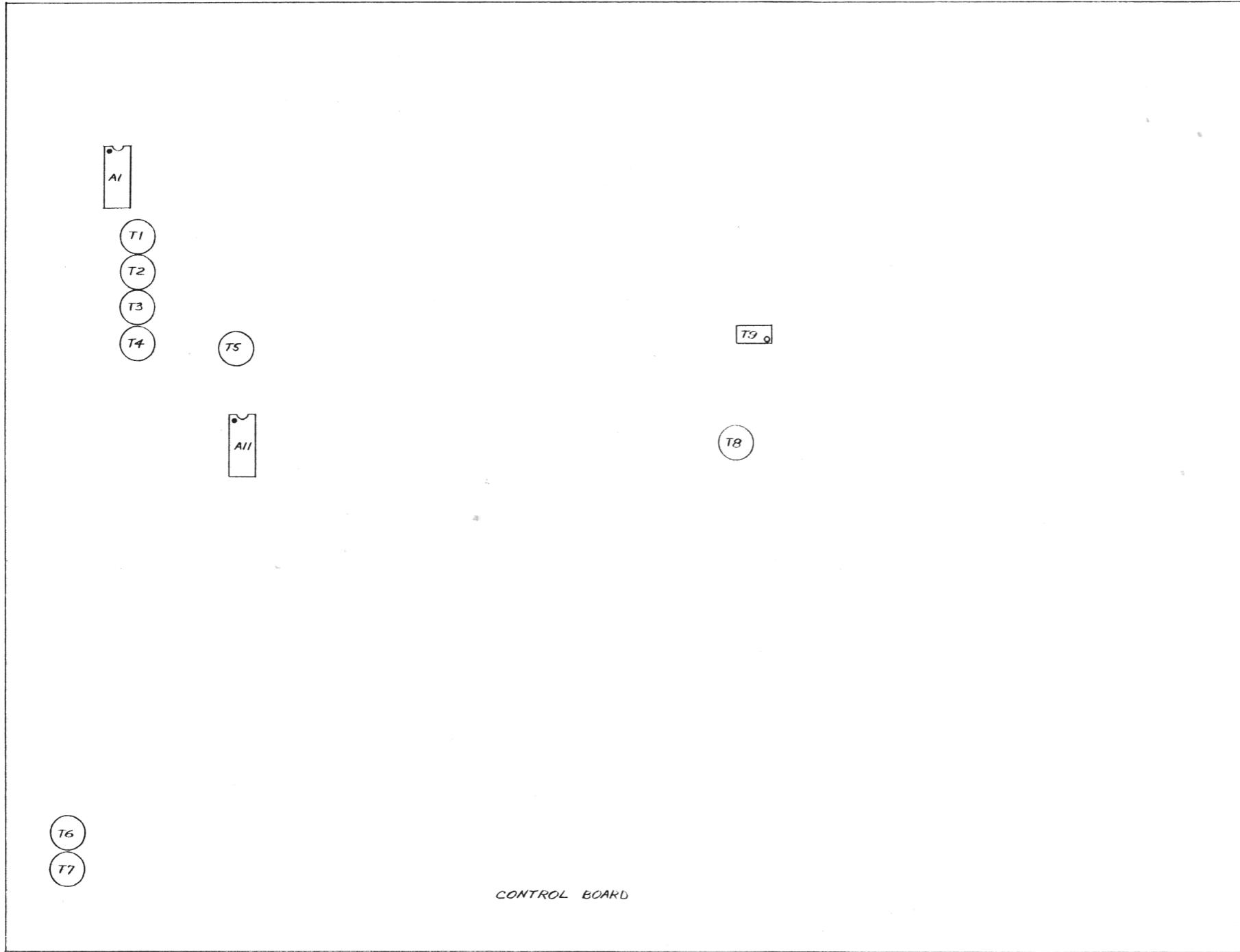
NUMBERS IN DASHED BLOCKS INDICATE
SCHEMATIC DRAWING NUMBERS

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OB-X WIRING BLOCK DIAGRAM

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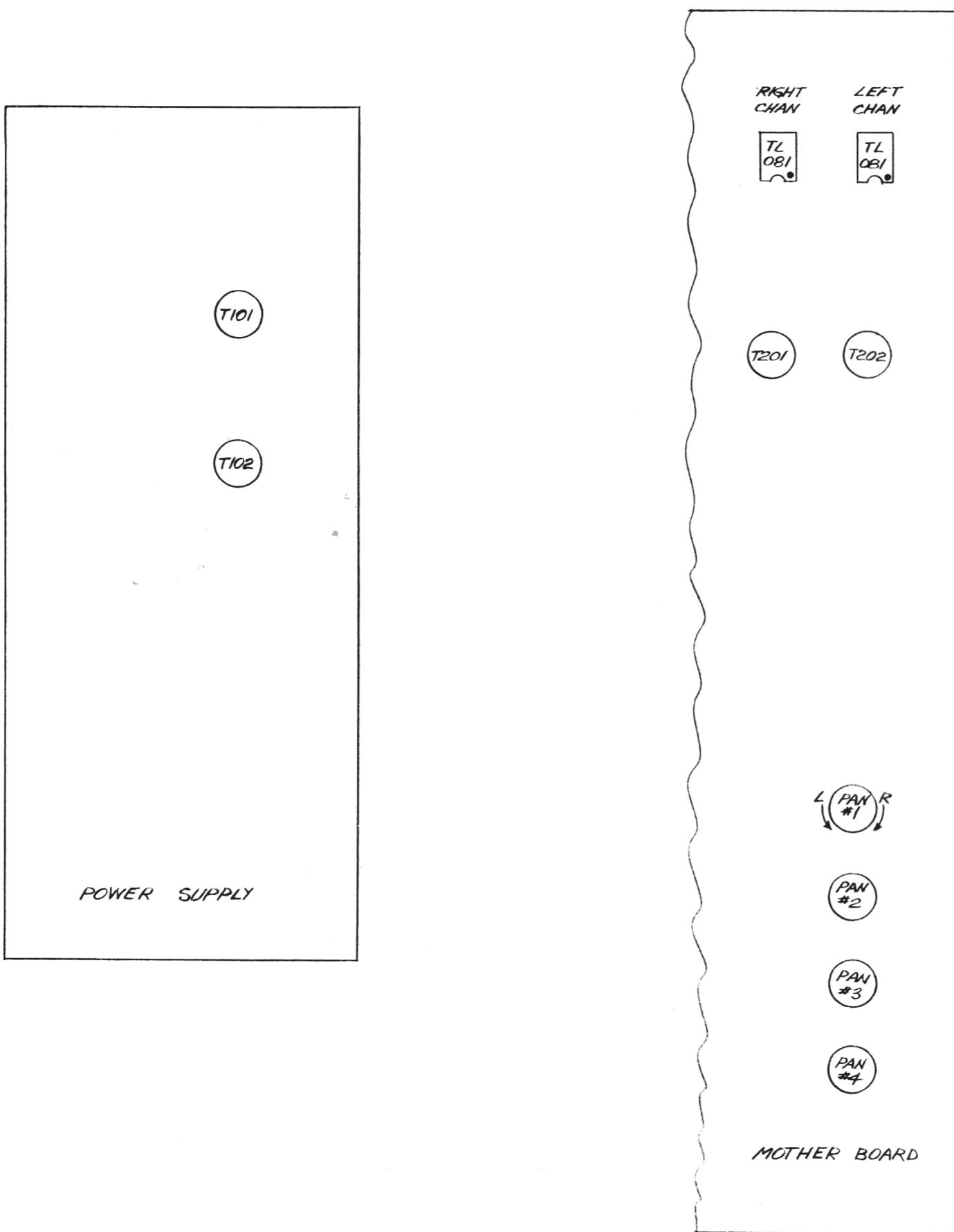


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OB-X CONTROL BOARD & VOICE CARD
TRIMMER PLACEMENT DIAGRAM

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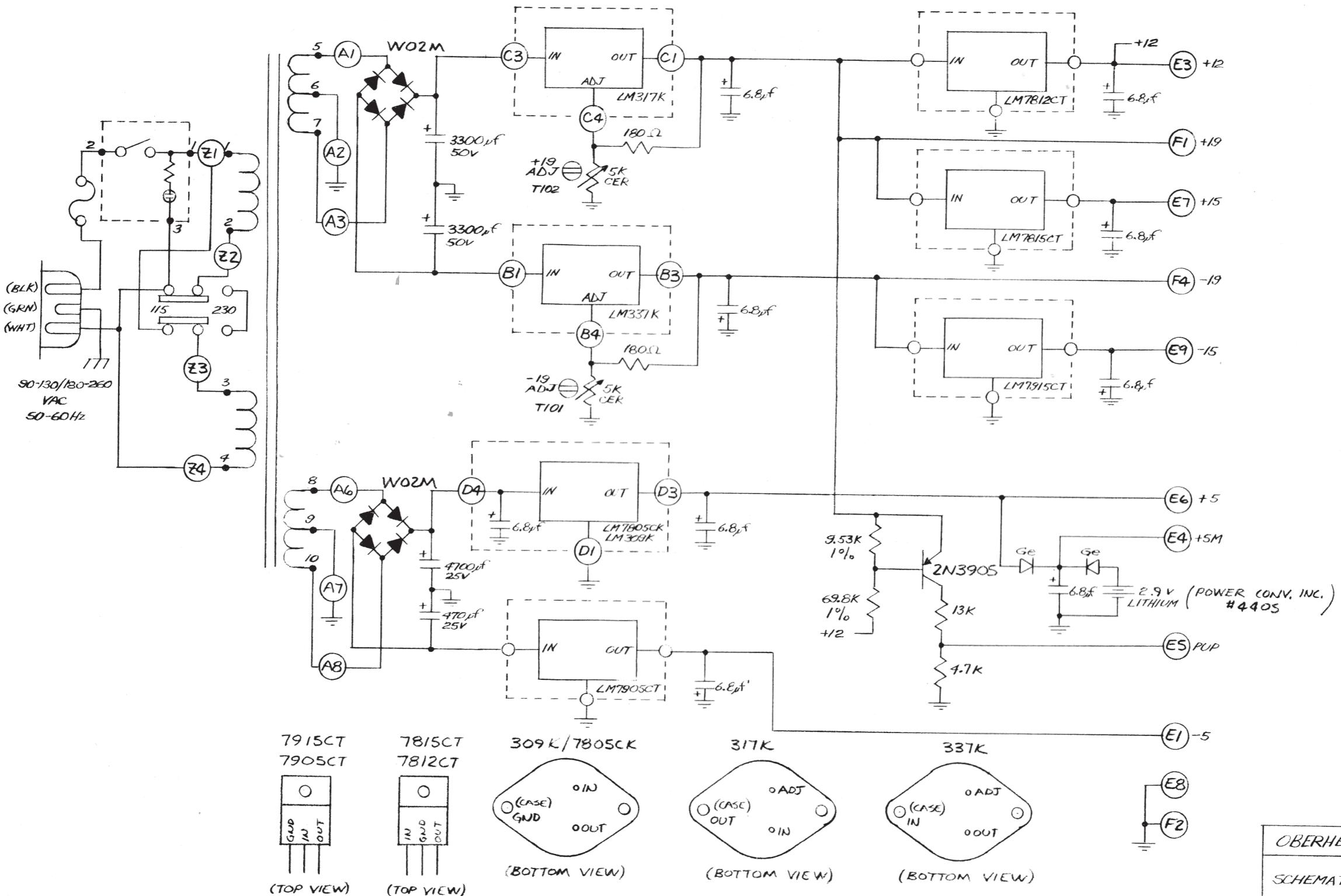


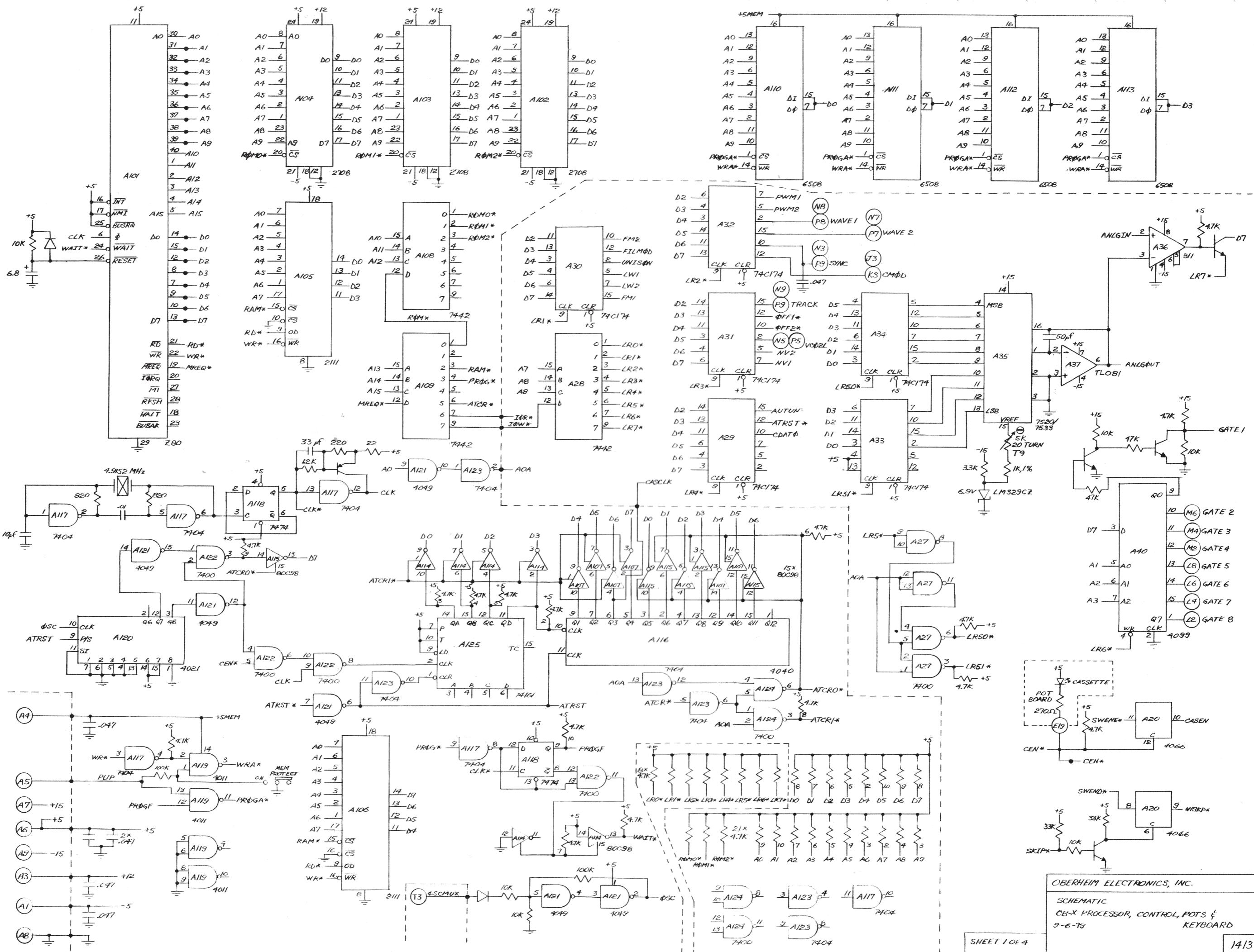
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OB-X POWER SUPPLY & MOTHER BOARD
TRIMMER PLACEMENT DIAGRAM

9-19-79

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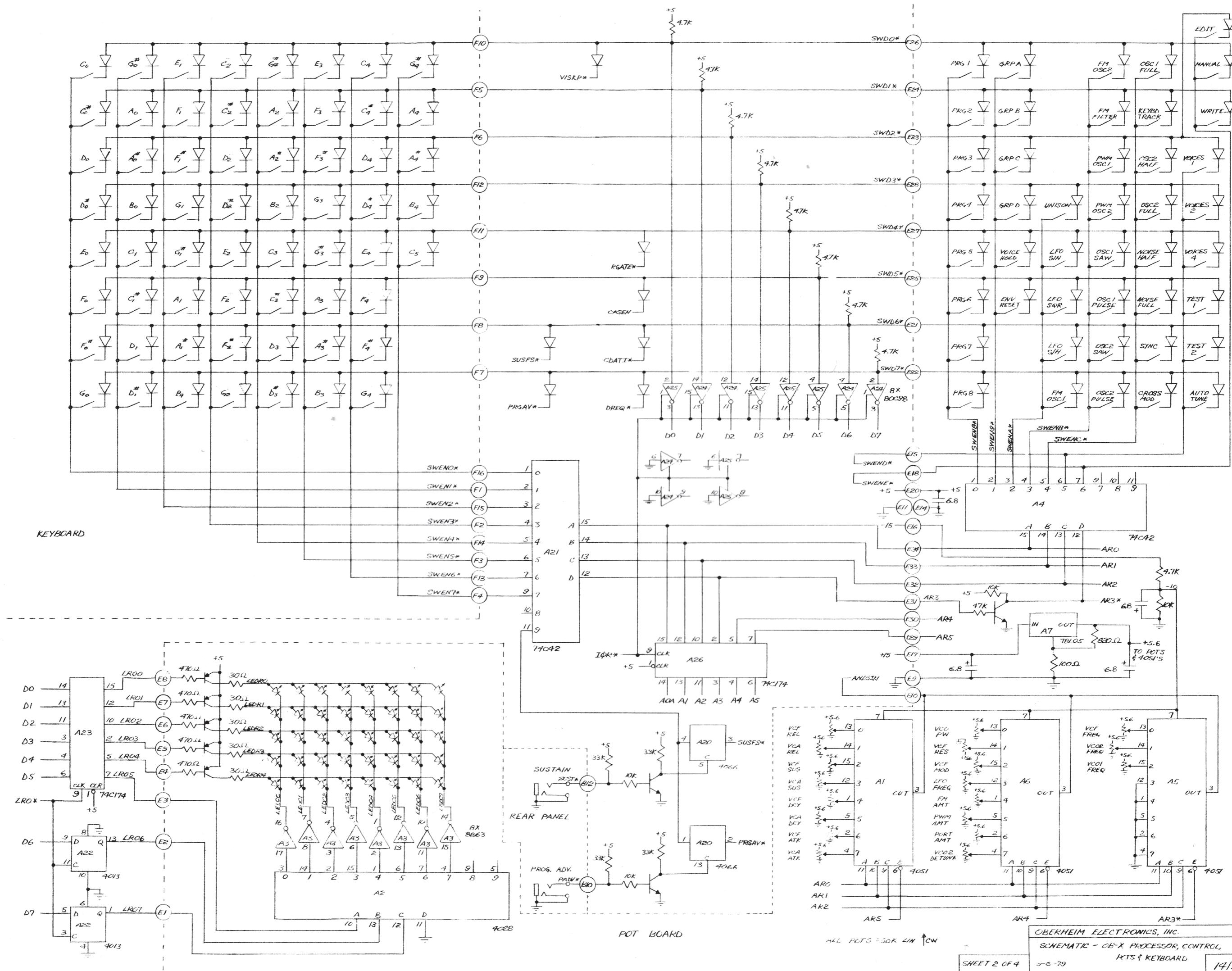


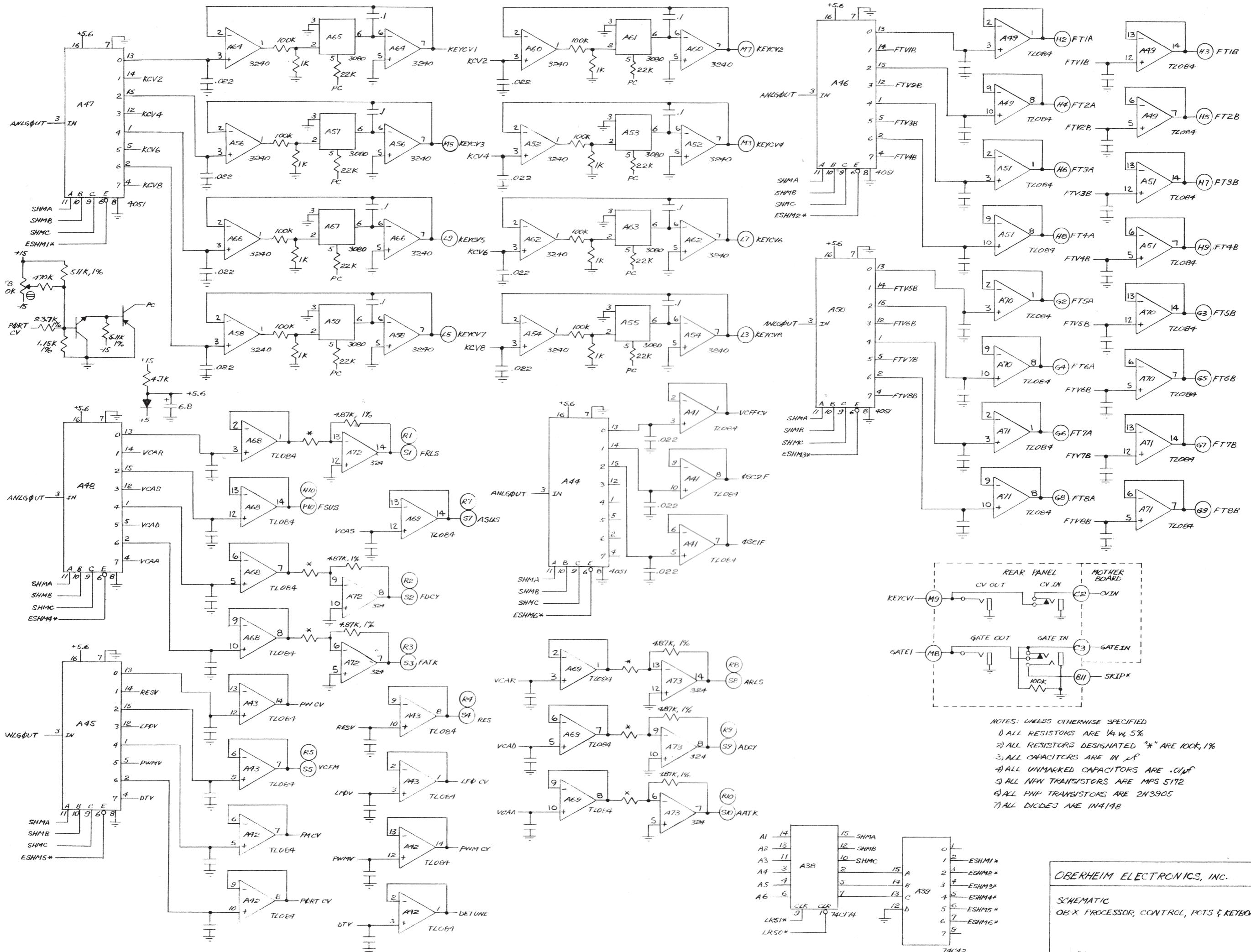


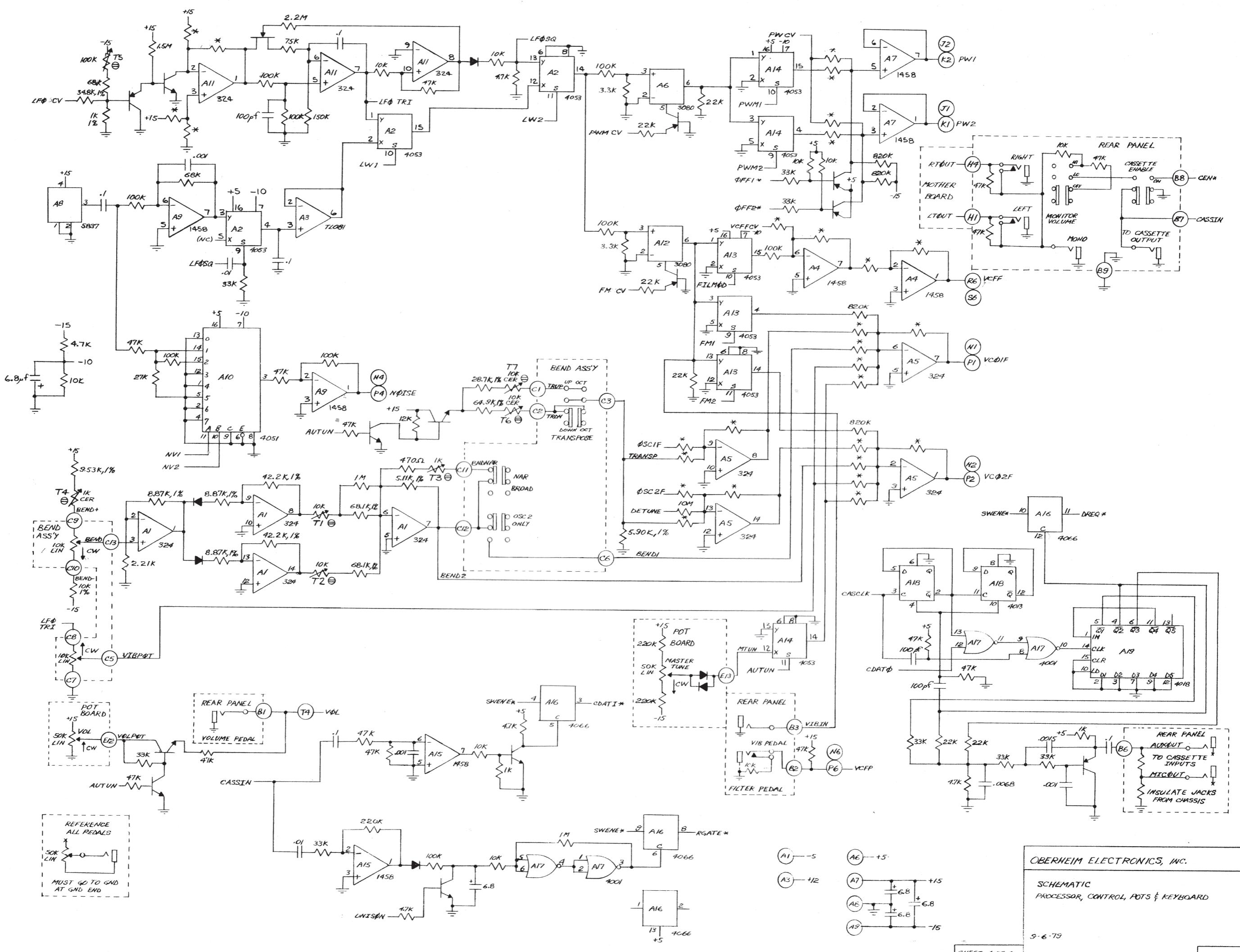
SCHEMATIC
CB-X PROCESSOR, CONTROL, POTS &
KEYBOARD
9-6-75

1413

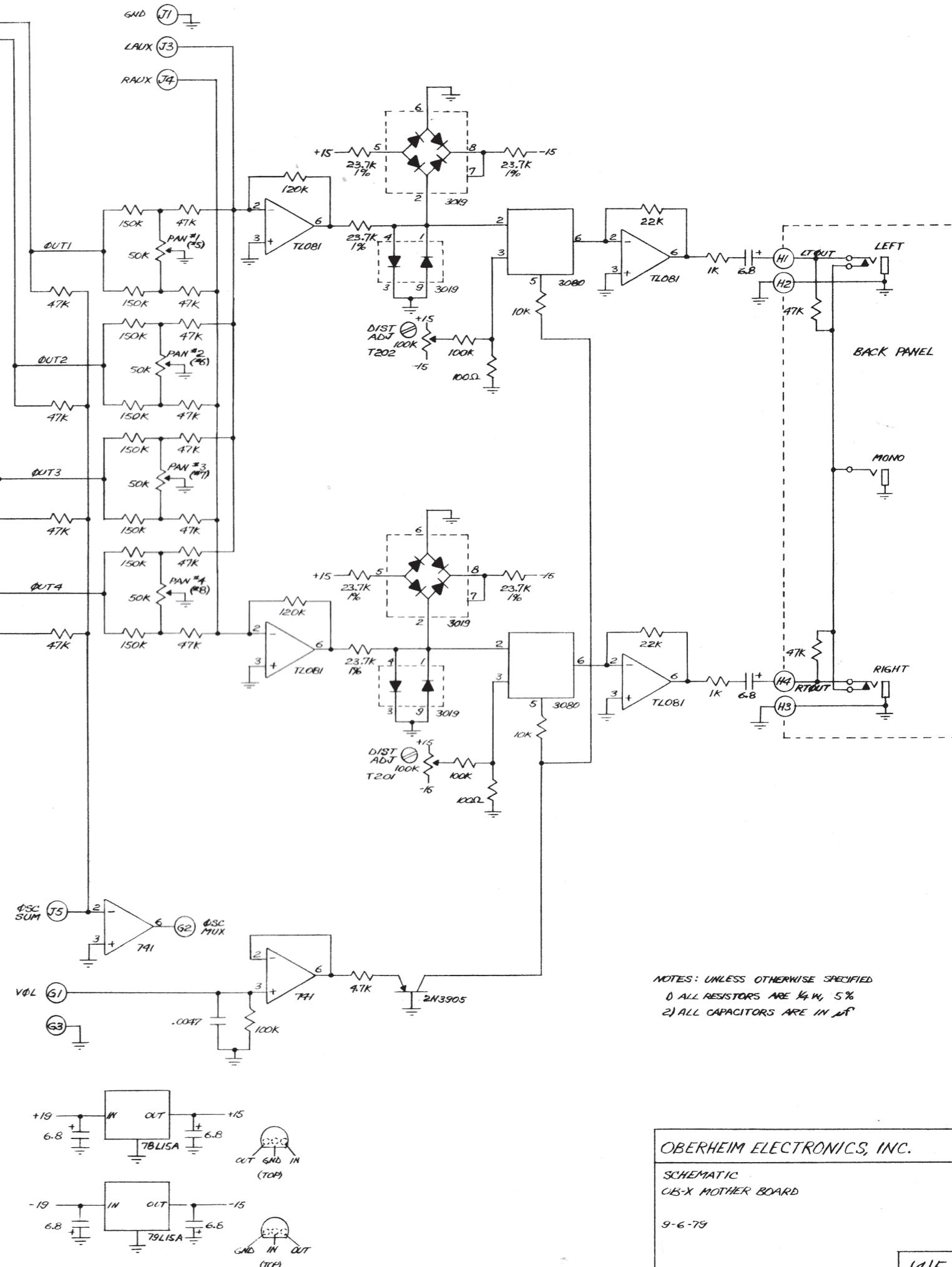
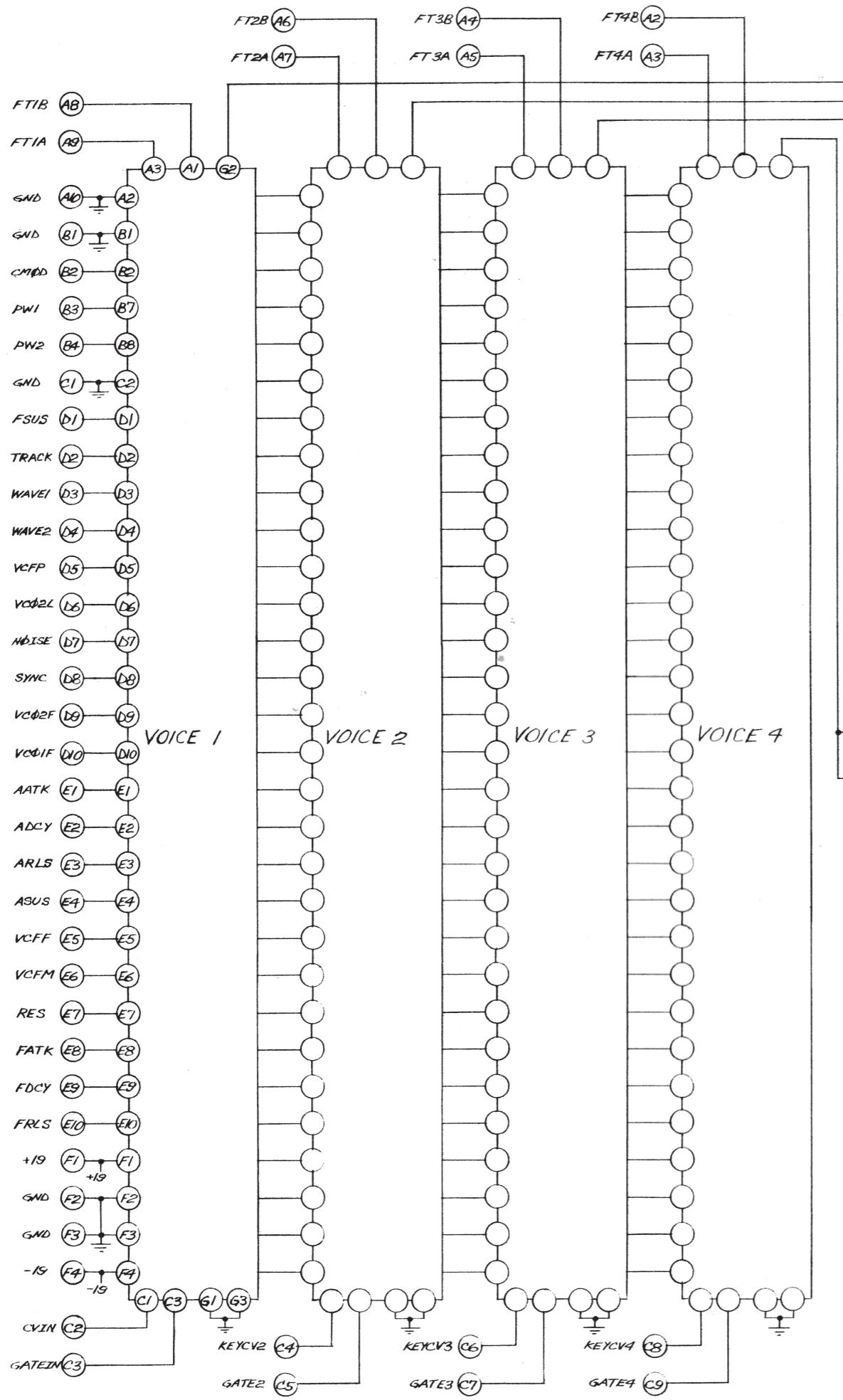
SHEET 1 OF 4







SCHEMATIC
PROCESSOR, CONTROL, POTS & KEYBOARD

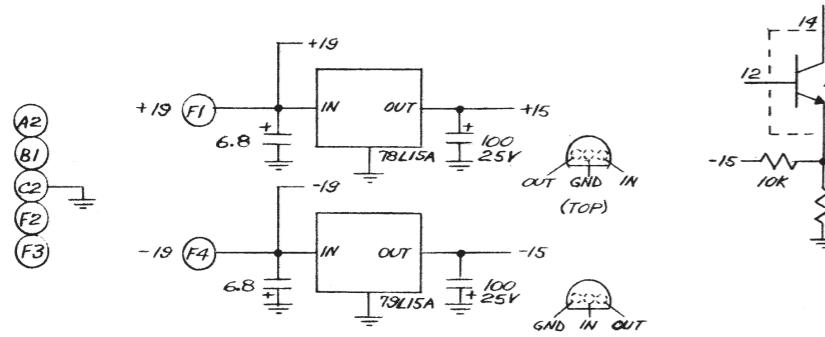
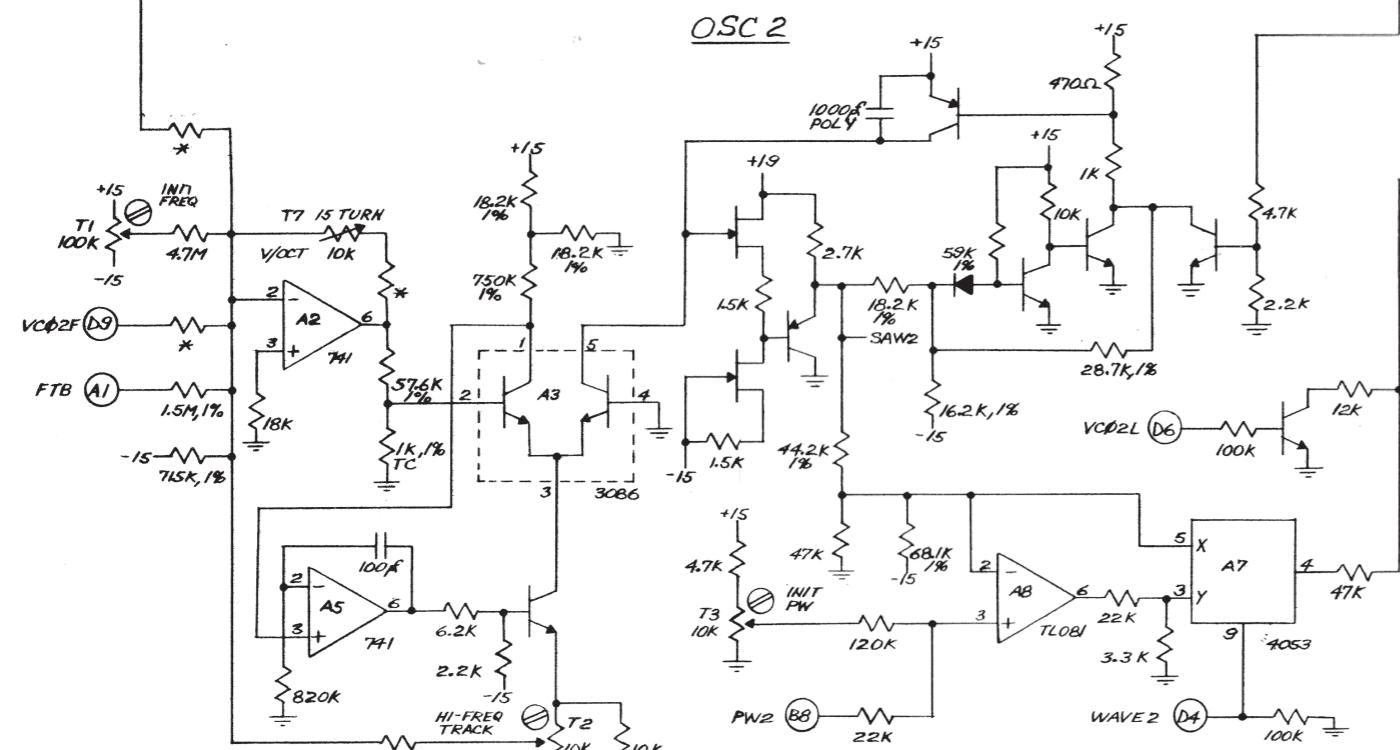
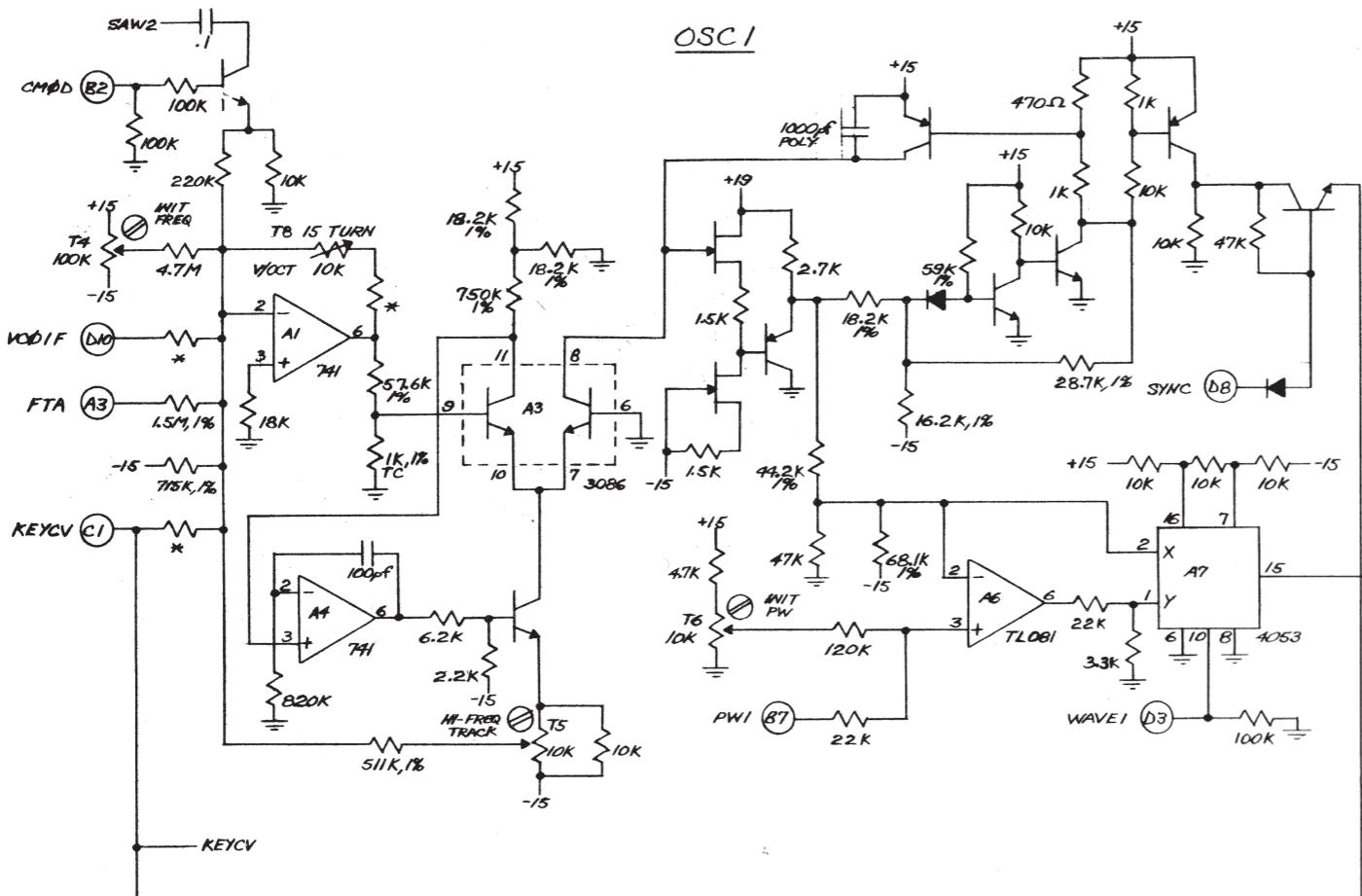


NOTES: UNLESS OTHERWISE SPECIFIED
1) ALL RESISTORS ARE 1/4W, 5%
2) ALL CAPACITORS ARE IN μ F

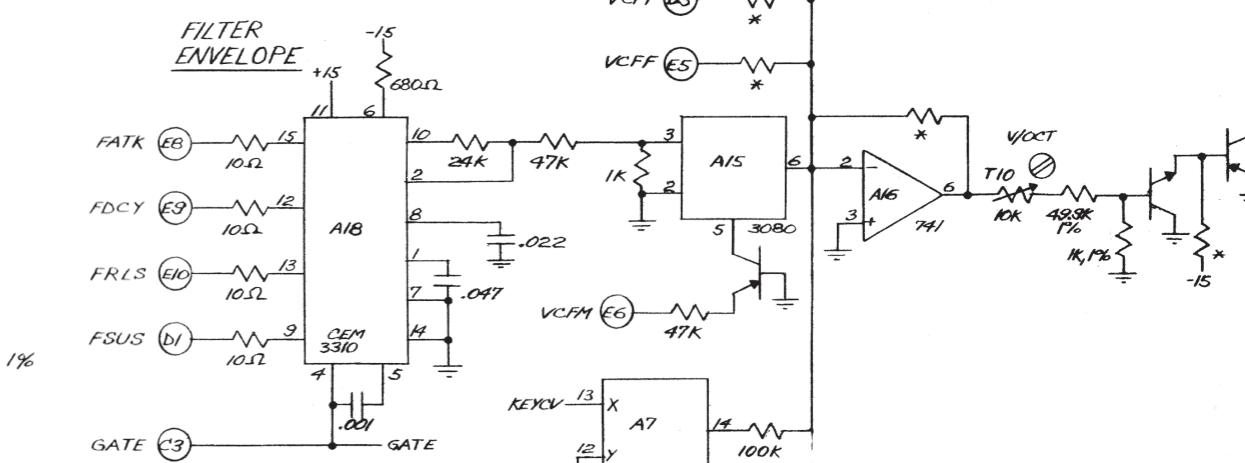
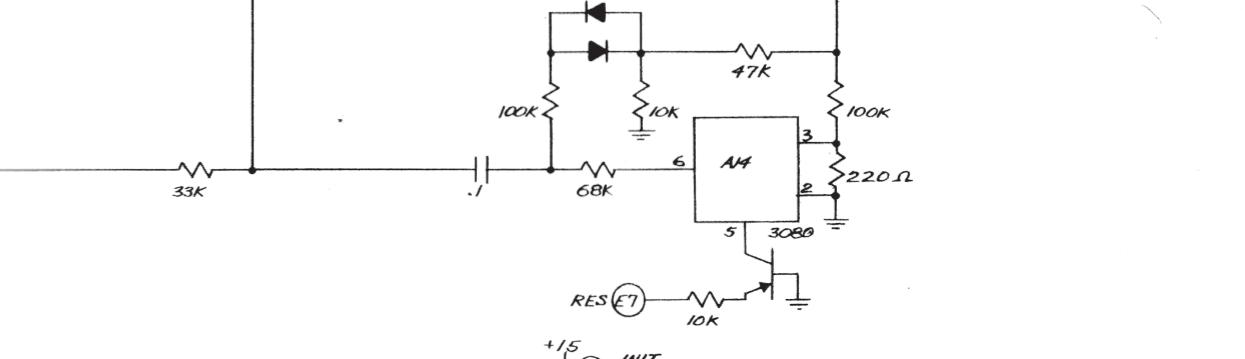
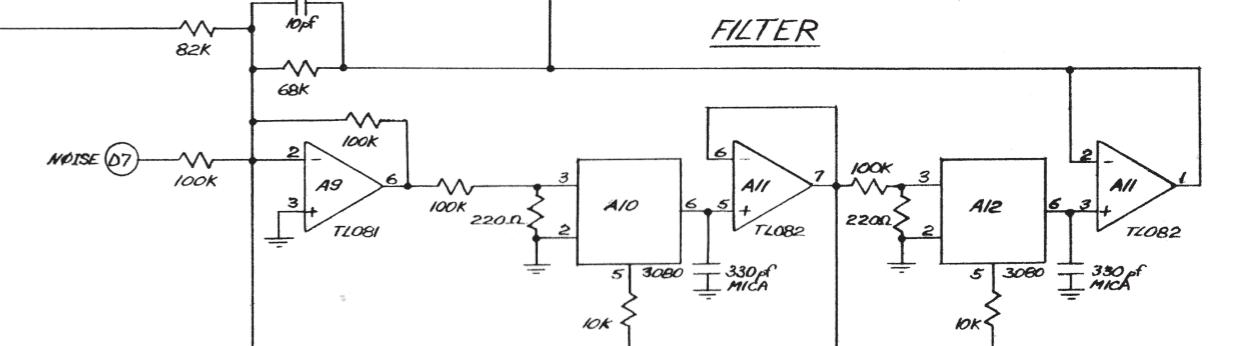
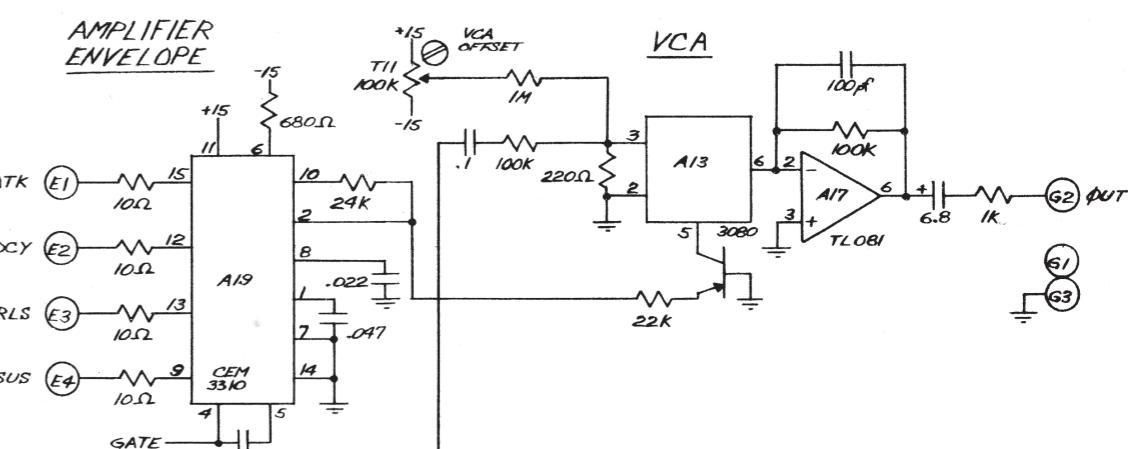
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SCHEMATIC
OB-X MOTHER BOARD

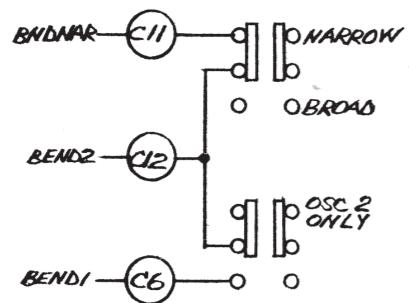
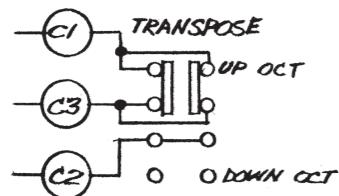
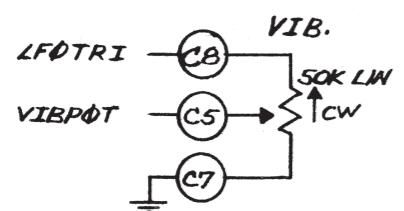
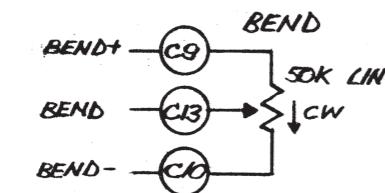
9-6-79



NOTES: UNLESS OTHERWISE SPECIFIED
 1) ALL RESISTORS ARE $\frac{1}{4}$ W, 5%
 2) RESISTORS MARKED "*" ARE MATCHED 100K, 1%
 3) ALL CAPACITORS ARE IN μ F
 4) ALL NPN TRANSISTORS ARE MPS5172
 5) ALL PNP TRANSISTORS ARE 2N3905
 6) ALL FET TRANSISTORS ARE 2N4302
 7) ALL DIODES ARE 1N4148



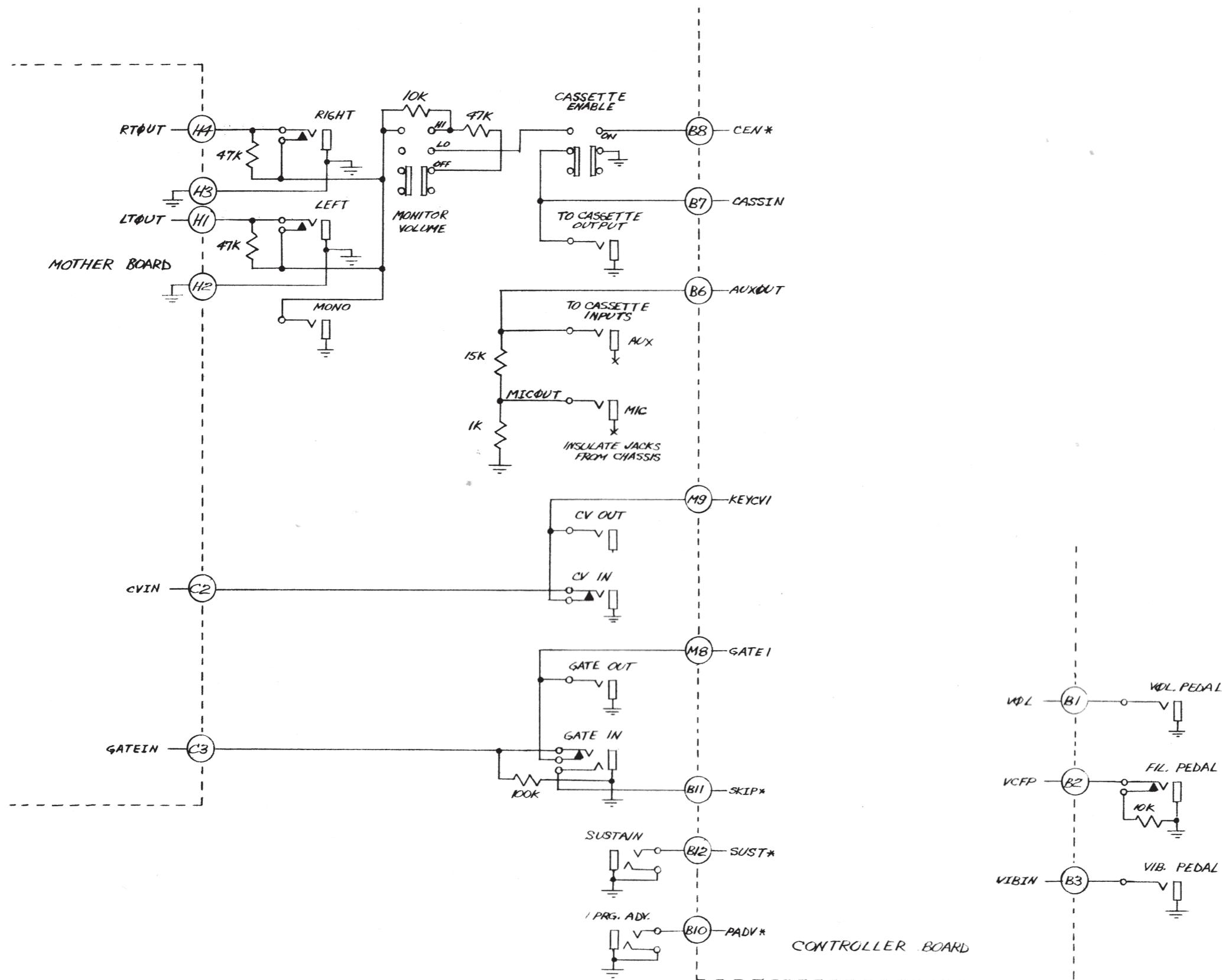
OBERHEIM ELECTRONICS, INC.
 SCHEMATIC - OB-X VOICE CARD
 6-30-79



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SCHEMATIC - OB-X BEND ASSEMBLY

6-30-79

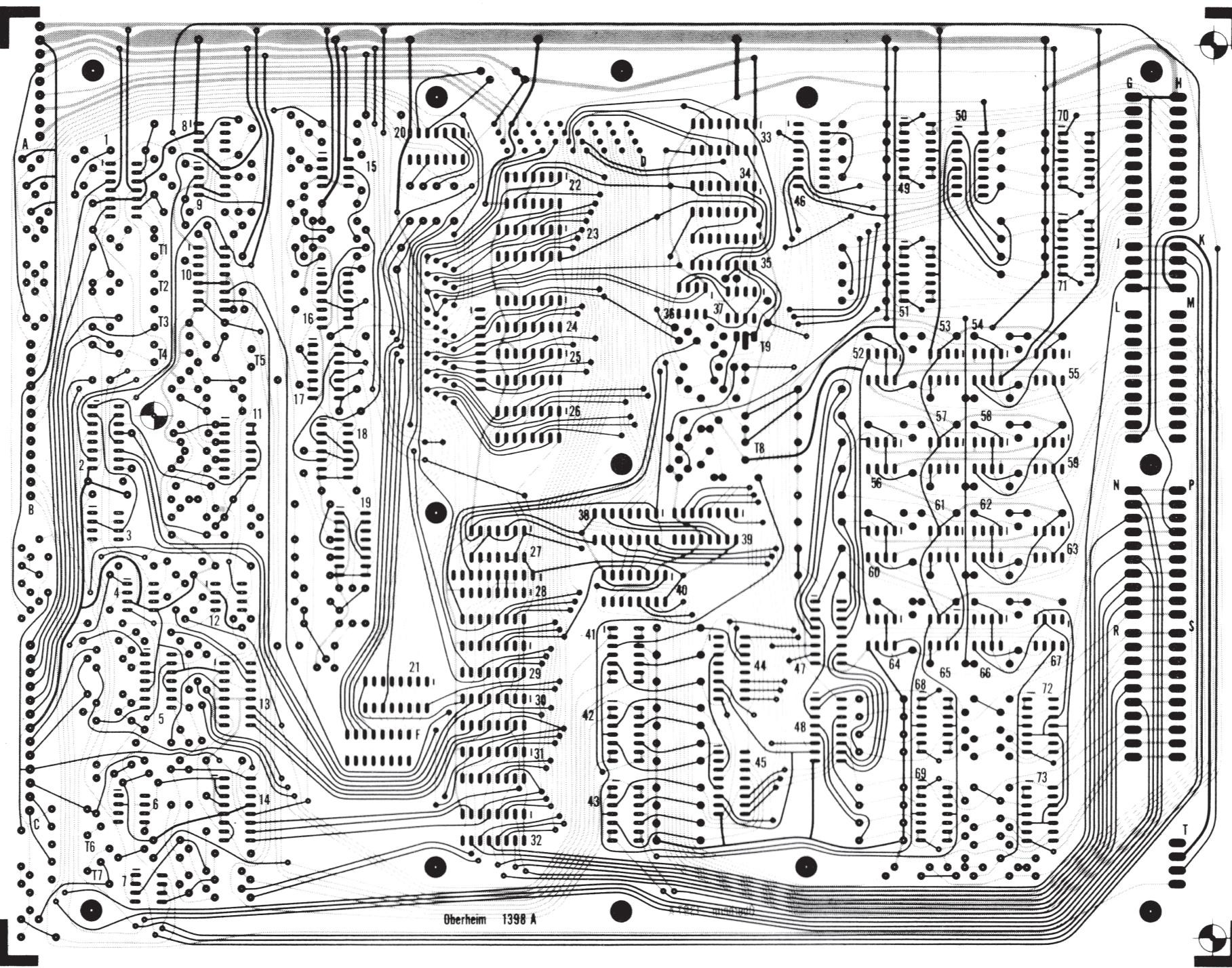


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SCHEMATIC - OB-X REAR PANEL

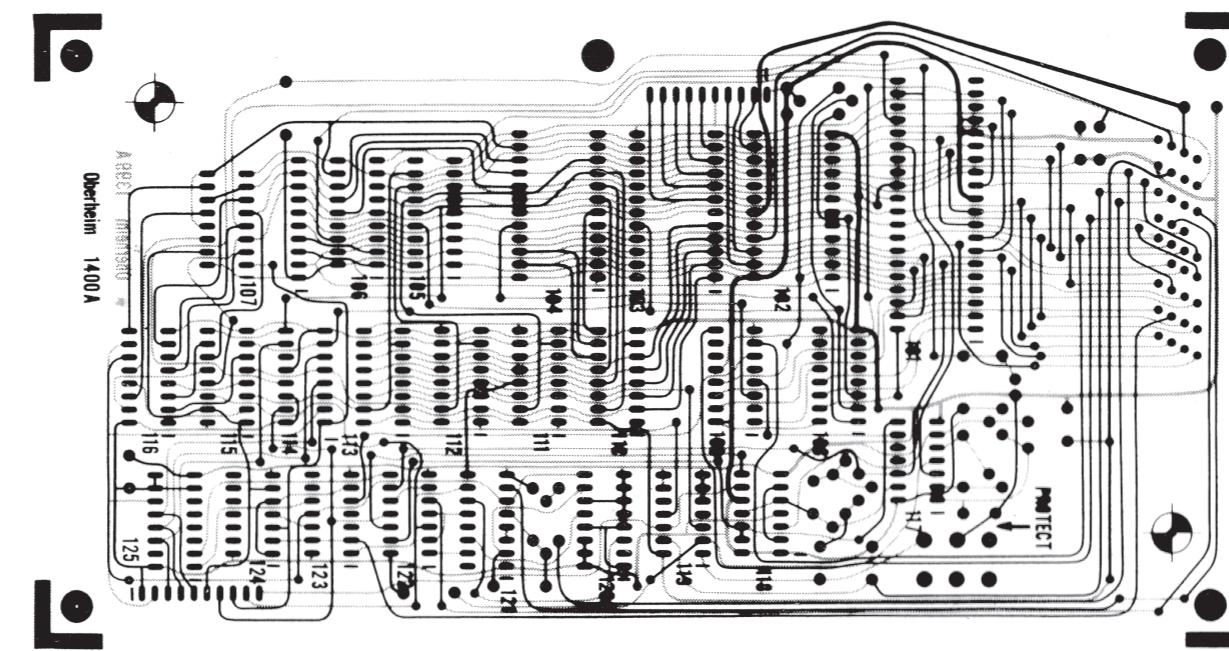
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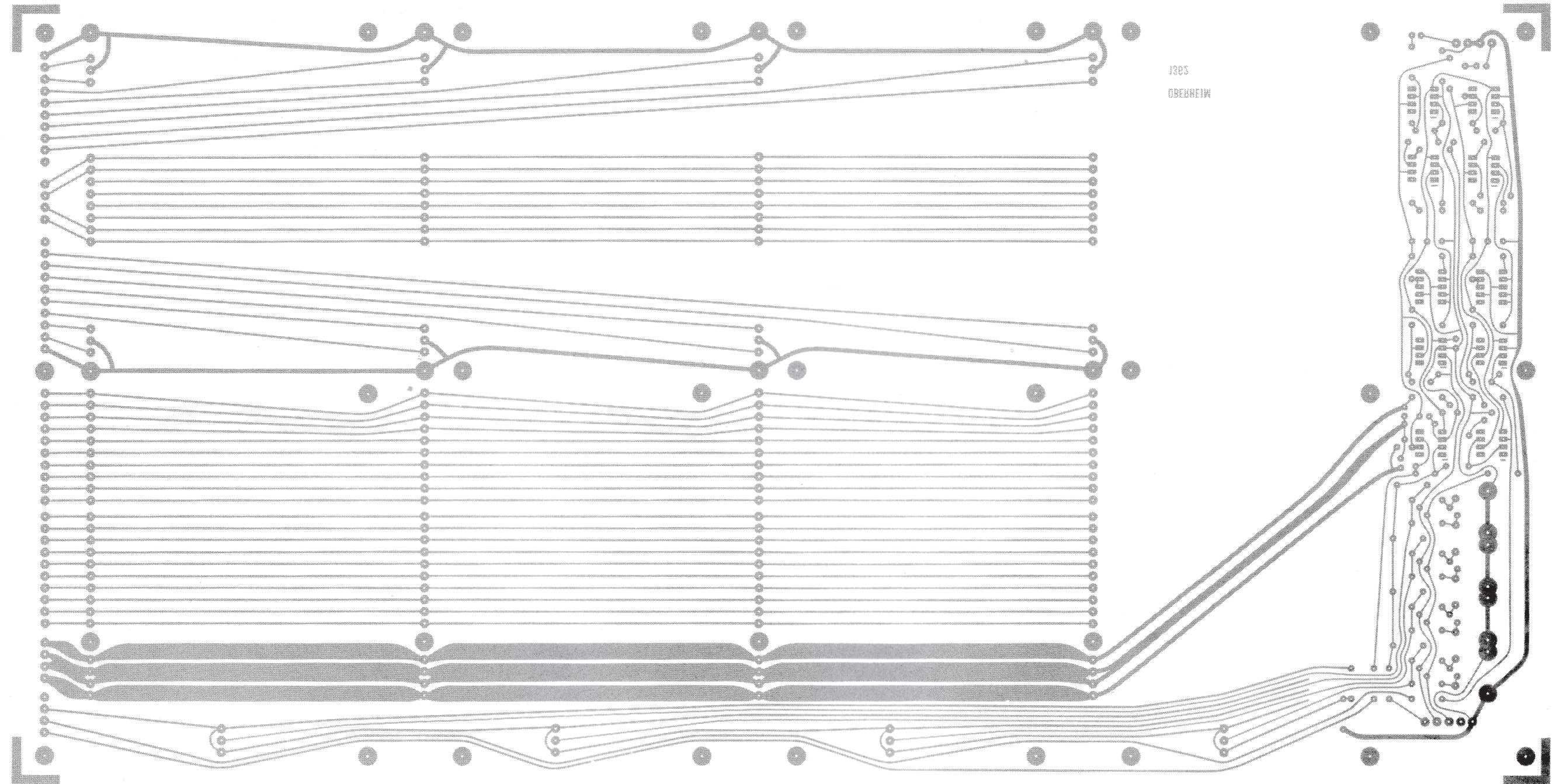


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SCALE:	APPROVED BY:	DRAWN BY
DATE: 9-21-79		REVISED
OB-X CONTROL BOARDS P.C. ARTWORK COMPOSITE		
DRAWING NUMBER		

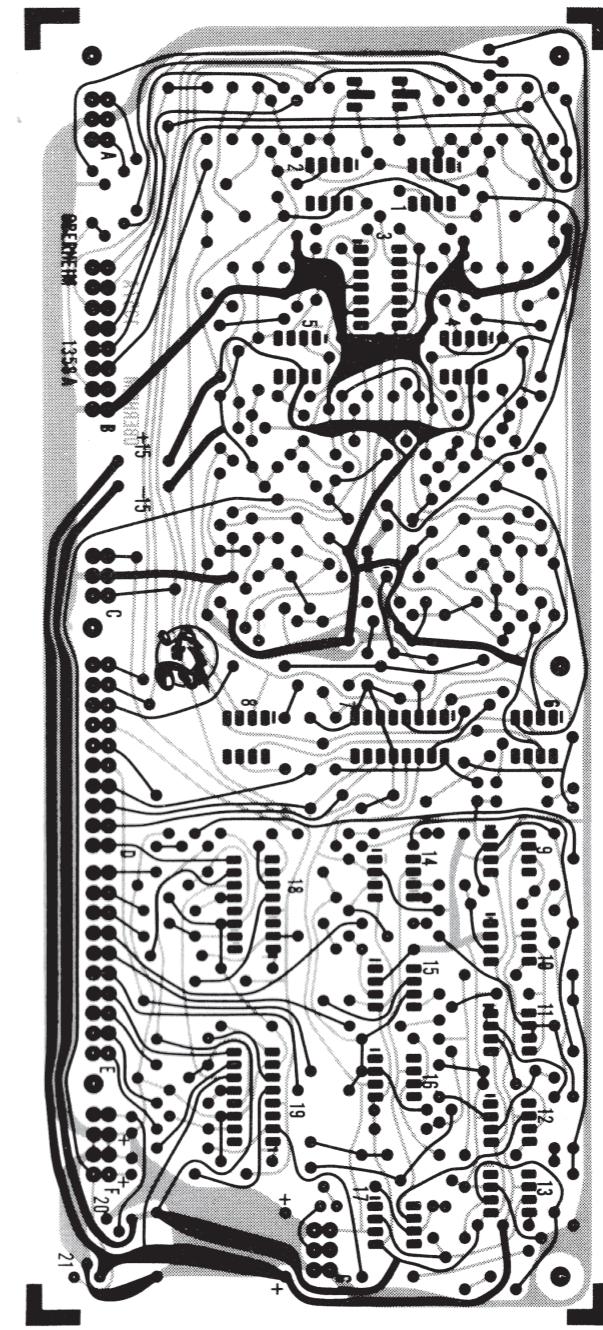
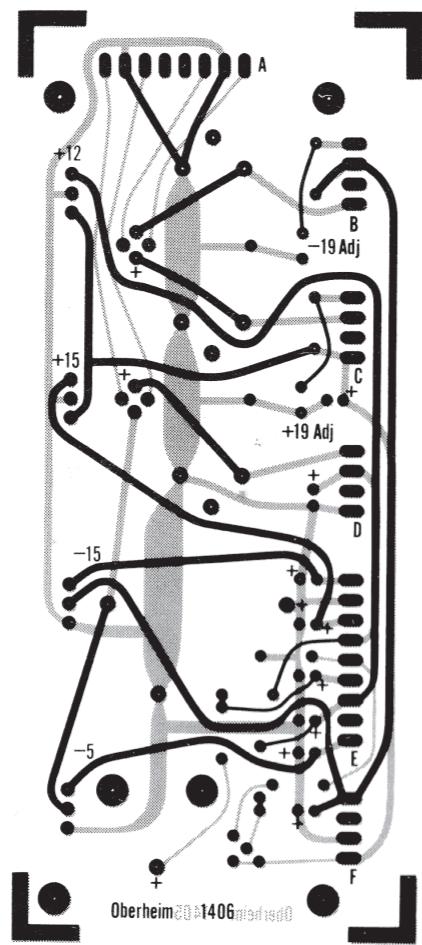


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DATE 9-21-79		REVISED
OB-X PROCESSOR BOARD P.C. ARTWORK COMPOSITE		
		DRAWING NUMBER



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DATE: 9-21-79		REVISED
OB-X MOTHER BOARD P.C. ARTWORK COMPOSITE		
DRAWING NUMBER		



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SCALE:	APPROVED BY:	DRAWN BY
DATE: 9-21-79		REVISED
OB-X POWER SUPPLY & VOICE CARD P.C. ARTWORK COMPOSITES		
DRAWING NUMBER		

OBERHEIM ELECTRONICS, INC.

ENGINEERING CHANGE ORDER

ECO NO.

001

OBERHEIM ELECTRONICS, INC.

ENGINEERING CHANGE ORDER

ECO NO.

002

PRODUCT AFFECTED

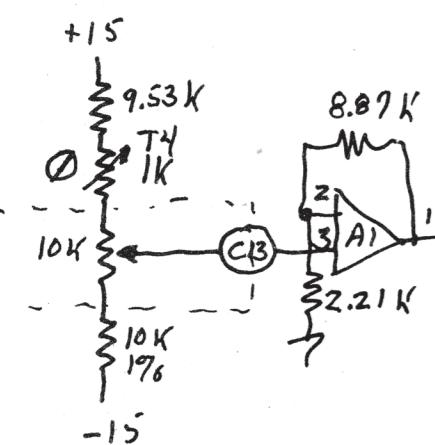
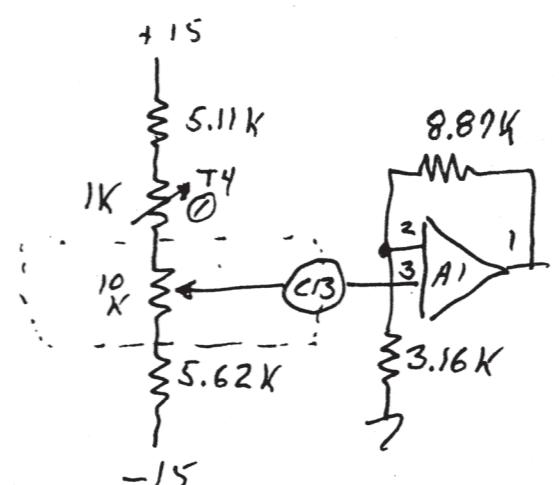
OB-X

DRAWINGS AFFECTED

1413 sheet 4 of 4

DESCRIPTION OF CHANGE

ON BENDER ELECTRONICS

WASNOW

PRODUCT AFFECTED

OBX

DRAWINGS AFFECTED

1413

INCORPORATED

sw 793804

DESCRIPTION OF CHANGE

- I) Change .022 μ fd mylar capacitors attached to pins 5 and 10 of IC 41 to .047 μ fd mylar.
- II) Change 47pf disk capacitor attached to pin 1 of A35 to 30pf disk.
- III) Change The "H1" EPROM to "HA1" type

REASON FOR CHANGE

Increase adjustment range of T4 on process/control Bd.

REASON FOR CHANGE

Improve Auto Tune performance

EFFECTIVITY

- FUTURE PRODUCTION ONLY
- RETROFIT UNITS IN PRODUCTION AND INVENTORY
- RETROFIT UNITS IN FIELD
- DRAWING CORRECTION ONLY; HARDWARE NOT Affected
-

WRITTEN BY

DATE

9/20/99

EFFECTIVITY

- FUTURE PRODUCTION ONLY
- RETROFIT UNITS IN PRODUCTION AND INVENTORY
- RETROFIT UNITS IN FIELD
- DRAWING CORRECTION ONLY; HARDWARE NOT Affected
-

APPROVED BY

DATE

9/20/99

WRITTEN BY

DATE

9/20/99

APPROVED BY

DATE

9/26/99

OBERHEIM ELECTRONICS, INC.

ENGINEERING CHANGE ORDER

ECO NO.

003

OBERHEIM ELECTRONICS, INC.

ENGINEERING CHANGE ORDER

ECO NO.

004

PRODUCT AFFECTED

OB-X

DRAWINGS AFFECTED

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INCORPORATE A

SN 993804

PRODUCT AFFECTED

OB-X

DRAWINGS AFFECTED

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DESCRIPTION OF CHANGE

DESCRIPTION OF CHANGE

I) Change The 10K Resistor attached to pin 26 of A101
To 100K

change The eight .022 μ fd mylar capacitors
attached to IC A47 to .022 μ fd polystyrene, polycarbonate,
or polypropylene.

II) change the 4.7K Resistor attached to connector pin M8
To 3.3K

REASON FOR CHANGE

-) MAKE POWER-ON RESET LONGER
-) INCREASE GATE OUT VOLTAGE FOR COMPATIBILITY WITH DS-2A

REASON FOR CHANGE

Improve Auto Tune performance

EFFECTIVITY

 FUTURE PRODUCTION ONLY RETROFIT UNITS IN PRODUCTION AND INVENTORY RETROFIT UNITS IN FIELD DRAWING CORRECTION ONLY; HARDWARE NOT AFFECTED

WRITTEN BY

DATE

9/20/79

EFFECTIVITY

 FUTURE PRODUCTION ONLY RETROFIT UNITS IN PRODUCTION AND INVENTORY RETROFIT UNITS IN FIELD DRAWING CORRECTION ONLY; HARDWARE NOT AFFECTED

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DATE

9/20/79

APPROVED BY

DATE

9/26/79

APPROVED BY

DATE

9/26/79

PRODUCT AFFECTED

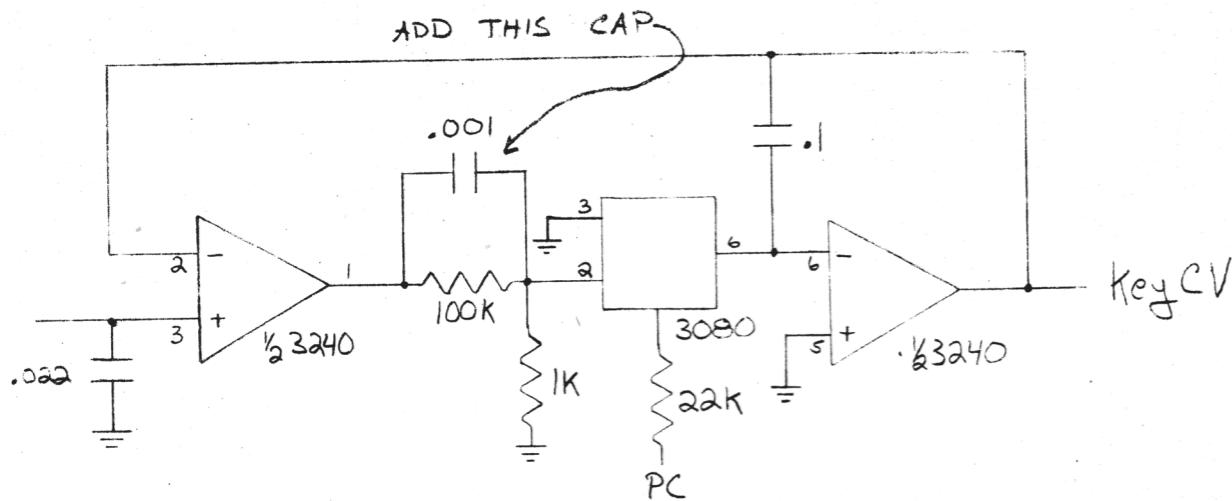
OB-X

DRAWINGS AFFECTED

1413 sheet 3 of 4

DESCRIPTION OF CHANGE

SERVICE NOTE FOR UNSTABLE KEY CV

CHANGE ONLY IF NECESSARY

REASON FOR CHANGE Unstable keyboard control voltages, due to 3240's oscillating. Modification must be made to all key CV circuits.

It is important to readjust DAC trimmer T9 on control board after modifying circuit.

EFFECTIVITY

- FUTURE PRODUCTION ONLY
- RETROFIT UNITS IN PRODUCTION AND INVENTORY
- RETROFIT UNITS IN FIELD
- DRAWING CORRECTION ONLY; HARDWARE NOT Affected
- SERVICE NOTE

WRITTEN BY

DATE

7-21-79

APPROVED BY

DATE

9-26-79

CONTROL BOARD INTERCONNECT LIST

CONTROL	POWER SUPPLY	REAR PANEL	MODULATION ASSEMBLY
A1	-5V	E1	TRANSPOSE SWITCH--UP
A2	(KEY)	E2	TRANSPOSE SWITCH--DOWN
A3	+12V	E3	TRANSPOSE SWITCH--CENTER
A4	+5MEM	E4	VIBRATO POT--WIPER
A5	PUP	E5	BEND OSC SWITCH--BOTH
A6	+5V	E6	VIBRATO POT--CW END
A7	+15V	E7	BEND POT--CCW END
A8	GND	E8	BEND POT--CW END
A9	-15V	E9	BEND RANGE SWITCH--NARROW
			BEND OSC & RANGE SW'S--CENTER
			BEND POT--WIPER
B1	VOL	VOLUME PEDAL JACK--TIP	
B2	VCFP	FILTER PEDAL JACK--TIP	
B3	VIBIN	VIBRATO PEDAL JACK--TIP	
B4	(NC)		
B5	(KEY)		
B6	AUXOUT	TO CASS AUX INPUT JACK--TIP	
B7	CASSIN	TO CASS OUTPUT JACK--TIP	
B8	CEN*	CASSETTE ENABLE SWITCH--ON	
B9	GND		
B10	PADV*	PROGRAM ADVANCE JACK--TIP	
B11	SKIP*	GATE IN JACK--RING	
B12	SUST*	SUSTAIN FOOTSWITCH JACK--TIP	
C1	TRUP		
C2	TRDN		
C3	TRANSP		
C4	(KEY)		
C5	VIBPOT		
C6	BEND1		
C7	GND		
C8	LFO TRI		
C9	BEND+		
C10	BEND-		
C11	BNDNAR		
C12	BEND2		
C13	BEND		

CONTROL	PROCESSOR	
D1	A4	1
D2	A5	2
D3	A6	3
D4	A1	4
D5	A2	5
D6	A3	6
D7	AOA	7
D8	A9	8
D9	A8	9
D10	A7	10
D11	D7	11
D12	D6	12
D13	D5	13
D14	D4	14
D15	D3	15
D16	D2	16
D17	D1	17
D18	DO	18
D19	IOR*	19
D20	IOW*	20
D21	CEN*	21
D22	(NC)	22
D23	ATRST	23
D24	(NC)	24
D25	OSCMUX	25
D26	PUP	26
D27	CASCLK	27
D28	(NC)	28
D29	+5MEM	29
D30	GND	30
D31	(NC)	31
D32	+12V	32
D33	-5V	33
D34	+5V	34

CONTROL	POT NO. 1
E1	LR07
E2	LR06
E3	LR05
E4	LR04
E5	LR03
E6	LR02
E7	LR01
E8	LR00
E9	GND (ANLG)
E10	ANLGIN
E11	GND
E12	VOLPOT
E13	MTUN
E14	GND
E15	SWEND*
E16	-15V
E17	+15V
E18	SWENE*
E19	CEN*
E20	+5V
E21	SWD6*
E22	SWD7*
E23	SWD2*
E24	SWD1*
E25	SWD5*
E26	SWD0*
E27	SWD4*
E28	SWD3*
E29	AR5
E30	AR4
E31	AR3
E32	AR2
E33	AR1
E34	AR0

CONTROL	KEYBOARD
F1	SWEN1*
F2	SWEN3*
F3	SWEN5*
F4	SWEN7*
F5	SWD1*
F6	SWD2*
F7	SWD7*
F8	SWD6*
F9	SWD5*
F10	SWD0*
F11	SWD4*
F12	SWD3*
F13	SWEN6*
F14	SWEN4*
F15	SWEN2*
F16	SWENO*

CONTROL	MOTHER NO. 2
G1	GND A10
G2	FT5A A9
G3	FT5B A8
G4	FT6A A7
G5	FT6B A6
G6	FT7A A5
G7	FT7B A4
G8	FT8A A3
G9	FT8B A2
G10	(NC) A1

CONTROL	MOTHER NO. 1
H1	GND A10
H2	FT1A A9
H3	FT1B A8
H4	FT2A A7
H5	FT2B A6
H6	FT3A A5
H7	FT3B A4
H8	FT4A A3
H9	FT4B A2
H10	(NC) A1

CONTROL	MOTHER NO. 2
J1	PW2 B4
J2	PW1 B3
J3	CMOD B2
J4	GND B1

CONTROL	MOTHER NO. 1
K1	PW2 B4
K2	PW1 B3
K3	CMOD B2
K4	GND B1

CONTROL	MOTHER NO. 2
L1	(NC) C10
L2	GATE8 C9
L3	KEYCV8 C8
L4	GATE7 C7
L5	KEYCV7 C6
L6	GATE6 C5
L7	KEYCV6 C4
L8	GATE5 C3
L9	KEYCV5 C2
L10	GND C1

CONTROL	MOTHER NO. 1
M1	(NC) C10
M2	GATE4 C9
M3	KEYCV4 C8
M4	GATE3 C7
M5	KEYCV3 C6
M6	GATE2 C5
M7	KEYCV2 C4
M10	GND C1

CONTROL	REAR PANEL
M8	GATE1 GATE OUT JACK--TIP
M9	KEYCV1 CV OUT JACK--TIP

REAR PANEL	MOTHER NO. 1
GATE IN JACK--TIP	GATEIN C3
CV IN JACK--TIP	CVIN C2

CONTROL	MOTHER NO. 2
N1	VCO1F D10
N2	VCO2F D9
N3	SYNC D8
N4	NOISE D7
N5	VCO2L D6
N6	VCFP D5
N7	WAVE2 D4
N8	WAVE1 D3
N9	TRACK D2
N10	FSUS D1

CONTROL	MOTHER NO. 1
P1	VCO1F D10
P2	VCO2F D9
P3	SYNC D8
P4	NOISE D7
P5	VCO2L D6
P6	VCFP D5
P7	WAVE2 D4
P8	WAVE1 D3
P9	TRACK D2
P10	FSUS D1

POWER SUPPLY BOARD INTERCONNECT LIST

CONTROL MOTHER NO. 2

R1	FRLS	E10
R2	FDCY	E9
R3	FATK	E8
R4	RES	E7
R5	VCFM	E6
R6	VCFF	E5
R7	ASUS	E4
R8	ARLS	E3
R9	ADCY	E2
R10	AATK	E1

CONTROL MOTHER NO. 1

S1	FRLS	E10
S2	FDCY	E9
S3	FATK	E8
S4	RES	E7
S5	VCFM	E6
S6	VCFF	E5
S7	ASUS	E4
S8	ARLS	E3
S9	ADCY	E2
S10	AATK	E1

CONTROL MOTHER NO. 1

T1	(NC)	G4
T2	GND	G3
T3	OSCMUX	G2
T4	VOL	G1

POWER SUPPLY	TRANSFORMER
A1	26VAC
A2	GND (CT)
A3	26VAC
A4	(KEY)
A5	(NC)
A6	10VAC
A7	GND (CT)
A8	10VAC

POWER SUPPLY	
B1	-32V
B2	(KEY)
B3	-19V
B4	ADJ

POWER SUPPLY	
C1	+19V
C2	(KEY)
C3	+32V
C4	ADJ

POWER SUPPLY	
D1	GND
D2	(KEY)
D3	+5V
D4	+12V

POWER SUPPLY	MOTHER NO. 1))
F1	+19V	F1)
F2	GND	F2)
F3	(KEY)	F3)
F4	-19V	F4)

CONTAINED)
IN A)

MOTHER NO. 1	MOTHER NO. 2)	SINGLE)
F1	+19V	F1)
F2	GND	F2)
F3	(KEY)	F3)
F4	-19V	F4)

CABLE)

POT BOARD INTERCONNECT LIST

POT NO. 1 POT NO. 2

A1	-15V	A1
A2	+15V	A2
A3	PORT	A3
A4	LFOPO	A4
A5	FMPOT	A5
A6	PWMPOT	A6
A7	DETUNE	A7
A8	+5POT	A8

POT NO. 1 POT NO. 2

B1	GND	B1
B2	VOLPOT	B2
B3	MTUN	B3
B4	SWEND*	B4
B5	LEDC0*	B5
B6	SWENA*	B6
B7	LEDC1*	B7
B8	SWENB*	B8

POT NO. 1 POT NO. 2

C1	SWD0*	C1
C2	SWD1*	C2
C3	SWD2*	C3
C4	SWD3*	C4
C5	SWD4*	C5
C6	SWD5*	C6
C7	SWD6*	C7
C8	SWD7*	C8

POT NO. 1 POT NO. 2

D1	LEDRO	D1
D2	LEDR1	D2
D3	LEDR2	D3
D4	LEDR3	D4
D5	LEDR4	D5
D6	LEDC6*	D6
D7	LEDC7*	D7
D8	SWEN9*	D8

MOTHER BOARD INTERCONNECT LIST

MOTHER NO. 1

H1	LTOUT	LEFT OUTPUT JACK--TIP
H2	SHIELD	LEFT OUTPUT JACK--SLEEVE
H3	SHIELD	RIGHT OUTPUT JACK--SLEEVE
H4	RTOUT	RIGHT OUTPUT JACK--TIP

MOTHER NO. 1

J1	GND	J1
J2	(NC)	J2
J3	LAUX	J3
J4	RAUX	J4
J5	OSCSUM	J5

REAR PANEL