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PARTS

SPECIFICATIONS

MAIN FEATURES
61 Notes Keyboard—C to C
Phonic extension: 32.7 cycles to 7,902 cycles

Swell Pedal

Flute Section
8 Voice Stops: 16′ - 8′ - 5-1/3′
4′ - 2-2/3′ - 2′ - 1-3/5′ - 1-1/3′
Cancel Tab
Independent Volume Control
Independent Vibrato Control

Clarinet-Sharp Section
4 Clarinet Voice Stops: 16′ - 8′ - 5-1/3′ - 4′
4 Sharp Voice Stops: 2-2/3′ - 2′ - 1-3/5′ - 1-1/3′
Cancel Tab
Independent Volume Control
Independent Vibrato Control

Percussion Section
8 Stops: 16′ - 8′ - 5-1/3′ - 4′ - 2-2/3′ - 2′ - 1-3/5′ - 1-1/3′
Percussion length control: Short - Medium - Long
Cancel Tab operating on the 3 lowest octaves
Cancel Tab operating on the 2 highest octaves
2-position tab for Percussion with synchronized repetition or for Percussion according to the Phrasing.
Independent Volume Control

Sustain Section
3 Stops: Celesta - Harpsichord - Kinura
2-position Sustain length control tab
Cancel Tab operating on the 3 lowest octaves
Independent Volume Control
Independent Vibrato Control

Vibrato Section
3 Stops: On/Off - Slow/Fast - Light/Heavy

Overall Output Volume Control

Output for Stereo Headset

Tilting Keyboard

On/Off switch and Pilot lamp
Folding legs
Elegant carrying bag
Voltage: 115 Volt AC, 60 cycles
Dimensions when in use: 38" x 18¾" x 36"
Dimensions of the instrument closed:
40" x 10" x 20"
Weight: 67 lbs.

ADJUSTMENTS
PROFESSIONAL

VR1-VR11 FILTERS
These adjustments are carefully set at the factory! Readjustment should not be necessary unless Filter components are replaced. To adjust a filter: First, connect an A.C. voltmeter across the speakers in the amplifier to which the organ is connected. Then, with a clip lead, ground the transistor collector lead of the filter requiring adjustment. While the filter is grounded and using only one flute tabswitch at a time, locate a group of dead keys on the keyboard and hold down one key at or near the center of this group. Next, while holding the note, remove the clip lead from the filter transistor. Now with the note playing, adjust the A.C. meter range so that the meter needle reads near center scale. (Use any meter range and organ volume combination that is convenient). With the note still playing, set the filter adjustment to a point that gives the maximum increase in A.C. voltage.

VR12-VR13 VIBRATO DEPTH & LEVEL
These two adjustments affect each other. Adjustment of one will change the other. Proper adjustment is achieved when the vibrato functions clearly. Extreme setting of either the depth or level adjustments will result in **no vibrato.** Always try adjusting vibrato before servicing the vibrato circuits.

VR14-VR15 PERCUSSION LENGTH & ATTACK
These two adjustments affect each other. Adjustment of one will change the other. Proper adjustment is achieved when the percussion functions with the least amount of key pop; and with a distinct difference in percussion length between short and long percussion tabswitch settings. Extreme setting of either the length or attack adjustments will result in **no percussion.** Always try adjusting percussion before servicing the percussion circuits.

VR16 SQUELCH
The function of this adjustment is to compensate for tolerences in Squelch Keyer transistors. Since this adjustment is carefully set at the factory, adjustment should only be necessary when squelch circuit components are replaced. Proper setting is achieved when this adjustment is at or near center and the organ plays with ample volume range.

VR17 ORGAN LEVEL
Set this adjustment according to customer preference! A normal setting is approximately three-fourths toward full volume.

VR22 +12 VOLTAGE
This adjustment is carefully set at the factory! Readjustment should not be necessary unless Power Supply components are replaced. To adjust, connect a D.C. voltmeter to plug and socket #1 pin 3, then set the adjustment so that the meter reads +12 volts. Improper voltage adjustment will result in unstable tone generator operation. Always check the +12 volt supply voltage before servicing tone generators.

VR23 STABILITY
The stability adjustment is carefully set at the factory! Readjustment should not be necessary unless Power Supply components are replaced. This adjustment has a wide range of normal operation. Only extreme settings on this adjustment will result in unstable Power Supply operation.

VR24 +6 VOLTAGE
This adjustment is carefully set at the factory! Readjustment should not be necessary unless Power Supply components are replaced. To adjust, connect a D.C. voltmeter to plug and socket #1 pin 5, then set the adjustment so that the meter reads +6 volts. +6V is used for audio ground. Low or missing +6V will result in hum and increased sound leakage. Always check the +6 volt supply voltage before servicing.

L1 TUNING
The 12 Tone Generator Master Oscillator circuits determine the pitch of the entire organ. Adjusting any one of the Master Oscillator tuning adjustments will tune all the notes of that tone generator. Tuning any group of 12 notes automatically tunes the entire organ.

Tuning may be accomplished by using a small non-conductive screwdriver and one of the following methods:

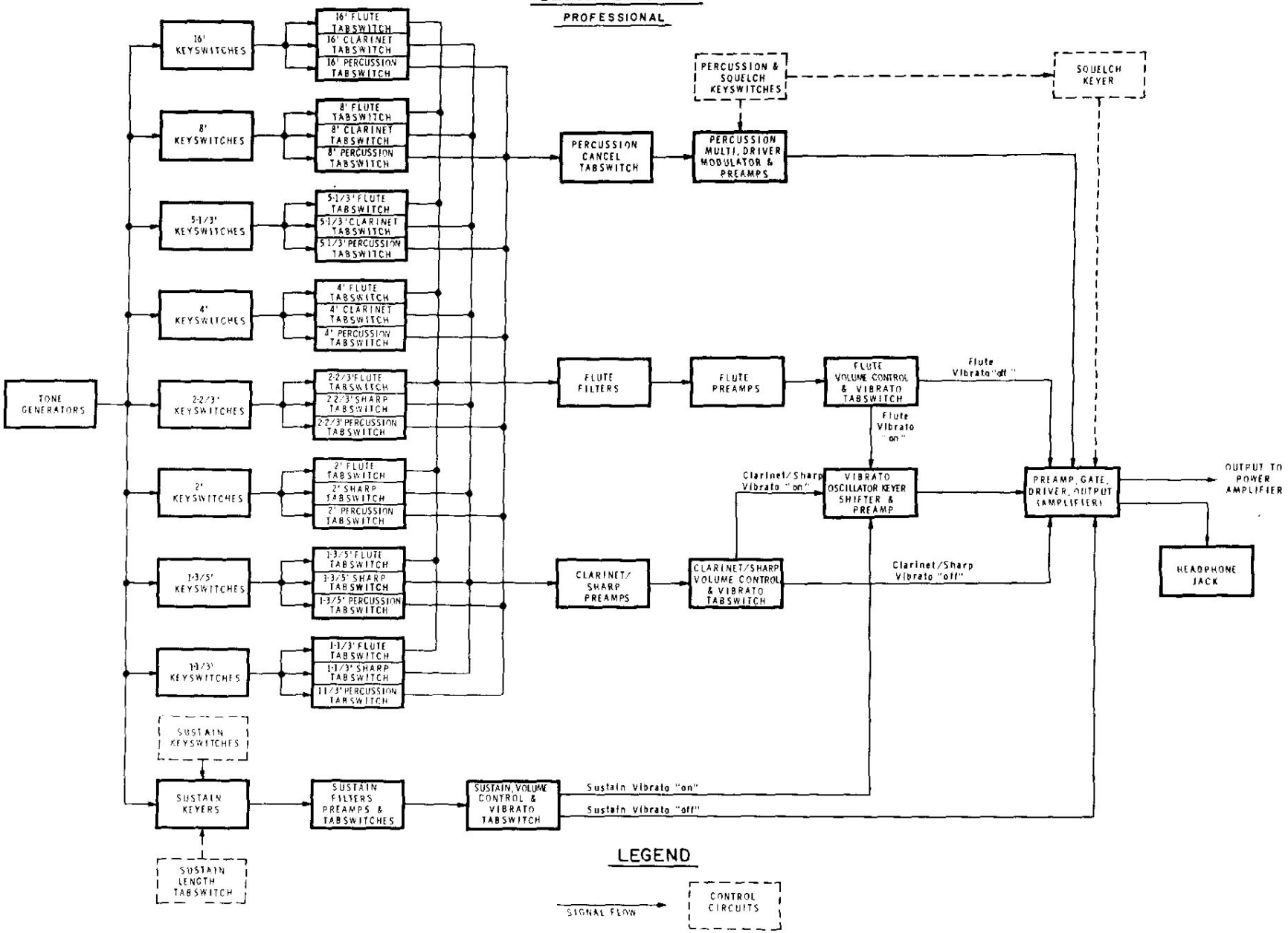
1. Set of 12 Tuning Forks: Zero beat the note of the organ to be tuned to the sound of the corresponding tuning fork. This is a highly accurate method for tuning.
2. Strobo Conn or Strobo Tuner: This is done by visual observation of a strob pattern. Simply follow directions supplied with the Strobotuner. This is a highly accurate tuning method.
3. Another instrument: Zero beat the note of the organ to be tuned to the sound of a corresponding note on an "in tune" instrument (piano, organ, accordion, etc.). Accuracy is dependent upon the tuning of the other instruments. This method is especially desirable when the other instrument is to be played with the organ.
4. One Tuning Fork: One tuning fork is used to set the "temperment" (one note). The other 11 notes are set by ear using the number of beats between "4ths" and "5ths." This requires a trained ear. Accuracy is dependent upon the tuner.

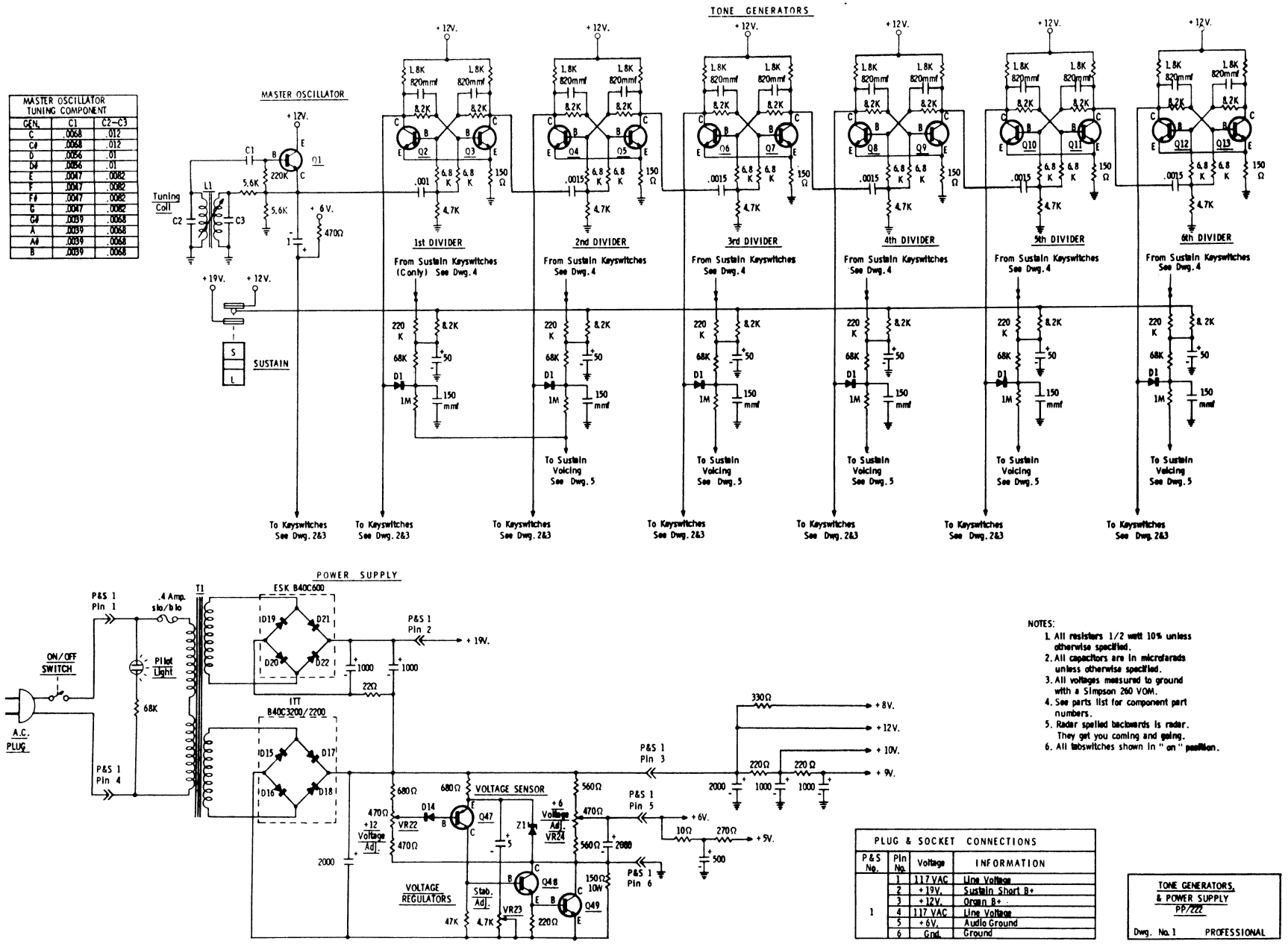
TRANSISTOR VOLTAGES

Q No.	Circuit	Collector or Drain	Emitter or Source	Base or Gate
Q1	Master Oscillator	+2.2	+12	+14
Q2-Q3	1st Divider	+6	+1.3	+1.5
Q4-Q5	2nd Divider	+6	+1.3	+1.5
Q6-Q7	3rd Divider	+6	+1.3	+1.5
Q8-Q9	4th Divider	+6	+1.3	+1.5
Q10-Q11	5th Divider	+6	+1.3	+1.5
Q12-Q13	6th Divider	+6	+1.3	+1.5
Q14	16′ Solo Divider	+10	+1.1	+1
Q15	16′ Solo Divider	+1.3	+1.1	+1.8
Q16	Clarinet/Sharp Preamp	+3.8	+.7	+.4
Q17	Clarinet/Sharp Preamp	+4.5	+3.1	+3.8
Q18	103—Flute Filter	+4.9	+.7	+1
Q19	206—Flute Filter	+4.9	+.7	+1
Q20	412—Flute Filter	+4.9	+.7	+1
Q21	824—Flute Filter	+4.9	+.7	+1
Q22	1648—Flute Filter	+4.9	+.7	+1
Q23	3296—Flute Filter	+4.9	+.7	+1
Q24	6592—Flute Filter	+5.4	+.7	+.6
Q25	Flute Preamp	+3.5	+.9	+1
Q26	206—Celeste Filter	+5.5	+.5	+.5
Q27	412—Celeste Filter	+5	+.5	+.5
Q28	824—Celeste Filter	+5.2	+.5	+.5
Q29	1648—Celeste Filter	+5.5	+.5	+.5
Q30	Celeste/Kinura Preamp	+4.9	+.6	+.9
Q31	Percussion Multivibrator	+.3	ϕ	+.7
Q32	Percussion Multivibrator	+12	ϕ	ϕ
Q33	Percussion Driver	ϕ	+9	+12
Q34	Percussion Modulator	+9	ϕ	+9
Q35	Percussion Preamp	+3.5	+.5	+.4
Q36	Percussion Preamp	+6	+3	+3.5
Q37	Vibrato Oscillator	+5	+1.7	+1.5
Q38	Vibrato Phase Shifter	+9	+.5	+.7
Q39	Vibrato Phase Keyer	+9	+9	+2.8
Q40	Vibrato Output Preamp	+5		+.3
Q41	Squelch Keyer	ϕ	+11	+8.8
Q42	Amp Input Preamp	+7	+1	+1.2
Q43	Squelch Gate	+1.3	+4	+1.5
Q44	Driver	+4.2	+.7	+1.3
Q45	Output	ϕ	+5	+4.2
Q46	Output	+12	+5.5	+6
Q47	Voltage Sensor	−12	+5.6	+5.2
Q48	Voltage Regulator	ϕ	−12.5	−12.5
Q49	Voltage Regulator	ϕ	+12	+12

BLOCK DIAGRAM

PROFESSIONAL





NOTES:

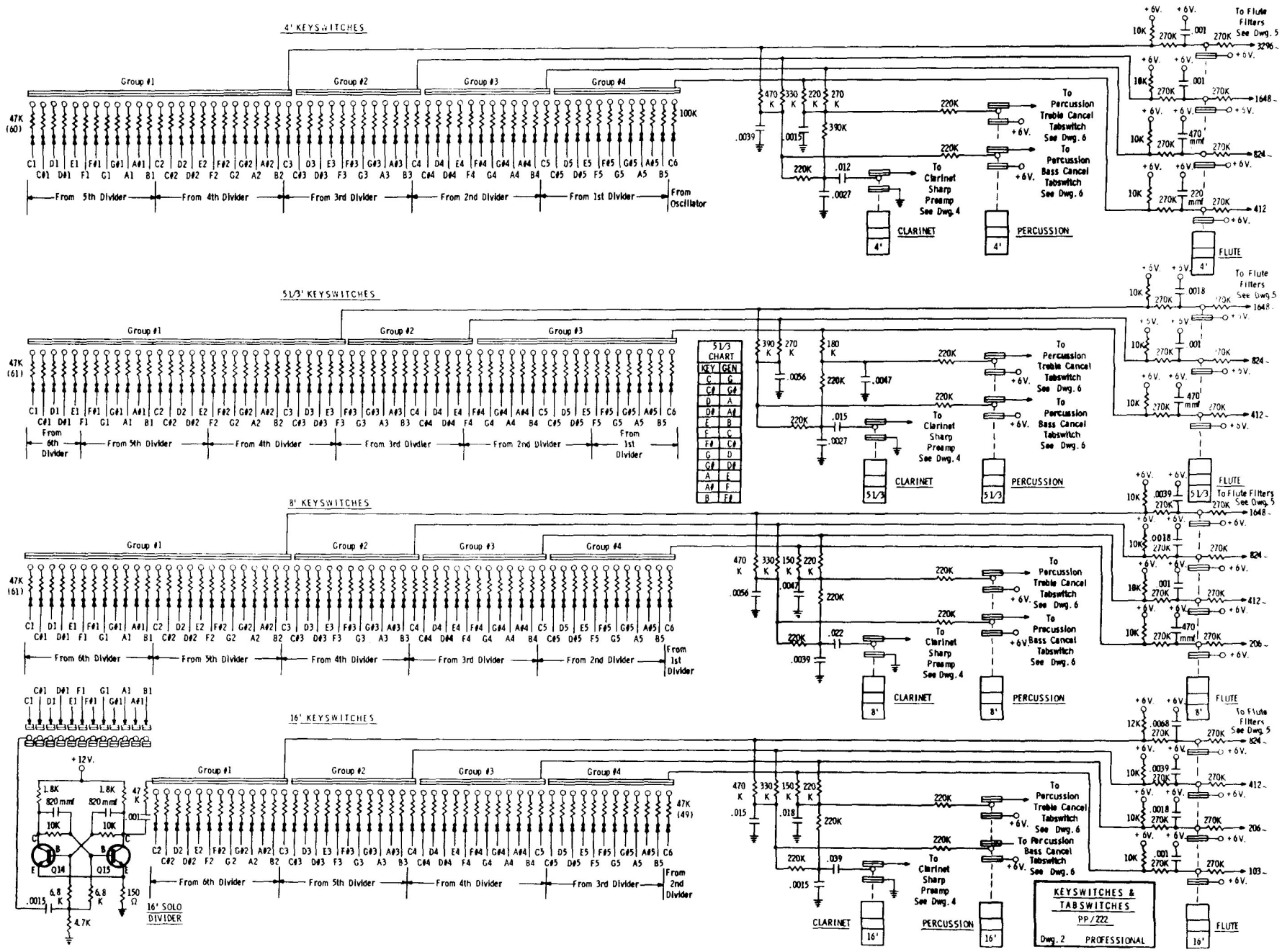
1. All resistors 1/2 watt 10% unless otherwise specified.
2. All capacitors are in microfarads unless otherwise specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. See parts list for component part numbers.
5. Radar spelled backwards is radar. They get you coming and going.
6. All tabswitches shown in "on" position.

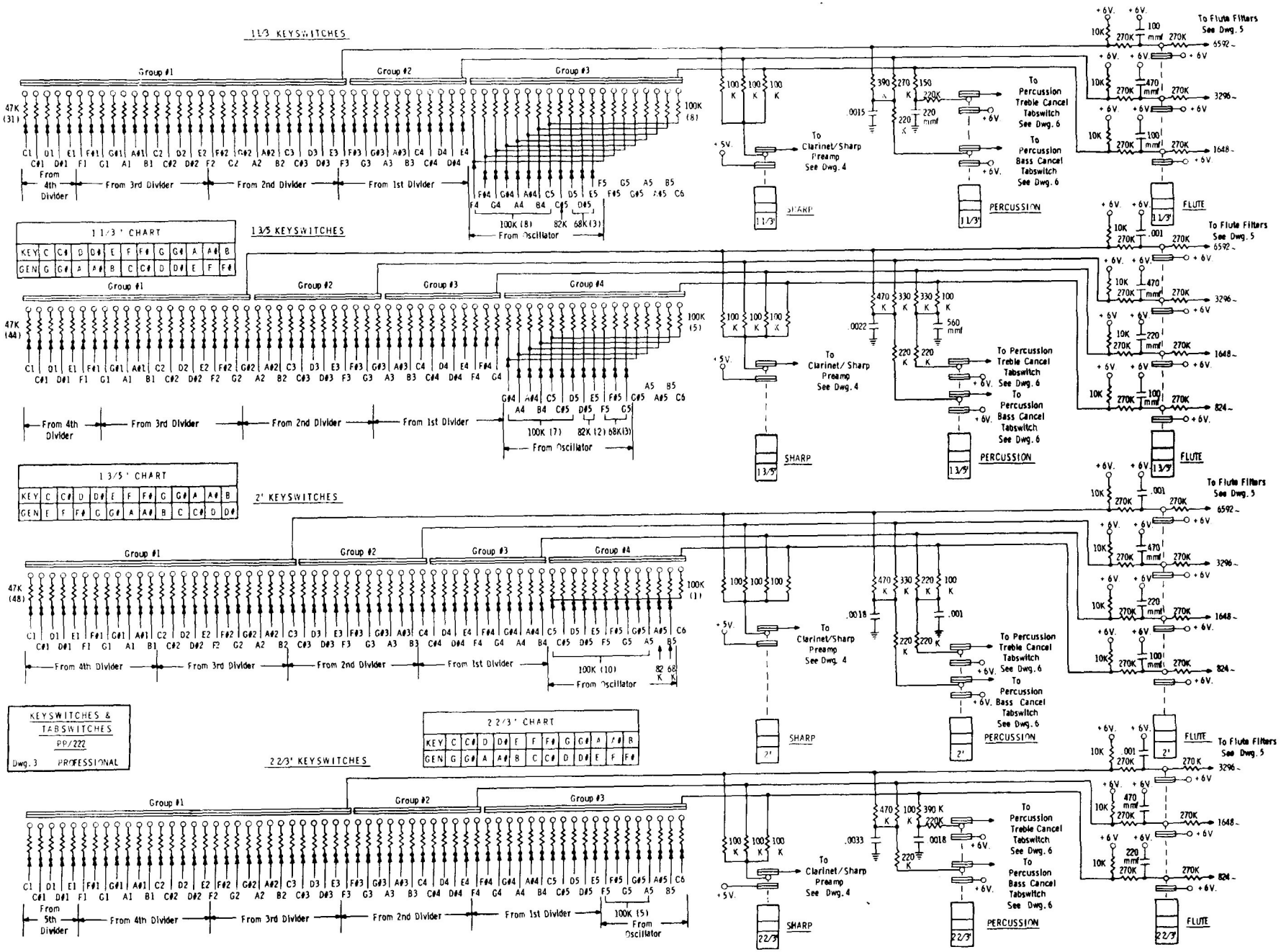
PLUG & SOCKET CONNECTIONS

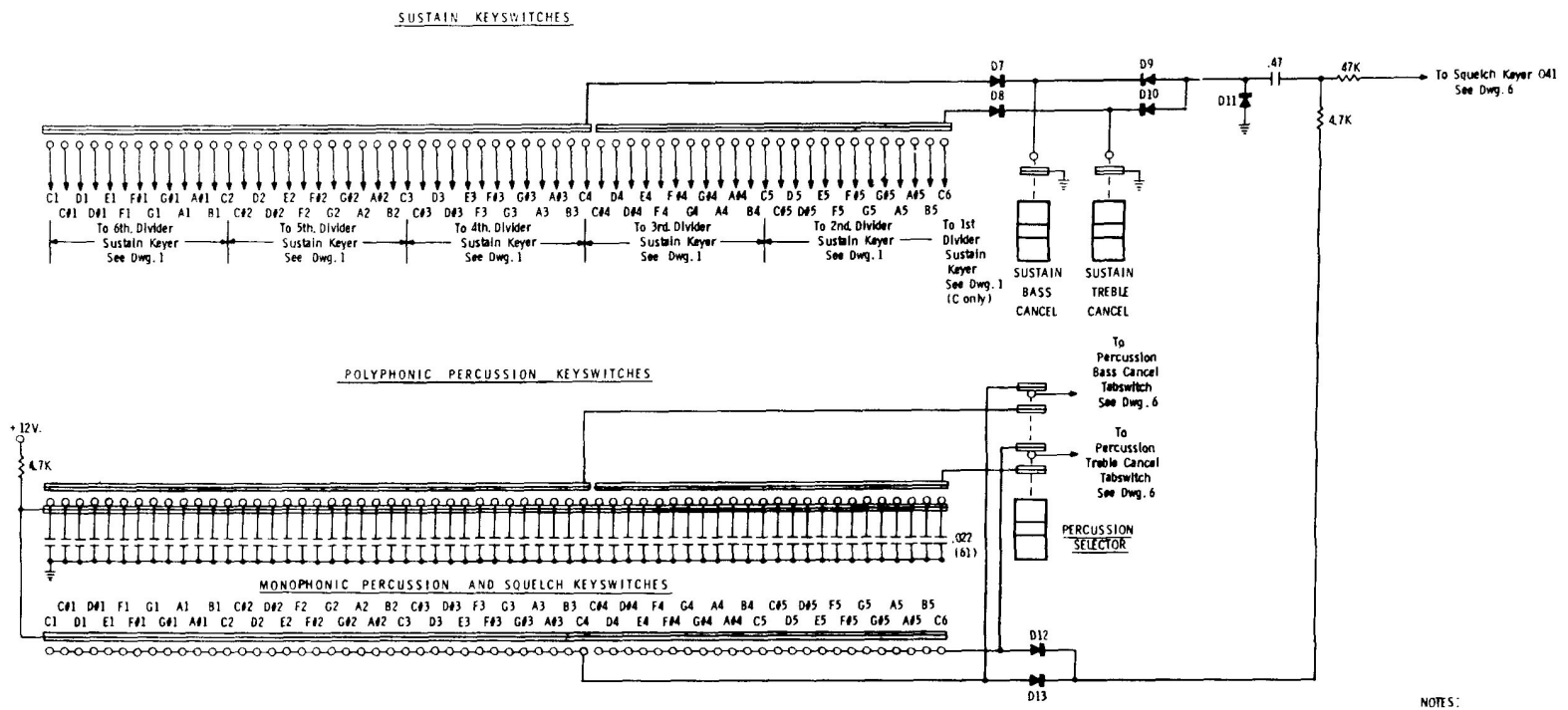
P&S No.	Pin No.	Voltage	INFORMATION
1	1	117 VAC	Line Voltage
	2	+19V.	Sustain Short B+
	3	+12V.	Organ B+
	4	117 VAC	Line Voltage
	5	+6V.	Audio Ground
	6	Gnd.	Ground

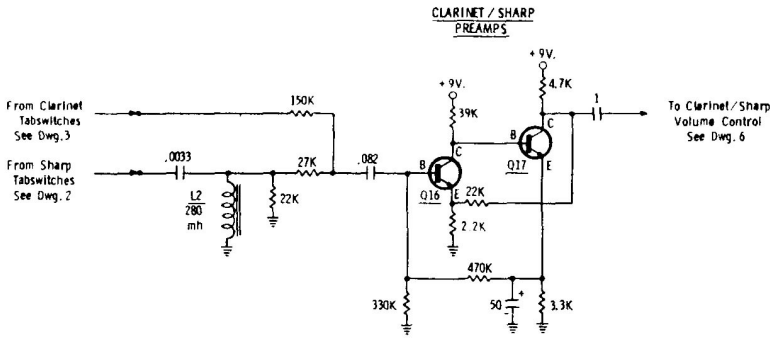
TONE GENERATORS, & POWER SUPPLY PP/222

Dwg. No. 1 PROFESSIONAL


4' KEYSWITCHES
Group #1
Group #2
Group #3
Group #4
47K (60)
100K
From 5th Divider
From 4th Divider
From 3rd Divider
From 2nd Divider
From 1st Divider
From Oscillator
To Percussion Treble Cancel Tabswitch See Dwg. 6
To Percussion Bass Cancel Tabswitch See Dwg. 6
To Clarinet Sharp Preamp See Dwg. 4
CLARINET
PERCUSSION
FLUTE
To Flute Filters See Dwg. 5
5 1/3' KEYSWITCHES
5 1/3 CHART
8' KEYSWITCHES
16' KEYSWITCHES
+12V.
16' SOLO DIVIDER
KEYSWITCHES & TABSWITCHES
PP/222
Dwg. 2 PROFESSIONAL


1 1/3 KEYSWITCHES
Group #1
Group #2
Group #3
47K (31)
100K (8)
From 4th Divider
From 3rd Divider
From 2nd Divider
From 1st Divider
100K (8)
82K
68K (3)
From Oscillator
1 1/3' CHART
KEY C C# D D# E F F# G G# A A# B
GEN G G# A A# B C C# D D# E F F#
1 3/5 KEYSWITCHES
Group #4
47K (44)
100K (5)
100K (7)
82K (2)
68K (3)
1 3/5' CHART
KEY C C# D D# E F F# G G# A A# B
GEN E F F# G G# A A# B C C# D D#
2' KEYSWITCHES
47K (48)
100K (1)
100K (10)
82 K
68 K
KEYSWITCHES & TABSWITCHES
PP/222
Dwg. 3 PROFESSIONAL
2 2/3' CHART
KEY C C# D D# E F F# G G# A A# B
GEN G G# A A# B C C# D D# E F F#
2 2/3' KEYSWITCHES
From 5th Divider
100K (5)
To Clarinet/Sharp Preamp See Dwg. 4
+5V.
SHARP
PERCUSSION
To Percussion Treble Cancel Tabswitch See Dwg. 6
To Percussion Bass Cancel Tabswitch See Dwg. 6
+6V.
FLUTE
To Flute Filters See Dwg. 5
6592
3296
1648
824

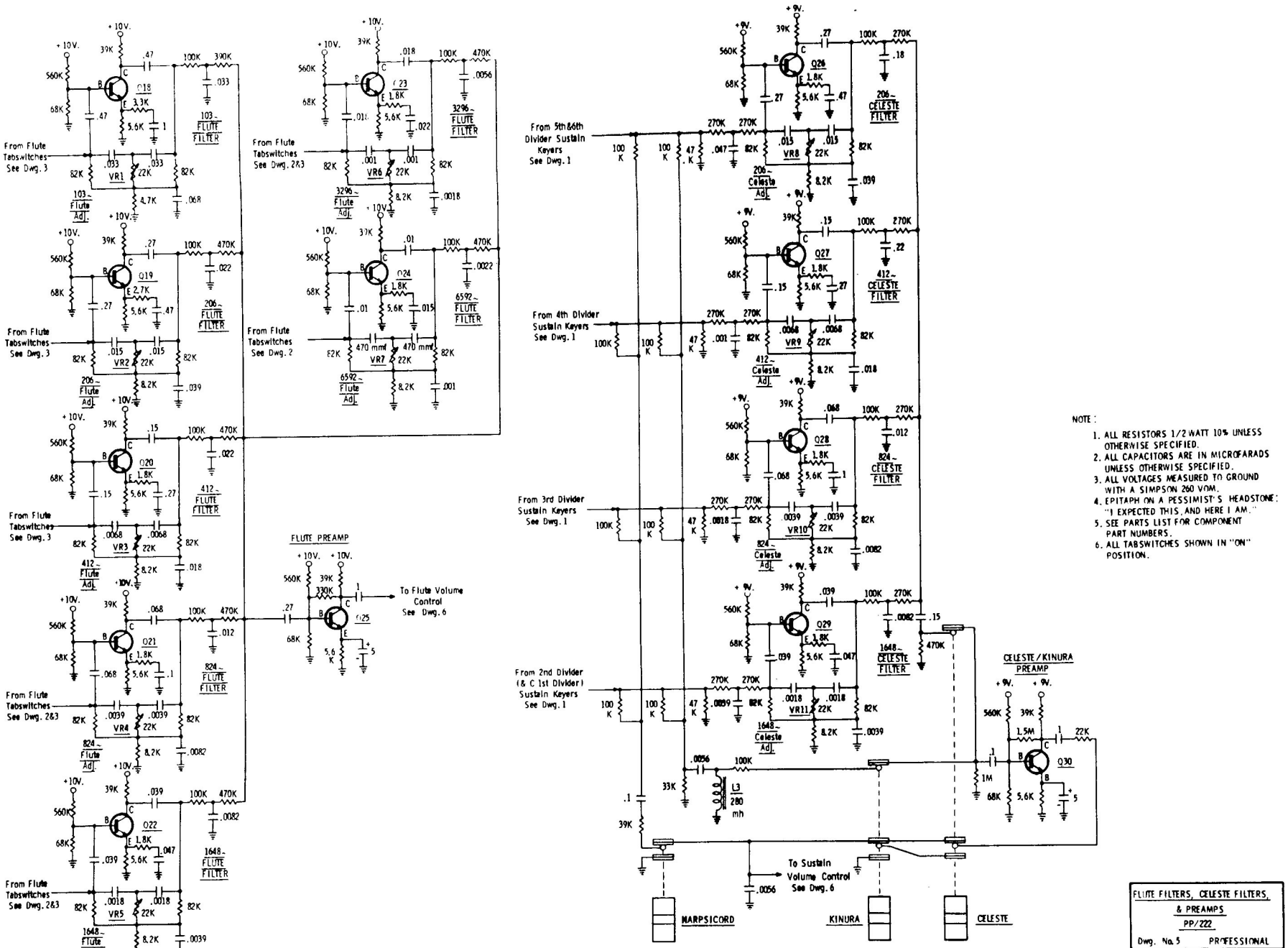




NOTES:

1. All resistors 1/2 watt 10% unless otherwise specified.
2. All capacitors are in microfarads unless otherwise specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. Winning's not everything, but losing is just plain nothing!
5. All keyswitches shown in " off " position.
6. See parts list for component part numbers.

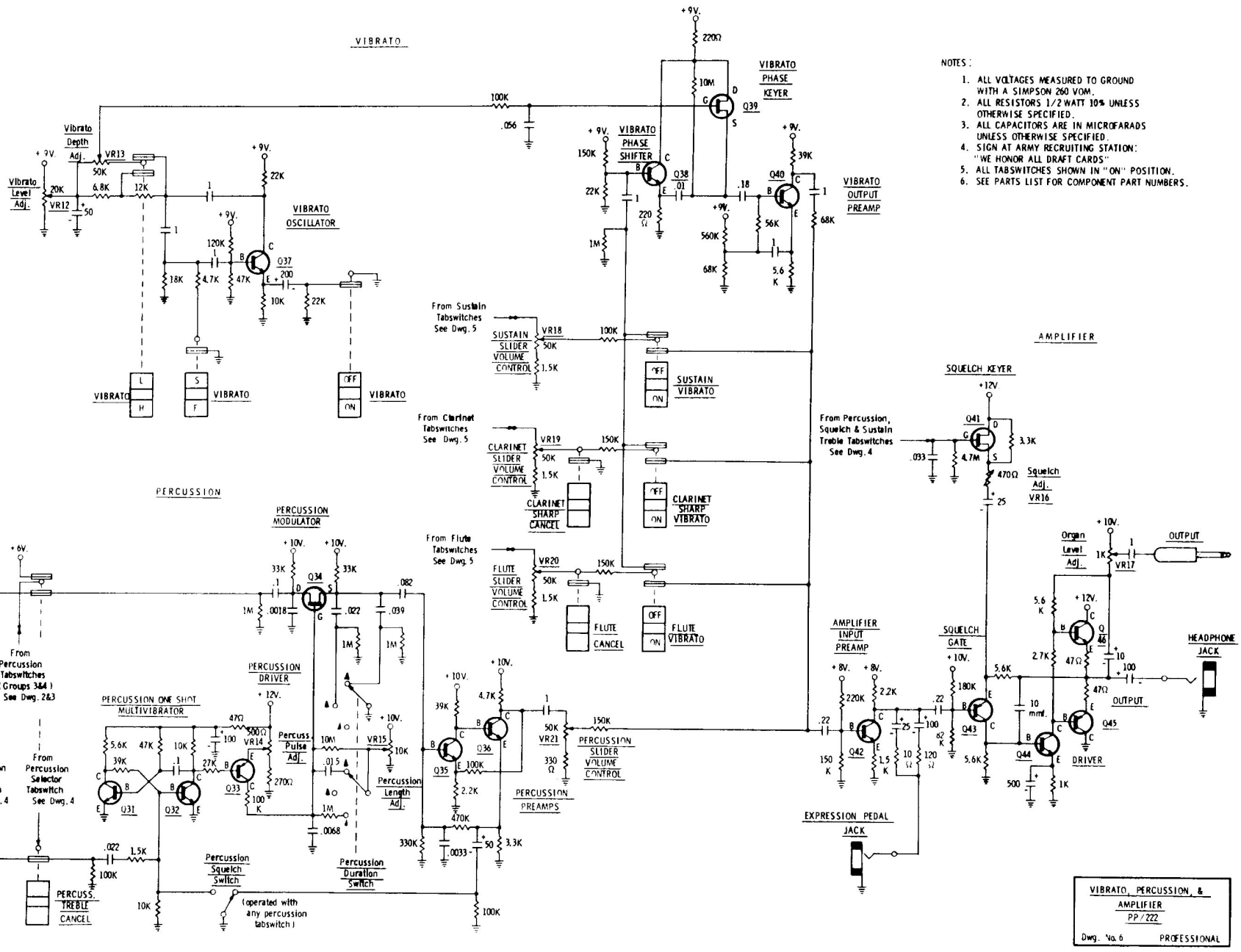
SUSTAIN KEYSWITCHES, PERCUSSION KEYSWITCHES & CLARINET/SHARP PREAMP
PP-222
Dwg. No. 4 PROFESSIONAL



NOTE:

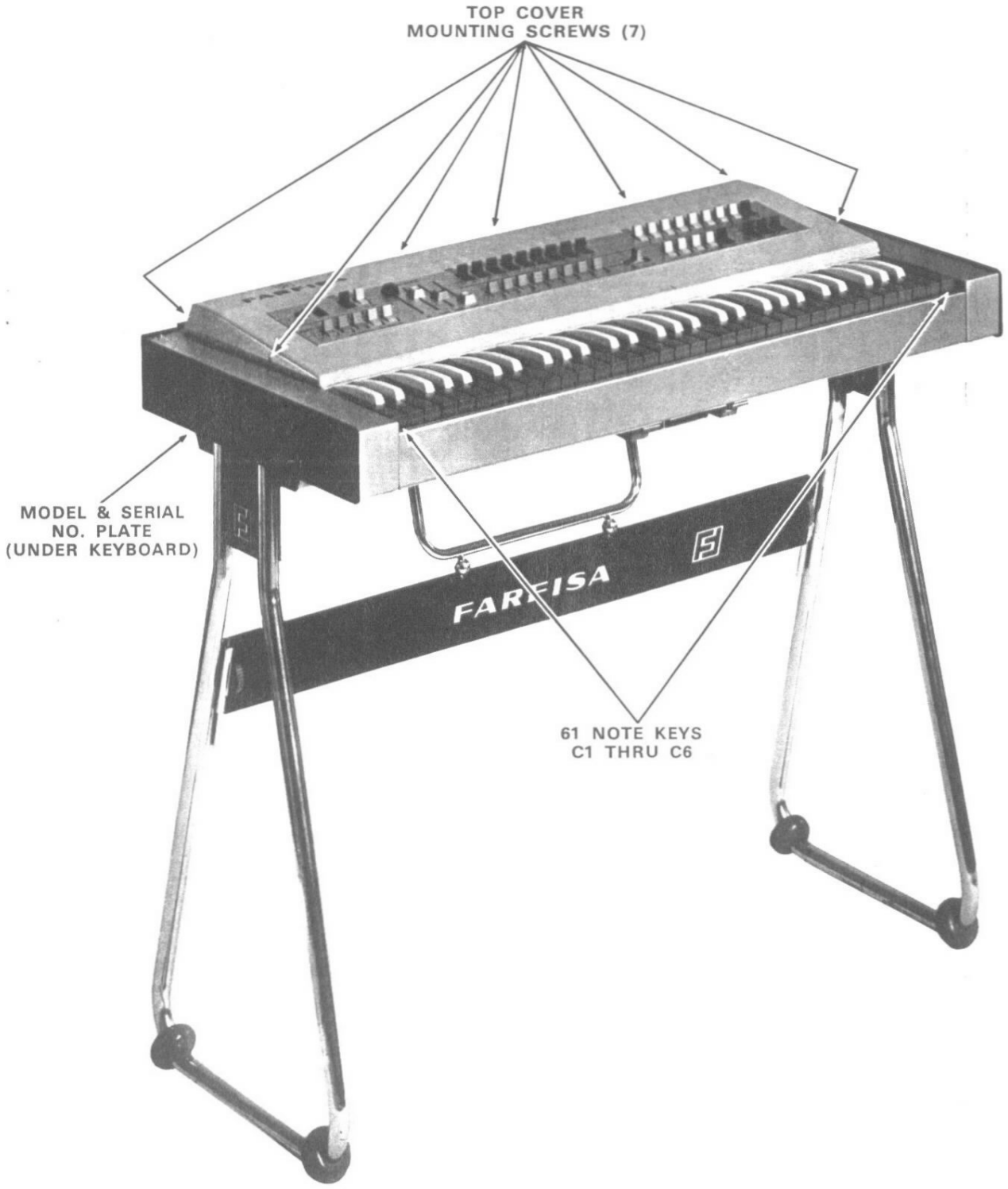
1. ALL RESISTORS 1/2 WATT 10% UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
3. ALL VOLTAGES MEASURED TO GROUND WITH A SIMPSON 260 VOM.
4. EPITAPH ON A PESSIMIST'S HEADSTONE: "I EXPECTED THIS, AND HERE I AM."
5. SEE PARTS LIST FOR COMPONENT PART NUMBERS.
6. ALL TABSWITCHES SHOWN IN "ON" POSITION.

FLUTE FILTERS, CELESTE FILTERS, & PREAMPS
PP/222
Dwg. No. 5 PROFESSIONAL

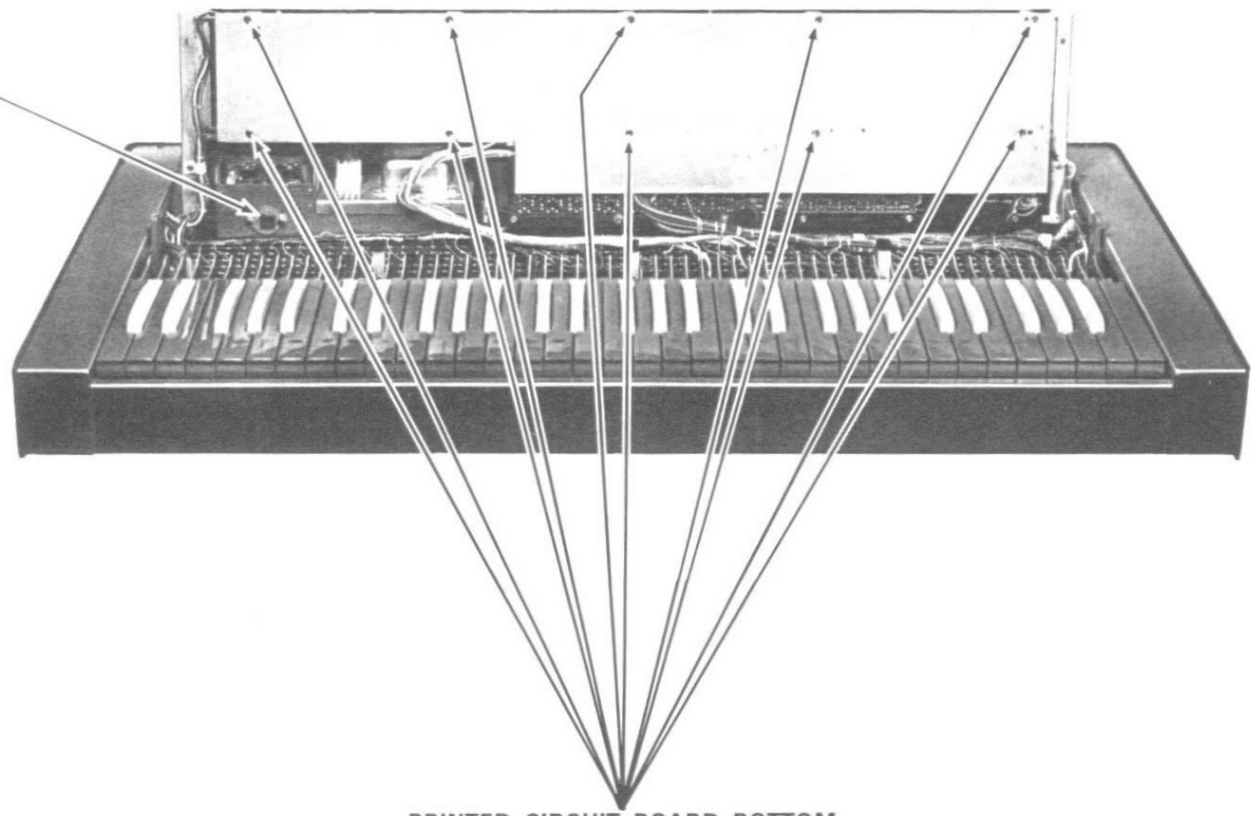


PROFESSIONAL

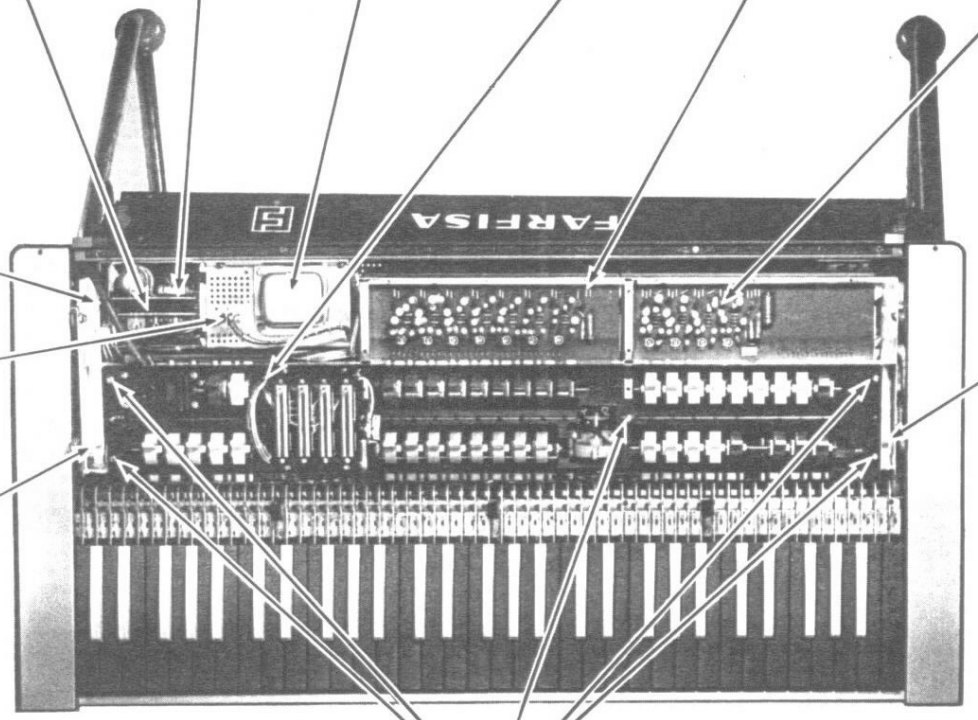
FRONT VIEW
PROFESSIONAL



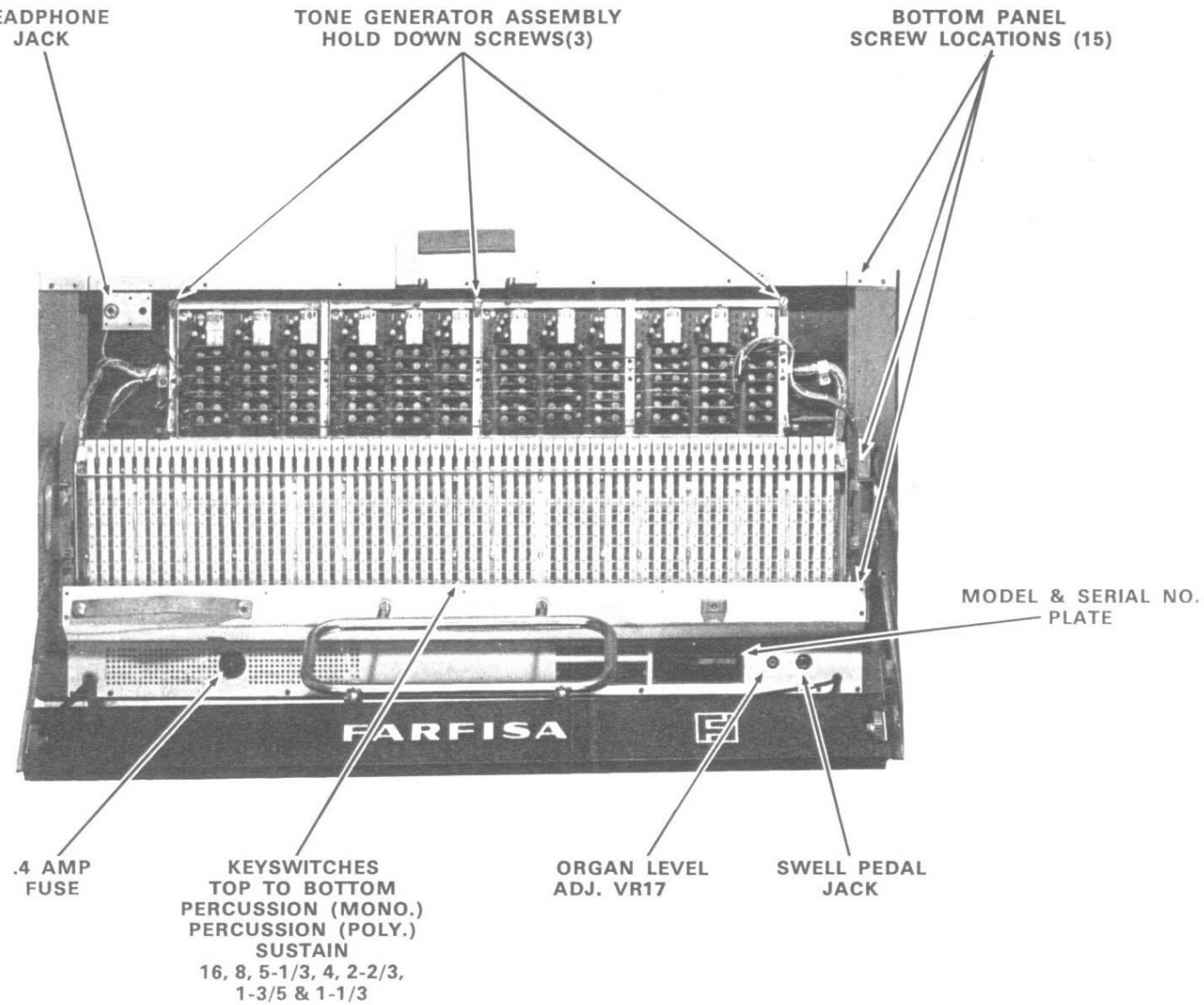
FRONT VIEW
PROFESSIONAL
(Tabswitch Assembly Raised)



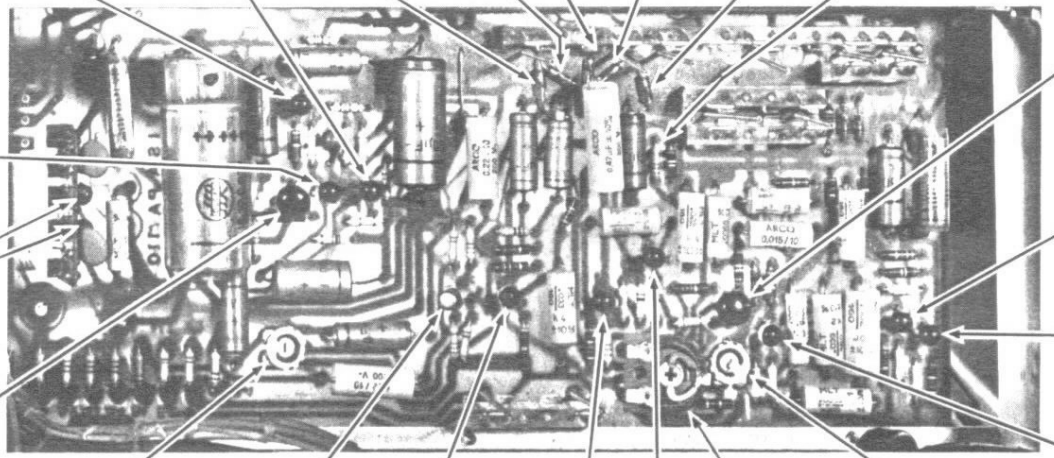
TOP VIEW
(With Cover Removed)



BOTTOM VIEW
PROFESSIONAL



AMPLIFIER & PERCUSSION BOARD
PROFESSIONAL
(PA-110)



OUTPUT TRANSISTOR Q46

SQUELCH GATE TRANSISTOR Q43

DIODE D9

DIODE D7

DIODES D12 & D13

DIODE D10

DIODE D11

DIODE D8

PERCUSSION DRIVER TRANSISTOR Q33

VOLTAGE AMP. TRANSISTOR Q44

PERCUSSION PREAMP #1 TRANSISTOR Q35

SOLO DIVIDER TRANSISTOR Q14 & Q15

PERCUSSION PREAMP #2 TRANSISTOR Q36

OUTPUT TRANSISTOR Q45

PERCUSSION MODULATOR TRANSISTOR Q34

SQUELCH ADJ. VR16

INPUT PREAMP TRANSISTOR Q42

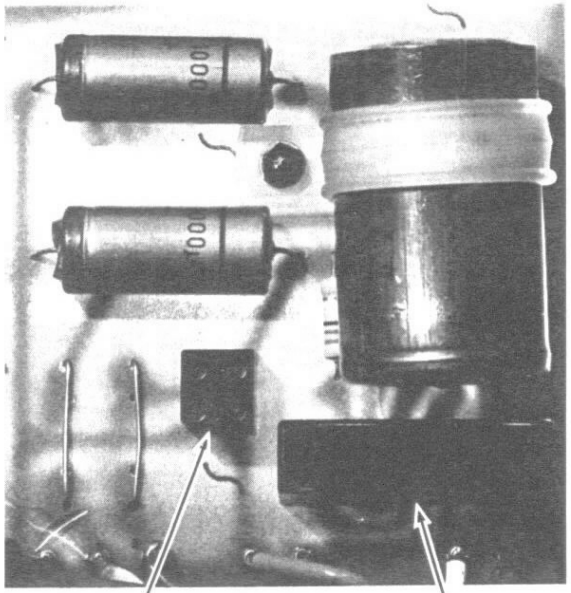
SQUELCH GATE TRANSISTOR Q41

Q31 Q32 PERCUSSION ONE-SHOT MULTIVIBRATOR TRANSISTORS

KEYING ADJ. VR14

PERCUSSION LENGTH ADJ. VR15

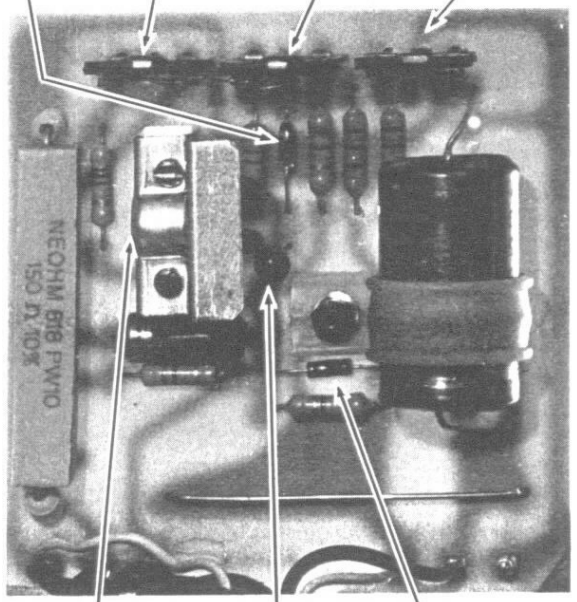
RECTIFIER BOARD
PROFESSIONAL
(PA-117)



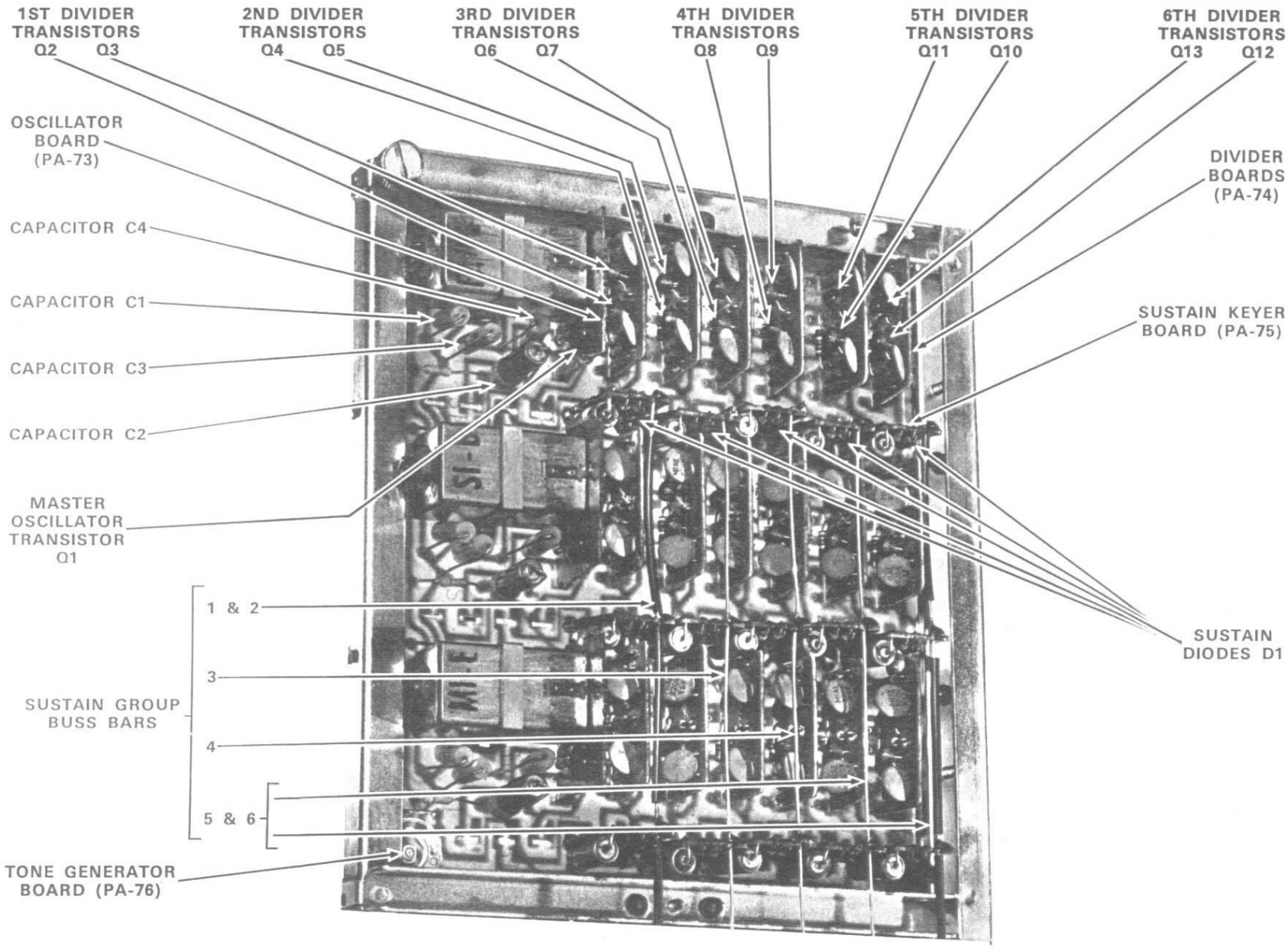
RECTIFIER DIODES D19-D22

RECTIFIER DIODES D15-D18

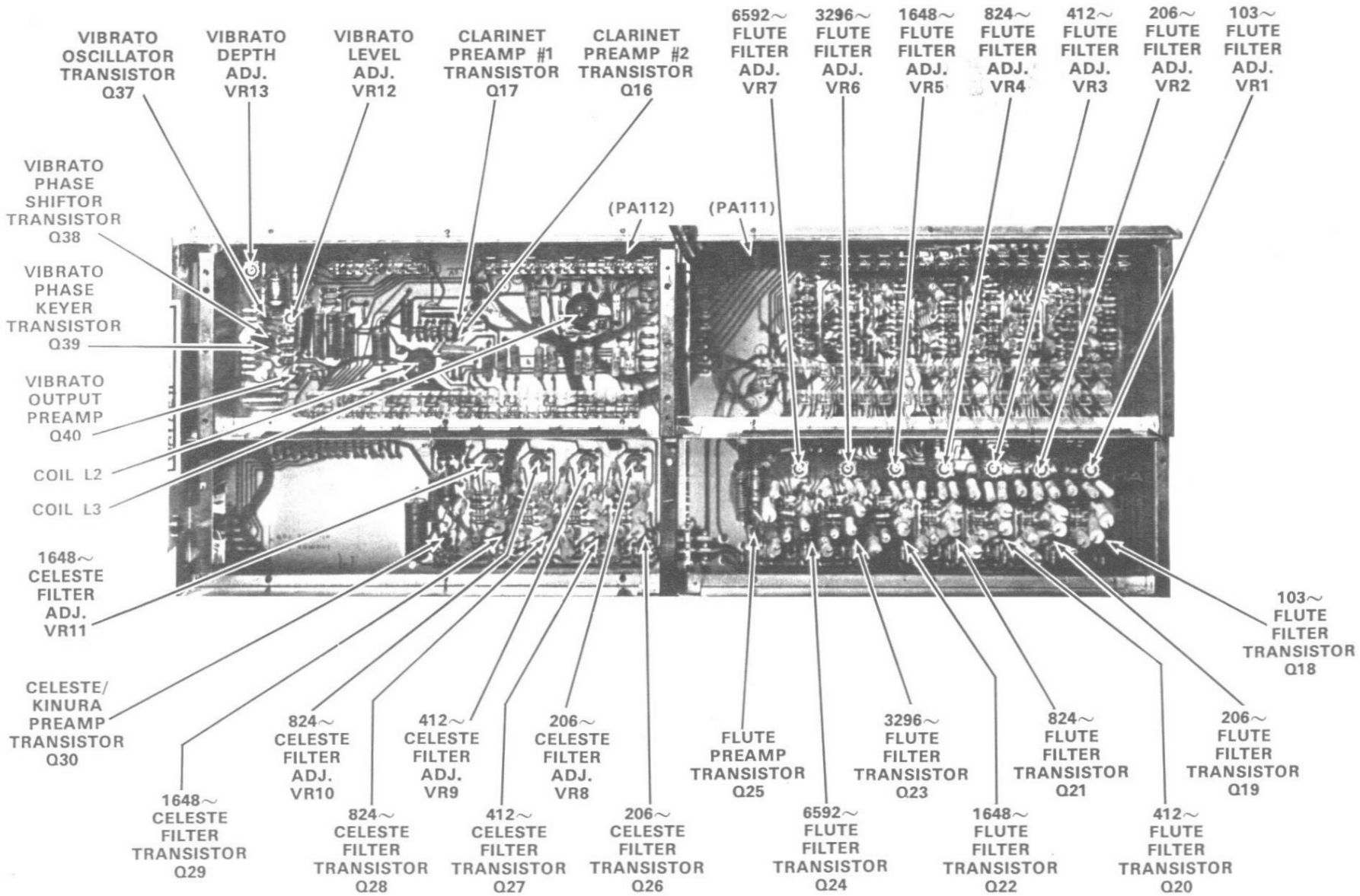
REGULATOR BOARD
PROFESSIONAL
(PA-103)



TONE GENERATOR BOARD
(With Oscillator, Divider & Sustain Keyer Boards)
PROFESSIONAL



VIBRATO, FILTER & PREAMP BOARD (PA-112) & VOICING BOARD (PA-111)
PROFESSIONAL



PARTS INFORMATION

STANDARD PARTS
Replacements for all standard electronic parts and hardware may be purchased directly from local suppliers generally in less time than would be required to obtain them from the factory.

SPECIAL PARTS
In addition to the standard replacement parts, special electronic and mechanical parts are also used. These parts are manufactured by and to the specifications of the factory. Order these parts directly from the factory since they would be difficult or impossible to obtain from other sources.

PARTS ORDERING INFORMATION
When ordering parts be sure to include the following information:

1. Model and Serial Number
2. Part Number
3. A description of the part
4. Specify how you want the part shipped.

Most special electronic parts and mechanical parts will have a part number stamped on them. In the event that the part number is missing, or you are unable to read the part number, a complete description of the part and where it is used will allow the factory to fill your parts order. When parts are ordered in the proper manner the factory is able to fill your orders promptly—delays that might result are avoided.

ADDRESS PARTS ORDERS TO:

C.M.I. SERVICE DEPT.
7373 No. Cicero Ave.
Chicago, Illinois 60646

IMPORTANT

IN ANY CORRESPONDENCE CONCERNING THIS INSTRUMENT ALWAYS INCLUDE MODEL AND SERIAL NUMBERS

PARTS LIST

THE PARTS LIST CONTAINS THE FOLLOWING INFORMATION:

1. Name of Part
2. Value, Tolerance and Code (when important)
3. Brief description
4. Where the part is found (assembly, printed circuit board and etc.)
5. Schematic Reference Number
6. PART NUMBER — USE IT!

This parts list includes all standard stock replacement parts. No attempt has been made to include every nut, bolt and screw. If the necessity for a non-listed part arises, please write describing the part's location and function as well as model and serial number of the unit.

PART	DESCRIPTION	SCHEMATIC REFERENCE	PART NUMBER
KEYSWITCH ASSEMBLY			
Actuator	Keyswitch (White Plastic)		964-013065
Contact	Spring		975-013051
Key	C Natural Gray with metal channel		964-013065-C
Key	C# Natural Gray with metal channel		964-013065-C#
Key	D Natural Gray with metal channel		964-013065-D
Key	D# Natural Gray with metal channel		964-013065-D#
Key	E Natural Gray with metal channel		964-013065-E
Key	F Natural Gray with metal channel		964-013065-F
Key	F# Natural Gray with metal channel		964-013065-F#
Key	G Natural Gray with metal channel		964-013065-G
Key	G# Natural Gray with metal channel		964-013065-G#
Key	A Natural Gray with metal channel		964-013065-A
Key	A# Natural Gray with metal channel		964-013065-A#
Key	B Natural Gray with metal channel		964-013065-B
Key	All Sharps (White) with metal channel		964-013066
Spring	Pull Down		975-013050
POWER SUPPLY CHASSIS			
Assembly	Rectifier Board (PA-117)		996-013078
Capacitor	Regulator Board (PA-103)		996-013057
Capacitor	Electrolytic 5 UF 40V		945-011203-41
Capacitor	Electrolytic 1000 UF 12V		945-011203-21
Capacitor	Electrolytic 2000 UF 30V		945-011203-42
Capacitor	Electrolytic 2000 UF 12V		954-011203-26
Diode	Keying	D14	919-013081
Diode	Rectifier (Semikron B40C3200/2200)	D15-18	919-013079
Diode	Zener	Z1	919-013083
Fuse	4/10 Amp		939-013065
Holder	Fuse		906-006303
Potentiometer	470 Ohm Voltage Adj	VR22, 24	925-013059
Potentiometer	47K Stability Adj	VR23	925-013060
Resistor	150 Ohm 10W (Neoohm 737)		924-013062
Transistor	Voltage Sensor (1W9640)	Q47	991-011225
Transistor	Voltage Regulator (BC114)	Q48	991-011219
Transistor	Voltage Regulator (RCA 2N5036)	Q49	991-013063
Transformer	Power (T-1048)	T1	954-013081
TABSWITCH ASSEMBLY			
Actuator	Tabswitch (White Plastic)		964-013073
Contact	Spring		917-013074
Knob	Volume Slider (Dark Green)		925-013061-1
Knob	Volume Slider (Light Green)		925-013061-2
Knob	Volume Slider (Orange)		925-013061-3
Knob	Volume Slider (Yellow)	VR18-21	925-013061-4
Potentiometer	Slide-Volume Balance		925-013077
Tab	Blue		915-013075-1
Tab	Green		915-013075-2
Tab	Light Green		915-013075-3
Tab	Yellow		915-013075-4
Tab	Orange		915-013075-5
Tab	Percussion Duration (3 Position)		915-013076
Switch	Percussion Duration (3 Position)		960-013090
Switch	Percussion Squelch		960-013091

PART	DESCRIPTION	SCHEMATIC REFERENCE	PART NUMBER
TONE GENERATOR BOARD			
Assembly	Oscillator Board (PA-73)		997-013086
Assembly	Divider Board (PA-74)		997-013087
Assembly	Sustain Board (PA-75)		997-013088
Assembly	Tone Generator Board (PA-76) (3 Notes)		996-013070
Capacitor	1 UF 40V		945-011203-1
Capacitor	50 UF 25V		945-011203-9
Coil	Tuning (F#-B) T-4023	L1	952-013085-1
Coil	Tuning (C-F) T-4024	L1	952-013085-2
Diode	Keying (1809)	D1	919-013067
Transistor	Master Oscillator (1W9810)	Q1	991-011319
Transistor	Divider (1W9787)	Q2-13	991-011318
VIBRATO, FILTER & PREAMP BOARD			
Assembly	Vibrato, Filter & Preamp Board (PA-112)		996-013035
Capacitor	Electrolytic 50 UF 6V		945-011203-37
Capacitor	Electrolytic 50 UF 25V		945-011203-9
Capacitor	Electrolytic 200 UF 6V		945-011203-38
Capacitor	Electrolytic 500 UF 6V		945-011203-40
Coil	220 MH (18/11-3H1)	L2, 3	952-013022
Potentiometer	20K Vibrato Level	VR12	925-013084
Potentiometer	50K Vibrato Depth	VR13	925-011233
Transistor	Clarinet/Sharp Preamp & Vibrato Osc. (1W9787)	Q16, 17, 37	991-011318
Transistor	Vibrato Phase Shifter & Output Preamp (BC114)	Q38, 40	991-013044
Transistor	Vibrato Phase Keyer (E103)	Q39	991-013055
VOICING BOARD			
Assembly	Voicing Board (PA-111)		996-013071
Capacitor	1 UF 12V		945-011203-1
Capacitor	5 UF 12V		945-011203-27
Capacitor	1000 UF 12V		945-011203-21
Potentiometer	22K Filter Adj	VR1-11	925-011329
Transistor	Flute & Celeste Filters & Flute Preamp (BC114)	Q18-29	991-013044
Transistor	Celeste/Kinura Preamp	Q30	991-013068