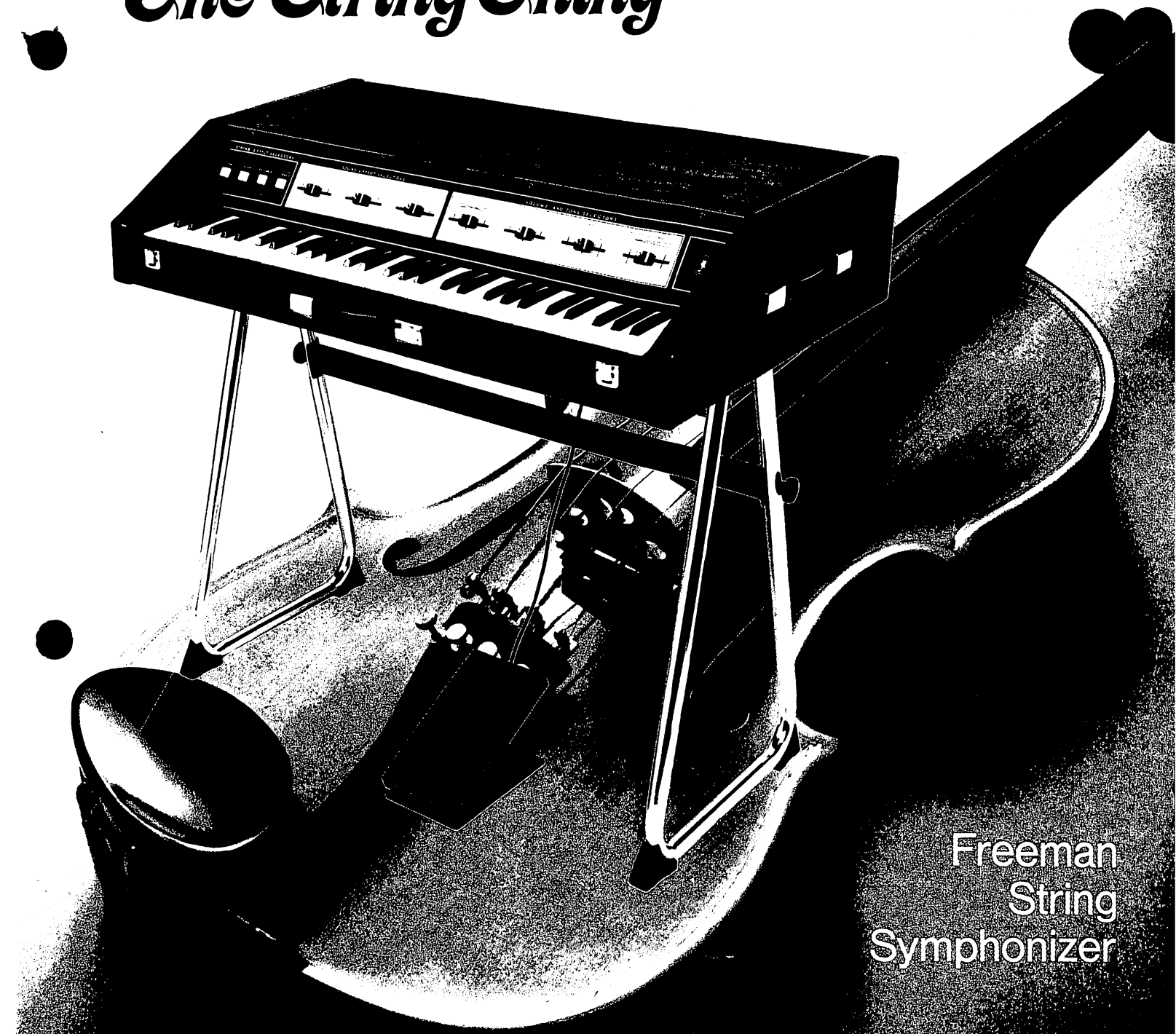
The String Thing



Freeman String Symphonizer

The audience will turn their heads around, looking for the orchestra, when they hear the sound of the revolutionary new Freeman String Symphonizer. It supports your act with the sounds of an entire string section—violins, violas, even cellos. And after the performance you can pack it up, carry it out the door and load it in your car trunk.

Play a one-finger melody for a solo violin effect. Play string quartets with just one hand. Two hands can sound like an entire string section. Want more? The *polyvoice* design makes each key sound like several violins at once. So when you press the "Ensemble" tab, just one finger can play the sounds of a small string section. And one chord comes on like an entire symphony.

The String Symphonizer's Reverb control lets you turn on some haunting concert hall acoustics. And you can "animate" your sound automatically for a vibrato that takes fine violinists years to master. You can even play a good old country fiddle, sliding the sound with the Glide pedal. Best of all, the Freeman String Symphonizer is tough. When you're on the road, setting up and tearing down, you can rely on it like an old friend.

The next time you go on stage, start pulling some new strings. With the Freeman String Symphonizer. You won't play second fiddle to anybody.

Freeman String Symphonizer

FRM-S810

The audience will turn their heads around, looking for the orchestra, when they hear the sound of the revolutionary new Freeman String Symphonizer. It supports your act with the sounds of an entire string section—violins, violas, even cellos. And after the performance you can pack it up, carry it out the door and load it in your car trunk.

Play a one-finger melody for a solo violin effect. Play string quartets with just one hand. Two hands can sound like an entire string section. Want more? The polyvoice design makes each key sound like several violins at once. So when you press the "Ensemble" tab, just one finger can play the sounds of a small string section. And one chord comes on like an entire symphony.

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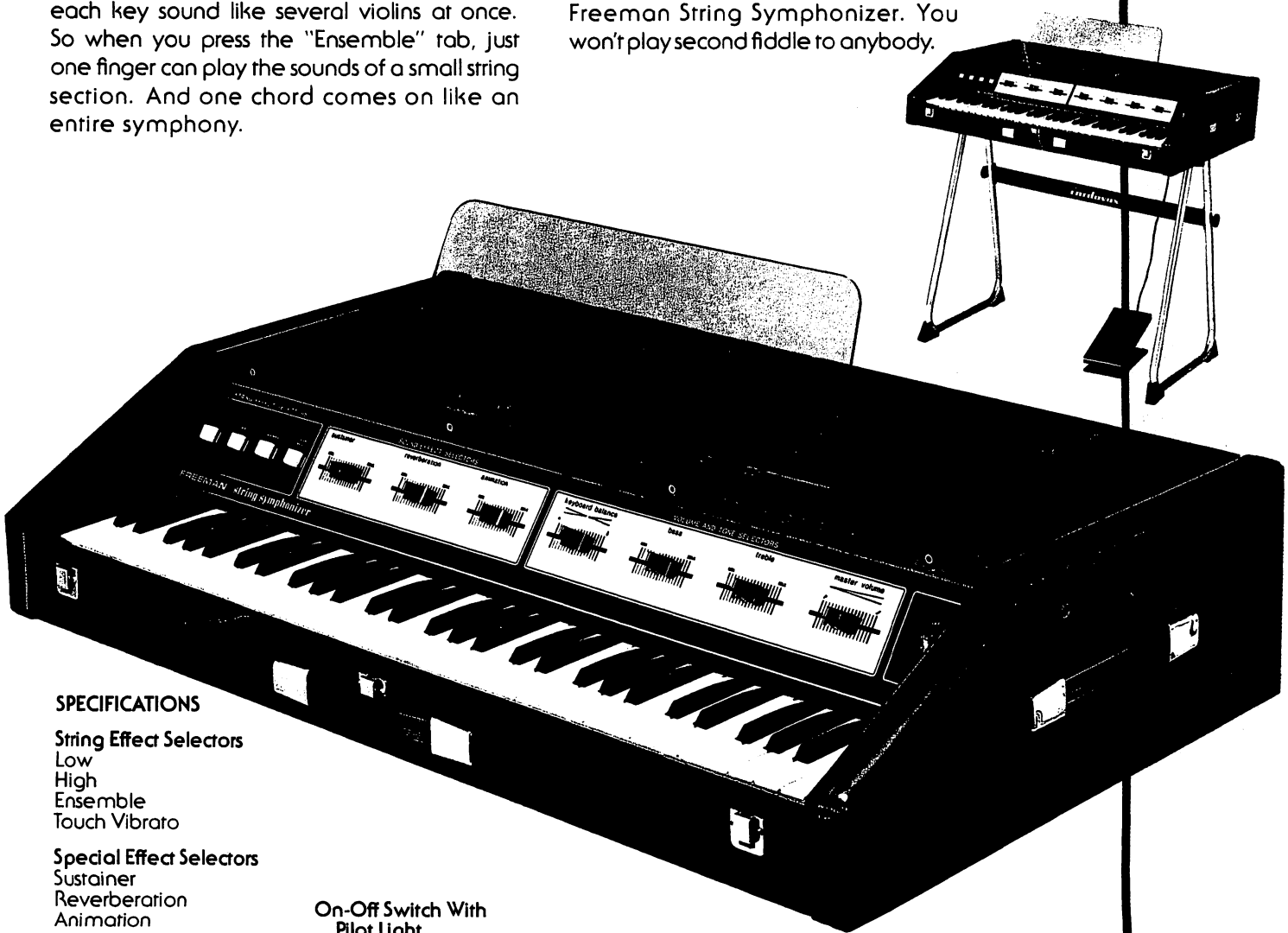


SPECIFICATIONS

String Effect Selectors
Low
High
Ensemble
Touch Vibrato

Special Effect Selectors
Sustainer
Reverberation
Animation

Volume and Tone Selectors
Keyboard Balance
Bass
Treble
Master Volume

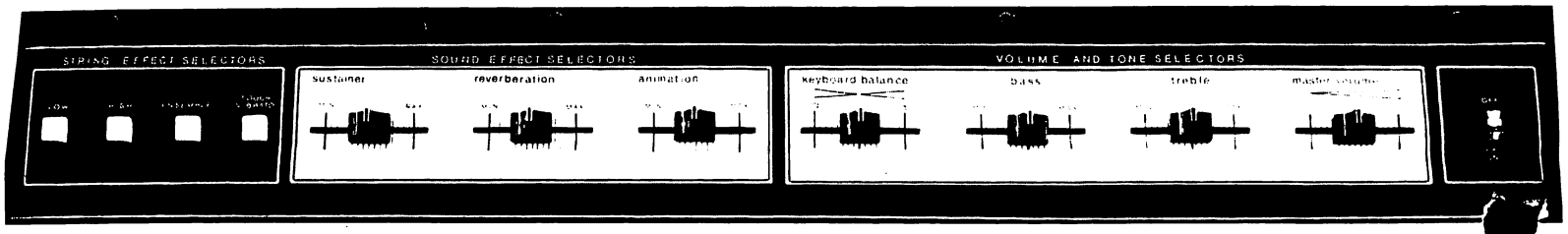
Dimensions:
Height, 34½" (with legs), 7⅞" (without legs)
Width, 38"
Depth, 23"

On-Off Switch With Pilot Light
61 Note Keyboard
Expression/Glide Pedal
Removable Music Rack
Detachable Legs
Removable Lid
Output Jack (to external amp)
Aux. Jack (for optional Cordovox Tone Cabinet)

Weight: 77 lbs.

FREEMAN STRING SYMPHONIZER

Distributed by Norlin Music, Inc.
7373 N. Cicero Avenue • Lincolnwood, Illinois 60646



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Aux. Jack (for optional Cordovox Tone Cabinet)

Weight: 77 lbs.

Freeman String Symphonizer

A product of North Music, Inc. 7373 N Cicero Avenue Lincolnwood, Illinois 60646

MODEL CSS SERVICE MANUAL

FREEMAN

FRMS-810

String Symphonizer

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PARTS

SPECIFICATIONS

String Effect Selectors

Low
High
Ensemble
Touch Vibrato

Special Effect Selectors

Sustainer
Reverberation
Animation

Volume and Tone Selectors

Keyboard Balance
Bass
Treble
Master Volume

Dimensions:

Height - 34-1/2" (with legs)
7-7/8" (without legs)
Width - 38"
Depth - 23"

On-Off Switch with Pilot Light
61-Note Keyboard
Expression/Glide Pedal
Removable Music Rack
Detachable Legs
Removable Lid
Output Jack (to external amp)
Aux. Jack (for optional Cordovox Tone Cabinet)

Weight: 77 lbs.

CIRCUIT DESCRIPTION

SCHEMATIC 1
GLIDE, TONE GENERATORS, ANIMATION & DIVIDERS

There are three generator systems used – Channel 1, Channel 2 and the Top Octave Synthesizers. Channel 2 always has an output as long as the high or low pushbuttons are on while the TOS and Channel 1 generators have an output only when the ensemble pushbutton is pressed.

Pressing the Glide Switch on the Expression Pedal activates the Glide circuitry which de-tunes the three generator systems by a half step.

Q1 GLIDE SWITCHER

When the Glide Switch is pressed, a ground is applied to the Glide Switcher causing it to conduct, applying negative voltage to the bases of the TOS Glide Keyer Q2 and the Channel 1 & 2 Glide Keyer Q3.

Q2, Q3 TOS GLIDE KEYER, CHANNEL 1 & 2 GLIDE KEYER

With the Glide Switch on, negative voltage is applied to the bases of Q2 & Q3 from the Glide Switcher Q1, causing them to conduct. When Q2 & Q3 conduct, negative voltage is applied to their respective oscillators shifting the frequency and creating the Glide effect. The TOS Glide Adjustment VR1 adjusts the amount of TOS frequency shift.

Q4-Q6, IC1-IC3 HIGH FREQUENCY MASTER OSCILLATOR, BUFFER, WAVE SHAPER, TOP OCTAVE SYNTHESIZERS AND DIVIDERS

With the ensemble pushbutton on, the High Frequency Master Oscillator Q4, creates a high frequency signal which is applied to the Top Octave Synthesizers IC1 & IC2 via the Buffer Q5 and Wave Shaper Q6. Here the signal is divided to create twelve specific octave frequencies which are applied to the IC Dividers IC3. These frequencies are then divided in half several times, creating lower octave frequencies. The outputs are then applied to the String Keyers. The Buffer Q5 acts as an isolation stage between the Master Oscillator Q4 and the TOS IC1 & IC2, preventing any change in Master Oscillator frequency due to change in circuit load.

The Wave Shaper Q6 converts signal from the High Frequency Master Oscillator Q4 into the proper drive signal for the TOS.

Q7 ANIMATION DRIVER

The Animation Driver supplies the operating voltage for the Animation Oscillators. How hard the Driver turns on, or how much voltage is supplied to the Animation Oscillators is determined by the Animation Control VR2.

Q8-Q19 ANIMATION OSCILLATORS

Voltage from Animation Driver Q7 is applied to these oscillators. This causes the Animation Oscillators to produce low frequency signals which are applied to the Channel 1 & Channel 2 Master Oscillator circuits shifting the frequency of the Master Oscillators high and low creating an animation or vibrato effect.

Q20-Q23, IC4 & IC5 CHANNEL 1 & 2 MASTER OSCILLATORS & DIVIDERS

The Channel 1 & 2 Master Oscillators run continuously, producing high frequency audio signals. These signals are then applied to their associated IC Divider where the frequencies are divided in half several times. The outputs of Channel 1 & Channel 2 Dividers are then applied to the String Keyers.

NOTE: The Channel 1 Master Oscillators, although they run continuously, only have an output to the Dividers when the ensemble pushbutton is on.

SCHEMATIC 2
STRING KEYING & VIBRATO

With the High and/or Low pushbutton on, positive voltage is applied through the emitter base junction of the C3-C6 and C1-B2 Buss Drivers Q26 & Q28 to the High and Low keyswitch buss bars.

Pressing a keyswitch lowers the voltage on the base of Q26 and Q28, turning it on and applying positive voltage to the touch vibrato keying circuit. Also, positive voltage from the keyswitch buss bar is applied to the String Keyer circuit, where audio signal from the TOS Generator and Channel 1 & 2 Generators is combined and passed through the String Keyer. This combined signal is then applied to a Collector Octave Preamp and then the String Preamps Q48 & Q49 before being sent to the Reverb Driver Q51 and the String Emitter Follower Q52.

Q25-Q28, C3-C6 & C1-B2 BUSS DRIVERS

Positive voltage from the Keyboard Balance Control VR4 is applied to the bases of Q25 & Q27, causing them to conduct which applies voltage through the emitter base junction of Q26 & Q28 to the High & Low Keyswitch Buss Bars.

Q29-Q36 TOUCH VIBRATO KEYERS & SWITCHERS

Pressing a keyswitch lowers the voltage on the base of its associated Buss Driver Q26 or Q28 causing it to conduct which applies a positive voltage to the base of Touch Vibrato Keyer Q29.

This causes Q29 to conduct which creates a pulse across the 3 UF capacitor, lowering the voltage on the base of Touch Vibrato Keyer Q30 and momentarily turning it off. With the touch vibrato pushbutton on, voltage from the collector of Q30 is applied to the bases of the Touch Vibrato Switchers Q31-Q36, causing them to conduct momentarily turning off the Animation Oscillators. As the 3 UF capacitor charges, Touch Vibrato Keyer Q30 turns on, grounding the bases of the Touch Vibrato Switchers Q31-Q36. This turns the Switchers off allowing the animation oscillator to resume normal operation (see circuit description on animation oscillators). The Touch Vibrato Delay Adjustment VR5 determines the length of time the oscillators remain off. Turning on the Touch Vibrato Pushbutton also adds a 3.9K resistor to ground off the Animation Control VR2, raising the minimum voltage on the base of the Animation Driver. This allows the Touch Vibrato to be heard with the animation control in the minimum position.

CIRCUIT DESCRIPTION

Q38-Q42 STRING KEYERS
Pressing a keyswitch with the High or Low pushbutton on applies positive voltage to a String Keyer circuit. This allows the audio signal from the TOS Generators and the Channel 1 & Channel 2 Generators to pass through the String Keyer and be applied to an Octave Collector Preamp.

Q37 SUSTAIN REGULATOR
The Sustainer Control VR6 determines how hard the Sustain Regulator turns on. This in turn controls the discharge rate of the sustain capacitors (located at the anode of D19). As the base of Q37 becomes less positive, it turns on hard which grounds the Sustain Control Line and cancels sustain. As the base of Q37 goes positive, the sustain and the control line moves farther from ground. Sustain capacitors discharge onto the String Keyer circuits allowing signal to pass through the String Keyer after the Keyswitch is released, creating a sustain effect.

Q43-Q47 OCTAVE COLLECTOR PREAMPS
Signal from the String Keyers is applied to the Octave Collector Preamps where it is amplified and applied to the String Preamps Q48 & Q49.

Q48, Q49 STRING PREAMPS
Signal from the five Octave Collector Preamps is applied to the Reverb Driver Q51 and String Preamp Emitter Follower Q52.

SCHEMATIC 3
REVERB, PREAMPS AND EXPRESSION PEDAL

Audio signal from the String Preamps is applied to the Reverb circuitry and to the String Preamp Emitter Follower Q52. Signal output from the Reverb circuitry and Emitter Follower are mixed and amplified by the Reverb Mixer Q55. Signal is then applied via the Volume Photocell P1 to the Main Preamps Q56 & Q57.

Q51 REVERB DRIVER
The audio output signal from the String Preamps Q48 & Q49 is amplified and applied to the reverb spring unit where the reverb effect is produced.

Q53, Q54 REVERB PREAMPS
Reverberating audio signal from the reverb spring unit is amplified and applied via the Reverberation Control VR8 to the Reverb Mixer Q55.

Q52 STRING PREAMP EMITTER FOLLOWER
Audio signal from the String Preamps Q48 & Q49 is transformed into a low impedance signal before being applied to the Reverb Mixer Q55.

Q55 REVERB MIXER
Audio signal from the String Preamp Emitter Follower and Reverb circuitry via the Bass and Treble Controls VR9 & VR10 are applied to the Reverb Mixer Q55. Here the signals are mixed and amplified before being sent via the Volume Photocell P1 to the Main Preamps Q56 & Q57.

Q56 & Q57 MAIN PREAMPS
Signal from the Reverb Mixer Q55 via the Volume Photocell P1 is applied to the Main Preamps where the signal is amplified before being applied to an external amp. The Master Volume Control VR11 controls the maximum range of the Expression Pedal.

SCHEMATIC 4
POWER SUPPLY

Positive and negative DC supply voltages are produced using Transformer T1, Diodes D26-D31 and several resistors and filter capacitors. These DC voltages are supplied to the various circuits of the organ. Zener Diodes Z1-Z3 and Regulator Transistors Q60-Q63 are used as voltage regulators for several voltage lines.

A 1/2 amp Slo/Blo fuse is also included in the Power Supply circuit ahead of Power Transformer T1, to prevent serious component damage in the event of a short circuit.

ADJUSTMENTS

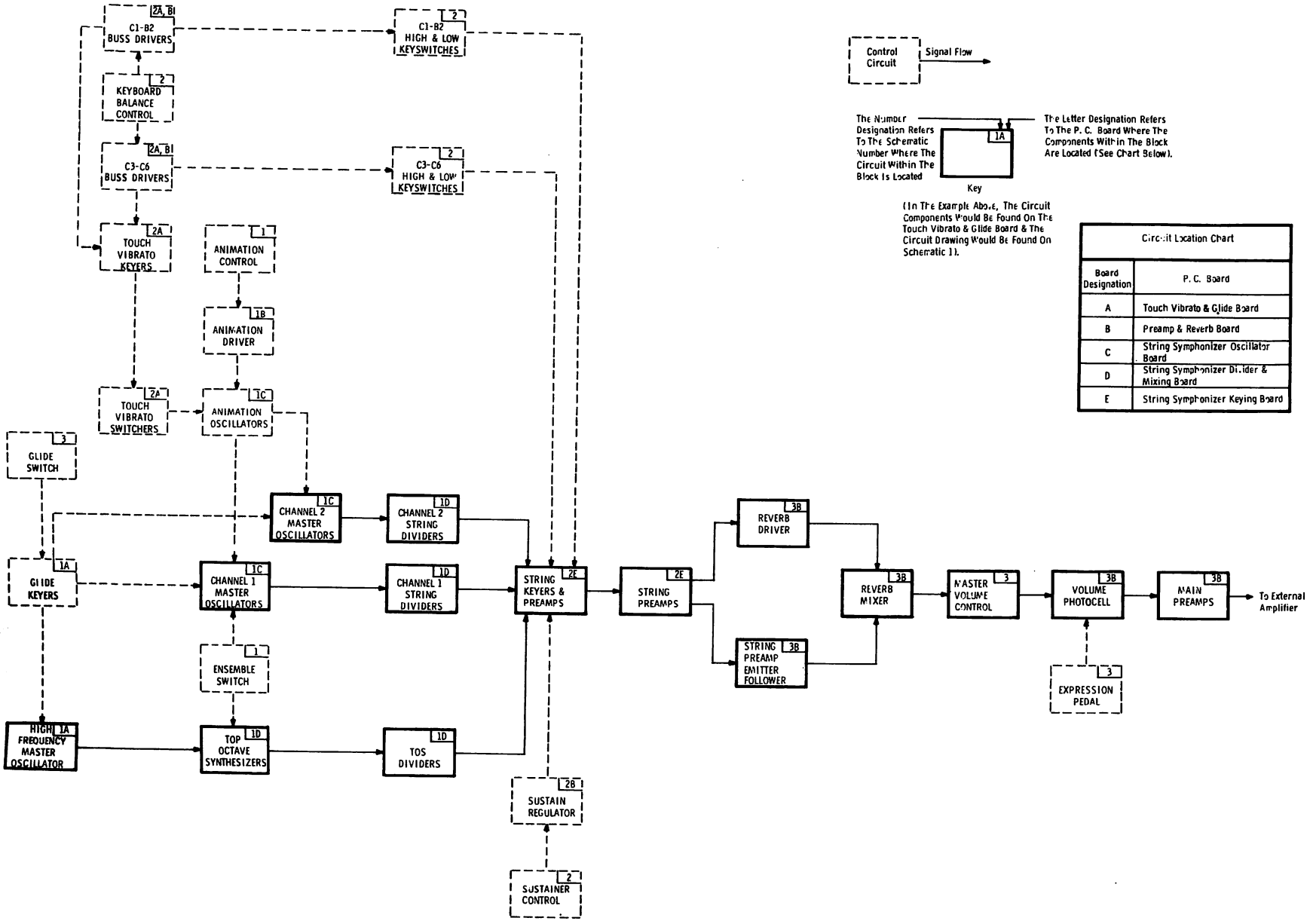
VR5 TOUCH VIBRATO DELAY ADJUSTMENT
This adjustment is factory-set for maximum vibrato .8 seconds after key is pressed. Minimum vibrato should begin approximately .3 seconds after key is pressed.

VR1 TOS GLIDE ADJUSTMENT
The TOS Glide Adjustment regulates the amount the TOS is de-tuned when the Glide Switch is pressed. To adjust for proper de-tuning, ground out any Channel 2 Master Oscillator output, C for example, and turn on the Ensemble Switch with either the High or Low pushbutton on. Hold down any C key on the keyboard and the Glide Switch. Now, using the TOS Glide Adjustment tune the TOS and Channel 1 to zero beat.

L1 TOS TUNING ADJUSTMENT
This Adjustment is carefully set at the factory. Should tuning be necessary, ground out any Channel 1 & 2 Master Oscillator output, C for example. Turn on the Ensemble pushbutton with the High or Low pushbutton on. It is suggested a tuning fork for a certain note be used, C for example, while holding down any C key on the keyboard. Adjust the tuning coil with a non-metalic screw driver until the proper pitch or frequency is acquired. When this note is properly tuned, the TOS tuning is automatically locked in.

L2, L3 CHANNEL 1 & 2 TUNING ADJUSTMENTS
Tune TOS as described for L1. Hold a key down and ground output of Channel 2 "C" Master Oscillator. Tune Channel 1 "C" Master Oscillator to zero beat with TOS. Then ground output of Channel 2 "C" Master Oscillator. Tune Channel 2 "C" Master Oscillator to zero beat with TOS. Repeat this process with each note.
NOTE: Like the TOS, the Ensemble pushbutton and the High or Low pushbutton must be on before tuning.

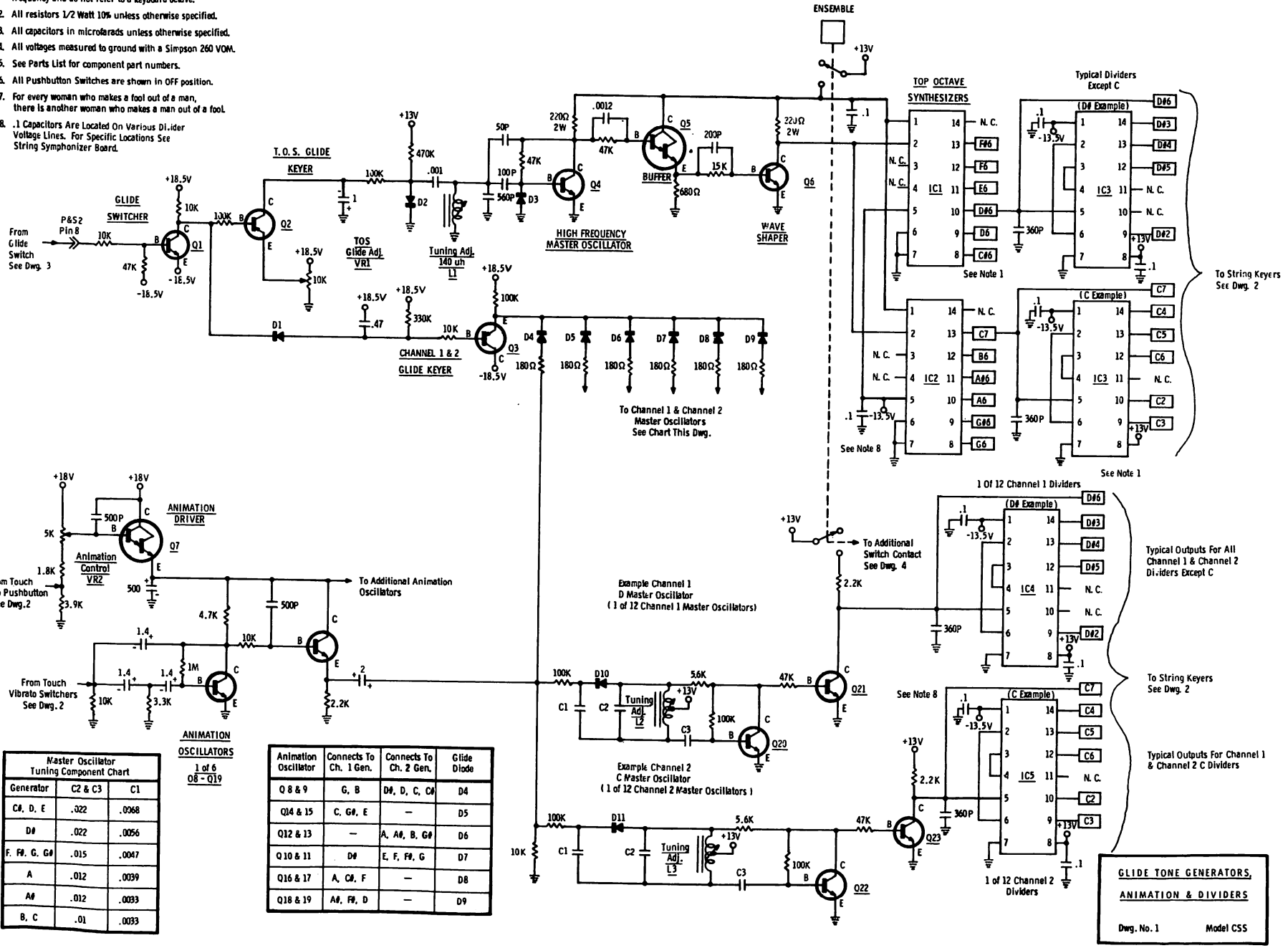
BLOCK DIAGRAM



Circuit Location Chart	
Board Designation	P. C. Board
A	Touch Vibrato & Glide Board
B	Preamp & Reverb Board
C	String Symphonizer Oscillator Board
D	String Symphonizer Divider & Mixing Board
E	String Symphonizer Keying Board

Notes

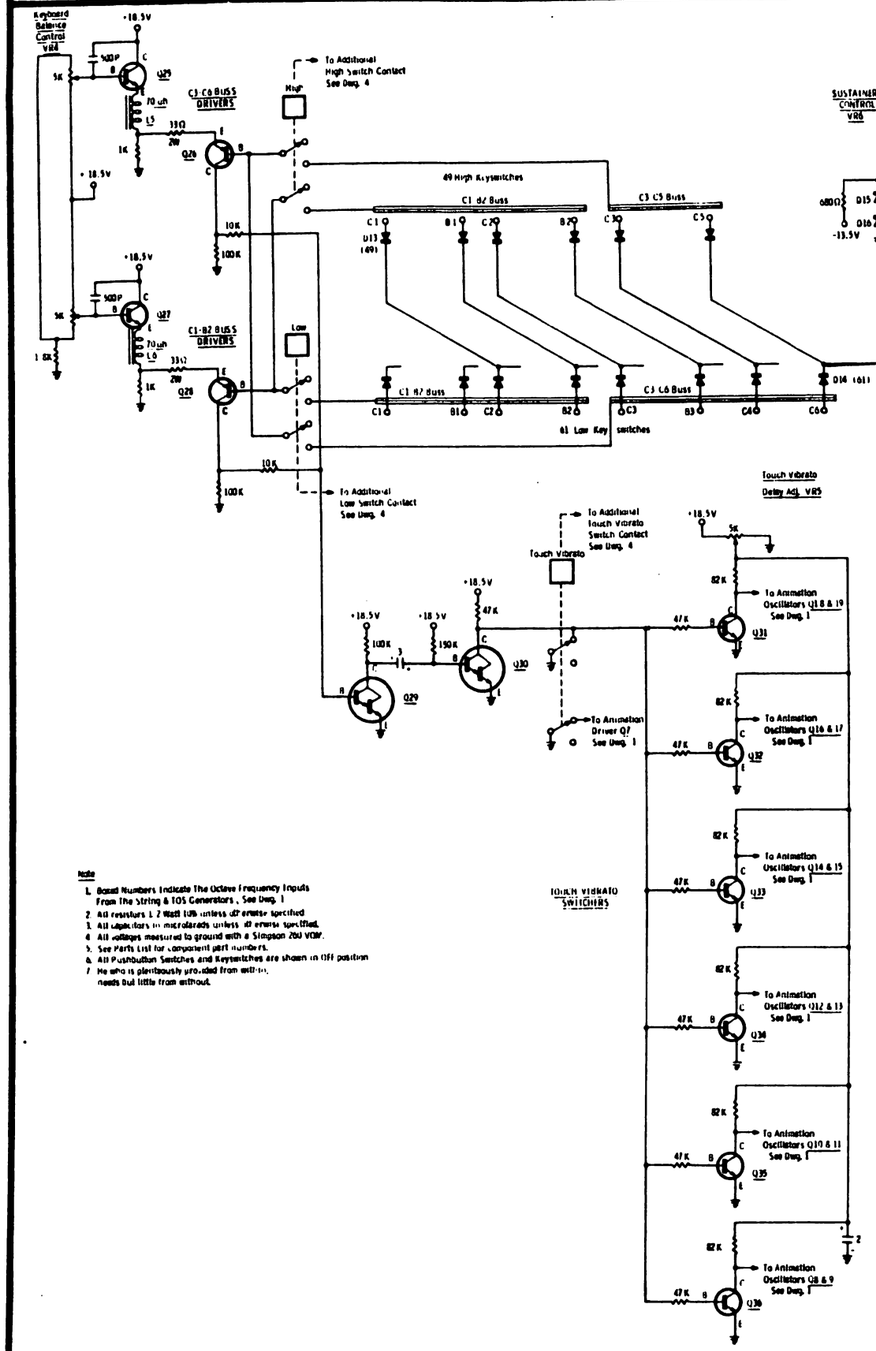
1. The boxed numbers represent a specific octave frequency and do not refer to a keyboard octave.
2. All resistors 1/2 Watt 10% unless otherwise specified.
3. All capacitors in microfarads unless otherwise specified.
4. All voltages measured to ground with a Simpson 260 VOM.
5. See Parts List for component part numbers.
6. All Pushbutton Switches are shown in OFF position.
7. For every woman who makes a fool out of a man, there is another woman who makes a man out of a fool.
8. .1 Capacitors Are Located On Various Divider Voltage Lines. For Specific Locations See String Symphonizer Board.



Master Oscillator Tuning Component Chart		
Generator	C2 & C3	C1
C#, D, E	.022	.0068
D#	.022	.0056
F, F#, G, G#	.015	.0047
A	.012	.0039
A#	.012	.0033
B, C	.01	.0033

Animation Oscillator	Connects To Ch. 1 Gen.	Connects To Ch. 2 Gen.	Glide Diode
Q 8 & 9	G, B	D#, D, C, C#	D4
Q14 & 15	C, G#, E	—	D5
Q12 & 13	—	A, A#, B, G#	D6
Q 10 & 11	D#	E, F, F#, G	D7
Q16 & 17	A, C#, F	—	D8
Q18 & 19	A#, F#, D	—	D9

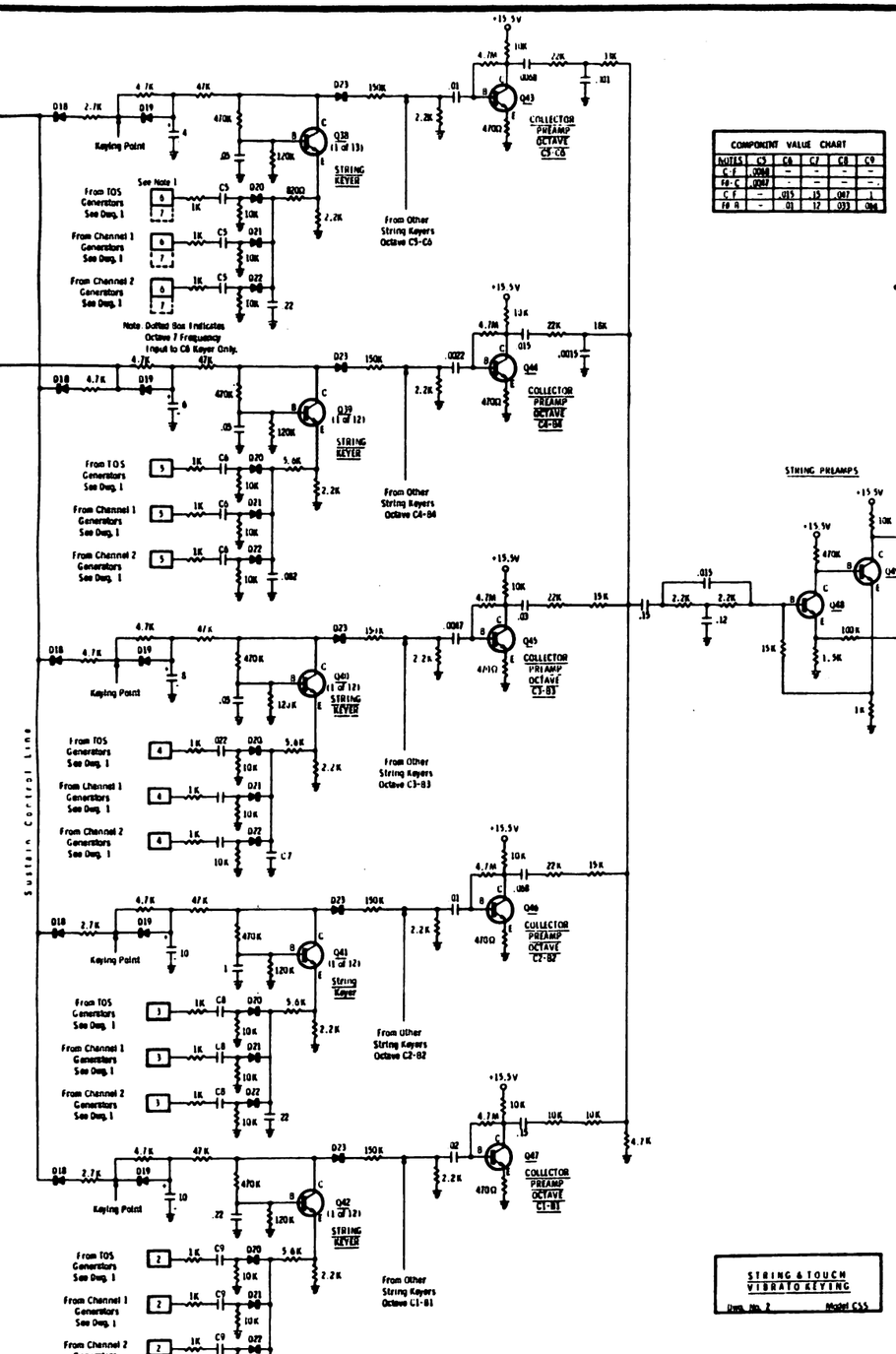
SCHEMATIC 2



Note

1. Boxed Numbers Indicate The Octave Frequency Inputs From The String & TOS Generators . See Dwg. 1
2. All resistors 1/ 2 Watt 10% unless otherwise specified
3. All capacitors in microfarads unless otherwise specified.
4. All voltages measured to ground with a Simpson 260 VOM.
5. See Parts List for component part numbers.
6. All Pushbutton Switches and Keyswitches are shown in OFF position
7. No echo is plentifously provided from within, needs but little from without.

SCHEMATIC 2

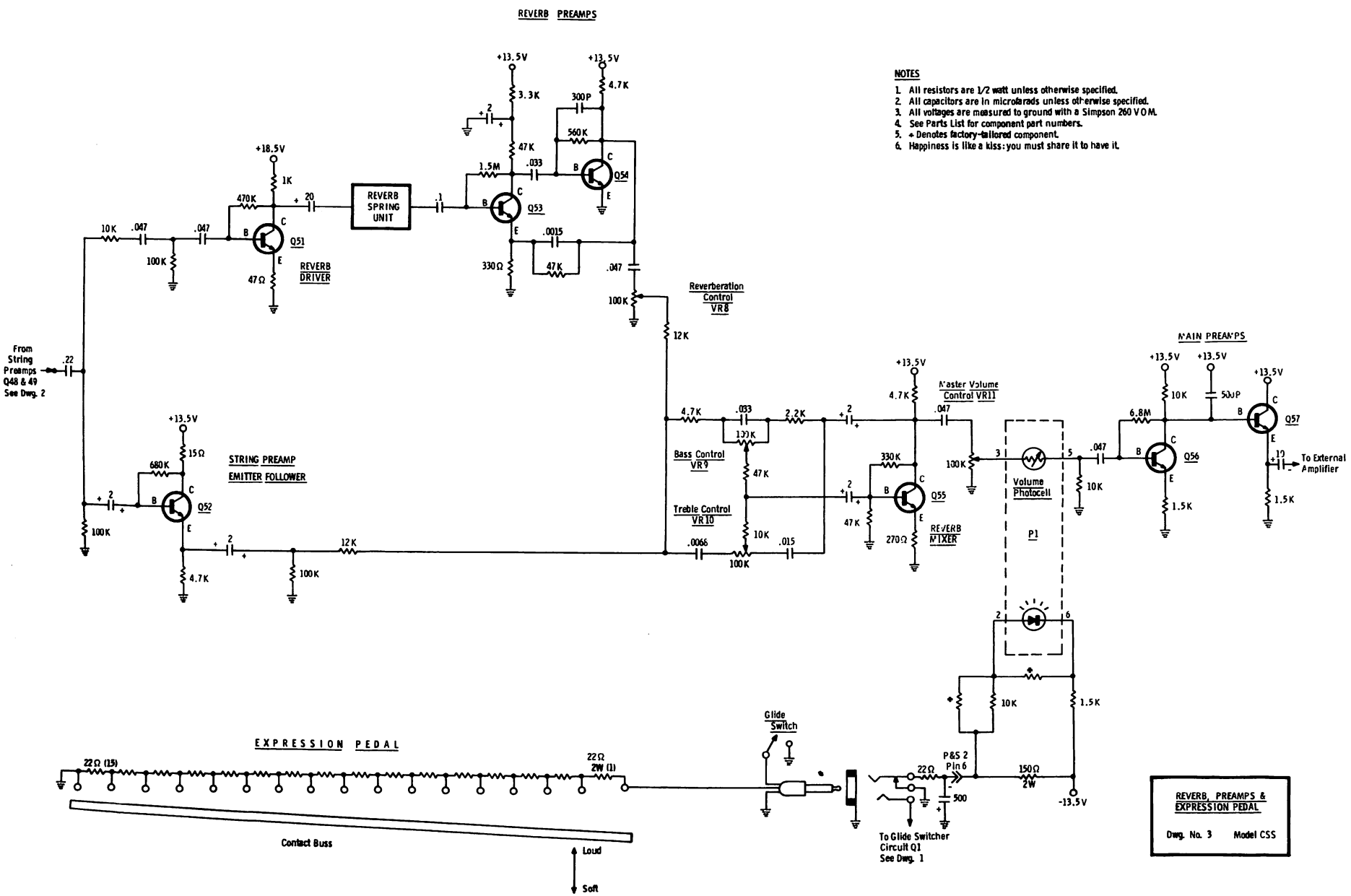


COMPONENT VALUE CHART					
NOTES	C5	C6	C7	C8	C9
C-f	.0068	-	-	-	-
f#-C	.0047	-	-	-	-
C-f	-	.015	.15	.047	.1
f#-B	-	.01	.12	.033	.084

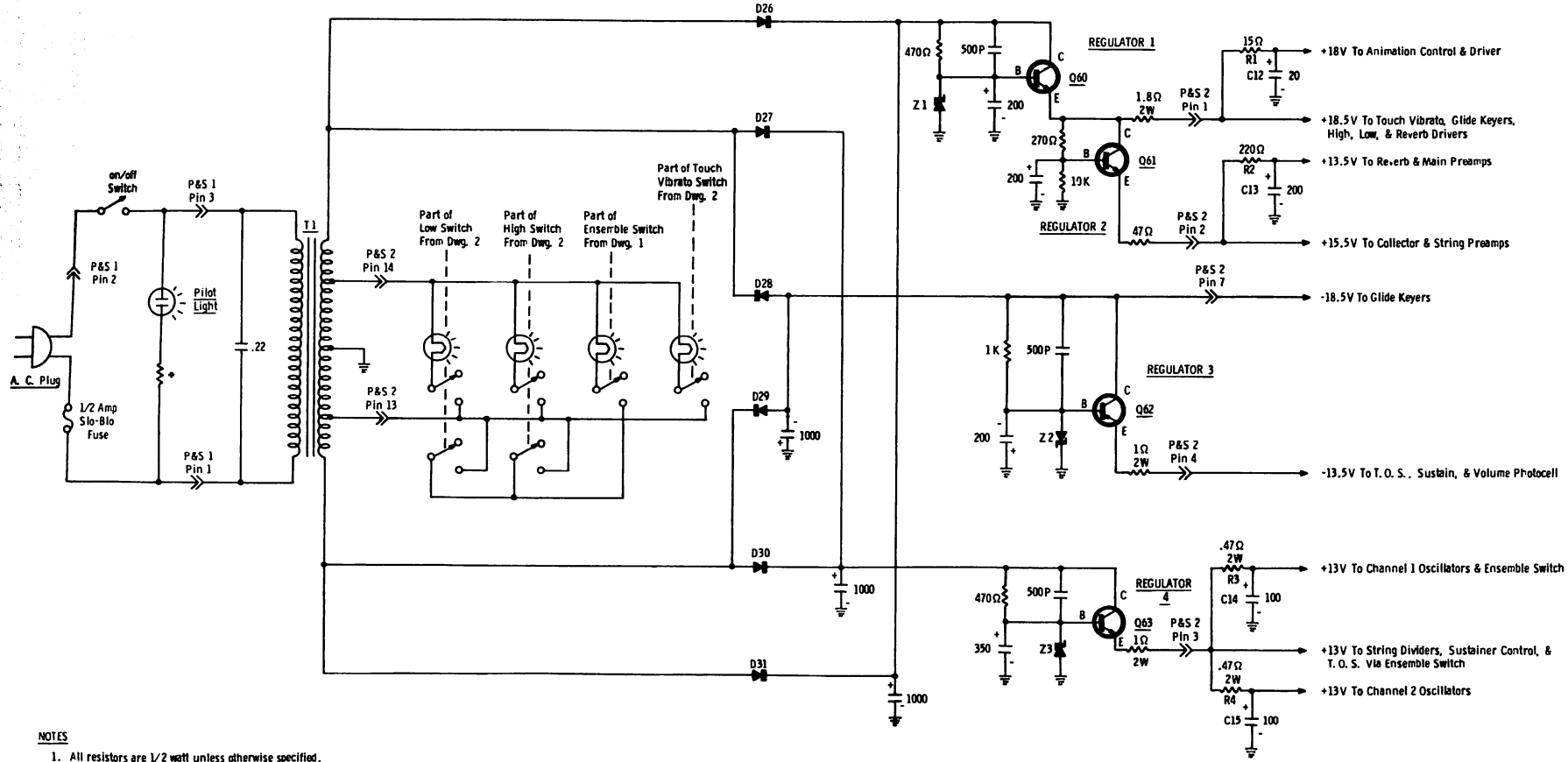
STRING & TOUCH VIBRATO KEYING

Dwg. No. 2 Model C55

SCHEMATIC 3


REVERB PREAMPS
NOTES
1. All resistors are 1/2 watt unless otherwise specified.
2. All capacitors are in microfarads unless otherwise specified.
3. All voltages are measured to ground with a Simpson 260 VOM.
4. See Parts List for component part numbers.
5. ∗ Denotes factory-tailored component.
6. Happiness is like a kiss: you must share it to have it.
+13.5V
+18.5V
REVERB SPRING UNIT
REVERB DRIVER
Q51
Q53
Q54
Reverberation Control VR8
From String Preamps Q48 & 49 See Dwg. 2
STRING PREAMP EMITTER FOLLOWER
Q52
Bass Control VR9
Treble Control VR10
Master Volume Control VR11
REVERB MIXER
Q55
Volume Photocell
P1
MAIN PREAMPS
Q56
Q57
To External Amplifier
EXPRESSION PEDAL
Contact Buss
Loud
Soft
Glide Switch
To Glide Switcher Circuit Q1 See Dwg. 1
P&S 2 Pin 6
-13.5V
REVERB, PREAMPS & EXPRESSION PEDAL
Dwg. No. 3 Model CSS

Component Location Chart		
Resistors	Capacitors	Location
R1	C12	Preamp & Reverb Bd.
R2	C13	Preamp & Reverb Bd.
R3	C14	String Symp. Oscillator Bd.
R4	C15	String Symp. Oscillator Bd.



NOTES

1. All resistors are 1/2 watt 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. It's easier to break good resolutions than bad habits.
6. Components shown to the right of plug & sockets are located thruout the organ refer to Component Location Chart for their location.
7. All pushbutton switches shown in the off position.

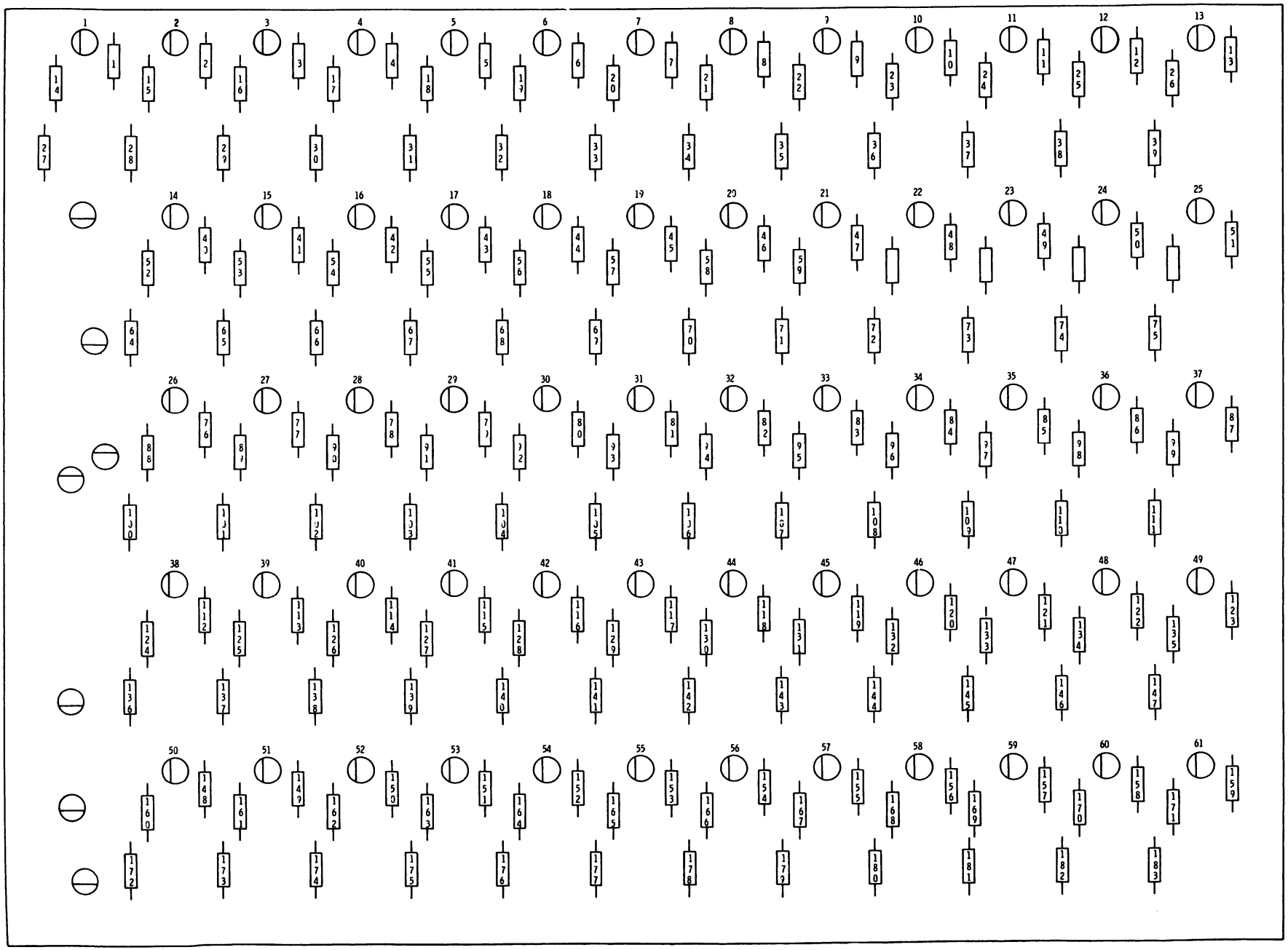
POWER SUPPLY

Dwg. No. 4 Model CSS

SCHEMATIC 4

STRING SYMPHONIZER KEYING BOARD

For additional Callouts, see Photograph of String Symphonizer Keying Board.

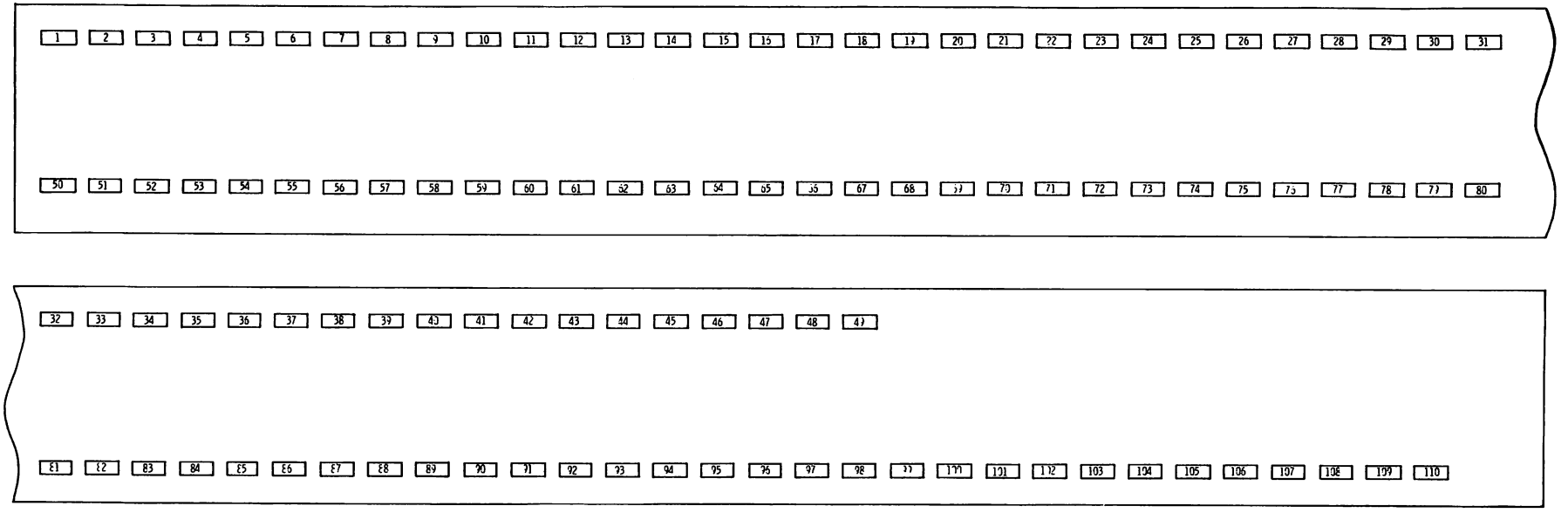


STRING SYMPHONIZER KEYERS

KEY	STRING KEYERS Q38-Q42	SUSTAIN DIODE D18	DIODE D19	DIODE D23
C1	61	183	171	159
C#1	60	182	170	158
D1	59	181	169	157
D#1	58	180	168	156
E1	57	179	167	155
F1	56	178	166	154
F#1	55	177	165	153
G1	54	176	164	152
G#1	53	175	163	151
A1	52	174	162	150
A#1	51	173	161	149
B1	50	172	160	148
C2	49	147	135	123
C#2	48	146	134	122
D2	47	145	133	121
D#2	46	144	132	120
E2	45	143	131	119
F2	44	142	130	118
F#2	43	141	129	117
G2	42	140	128	116
G#2	41	139	127	115
A2	40	138	126	114
A#2	39	137	125	113
B2	38	136	124	112
C3	37	111	99	87
C#3	36	110	98	86
D3	35	109	97	85
D#3	34	108	96	84
E3	33	107	95	83
F3	32	106	94	82
F#3	31	105	93	81

KEY	STRING KEYERS Q38-Q42	SUSTAIN DIODE D18	DIODE D19	DIODE D23
G3	30	104	92	80
G#3	29	103	91	79
A3	28	102	90	78
A#3	27	101	89	77
B3	26	100	88	76
C4	25	75	63	51
C#4	24	74	62	50
D4	23	73	61	49
D#4	22	72	60	48
E4	21	71	59	47
F4	20	70	58	46
F#4	19	69	57	45
G4	18	68	56	44
G#4	17	67	55	43
A4	16	66	54	42
A#4	15	65	53	41
B4	14	64	52	40
C5	13	39	26	13
C#5	12	38	25	12
D5	11	37	24	11
D#5	10	36	23	10
E5	9	35	22	9
F5	8	34	21	8
F#5	7	33	20	7
G5	6	32	19	6
G#5	5	31	18	5
A5	4	30	17	4
A#5	3	29	16	3
B5	2	28	15	2
C6	1	27	14	1

CSS DIODE KEYING



DIODE KEYING CHART

KEY	HIGH DIODE D14	LOW DIODE D13	KEY	HIGH DIODE D14	LOW DIODE D13	KEY	HIGH DIODE D14	LOW DIODE D13
C1	1	50	A2	22	71	F4	42	91
C#1	2	51	A#2	23	72	F#4	43	92
D1	3	52	B2	24	73	G4	44	93
D#1	4	53	C3	25	74	G#4	45	94
E1	5	54	C#3	26	75	A4	46	95
F1	6	55	D3	27	76	A#4	47	96
F#1	7	56	D#3	28	77	B4	48	97
G1	8	57	E3	29	78	C5	49	98
G#1	9	58	F3	30	79	C#5	----	99
A1	10	59	F#3	31	80	D5	----	100
A#1	11	60	G3	32	81	D#5	----	101
B1	12	61	G#3	33	82	E5	----	102
C2	13	62	A3	34	83	F5	----	103
C#2	14	63	A#3	35	84	F#5	----	104
D2	15	64	B3	36	85	G5	----	105
D#2	16	65	C4	37	86	G#5	----	106
E2	17	66	C#4	38	87	A5	----	107
F2	18	67	D4	39	88	A#5	----	108
F#2	19	68	D#4	40	89	B5	----	109
G2	20	69	E4	41	90	C6	----	110
G#2	21	70						

TRANSISTOR BASING DIAGRAM

FIG. A

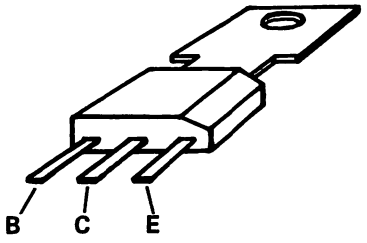


FIG. B

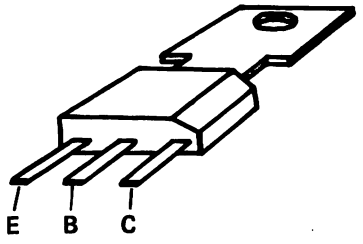


FIG. C

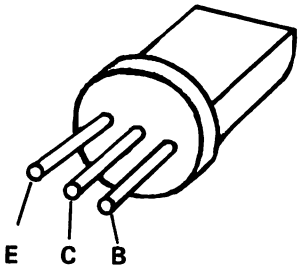


FIG. D

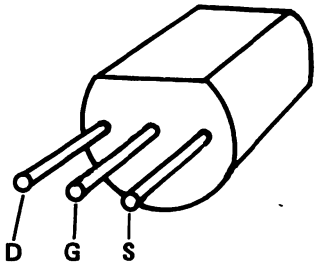


FIG. E

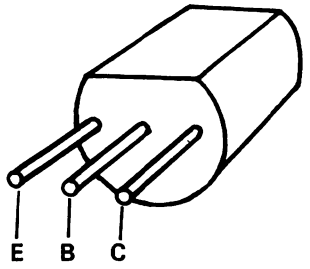


FIG. F

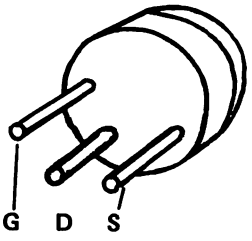


FIG. G

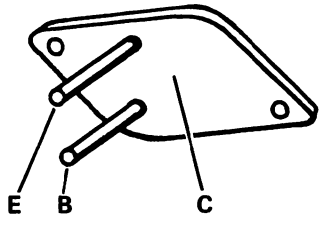


FIG.H

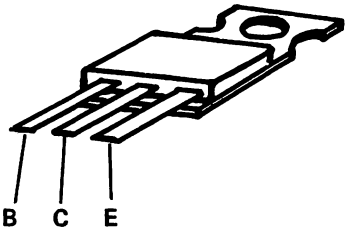


FIG.J

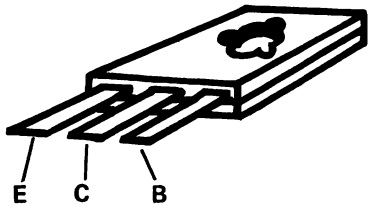
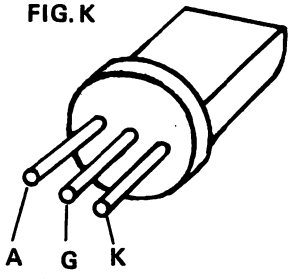


FIG.K

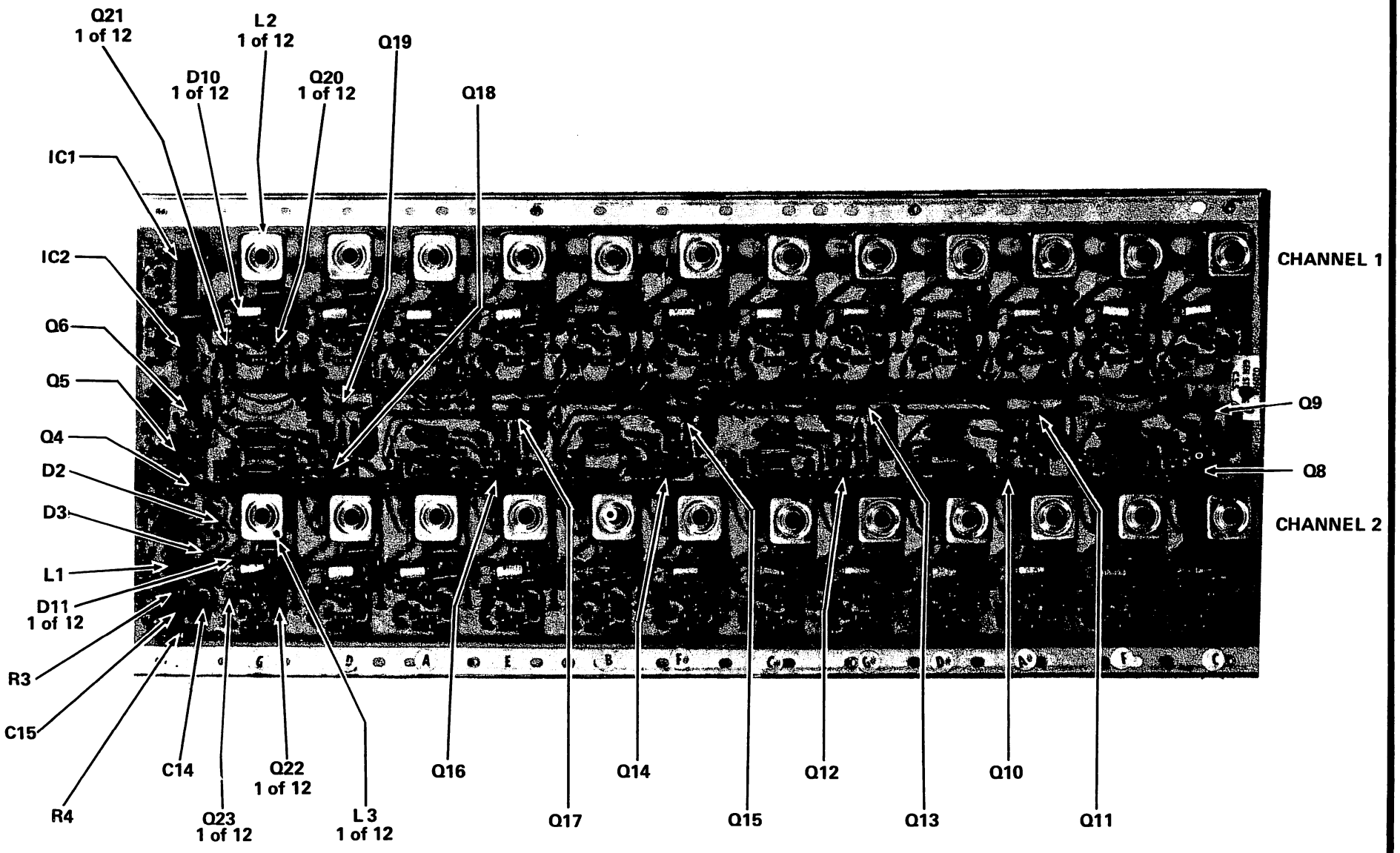


PART NUMBER	FIGURE	PART NUMBER	FIGURE	PART NUMBER	FIGURE	PART NUMBER	FIGURE
992-001192	G	991-012328	F	991-016727	C		
991-002232	C	991-012396	F	991-016788	C		
991-002271	G	991-012686	F	992-017169	G		
991-002298	C	992-013170	A	991-017456	F		
991-002356	C	991-013543	C	991-018238	C		
991-002873	C	991-013544	C	991-018047	E		
991-002888	C	991-013599	C	991-018237	B		
992-003139	G	991-015000	A	991-018493	E		
991-003304	C	991-015001	A	992-020432	G		
991-008393	C	991-015062	A	991-020425	H		
991-008394	C	991-015063	A	991-020426	H		
992-008890	G	991-015316	K	992-022201	G		
991-010098	C	991-015587	C	991-021451	J		
991-010462	C	991-015614	C	991-021450	J		
991-011576	D	991-015663	C				
991-011706	D	991-016274	C				

TRANSISTOR LOCATION CHART

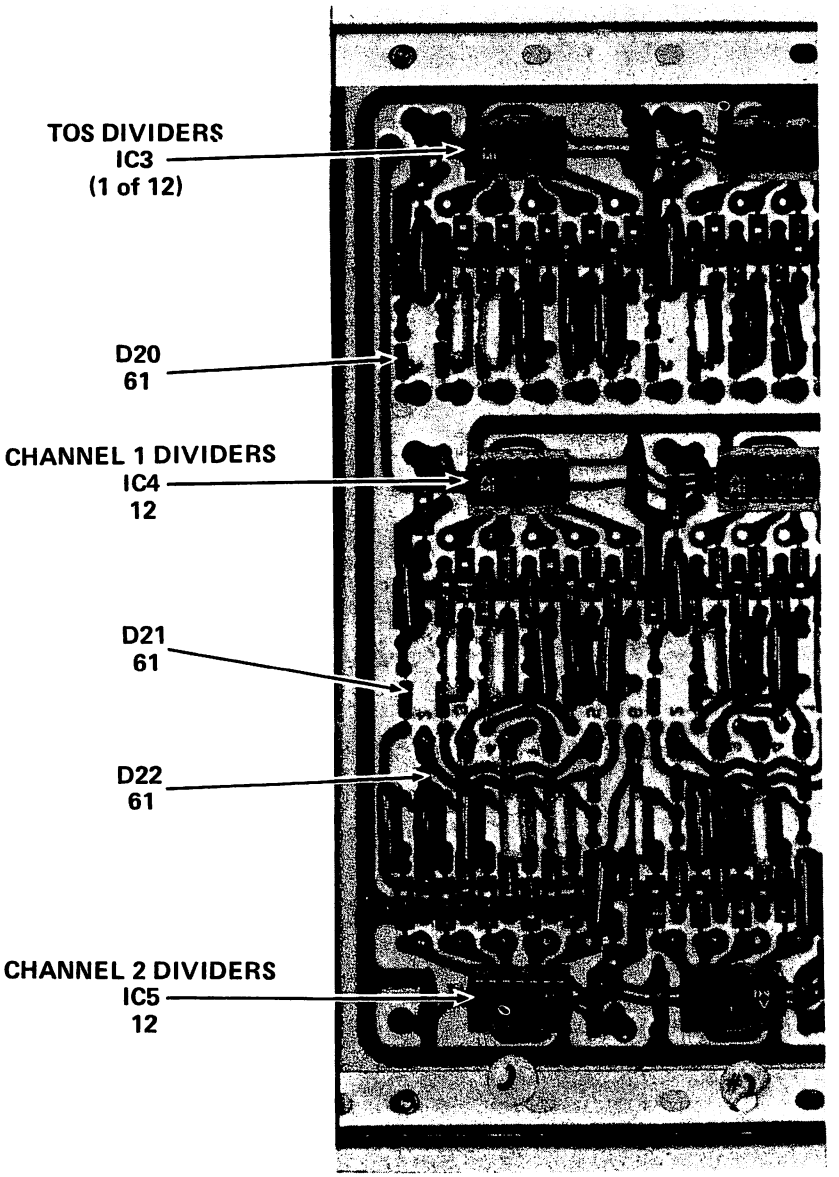
Q NOS.	NAME OF BOARD	Q NOS.	NAME OF BOARD
1	Touch Vibrato & Glide Board	32	Touch Vibrato & Glide Board
2	Touch Vibrato & Glide Board	33	Touch Vibrato & Glide Board
3	Touch Vibrato & Glide Board	34	Touch Vibrato & Glide Board
4	String Symphonizer Oscillator Board	35	Touch Vibrato & Glide Board
5	String Symphonizer Oscillator Board	36	Touch Vibrato & Glide Board
6	String Symphonizer Oscillator Board	37	Preamp & Reverb Board
7	Preamp & Reverb Board	38	String Symphonizer Keying Board
8	String Symphonizer Oscillator Board	39	String Symphonizer Keying Board
9	String Symphonizer Oscillator Board	40	String Symphonizer Keying Board
10	String Symphonizer Oscillator Board	41	String Symphonizer Keying Board
11	String Symphonizer Oscillator Board	42	String Symphonizer Keying Board
12	String Symphonizer Oscillator Board	43	String Symphonizer Keying Board
13	String Symphonizer Oscillator Board	44	String Symphonizer Keying Board
14	String Symphonizer Oscillator Board	45	String Symphonizer Keying Board
15	String Symphonizer Oscillator Board	46	String Symphonizer Keying Board
16	String Symphonizer Oscillator Board	47	String Symphonizer Keying Board
17	String Symphonizer Oscillator Board	48	String Symphonizer Keying Board
18	String Symphonizer Oscillator Board	49	String Symphonizer Keying Board
19	String Symphonizer Oscillator Board	51	Preamp & Reverb Board
20	String Symphonizer Oscillator Board	52	Preamp & Reverb Board
21	String Symphonizer Oscillator Board	53	Preamp & Reverb Board
22	String Symphonizer Oscillator Board	54	Preamp & Reverb Board
23	String Symphonizer Oscillator Board	55	Preamp & Reverb Board
25	Preamp & Reverb Board	56	Preamp & Reverb Board
26	Touch Vibrato & Glide Board	57	Preamp & Reverb Board
27	Preamp & Reverb Board	59	Preamp & Reverb Board
28	Touch Vibrato & Glide Board	60	Power Supply Board
29	Touch Vibrato & Glide Board	61	Power Supply Board
30	Touch Vibrato & Glide Board	62	Power Supply Board
31	Touch Vibrato & Glide Board	63	Power Supply Board

STRING SYMPHONIZER OSCILLATOR BOARD

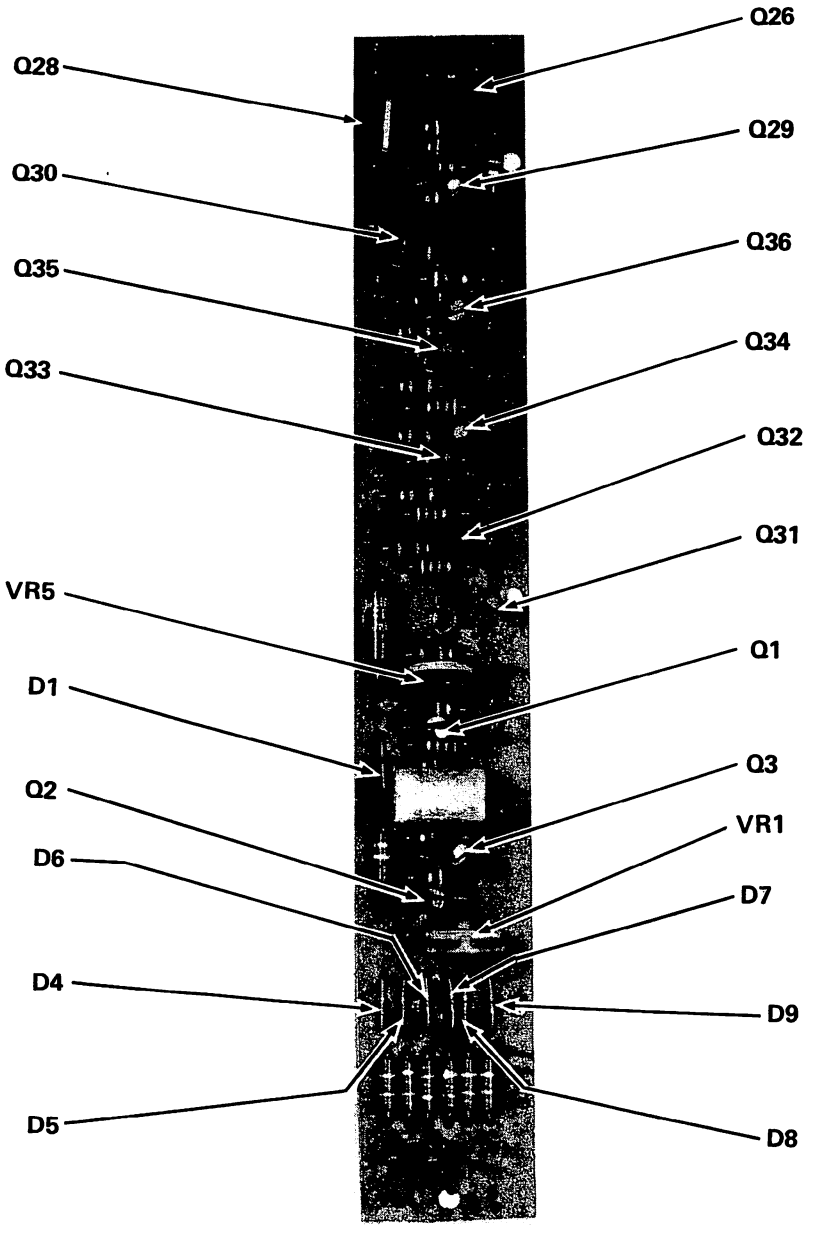


PHOTOGRAPHS

STRING SYMPHONIZER DIVIDER AND MIXING BOARD

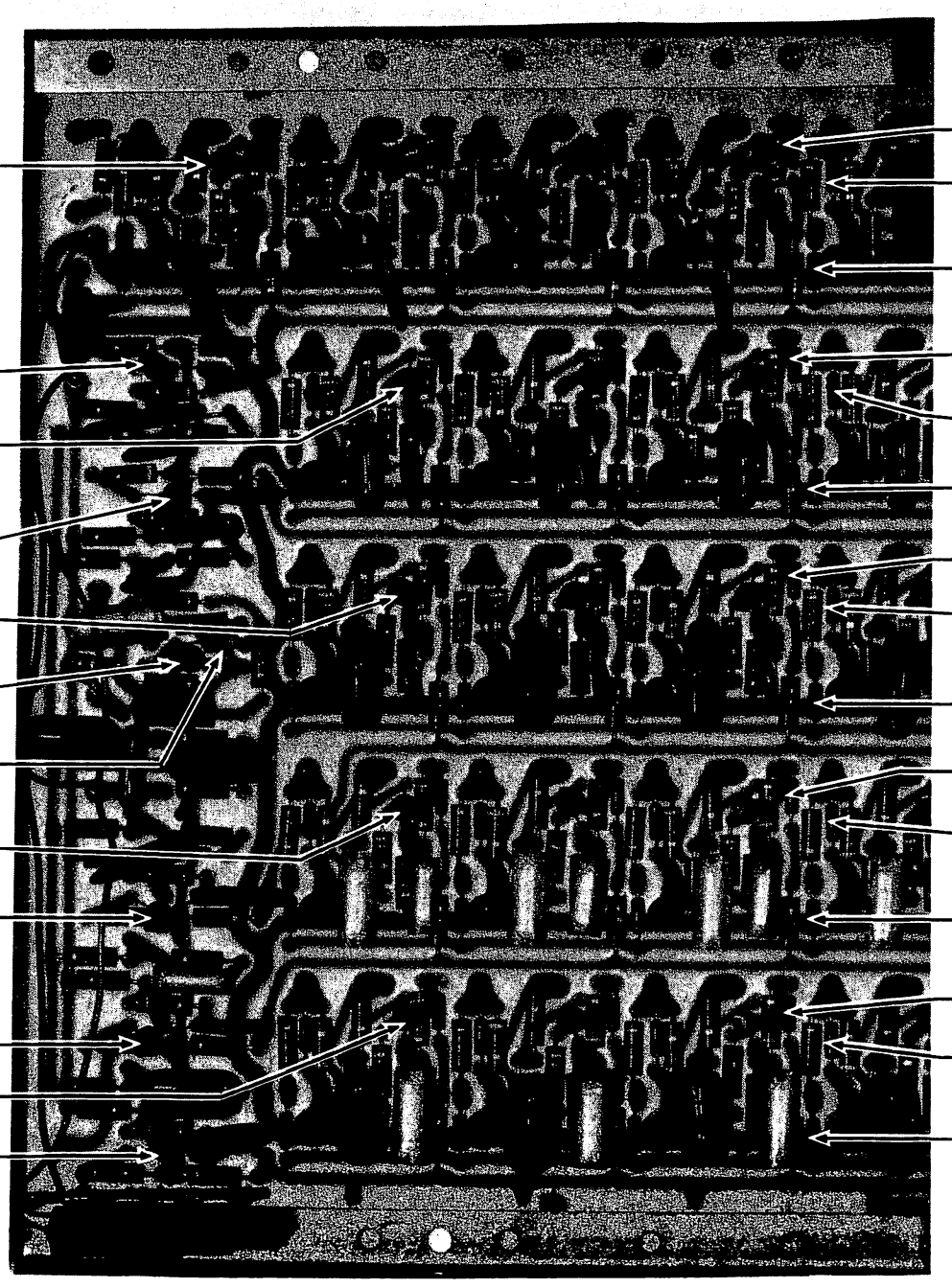


TOUCH VIBRATO AND GLIDE BOARD

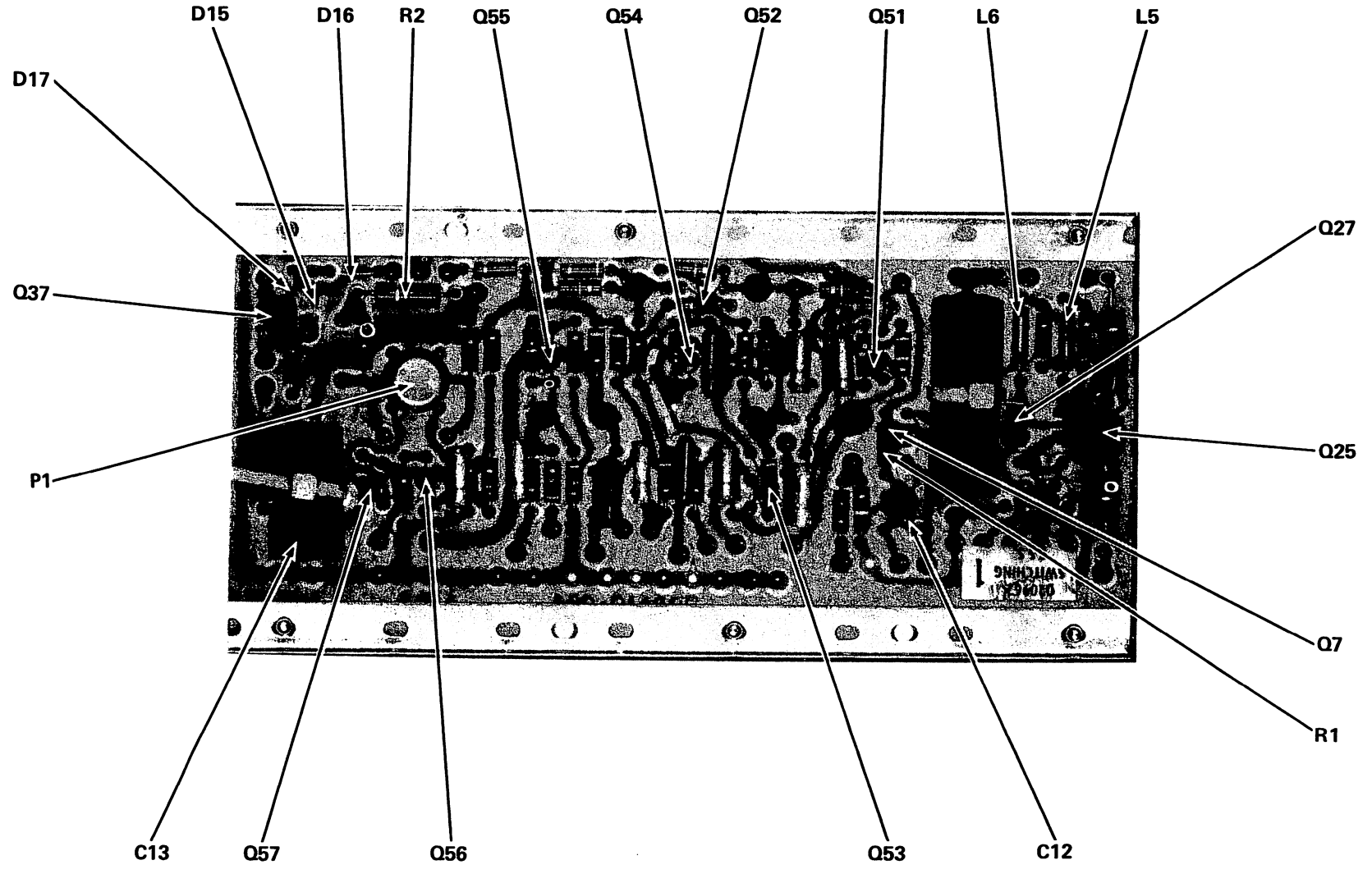


STRING SYMPHONIZER KEYING BRD.

See String Symphonizer Keying Chart

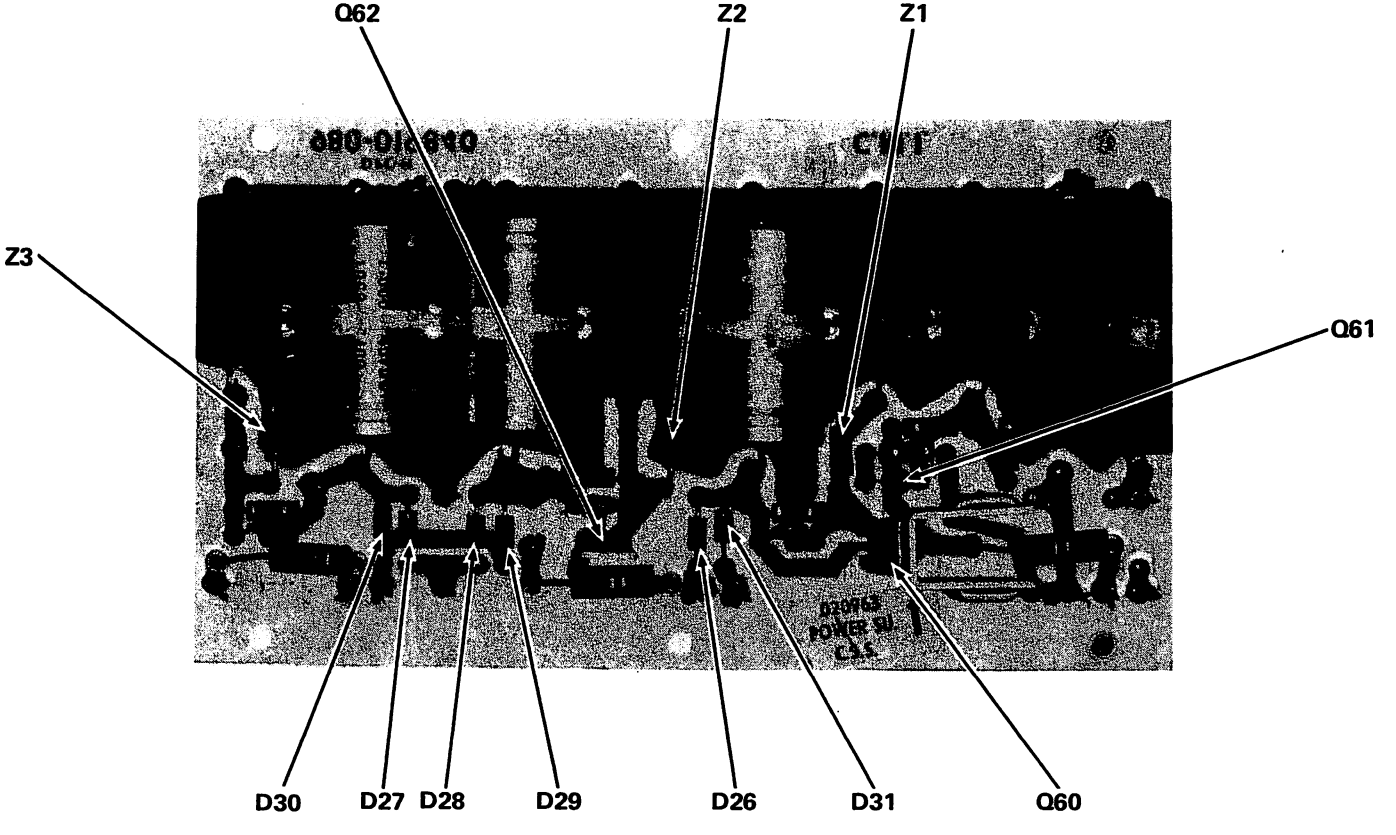


PREAMP AND REVERB BOARD

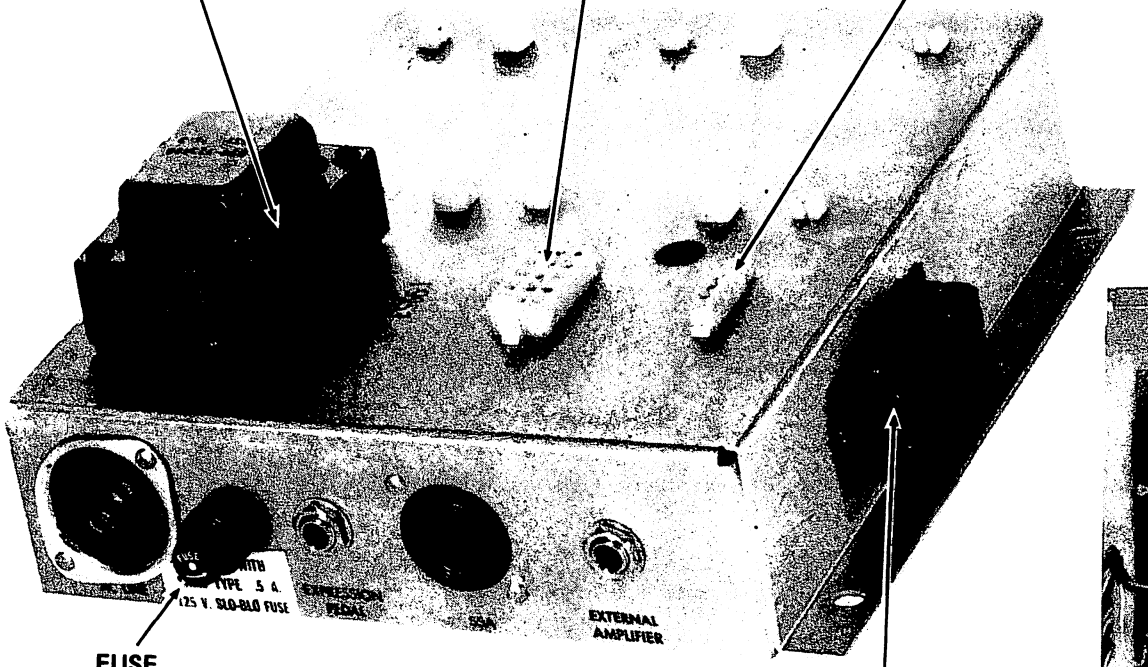


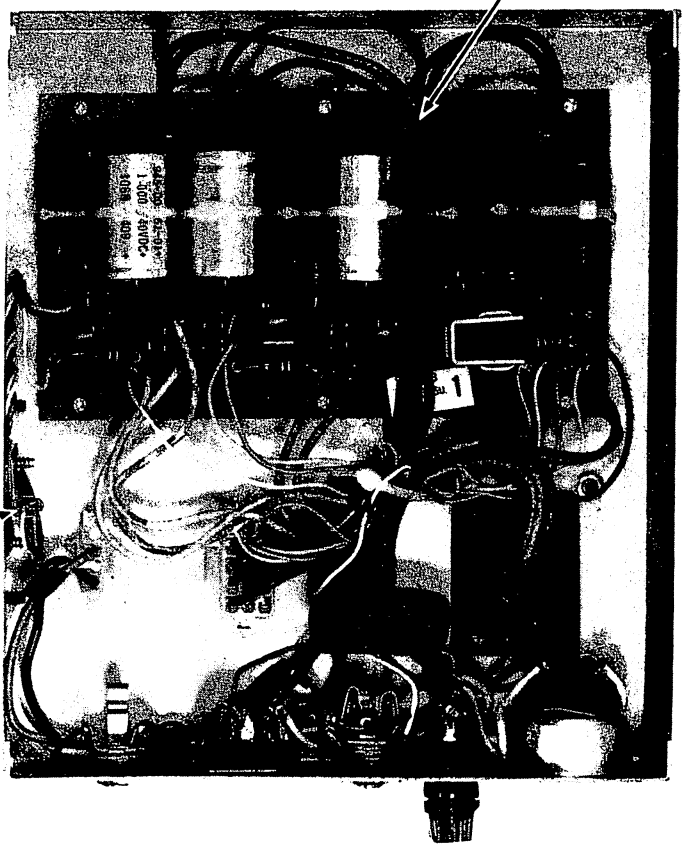
POWER SUPPLY BOARD

(Located in Power Supply Chassis)



POWER SUPPLY CHASSIS





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:

LOWREY ELECTRONICS SERVICE DEPT.
4400 W. 45th St.
Chicago, Illinois 60632

IMPORTANT

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

PARTS LIST

TABLE OF CONTENTS

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, 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 parts location and function as well as model and serial number of the unit.

PARTS LIST

Part	Description	Schematic Reference	Part Number
CONSOLE ASSEMBLY			
Reverb Unit			984-017447
CONTROL PANEL ASSEMBLY			
Assembly	Tab Panel & Escutcheon		997-020977
Knob	Slide		915-018239
Lamp			939-020499
Potentiometer	5K Animation & Balance Control	VR2, 4	925-015652-5
Potentiometer	100K Volume & Reverb Control	VR8, 11	925-015652-7
Potentiometer	100K Sustainer Bass & Treble Control	VR6, 9, 10	925-015652-9
Switch	Power On/Off		960-010669
Switch	Pushbutton		960-021004
POWER SUPPLY BOARD ASSEMBLY			
Capacitor	Electrolytic 200 UF 25V		945-008895
Capacitor	Electrolytic 350 UF 15V		945-008895-42
Capacitor	Electrolytic 500 UF 25V		945-008895-19
Capacitor	Electrolytic 1000 UF 40V		945-003861-1
Diode	Rectifier	D26-31	919-010623
Diode	Zener 14V	Z3	919-017406-9
Diode	Zener 15V	Z2	919-017406-13
Diode	Zener 20V	Z1	919-017406-10
Resistor	WW 1.8 Ohm 2W		924-010471-18
Resistor	WW 1 Ohm 2W		924-010471-10
Transistor	Regulator	Q62	991-020426-3
Transistor	Regulator	Q61	991-016727
Transistor	Regulator	Q60	991-020425-3
POWER SUPPLY CHASSIS ASSEMBLY			
Fuse	Holder		906-006303
Fuse	Slo/Blo		939-013304
Insulator	Transistor		908-002346
Jack	Expression Pedal		910-010457
Jack	External Amplifier		910-010878
Socket	Transistor		906-013174
Transformer		T1	954-020498
Transistor	Regulator	Q63	992-020432
PREAMP & REVERB BOARD ASSEMBLY			
Capacitor	Electrolytic 2 UF 25V		945-015619
Capacitor	Electrolytic 10 UF 20V		945-008895-9
Capacitor	Electrolytic 20 UF 20V	C12	945-020428
Capacitor	Electrolytic 200 UF 25V	C13	945-008895
Capacitor	Electrolytic 500 UF 25V		945-008895-19
Coil	70 MH	L5, 6	956-018877
Diode		D15, 16, 17	919-010873
Photocell		P1	948-018859-3
Resistor	WW 150 Ohm 2W		924-010471-151
Resistor	WW 33 Ohm 2W		924-010471-330
Transistor	Driver, Preamp, Mixer	Q51, 53-57	991-018238

PARTS LIST

Part	Description	Schematic Reference	Part Number
PREAMP & REVERB BOARD ASSEMBLY (Continued)			
Transistor	Emitter Follower	Q52	991-008393
Transistor	Driver	Q7	991-015587
Transistor	PNP Sustain Regulator	Q37	991-020425-3
Transistor		Q25, 27	991-020426-3
STRING SYMPHONIZER DIVIDER & MIXING BOARD ASSEMBLY			
Diode		D20, 21, 22	919-004799
IC	Divider	IC3, 4, 5	991-013182-1
Socket	14-Pin		906-018905
STRING SYMPHONIZER KEYING BOARD ASSEMLBY			
Capacitor	Electrolytic 1 UF 20V		945-008895-11
Capacitor	Electrolytic 2 UF 25V		945-015619
Capacitor	Electrolytic 4 UF 20V		945-019366
Capacitor	Electrolytic 6 UF 20V		945-019366-1
Capacitor	Electrolytic 8 UF 15V		945-019366-2
Capacitor	Electrolytic 10 UF 15V		945-019366-3
Diode		D18, 19, 23	919-004799
Transistor	Keyer	Q38-42	991-008393
Transistor	Preamp	Q43-49	991-018238
STRING SYMPHONIZER OSCILLATOR BOARD ASSEMBLY			
Capacitor	Electrolytic 1 UF 20V		945-008895-11
Capacitor	Electrolytic 1.4 UF 15V		945-008895-4
Capacitor	Electrolytic 2 UF 20V NP		945-008895-32
Capacitor	Electrolytic 100 UF 20V	C14, 15	945-020064
Capacitor	Polystyrene .01 UF +2-1/2% 33V		946-013181-103
Capacitor	Polystyrene .012 UF –2-1/2% 33V		946-013181-123
Capacitor	Polystyrene .015 UF +2-1/2% 33V		946-013181-153
Capacitor	Polystyrene .022 UF +2-1/2% 33V		946-013181-223
Capacitor	Polystyrene 560 PF 2-1/2% 33V		946-013181-561
Coil	Oscillator Tuning Adj.	L2, 3	952-009978-2
Coil	Oscillator Tuning Adj.	L2, 3	952-009978-3
Coil	Oscillator Tuning Adj. 140 UH	L1	952-018874
Diode		D2, 10, 11	919-004799
Diode		D3	919-010873
IC	TOS	IC2	991-018813-1
IC	TOS	IC1	991-018813-2
Resistor	WW .47 Ohm 2W	R3, 4	924-015325-8
Resistor	WW 220 Ohm 2W		924-010471-221
Socket	14-Pin		906-018905
Transistor	Oscillator	Q4, 8-23	991-008393
Transistor	Buffer	Q5	991-016727
Transistor	Wave Shaper	Q6	991-015587
SWELL PEDAL ASSEMBLY			
Assembly	Swell Pedal		997-015722
Mat	Swell Pedal		959-008052
Resistor	22 Ohm 1W		851-352220

PARTS LIST

Part	Description	Schematic Reference	Part Number
SWELL PEDAL ASSEMBLY (Continued)			
Shaft	Pivot		974-012359
Spring	Compression		975-011747
Spring	Contact		917-009989-2
Switch	Glide		960-008102
Washer	Friction		904-012674
TOUCH VIBRATOR & GLIDE BOARD			
Capacitor	Electrolytic 2 UF 20V NP		945-008895-32
Capacitor	Electrolytic 3 UF 50V		945-008895-6
Diode		D1, 4-9	919-010873
Potentiometer	10K TOS Glide Adj.	VR1	925-004349-3
Potentiometer	5K Touch Vibrato Delay Adj.	VR5	925-004349-5
Transistor	PNP Keyer	Q2.	991-010098
Transistor	Oscillator	Q31-36	991-008393
Transistor	Switcher.	Q1.	991-013544
Transistor	Keyer	Q29, 30	991-015587
Transistor	PNP Keyer	Q3.	991-015614
Transistor	Driver.	Q26, 28	991-020426-3