

SERVICE MANUAL

L SERIES



HAMMOND ORGAN COMPANY
DIVISION OF HAMMOND CORPORATION

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INTRODUCTION TO REVISED MANUAL

Welcome to the revised edition of the Hammond L-100 Series Service Manual.

Started in late 2018, this edition updates the original manual for the modern era. Changes include:

- Schematics recreated in Illustrator allowing support for interactive comparisons between models and a 17MB reduction in file size
- Spelling and typographic mistakes corrected
- Hyper-links added to cross-references, table of contents, figures, etc.
- Images touched up
- Most images added in-line with column text to aid on-screen viewing
- Page layout redesigned for a compromise between landscape printing and on-screen reading
- Font changed to sans serif (Helvetica Neue) for easier on-screen readability

I-1 METHOD

The original service manual had been scanned by an unknown source. This was then downloaded and OCR-ed.

OCR errors were either corrected or re-keyed. Then all text was composited in Adobe InDesign. Images were captured, edited, and enhanced in Adobe Photoshop.

I-2 REVISION HISTORY

The following revisions have been made:

Revision	Date	Comments
Original	ca. 1961	Original service manual written by Hammond Organ Company
1.0	November, 2018	Initial update by Michael Hightower
1.1	February, 2022	Added Kon Zissis' modifications, minor edits

To suggest corrections/improvements or to add content, please contact Michael Hightower via mphtower@gmail.com.

I-3 PRINTING INSTRUCTIONS

The main body of the document is typeset on 8.5" x 11" (US Letter) in a landscape format. The schematics are typeset on 8.5" x 14" (US Legal) in a landscape format.

Pages numbers and layout:

- 8.5" x 11 (US Letter) Landscape:
Cover page – 37
55 – End of document
- 8.5" x 14 (US Legal) Landscape:
39 – 54

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INTRODUCTION TO ORIGINAL SERVICE MANUAL

II-1 OVERVIEW

This manual contains service information for L-100 Series organs. The series is comprised of the following models:

L-100
L-100A
L-100-1
L-100-2
L-200

The Model L-100 Hammond organ is a completely self-contained console, requiring no external tone cabinet. It has two manuals or keyboards of 44 keys each, a 13 note pedal keyboard, and an expression (swell) pedal for controlling the volume. All tones are produced by electro-magnetic tone generators and electrically amplified. Selection of tone colors is made by adjusting 17 drawbars and 6 preset tabs. Other characteristics of the music are adjusted by means of 10 other tabs. A toggle switch, located to the right of the console above the manuals, is used to turn on the organ. A pilot light shows when the organ is turned on.

Model L-100A is similar to Model L-100, with the addition of percussion voicing circuitry, controlled from the lower left end block.

Model L-100-1 is similar to L-100, with a six-voice percussion feature added. Percussion controls are mounted in the lower right end block.

Model L-100-2 is identical to Model L-100-1, with the addition of the "drawer" type automatic Rhythm II feature. No service information for Rhythm II is contained in this manual, since its circuitry is independent of the organ. For Rhythm II service information, refer to the Service Manual for Rhythm II HO-466.

Model L-200 with inbuilt rhythm is electrically identical to the L-100-2 organ. Wiring of the rhythm unit to the console is presented in *Figure 5-9*.

L-Series organs will have fuses added to the Canadian power supply (101-000130) to comply with C.S.A. standards. Location and value of fuses are shown in *Figure 5-17*.

For convenience in locating desired information, this manual is divided into the following sections:

- I. How the Organ Operates
- II. Theory of Operation
- III. Disassembly
- IV. Practical Service Suggestions
- V. Diagrams
- VI. Parts List

II-2 SPECIFICATIONS

DIMENSIONS: Width, 43½"; Height, 44½"; Depth, 23"

WEIGHT: 215 lbs.

POWER INPUT: 140 Watts

OUTPUT: 15 Watts, E.I.A.

SECTION I

HOW THE ORGAN OPERATES

1-1 GENERAL

This section contains a description of the operating principles of L-100 Series organs. *Figure 1-1* and *Figure 1-2* depict the locations of the various subassemblies. *Figure 1-4* is a block diagram.

1-2 TONE SOURCE

Most tone sources, such as strings, reeds, or pipes, produce complex tones. The Hammond tone-producing mechanism, however, generates individual frequencies which can be combined by means of harmonic drawbars to produce any desired tone quality. The block diagram, *Figure 1-4*, shows the chief components of the instrument.

Electrical impulses of various frequencies are produced in the “tone generator assembly” which contains a number of “tone wheels” driven at predetermined speeds by a motor and gear arrangement. Each tone wheel is a steel disc similar to a gear, with high and low spots, or teeth, on its edge (see *Figure 1-5*). As the wheel rotates, these teeth pass near a permanent magnet, and the resulting variations in the magnetic field induce a voltage in a coil wound on the magnet. This small voltage, when suitably filtered, produces one note of the musical scale, its pitch or frequency depending on the number of teeth passing the magnet each second.

A note played on either manual of the organ consists of a fundamental pitch and a number of harmonics, or multiples of the fundamental frequency. The fundamental and harmonics available

on each playing key are controllable by means of drawbars. By suitable adjustment of these controls the player may vary the tone colors at will. Several pre-selected tones are also available by use of the preset tabs.

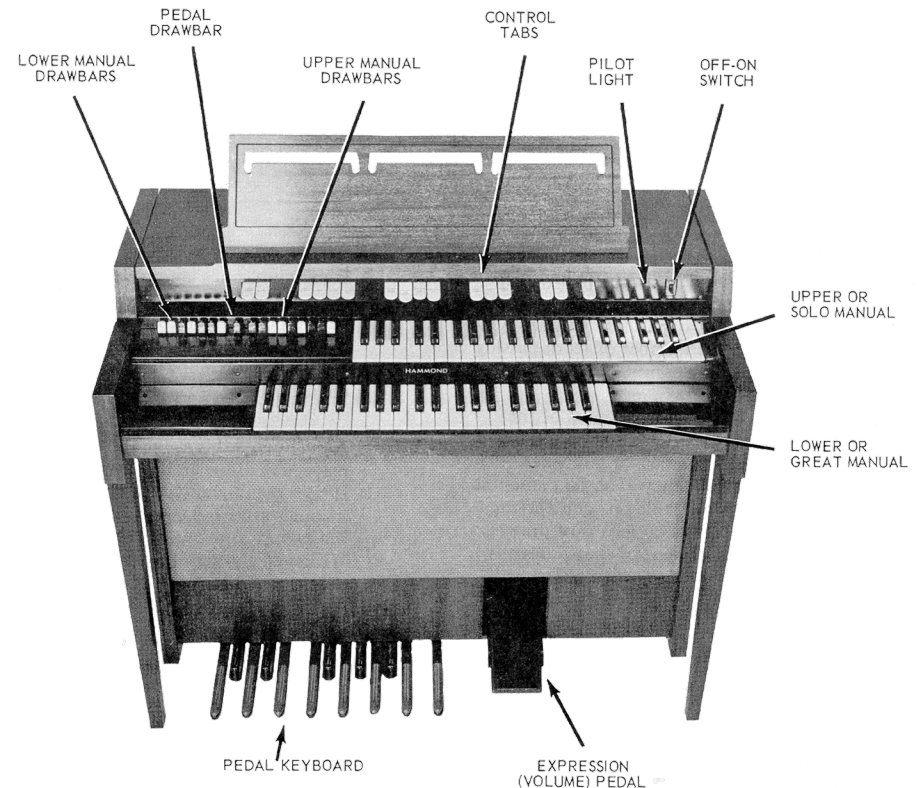


Figure 1-1: L-100 Console, Front View

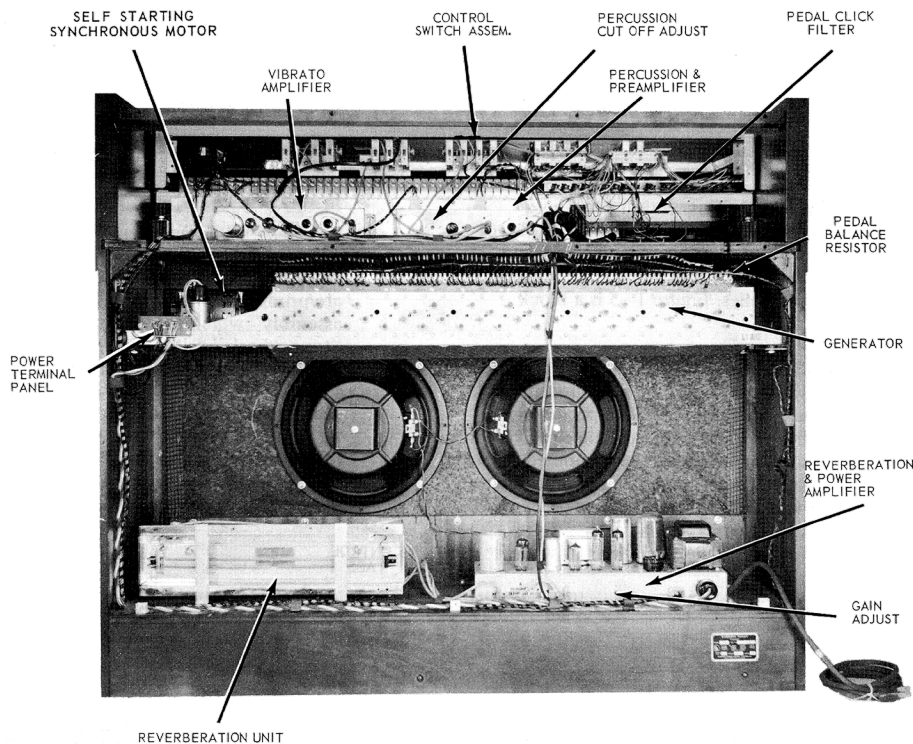


Figure 1-2: L-100 Console, Rear View

Mixed tones from the upper manual and lower manual and pedals go through the pre-amplifier and the “vibrato amplifier”. Vibrato may be added, depending on the position of the vibrato selector tabs. The tones then pass through the expression control and additional stages of amplification before reaching the speaker.

Percussion tones are produced by borrowing a signal from the upper manual 2nd harmonic drawbar, 3rd harmonic drawbar, or both, and conducting the signal through the percussion amplifier, where its decay characteristics are controlled.

A portion of this signal is returned to the respective drawbar. The percussion signal is then combined with the signal from the manuals after the vibrato system but before the expression control. The control tubes are keyed through the 6th harmonic key contacts and busbar.

The pedal tones do not require drawbars for tone color variation, because they are produced as complex tones by special tone wheels. The single pedal drawbar adjusts the volume of the pedals relative to that of the manuals, and the pedal signal then is combined with the signal from the manuals before passing into the matching transformer.

1-3 MOTOR AND POWER SWITCH

The tone generator assembly, in which all tones of the organ originate, is driven at constant speed by a self starting synchronous motor, operating at 1800 RPM located at the left side (rear view) of the console (Figure 1-2). (In 50 cycle organs, the generator speed is 1500 RPM).

A toggle switch (Figure 1-1) controls power to the organ.

1-4 TONE GENERATOR

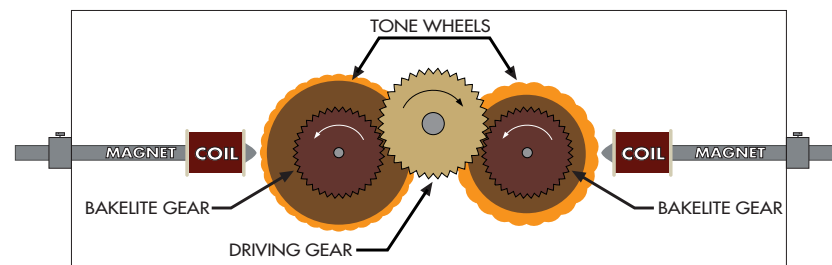


Figure 1-3: Section of Main Generator

All tones of the organ originate as electrical signals in the tone generator assembly. It contains 87 tone wheels having various numbers of teeth, with suitable gears for driving them at various speeds from a main shaft extending along the center. Each pair of tone wheels is mounted on a shaft and between them is a bakelite gear held by a coil spring, forming a mechanical vibration filter (see Figure 1-3). As the gear is not rigidly attached to the shaft, any pair of wheels which may be stopped accidentally will not interfere with the operation of the others.

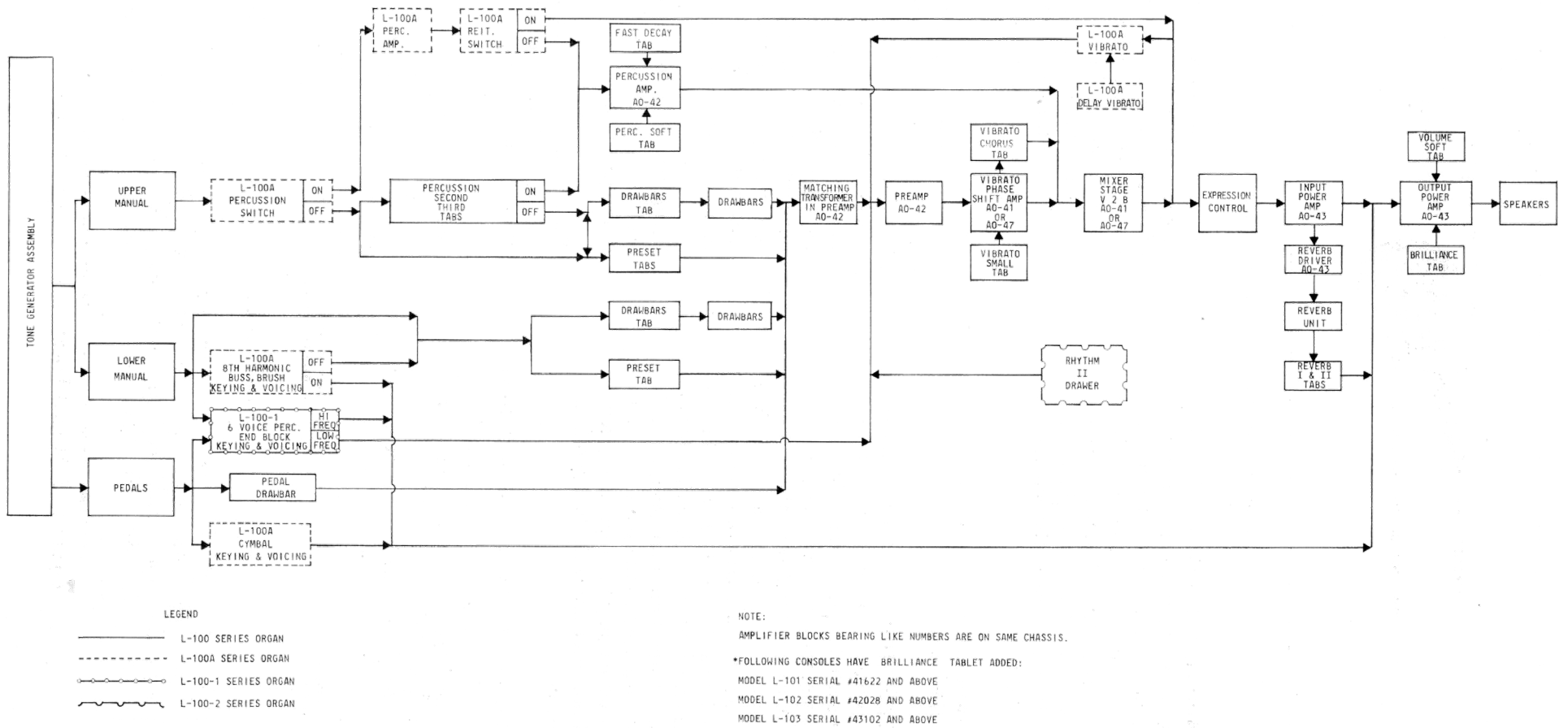


Figure 1-4: Block Diagram, L-100 Series

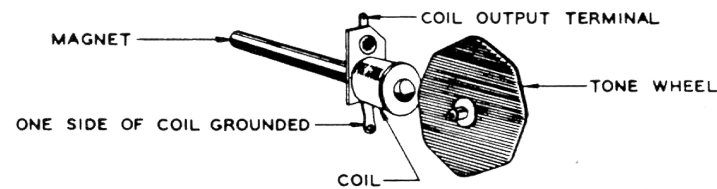


Figure 1-5: Typical Tone Generator

Adjacent to each tone wheel is a magnetized rod with a pickup coil wound on it. These magnets extend through the front and back of the generator, and are held by set screws which can be loosened in case adjustment is ever necessary. *Figure 1-6* shows the location of the magnet for any frequency number. In the illustration the dotted lines indicate frequencies whose tone wheels are on the same shaft.

On top of the tone generator assembly are small transformers and condensers, forming tuned filters for the higher frequencies. They are not likely to need replacing. In case one filter becomes inoperative, both the transformer and condenser must be replaced with a matched set from the factory. *Figure 1-7* shows the location of these filters. A few frequencies use untuned filters consisting of coils alone.

Wiring from the various filter assemblies leads to the terminal strip on the long edge of the generator.

The output frequencies of the tone generator are numbered, for convenience, in order of increasing frequency. The lowest, number 1, is about 32 cycles per second, and the highest, number 91, is about 6000 cycles per second. Frequency numbers 1 to 13 are used only for the pedals; numbers 14 to 17 are omitted; and numbers 18 to 91 are used for the manuals. *Figure 1-7* showing filter locations also shows the termination point of each frequency, while *Figure 1-5* shows typical tuned and untuned tone generators.

In case any generator frequency is weak or absent, refer to *Practical Service Suggestions* for the procedure to be used in locating and correcting the trouble.

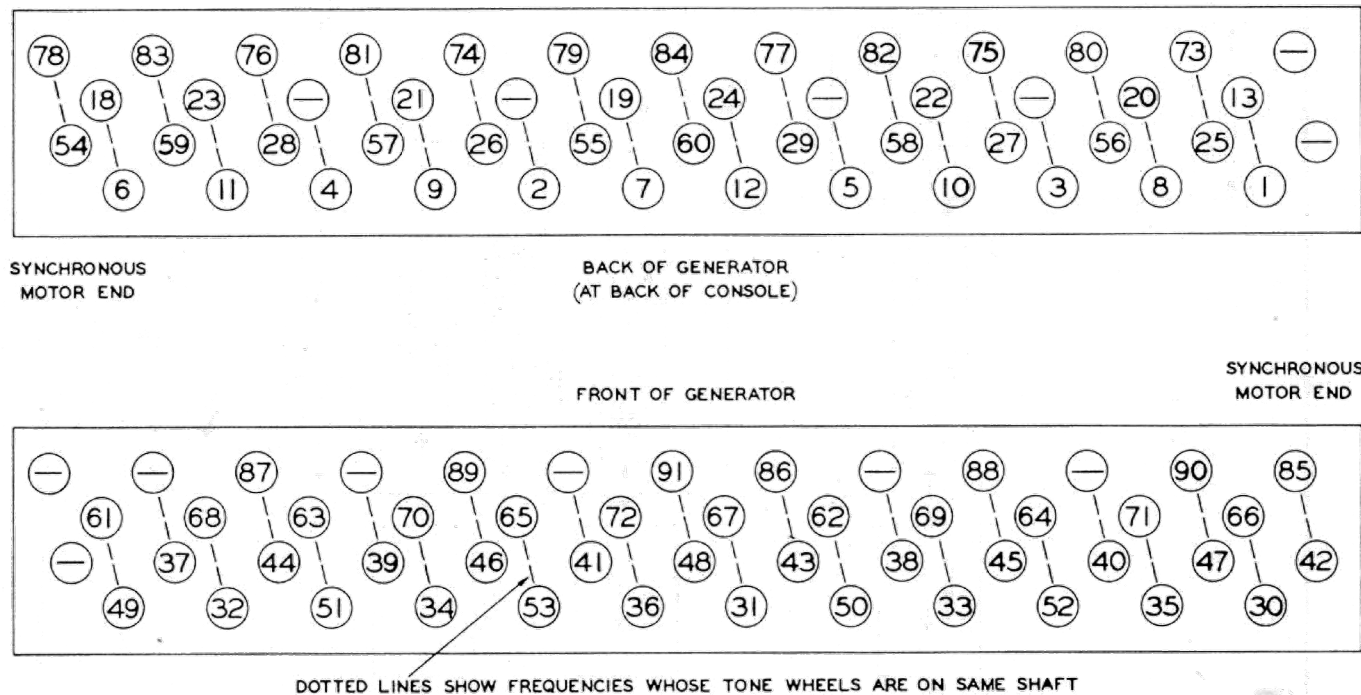


Figure 1-6: Magnet Locations on Tone Generator

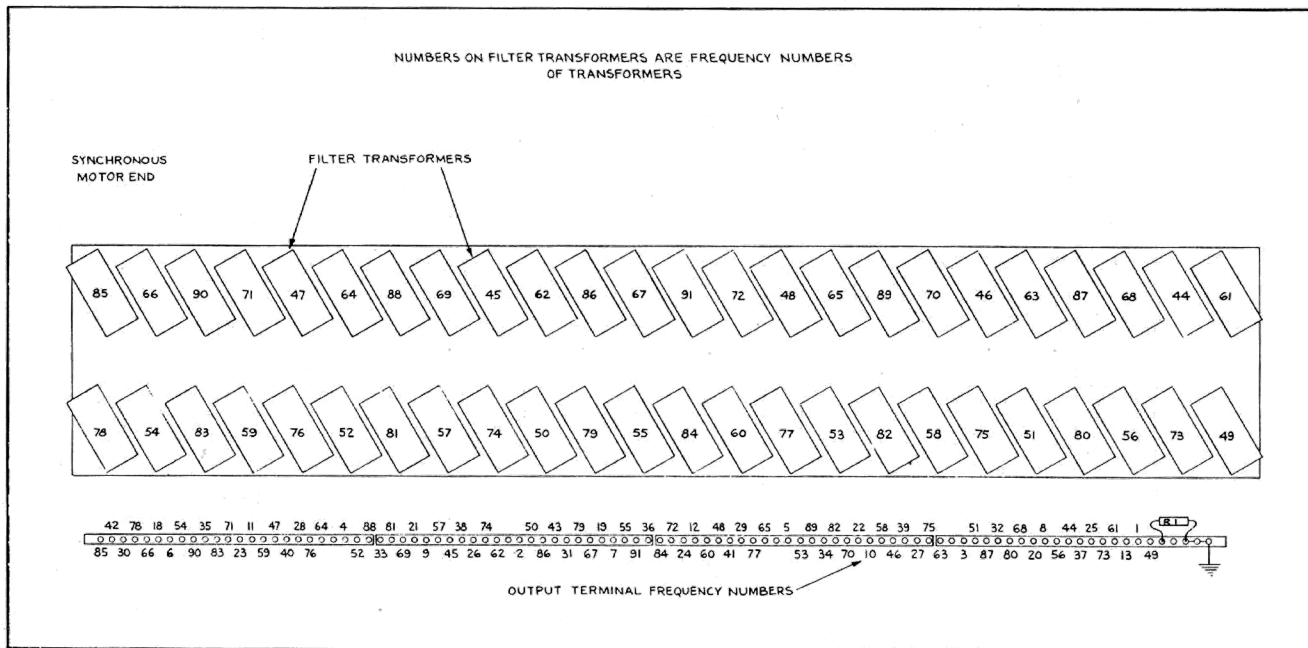


Figure 1-7: Filter Locations and Frequency Terminations on Generator Cover

1-5 MANUALS

Musical frequencies from the tone generator go through the manual cable to terminal strips on the two manuals and from them to the key contact springs.

Each of the two manuals has 44 playing keys, or approximately $3\frac{1}{2}$ octaves. The two manuals do not cover exactly the same pitch range, but they are arranged so that keys of like pitch are in line. Middle "C" is the first C on the upper manual and the key in line with it on the lower manual.

Under each key are a number of contact springs (for the fundamental and harmonics of that key) which contact an equal number of busbars when the key is pressed. All contact springs and busbars have precious metal contact surfaces to avoid corrosion, and the manuals are sealed to exclude dust so far

as possible. In case a contact becomes dirty in spite of these precautions, a busbar shifter is provided in each manual to slide the busbars endwise and thus provide a fresh contact surface. (See paragraph "4-7-11 Key Does Not Play or Harmonic Is Missing" on page 35.)

Looking under the lower manual on the left hand end (front view) a black wood end block will be observed. One half inch from the front of this block is a drilled hole. Within this drilling is a small metal tongue with a punched hole. Using either long nose pliers or a hook, this tongue can be moved in and out and it in turn moves the busbars. The upper manual shifter is in a similar place and access to it is from the rear of the console.

The key contacts are connected through resistance wires to the manual terminal strips. The manual wiring chart, *Figure 1-8*, shows how the contacts of each key are connected to the proper frequencies to supply the fundamental and harmonics of that particular key. The blank spaces indicate that no key contact is used, inasmuch as the higher harmonics of these keys are not required. Since the percussion control circuit is keyed through the

6th harmonic busbar, the blank spaces in this row have contacts connected to ground through resistance wires.

The busbars of each manual, each one carrying a certain harmonic, are wired to the appropriate harmonic drawbars for that manual through the "Drawbars" tab.

HARMONIC	BUSBAR LEAD COLOR	FREQUENCY NUMBERS																																																											
		18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61																
SUB-FUND	BROWN																																																												
FUND	ORANGE	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73																
UPPER MANUAL	3RD	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91																	
	4TH	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91																						
	5TH	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91																										
	8TH	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91																																		
	2ND	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85																
	SUB-3 RD	RED	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80															
	6TH	GREY	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*								
	NOTES																																																												
F	F#	G	G#	A	A#	B	C	C#	D	D#	E	F	F#	G	G#	A	A#	B	C	C#	D	D#	E	F	F#	G	G#	A	A#	B	C	C#	D	D#	E	F	F#	G	G#	A	A#	B	C	C#	D	D#	E	F	F#	G	G#	A	A#	B	C						
6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61						
KEY NUMBERS																																																													
FREQUENCY NUMBERS																																																												BUSBAR LEAD COLOR	HARMONIC
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	BROWN	FUND																
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	RED	2ND																
46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	GREEN	5TH																
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	BLUE	6TH																	
54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	VIOLET	8TH																						
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	ORANGE	3RD																
42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	YELLOW	4TH																

* CONTACTS GROUNDED THROUGH 16 OHMS

Figure 1-8: Manual Wiring Chart

1-6 HARMONIC DRAWBARS

The left group of seven harmonic draw bars (*Figure 1-9*) is associated with the lower manual, and the right group of nine draw bars controls the upper manual. By sliding these drawbars in and out, the organ is able to mix the fundamental and harmonics (or overtones) in various proportions. The distance a bar is pulled out determines the strength of the corresponding harmonic; and if a drawbar is set all the way in, the harmonic it represents is not present in the mixture. Neither manual will play unless one of its drawbars is pulled out at least part of the way with the drawbar tab pressed, or a preset tab is pressed.

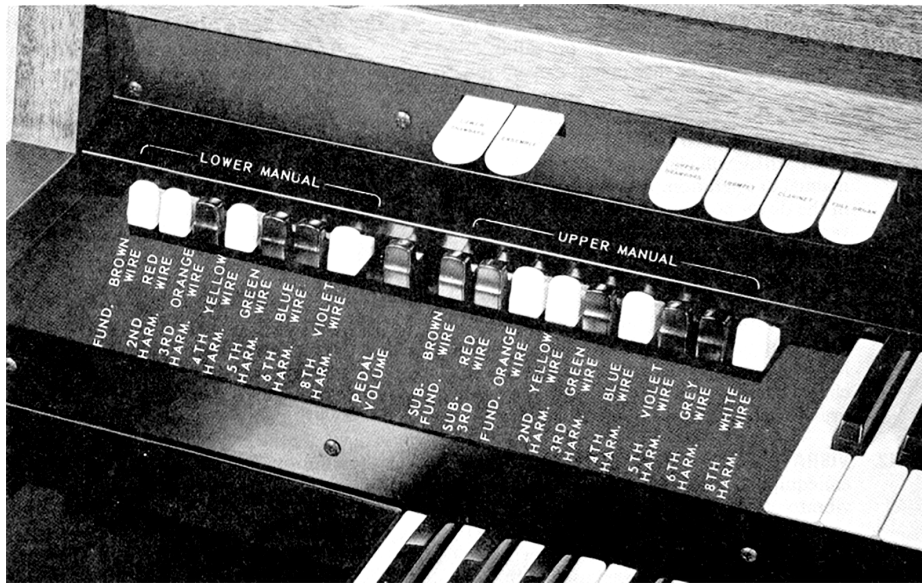


Figure 1-9: Drawbars & Control Tabs (Partial View)

The drawbars slide over 17 busbars, representing intensity levels. As the drawbar moves, its contact is touching some busbar at all times, and therefore there is a smooth change in volume of that harmonic.

These busbars extend the length of the drawbar assembly, and are connected to the low impedance primary of a matching transformer. Signals from the high impedance secondary of this

transformer go to the preamplifier input. The matching transformer is located within the preamplifier chassis.

1-7 PEDAL DRAWBAR

The center drawbar adjusts the volume of the pedals. Its operation is similar to that of a manual drawbar.

1-8 PEDAL KEYBOARD

The 13 playing pedals are operated by the left foot and are connected to the lowest 13 frequencies of the generator. Like the manuals, they have light and dark keys arranged in the standard octave pattern. *Figure 1-10* identifies the pedals and shows the generator frequency number associated with each. A single contact on each pedal closes when the pedal is pressed, thereby allowing the correct generator frequency to reach the amplifier.

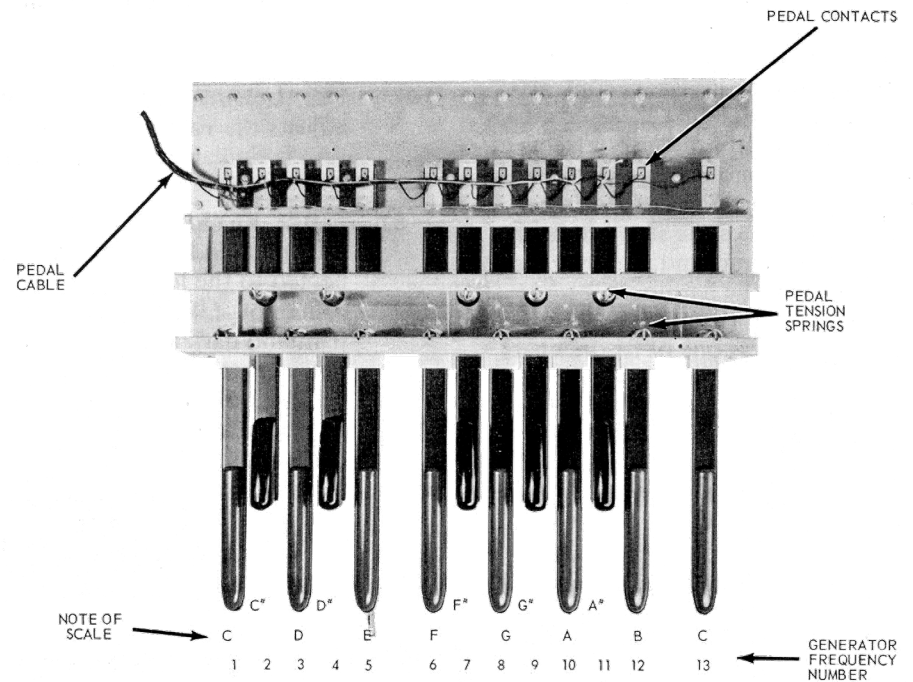


Figure 1-10: Pedal Keyboard

1-9 EXPRESSION PEDAL

The expression pedal, sometimes called “swell” pedal (*Figure 1-1*) is operated by the player’s right foot and varies the volume of both manuals and pedals together. When the pedal is tilted back (closed) by pushing on the player’s heel the music is softest, and when pushed forward (opened) by the player’s toe the music is loudest.

1-10 CONTROL TABS

There are 17 tabs on the L-100 series instrument, each providing some change in the instrument’s operation.

To have the instrument sound after turning it on, tabs such as FULL ORGAN and ENSEMBLE will place the upper and lower manual in operation. A tab is in use when in the down position. Functions of the various tabs from left to right as they appear on the instrument are given in the following paragraphs.

1-11 PRESET TABS

Four tabs are provided for the upper manual and two for the lower manual. As indicated, they provide a choice of using the drawbars or playing the preset tones indicated on them.

1-12 VIBRATO TABS

The L-100 series organs are equipped with 3 tabs which vary the vibrato effect. Three degrees of vibrato are available using the VIBRATO NORMAL, VIBRATO SMALL or both together. VIBRATO CHORUS can be used with VIBRATO NORMAL, VIBRATO SMALL, or both, to provide different degrees of chorus.

1-13 REVERBERATION AND VOLUME SOFT TABS

Several degrees of reverberation are obtained by the use of either or both tabs labeled REVERB I and REVERB II. These tabs, in addition to turning this feature on, govern the loudness or amount of reverberation by a resistive network used in conjunction with the

speaker. The VOLUME SOFT tab controls the overall volume of the organ and is especially useful where playing.

1-14 PERCUSSION CONTROL TABS

There are four of these tabs which operate only when the upper manual DRAWBARS tab is depressed. Pressing either the SECOND HARMONIC or THIRD HARMONIC tab will, when the upper manual is played, cause the tone to sound percussively (in addition to sustained organ tones). Both tabs can be depressed, giving a combination percussive tone. The FAST DECAY tab causes the percussive tones to fade away with greater rapidity. PERCUSSION SOFT reduces the volume for the percussive signal. Operation of the electrical circuits associated with this feature is described in subsequent paragraphs.

1-15 L-100A PRESET PERCUSSION UNIT

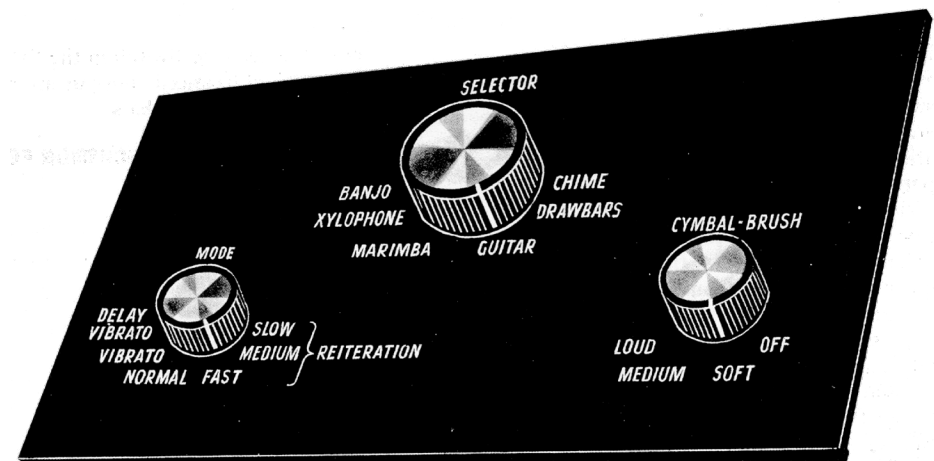


Figure 1-11: L-100A Preset Percussion Unit

When added to the L-100 series instrument, this unit adds five pre-voice percussion effects, including reiteration in three speeds. It also provides three percussion effects, “Normal (Non-Vibrato)”, “Vibrato”, and “Delayed Vibrato”. For the rhythm accompaniment it also provides a “Cymbal-Brush” effect, the “Brush” being on the

lower manual, and available when played in a legato fashion each time a key is depressed. The “Cymbal” is available on the pedal and sounds each time a pedal is depressed. The “Cymbal-Brush” control turns these effects on and selects the “Cymbal-Brush” volume.

1-15-1 SELECTOR SWITCH

With the Selector Switch in the “Drawbar” position, the signals from the upper manual harmonic busbars are routed to their associated drawbars in the upper manual group. The following is a breakdown of the harmonic switching used.

1-15-2 HARMONIC BUSBAR SWITCHING AND REITERATION SPLIT—UPPER MANUAL

The sub-fundamental, sub-third and eighth harmonics are not switched. The sixth harmonic busbar is used for percussion keying.

With the Selector Switch in the “Drawbar” position, all harmonic busbars are routed to their associated drawbars (see *Table 1-1*).

Selector Position	“A” Channel	“B” Channel	DRAWBARS
Chime	2nd, 3rd, 4th, 5th (to Fc Div.), 1-¼ (to Fc Div.)		Fundamental
Guitar	Fundamental, 3rd, 4th, 5th		2nd
Marimba	Fundamental	2nd	3rd, 4th, 5th
Xylophone	Fundamental	3rd	2nd, 4th, 5th
Banjo	2nd, 3rd, 4th, 5th		Fundamental

Table 1-1: Select Switch Effect on Drawbars

1-16 L-100-1 SIX-VOICE PERCUSSION FEATURE

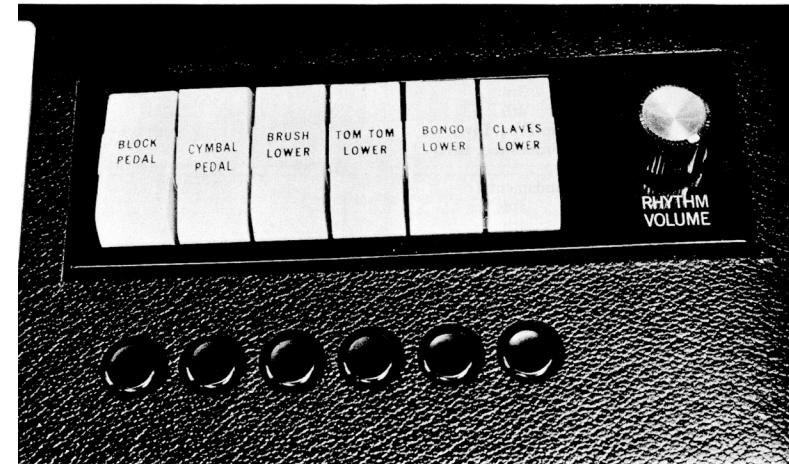


Figure 1-12: L-100-1 Six-Voice Percussion Controls

1-16-1 LOCATION OF CONTROLS

The rhythm controls are located on the right end block of the lower manual.

1-16-2 VOICING

The following voices are available.

BLOCK
CYMBAL
BRUSH
BONGO
TOM-TOM
CLAVES

1-16-3 OPERATION OF CONTROLS

Any of the six voices may be played at any time by means of the momentary push buttons associated with the rocker tabs.

The BLOCK and CYMBAL voices are programmed into the pedal keyboard when their rocker tabs are “on”. The remaining four voices are programmed into the lower manual keys when their rocker tabs are “on”.

The RHYTHM VOLUME control, mounted to the right of the rocker tabs, regulates the loudness of the rhythm voices relative to the other organ voices. The organ’s expression pedal also affects the rhythm voices except brush and cymbal.

The BRUSH and CYMBAL voices sound without reverberation, The remaining voices are reverberated whenever a REVERB tab on the organ’s control panel is depressed.

1-17 EXTERNAL EQUIPMENT

The L-100 Series organs may be equipped with extension speakers, external inputs and earphones.

1-18 EXTENSION SPEAKERS

A Hammond Model PR-40 Tone Cabinet may be used as an extension speaker, A Tone Cabinet Control Kit, P/N AO-22625-2 is required for proper interconnections. Installation instructions are furnished with the kit.

1-19 EXTERNAL SOUND SOURCE

A record player or microphone equipped with a suitable preamplifier, or a radio, can be played through the organ’s speaker. The device used should have an output level of about ½ volt rms maximum, and should have its own volume control, since the organ volume controls will not affect the signal. The organ may be played at the same time.

To connect an external sound source, a Switchcraft Type 330 F1 “Y” connector is required. Remove the connector cable from the WH (White) RCA terminal on the power amplifier.

Insert the “Y” connector into the terminal, and insert cable previously removed into one arm of the “Y”. Connect the external sound source to the other arm.

1-20 EARPHONES

In order to use earphones, the output jack and network shown in *Figure 1-13* are required. When earphones are in use, organ speakers are silenced.

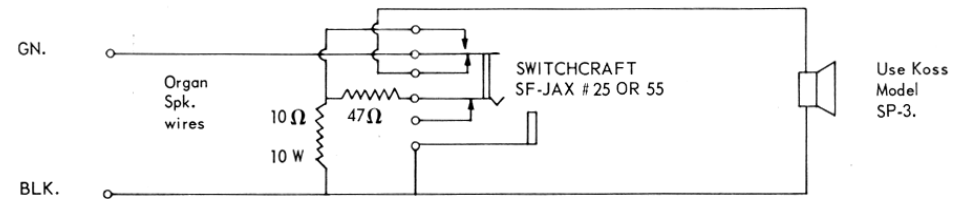


Figure 1-13: Earphone Adapter Circuit

SECTION II

THEORY OF OPERATION

2-1 GENERAL

This section contains circuit descriptions of the amplifier chassis, and the percussion attachments. There are three amplifier assemblies in the L-100 series instruments. On the upper shelf as viewed from the rear, to the left is the vibrato amplifier, towards the center is the preamplifier and percussion amplifier, while the reverberation and power amplifier is located on the lower shelf.

2-2 PRE-AMPLIFIERS

(See Figure 5-2)

The preamplifier (V1) receives all signals impressed on the matching transformer secondary, which originate by use of the drawbars or preset tabs. Should any percussion tab be in use, a portion of the second, third or both harmonics of the upper manual will also appear in the input circuit of the percussion amplifier which will be discussed further on.

2-3 VIBRATO PHASE SHIFT AMPLIFIER

(See Figure 5-2)

The vibrato system varies the frequency of the tones by continuously shifting their phase. Circuit components include three series-connected vacuum tube phase shifter stages (V2A, V2B, and V3A), associated saturable reactors (SR101, SR102, SR103), voltage amplifier (V3A), vibrato oscillator (V4A), and driver stages (V4B, V5).

A single low frequency oscillator (V4) provides the rate for the vibrato system (approx. 6.8 CPS). With either the normal or small vibrato tab in use, this oscillator impresses its signal on V4, a cathode follower and isolation stage. Positive pulses now appear on the grid of driver tube V5. The plate circuit of this tube is in series with three saturable reactors located in the plate and cathode circuits of the phase shift stages. Irrespective of which vibrato stop is used, the rate remains constant, but the degree of vibrato is determined by the amplitude of the positive pulse on the driver tube.

The continuous phase shift is accomplished by using 180° out-of-phase signals from the plate and cathode of each shifter stage and controlling them with the saturable reactors. Plate and cathode resistors are of equal value and consequently signals are equal in amplitude in each plate and cathode circuit. The saturable reactors serve as a means of providing a varying composite of signals from both plate and cathode of each stage, ranging from virtually full cathode signal to full plate signal.

The driver tube plate current varies from about .5ma to 5ma at vibrato rate. This current varies the degree of saturation in the reactor cores and results in a smoothly varying impedance.

At minimum driver current (when the voltage feeding driver tube V5 is negative and driver tube is nearly cut off) the reactor impedances are maximum and are large compared to the 15,000Ω plate circuit series resistors R104, R110, and R115.

Therefore, under this condition most signal will emanate from the plate. (The reactors being virtually short circuited by the plate circuit series resistors) and phase shift will be maximum—approaching 180°—since plate voltage is 180° out of phase with grid voltage.

At maximum driver current (when voltage feeding driver tube V5 is positive and driver tube is conducting maximum current) the reactors are saturated and their impedance is a minimum—small compared to the 15, 000Ω plate circuit series resistors R104, R110, R115. Therefore, most signal will emanate from the cathode (the saturated and low impedance reactors virtually short circuit the plate circuit series resistors) and phase shift will be a minimum—approaching 0°—since cathode voltage is in phase with input grid voltage.

Between these extremes, the phase varies smoothly under control of the saturable reactors.

The continuous change in phase is equivalent to a continuous frequency variation, and thus the frequency varies up and down at vibrato rate.

2-4 PERCUSSION AMPLIFIER

(See Figure 5-2)

With either or both of the 2ND or 3RD HARMONIC tabs depressed, the signal will be impressed upon the input of the 2N306 transistor. The output of this transistor is resistance coupled to the one half of V11 which acts as a control tube and is normally conducting, so when a key is depressed the percussive note first sounds loudly. It passes through the control tube and a band pass filter and is impressed on the grid terminal of V1.

Immediately the note begins to fade away, giving the characteristic percussion effect. This fading is accomplished as follows: When either harmonic stop is depressed the keying wire (normally held at +28VDC through anti-spark resistor R215) is connected to the solo manual 6th harmonic drawbar. When a key is pressed this keying

line is grounded through the key contact and tone generator filter. This virtually grounds the grid and plate of V11 (connected as a diode) open-circuiting the tube and isolating the control tube grid circuit. The grid of the control tube drifts from its operating potential of about 25 volts to a cutoff potential (about plus 15 volts) at a rate determined by the time required for C210 to discharge through R219 and R409.

The percussion signal is now blocked. No percussion notes can sound until all keys of the solo manual are released and the control grid again rises to plus 25 volts. The time of this rise (that is, how quickly the control tubes turn on again after the key is released) is the time required to charge C210 to plus 25 volts through R218

When a “percussion” tab is pressed, the solo manual second, third, or both harmonic manual busbars are connected to the green percussion signal line and a 5Ω series resistor is connected between the manual bus wire and drawbars providing for a sustained signal in addition to the percussion signal. The 6th harmonic drawbar is disconnected from its lead wire and this wire (which is grounded through the generator magnets when any key is pressed) is used to turn off the control tube. Therefore the 6th harmonic is not available on the upper manual when the percussion is in use.

When the PERCUSSION SOFT tab is down, it reduces the volume by shunting resistor R224 into the dividing network composed of R222 and R223.

The PERCUSSION FAST DECAY tab determines how fast the sound fades away after a key is pressed. When the tab is up, resistor R219 discharges capacitor C210, reducing the DC voltage on the control tube grids to cut-off in about 2½ seconds.

When the tab is down, resistor R409 is shunted across resistor R219, reducing the time to discharge capacitor C210 and thereby reducing the DC voltage on the control tube grid to cut off in less than one-half second.

With either or both 2ND and 3RD HARMONIC tab down, the harmonic drawbar wires are connected to the green signal input wire of the percussion amplifier. Either or both signals are fed back to their respective drawbars by resistors R410 and R411 which are shorted out when the percussion tabs are not in use.

The percussion signals as well as the signals from the vibrato and phase shift amplifier are combined in the input circuit of cathode follower V1 and are sent to the expression control, which is also connected to the input of the reverberation and power amplifier.

2-5 REVERBERATION AND POWER AMPLIFIER

(See Figure 5-2)

The combined signal, from both prior mentioned amplifiers (after the expression control has acted upon them) are impressed on the grid of V6 and in turn on V7, the reverberation drive tube. After passing through the reverberation unit the signal is again amplified by V6 and passed through a resistive network, components of which are variable, permitting the reverberation to be available in several intensities and “off”. From the input of V7 (the reverberation drive tube) a signal is shunted around the reverberation unit and its control features which provide a path for the non-reverberation signal. The input of V8 receives this signal as well as a reverberative signal. This common input line also contains the VOLUME SOFT tab circuitry.

The output of the second half of V8 is a phase inverter driving push-pull output tubes V9 and V10. A feedback circuit from the output transformer secondary (R336 and R337) makes the pedal response more uniform by reducing speaker resonance R336 is adjusted at the factory

2-6 POWER SUPPLY

(See Figure 5-2)

The power supply uses a 5U4 rectifier tube with conventional filtering circuit.

2-7 L-100A PERCUSSION VOICING CIRCUITRY

(See Figure 5-3)

2-7-1 MODE SWITCH

With the “Mode Switch” in any of the reiteration positions, the harmonics necessary to produce the “Chime”, “Guitar”, and “Banjo” are all fed into the “A” reiteration channel only, while the “Marimba” and “Xylophone” effects feed harmonics into both the “A” and “B” channels. This split into the “A” and “B” channels only occurs with the use of reiteration. Without reiteration, all effects are routed into the regular percussion system. The two reiteration channels are identical.

You will note that a field-effect transistor is located across the secondary windings of the two input transformers. These gates—Q100 and Q303—are fed alternating pulses from a bistable multi-vibrator which supplies alternate pulses to each one of these gates. While one is on, the other is off. These gates shunt the signal to ground, thereby making the channel inoperative. These individual signals are further amplified by a one stage transistor amplifier, Q301 for the “A” channel and Q302 for the “B” channel. They are then mixed together and fed to a common amplifier, Q307, which in turn feeds this percussion signal to the input side of the swell pedal.

The multi-vibrator which supplies the keying pulse for these two gates does not run continually, but rather is turned off and on each time a key is depressed on the upper manual. The multi-vibrator consists of Q305 and Q306. The multi-vibrator rate varies with the applied base voltage. This voltage is applied through the “Mode Switch” and R684 and R685. Q304 provides the necessary switch pulse to start the multi-vibrator.

NOTE 2-7-A

Whenever the reiteration is used, it completely bypasses the percussion section of the AO-42 amplifier.

With the “Mode Switch” in the “Normal”, “Vibrato”, or “Delayed Vibrato” position, the various pre-voiced percussions are routed to a percussion preamplifier comprising Q314 and Q313. These amplified signals are then routed into the regular Hammond percussion system at the collector of Q201. With the “Mode Switch” in the “Normal” position all percussion voices sound as normal—that is, they have no vibrato.

NOTE 2-7-B

To obtain the following vibrato effects it will be necessary to depress one or both of the VIBRATO tabs.

With the “Mode Switch” in the “Vibrato” position, a portion of the percussion signal is taken from the input side of the Expression pedal and routed through R670, the “Mode Switch”, and is then fed to the grid of V1A (Pin 2). Here the percussion voices are amplified and fed to the vibrato phase-shift amplifier. All voices so routed now appear with vibrato.

With the “Mode Switch” in the “Delayed Vibrato” position, a portion of the percussion signal is taken from the input side of the Expression pedal, and routed to a voltage divider made up of R682 and R681. This weak signal is fed to the base of Q112. Note that the emitter of this stage is not bypassed and the output of this stage is relatively low. During keying, after a .5 second delay, the charge on C631 is depleted by Q308 and Q309. With this charge depleted, Q308 and Q309 stop conducting and their respective collectors assume the supply potential +12V. This +12V, from the collector of Q309, is now applied to the base Q310, thereby placing Q310 and Q311 in a state of conduction. With Q311 now conducting, C633 is placed across the emitter resistor of Q312. This materially increases the gain of this stage, and, as the percussion is dying away, feeds this amplified portion of the fading percussion signal through both the “Mode Switch” and R683 to the grid of V1A (Pin 2). There the signal is amplified and fed to the Vibrato Phase Shift Amplifier. All voices so routed now appear with a vibrato tail-off.

Two positions of the “Mode Switch”, “Vibrato” and “Delayed Vibrato”, also affect the normal Hammond percussions when they are in use (See *Note 2-7-B* above).

2-7-2 FREQUENCY DIVIDER

When using the “Chime” voice, it is necessary to create a 1-¼ harmonic for the proper reproduction of the “Chime” tone. This is accomplished by routing the 5th harmonic into an amplifier made up of Q315 and Q316. Q317 rectifies and further amplifies this pulse which is then fed to a two-stage frequency divider made up of Q318, Q319, Q320, and Q321. The output of this second frequency divider is then routed back to the “Selector Switch”, and is used as one of the harmonics in the “Chime” voice.

NOTE 2-7-A

Because a frequency divider can handle only one frequency at a time, any attempt to play two or more “chime” notes at a time will result in distortion.

2-7-3 CYMBAL AND BRUSH

The “Cymbal-Brush” switch when in the “off” position disables the keying functions necessary to produce the “Brush” effect. With the “Cymbal-Brush” switch in any one of the “on” positions, the 8th harmonic of the lower manual is disabled and this harmonic busbar is used for keying the “Brush” effect. The pedal signal (keying) contact is used to activate the “Cymbal” effect each time a pedal is depressed.

2-7-4 BRUSH KEYING

With the “Cymbal-Brush” switch in any of the ON positions, the base of Q322 is routed now to the 8th harmonic busbar in the lower manual. Anytime a key is depressed, the base voltage of this transistor is routed to ground, and this stage stops conducting. The attendant rise in collector voltage is impressed on one plate

of C608. The other plate of C608 responds by driving excess electrons off to ground through resistor R624. The resultant positive voltage is then fed through D203 to the base of Q323, the “Brush” gate. To the base of this “Brush” gate is also fed the noise from the noise generator Q324. This noise is now tuned in the collector circuit and fed to the “Cymbal and Brush” amplifier which consists of Q325 and Q326.

2-7-5 CYMBAL KEYING

Anytime a pedal is depressed, the pedal signal is routed to the pedal drawbar. A portion of this same signal is also fed to Q327 and Q328. These stages amplify and shape the signal and feed it through R612 to the base of Q330, and through R613 and Q205 to a R/C storage network and the base of Q329. The signal developed across R616, the emitter resistor of Q330, is rectified by Q204 and this positive voltage is applied to the base of Q331, the “Cymbal” gate, turning it on. At the same time, the output of Q328 is being rectified by D205 and slowly applied to the base of Q329. When Q329 is biased into conduction it depletes the base bias normally supplied to Q330 through R612 and Q330 stops conducting. In this state, no signal is available at the emitter or Q330 to be rectified, and Q331, the “Cymbal” gate, slowly turns off. To the base of this “Cymbal” gate is also fed the noise from the noise generator, Q324. This noise is tuned in the collector circuit of Q331 and fed to Q325 and Q326, the “Cymbal and Brush” amplifier.

2-7-6 BRUSH AND CYMBAL AMPLIFICATION

After being amplified by Q325 and Q326, the “Brush and Cymbal” signals are routed to a voltage divider consisting of R604, R605, and R606. It is then tapped by the switch and routed to R602, the overall level control. This is located on a terminal strip on the lower organ shelf, near the AO-43 amplifier. The wiper of the overall level control (R602) now feeds into the AO-43 amplifier through R601 and C318 to Pin 7 of V8. To enhance the “Brush and

Cymbal” effects, a small high frequency speaker is attached to the main amplifier. It is located under the lower right hand end block on the organ.

2-7-7 POWER SUPPLY

Power supply chassis is supplied with +340VDC from the AO-43 amplifier. The +80 volts required for the percussion assembly is obtained from voltage dividers R690 and R691. +12VDC is obtained from Zener Diode D201.

2-8 L-100-1 SIX-VOICE PERCUSSION CIRCUITRY

2-8-1 POWER SUPPLY

(See Figure 5-5)

Power supply components are located in the power supply chassis assembly (127-7 through -9). All necessary DC supply voltages for the rhythm unit are supplied by this chassis. The output voltages are 30VDC, 15VDC, and 5.5VDC. The 5.5V output is not used in the Model L-100-1 organ.

120VAC 50/60 Hz is supplied to the power transformer from an external source. The secondary AC voltage is 40VAC, which is then bridge rectified by diodes D100, D101, D102, and D103. This DC voltage is then filtered by the combination of R101, R103, C100A, C101 and then applied across the 30VDC Zener diode D104.

The 30VDC is the supply voltage for the amplifier stages Q106, Q107 and Q108 on the rhythm PWB, and the reference voltage for the 15VDC and 5.5VDC supplies. The 30VDC is supplied to the voltage divider of R107 & R108 and fed to the voltage regulators Q100 & Q102, the output of which is the 15VDC which is used to supply all other circuits on the rhythm device.

The 30VDC is also supplied to the voltage divider R106 & R105, and fed to the emitter follower Q101, the emitter output of which is 5.5VDC. Q101 is used as a voltage regulator and in conjunction with C100B provides the filtering for the 5.5VDC.

2-8-2 *PUSH BUTTON CIRCUITS*

(See Figure 5-4)

One side of each push button is connected through R200, 2.2K Ω resistor, to the 15VDC supply. The 15VDC is available to the push buttons at all times, and if one is depressed at any time, that particular voice will appear at the output. When any of the push buttons are depressed, that button applies 15VDC to the base input of a phase shift oscillator

For example, if the BLOCK push button is depressed, 15VDC is applied to the junction of R100B and capacitor C100B. This signal is differentiated by C100B and the resulting pulse is fed through D100B and R105 to the base of Q100B, turning it on. This signal is fed back to the base, inverted by the phase shift network C103B, C102B, C104B, R106B, and R107B, and will be regenerative for a period of time determined by R100B, C100B, and R101B. The decay time of the collector output depends upon the values of C101B, R105B and R102B. The output is coupled through capacitor C105B, resistor R104B, and capacitor C120 to the base of amplifier stage Q107. After amplification by Q107 and Q105, it is connected to R203, the volume control. TOM-TOM, BONGO, and CLAVES are similar in operation. The frequencies of the oscillators are determined by the values of the components in the phase shift network.

When the BRUSH push button is depressed, +15VDC is supplied to the junction of R116 and C111, and this supplies bias through D102 to the base of Q103, turning "on" the one shot multi-vibrator stage, Q103 and Q104 for one complete cycle.

The Brush Gate transistor Q105 is turned "on" for a period determined by C113 and R120 of the multi-vibrator stage. This applies positive bias through R123, D104, and R124 to base of

Q105, turning on Q105 and allowing white noise to appear on collector of Q105, tuned by C115 and L101. This signal is then routed through C117 and output level control R126 and R127 to hiss amplifier Q106.

2-8-3 *LOWER MANUAL KEYING CIRCUITS*

(See Figure 5-4)

The lower manual buss line is connected through C124 and the base of Q109, which is a pulse amplifier stage. Resistor R147 provides base bias to the stage, so that with no key depressed, the collector is at approximately 4.5VDC. C124 and R145 are a differentiating network that puts a pulse on the base of Q109. This pulse is amplified by Q109, and the collector of Q109 instantaneously rises from 4.5VDC to approximately 11VDC. This change is routed through R149 to the base of Q110, which at an emitter voltage of 5.5VDC and base bias of 4.5VDC was "off". With 11VDC on its base, Q110 turns "on", and its collector, which was at 15VDC drops to 5.5VDC.

This change is coupled through C126 and R153 to the base of Q111, a PNP which has been biased "off" through R152 and R153. The change in bias turns "on" Q111 and the collector has an instantaneous output of +15VDC for about 2 milliseconds duration. This trigger pulse is defined as the lower manual trigger pulse. The pulse is routed through whichever LOWER tabs are "on" to trigger the selected voices. Output is obtained as described in 2-8-2 *Push Button Circuits*.

2-8-4 *PEDAL KEYING CIRCUIT*

(See Figure 5-4)

A signal of approximately 75mv P-P from the pedal keyboard is connected to the input T4. The first two stages using transistors Q1 & Q2 are basically amplifiers providing a +13VDC square wave pulse for each input cycle. The first +13VDC square wave pulse appearing on transistor Q2 collector turns on Q4, providing a +13VDC pulse at output terminal T11. At the same time C4 is

charged through R6. This charging time is long enough to delay the conduction of Q3 until after the first pulse; then Q3 conducts, cutting off Q4 before the second pulse can be passed. Effectively, each time a signal is applied to the input at T4, one pulse appears at the output terminal (T11), which connects to terminal F of voice generator board 124-000114. Q115 is normally off. The input at "F" is fed through R163 to the base of Q115 to turn the transistor on. When Q115 is on, the DC voltage at its collector drops from +15VDC to 0VDC. Note that pin "G" is jumpered to pin "C", and that both are common to Q115's collector.

The signal altering pin "C" is fed through R160 to the base of Q114, which is normally in the "on" condition with no pedal pressed (collector at 0VDC). When a pedal is pressed, the negative signal applied to the base turns "off" Q114, and the collector voltage rises to +15VDC.

Point "D" is routed to point "A" and coupled through C127 and R156 to the base of Q112. Q112 which is normally "off" is turned "on", and its collector voltage drops to zero. The collector signal of Q112 is then fed to the base of PNP Q113, turning it "on", and its collector switches to +15VDC.

This +15V DC pulse on the collector of Q113 is designated as the pedal-down pulse, and is routed through the BLOCK and/or CYMBAL tabs, when "on" to trigger the selected voices. Output is obtained as described in *2-8-2 Push Button Circuits*.

SECTION III

DISASSEMBLY

3-1 GENERAL

This section contains description of disassembly techniques peculiar to L-100 Series organs.

3-2 ACCESS

For access to some of the parts discussed in following paragraphs it may be necessary to remove organ top, back, or both.

3-3 UPPER MANUAL KEY

To remove an upper manual key, proceed according to the following:

- a. Remove four screws which secure metal cover on control panel assembly.
- b. Remove two large screws located at ends of control assembly, which secure it to the upper manual.
- c. To remove a black key, loosen its key mounting screw. Lift control panel assembly and lift out key.
- d. To remove a white key, loosen its key mounting screw and those of adjacent black keys. Lift control panel, push the keys back and lift out white key.

NOTE 3-3-A

If removal involves the lowest three keys, it will be necessary to remove or loosen drawbar assembly. See 3-6 *Drawbar, Drawbar Knobs or Drawbar Assembly*.

3-4 LOWER MANUAL KEY

To remove a lower manual key proceed according to the following.

- a. Remove four screws which secure metal cover on control panel assembly.
- b. Remove two upper manual mounting bolts which secure manual assembly to case work.
- c. Remove two screws which pass through angle brackets into upper manual. These brackets are located inside of cheek blocks. These screws are accessible from front of organ.
- d. Remove AO-41 and AO-42 amplifiers from rear of upper manual.
- e. Tilt manual up from front.
- f. Using ¼" box ratchet, loosen key mounting screw.
- g. To remove a black key, loosen its key mounting screw. Unhook key from screw and lift off key
- h. To remove a white key loosen its key mounting screw and those of adjacent black keys. Unhook these keys from screws, push them back, and lift out the white key.

3-5 DRAWBAR CONTACT SPRING

To remove a drawbar contact spring proceed according to the following:

- a. Remove four screws which secure metal cover on control panel assembly.
- b. Push drawbar all the way in.
- c. Remove screw at back end of drawbar.
- d. Pull out contact spring. To disconnect spring entirely, unsolder wire.

CAUTION

Do not under any circumstances pull drawbar forward while contact spring is off, as damper spring will catch in slot and necessitate removal of entire drawbar assembly.

3-6 DRAWBAR, DRAWBAR KNOBS OR DRAWBAR ASSEMBLY

To remove any of these, proceed according to the following.

- a. Remove four screws that secure metal cover on control panel assembly.
- b. Unsolder black wire from “Full Organ” tab switch.
- c. Remove two large screws located at ends of control assembly that secure the assembly to the upper manual. Turn control panel face up, and prop up in this position, being careful not to stress wires.
- d. Remove four hexagonal machine screws holding drawbar assembly to base.
- e. To remove knob, tilt drawbar assembly up, and remove screw which holds knob.
- f. To remove drawbar and contact spring, pull them out at back

of assembly, while pressing with thumb to release pressure on contact.

- g. To separate drawbar from contact spring, remove screw at back end of drawbar.
- h. To remove entire drawbar assembly, unsolder all connecting wires.

3-7 UPPER MANUAL

To remove upper manual proceed according to the following.

- a. Remove four screws which secure metal cover on control panel assembly.
- b. Unsolder black wire from the “Full Organ” tab switch going to drawbar assembly.
- c. Disconnect nine colored wires emanating from right end of upper manual which terminate at upper manual control Cab switches.
- d. Dismount the AO-41 or AO-47 Vibrato and AO-42 Percussion amplifiers from rear of upper manual.
- e. Remove heavy grounding wire attached to manual just to right of first key channel.
- f. Remove small bracket holding pedal click filter to manual (grey wire from pedal drawbar leads to this filter).
- g. Remove two upper manual mounting bolts which secure manual assembly to case work.
- h. Remove two screws which pass through angle brackets into upper manual. These brackets are located on inside of cheek blocks. The screws are accessible from front of organ.
- i. Remove two screws securing control panel to upper manual and tilt control panel face up.
- j. Remove four hexagonal machine screws holding drawbar

assembly to base. Control panel and drawbar assembly can be folded over and rest on top of amplifiers.

- k. Replace control panel mounting screws.
- l. Prop up front of upper manual so that its terminal strip is accessible. Be careful when raising and lowering manual that its terminal strip is not damaged by rubbing lower manual keys.
- m. Unsolder manual cable from terminal strip. Lower manual into normal Position.
- n. Carefully lift manual assembly out of console.

3-8 LOWER MANUAL

To remove lower manual proceed according to the following.

- a. Perform operations a. through e. of *3-7 Upper Manual*.
- b. Disconnect 9 colored wires emanating from right end of lower manual which terminate at lower manual control tab switch.
- c. Remove four screws from under manual assembly (front) which secure terminal.
- d. Remove lower manual end blocks by removing two screws through manual frame and one screw through bracket on cheek block.
- e. Unsolder manual cable from terminal strip.
- f. Tilt upper manual up from front. Remove two hexagonal bolts that secure lower manual to case work.
- g. Loosen four hexagonal head studs securing lower manual to front rail. (Tighten these last when reinstalling manual.)
- h. Lift out lower manual.

3-9 GENERATOR

To remove generator, disconnect organ from power source, then proceed according to the following:

- a. Remove generator power panel cover.
- b. Unsolder all wires on power panel except yellow and grey wires to motor and starting condenser.
- c. Press generator-to-manual cable and generator-to-pedal cable down and un-solder from terminal strip.
- d. Unsolder grey wire which goes to pedal click filter and remove heavy grounding wire (black).
- e. Remove four hexagonal bolts which secure generator to mounting angles. Lift out generator.

3-10 MOTOR

To remove motor disconnect organ from power source, then proceed according to the following:

- a. Remove generator power panel cover.
- b. Unsolder grey wire to motor.
- c. Unsolder red and black wires on starting capacitor.
- d. Compress coupling spring between motor and generator and remove spring.
- e. Force off spring clamp which secures motor to mounting frame. Lift out motor.

3-11 PEDAL KEYBOARD

To remove pedal keyboard, proceed according to the following:

- a. Dress down generator-to-manual and generator-to-pedal cables, unsoldering latter.
- b. Remove two screws in lower back of console and three screws between amplifier and front of console.
- c. Lift console and pull out keyboard. (When reinstalling pedal

keyboard replace two screws in back of console first, leaving them loose until remaining screws are replaced.)

3-12 SWELL ASSEMBLY

To remove swell assembly, perform steps a. through d. If replacement of assembly is required, perform step e.

- a. Remove two leads with white coded ends from preamplifier and main amplifier.
- b. Remove four wood screws securing swell housing cover to case and lift out cover.
- c. Remove four screws securing swell pedal assembly to case work. Swell assembly is now loose and can be picked up and removed from back.
- d. Swell potentiometer can be removed at this time if necessary and will require an Allen $\frac{1}{16}$ " wrench.
- e. Replacement for more dependable swell operation can be made by ordering Part Number 123-000021 from the factory, and proceeding as follows:
 1. Remove Expression Control housing.
 2. Unplug long shielded lead from Percussion Amp. Chassis and short shielded lead from Power Amplifier Chassis.
 3. Remove four screws securing Expression Control Chassis to floor of cabinet.
 4. Remove Expression Control as one.
 5. Place new Expression Control in position and secure with original screws.
 6. Plug long shielded lead into Percussion Amplifier jack and short lead into Power Amplifier Jack.
 7. Using accompanying terminal strip, splice two Brown wires from Expression Control into Blue & Gray 6.3VDC filament leads originating in 6-pin rectangular plug on Power Amplifier Chassis. Secure Terminal Strip to cabinet floor with small wood screw.

8. Replace Expression Control Housing.

NOTE 3-12-A

If swell assembly is replaced as directed, circuitry will conform to Figures 5-3 and 5-4.

3-13 TO REPLACE A BROKEN TAB

Proceed according to the following:

- a. Remove four screws which secure metal cover on control panel assembly.
- b. Remove two Phillips screws from front of control panel which hold bank of switches associated with tab to be replaced.
- c. Remove lock washer from either end of switch assembly, and pull rod out so it just clears broken tab. It may be necessary to tilt assembly so that the free end of rod will clear adjacent switch assembly.
- d. Remove remains of broken tab and insert new piece.

NOTE 3-13-A

A small bronze spring washer will be found between tab and one side of switch assembly. Be sure this is re-inserted with new tab.

3-14 PILOT LIGHT OR POWER SWITCH

Disconnect organ from power source, then proceed according to the following:

- a. Remove four screws which secure metal cover on control panel assembly.
- b. Replace bulb with N^o. 12 GE 6.3V .15A miniature 2-pin.
- c. To replace power switch, unsolder two black leads from generator power panel.
- d. Compress springs on sides of switch and push through front of control panel.

3-15 PERCUSSION CIRCUITRY, L-100A

With the exception of power supply and terminal strip assembly, *Figure 5-11*, the percussion circuitry is mounted on the lower left end block. If access to end block circuitry is required, remove control knobs before removing end block from organ.

3-16 SIX-VOICE PERCUSSION CIRCUITRY, L-100-1

The power supply, 127-000007 and pedal control board assembly, 063-042051, are mounted on the left (rear view) wall of the console.

The rhythm voice board, 124-000114, is located on the bottom left (rear view) of the console.

SECTION IV

PRACTICAL SERVICE SUGGESTIONS

4-1 GENERAL

This section contains performance standards, adjustment procedures, and troubleshooting information.

NOTE 4-1-A

Before making any checks or adjustments involving amplifiers, test all tubes to ensure they are operating properly.

4-2 ORGAN PERFORMANCE CHECK

To prepare the organ for performance check, proceed according to the following:

- a. Place all tabs in up (off) position.
- b. Push drawbars into limit of motion.
- c. Set swell pedal for maximum output.
- d. Connect meter to speaker terminals.

NOTE 4-2-A

At certain steps in the following procedure, conditions other than above may be specified. Return controls to above conditions as each step is completed.

NOTE 4-2-B

Drawbars, pedals, and keys are called out by number, beginning with No. 1, at left end of row.

4-3 EQUIPMENT REQUIRED

- a. VTVM, Commander 870 or equivalent.
- b. Oscilloscope, Tektronix 503 or equivalent.

4-4 PROCEDURE

- a. Depress UPPER DRAWBARS tab and pull drawbar No. 1 to position 8. Play lowest C on upper manual (Frequency 25), and observe meter. If output is not between 1.6V and 2V rms, adjust GAIN ADJUST on power amplifier to bring output into range.
- b. Maintain conditions of step a. Depress VOLUME SOFT tab. Output should drop to range of 0.69 to 0.9 volts rms.
- c. Set pedal drawbar at position 8. Depress lowest C pedal. Output should be between 4V and 5.5V rms.

NOTE 4-4-A

If output is not within specified range, select R1, Figures 5-1 through 5-4, from 1.8 Ω to 27 Ω to bring output into range.

- d. Maintain conditions of step c. Depress VOLUME SOFT tab. Output should drop to 0.8V to 1.5V rms.
- e. Return VOLUME SOFT tab to "up" position. Maintain other conditions of step c. Play all pedals to be sure output changes smoothly from note to note.
- f. Make upper manual preset listening check. Hold down F, A, C chord near center of upper manual.
 1. Trumpet. Set up upper drawbars to 006688888. Press

- TRUMPET preset and then UPPER DRAWBARS preset. The musical quality should be identical.
2. Clarinet. Set upper drawbars to 008080800. Press CLARINET preset and then UPPER DRAWBARS preset. The musical quality should be identical.
 3. Full organ. Set up upper drawbars to 868868446. Press FULL ORGAN preset and the UPPER DRAWBARS preset. The musical quality should be identical.
- g. Make lower manual preset listening check. Hold down F, A, C chord near center of lower manual.
1. Set up lower drawbars to 6644222.
 2. Press ENSEMBLE preset and then LOWER DRAWBARS preset. The musical quality should be identical.
- h. Percussion cutoff control and output checks.
1. Cut-off: With only THIRD HARMONIC, FAST DECAY, and UPPER DRAWBARS tablets depressed and all drawbars pushed in, hold down the lowest C key on upper manual and adjust percussion cut-off control on preamplifier chassis to point at which output signal is just barely audible.
 2. Output voltages: With only UPPER DRAWBARS and SECOND HARMONIC tablets depressed, press the lowest C key on upper manual. Output voltages across speakers should be between 3.0V and 5.5V rms. With PERCUSSION SOFT tablet depressed, output should be 1.5V to 2.8Vrms.
 3. Vibrato check: Depress FULL ORGAN tab. Hold down F, A, C chord near center of upper manual. Depress VIBRATO SMALL tab and observe vibrato effect. Then, in addition, depress VIBRATO NORMAL tab. Vibrato effect should increase. In addition, press VIBRATO CHORUS tab. Vibrato effect should become more pronounced.

NOTE 4-4-3-A

Later organs, Figures 5-2 through 5-4, are equipped with vibrato width potentiometer R131. Adjust if vibrato effect is too narrow or too broad.

4. Reverberation check: Depress FULL ORGAN tab. Hold down F, A, C chord near center of upper manual. Add REVERB I tab. Observe that reverberation is heard as chord is played and released.

Add REVERB II tab. Reverberation should be increased relative to REVERB I tab as chord is played and released.

5. Microphonics and Hum check: Tap each tube and replace it if there is ring or howl in the speaker with expression pedal maximum and VOLUME SOFT tab not depressed.

Hum in speakers with expression pedal maximum and VOLUME SOFT tablet not depressed must be very low in volume and not measure more than 15mV rms. If hum is excessive, see paragraph 4-22.

NOTE 4-4-5-A

On L-100-2 the SILENT-SOUND tab on Rhythm II must be in SILENT position.

4-5 VIBRATO

To check vibrato, proceed according to the following:

Pull out upper manual 2' drawbar to position 8. Place all other drawbars fully in to 0. Depress the UPPER DRAWBARS tab.

- a. Remove the brown RCA cable from the BN (Brown) RCA jack located on the preamplifier chassis. Connect an

oscilloscope's VERTICAL INPUT to the disconnected brown RCA plug.

- b. Remove the black RCA cable from the BK (Black) RCA jack located on the vibrato phase shift amplifier. Insert into the BK RCA jack an adapter with two RCA jacks and one RCA plug. Reconnect the RCA cable (black) into one of the adapter RCA jacks and connect the oscilloscope's EXT. TRIGGER IN binding post to the remaining adapter RCA jack.
- c. Set scope controls as follows:
 1. TRIGGER: SOURCE-EXT., COUPLING-AC: SLOPE +
 2. HORIZONTAL SWEEP 0.2 msec/cm.
 3. VERTICAL SENSITIVITY 0.2 volt/cm.
- d. Hold down key #7 (frequency #60) on the upper manual.
- e. Adjust the TRIGGER LEVEL control for a stable pattern.
- f. Adjust the VARIABLE sweep time control until one complete sine wave covers 4 cm.
- g. Adjust the VERTICAL VARIABLE control for a display height of 4 cm.
- h. Depress the VIBRATO NORMAL tab Adjust the VIBRATO WIDTH control for a total phase shift swing of 2 cm (refer to *Figure 4-1*. If VIBRATO WIDTH control does not give a satisfactory result, select R133, *Figure 5-2* between 220 Ω and 1K Ω .

NOTE 4-5-A

Phase shift can be best read if waveform is centered so that the center peak of the sine wave coincides with a graticule line.

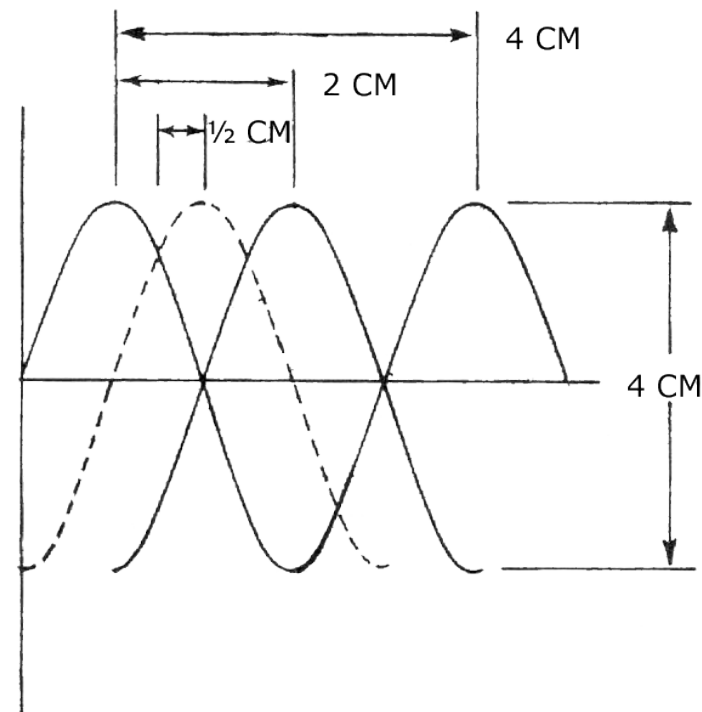


Figure 4-1: Vibrato Adjustment Waveform

- i. Release VIBRATO NORMAL tab. Single wave must be centered $\pm 1/2$ cm as shown in *Figure 4-1*.
- j. Disconnect external leads and adapter. Reconnect RCA cables to proper jacks.

If an oscilloscope is not available, make the following listening test:

- k. Depress FULL ORGAN tab. Hold down F, A, C chord near center of the upper manual. Depress VIBRATO SMALL tab and observe vibrato effect. Add VIBRATO NORMAL tab and

observe increased vibrato. Add VIBRATO CHORUS tab and observe that vibrato effect becomes more pronounced.

4-6 L-100A PERCUSSION PERFORMANCE CHECK

To check the performance of the L-100A percussion unit, whether factory installed, or added as a kit, proceed according to the following:

a. Selector Switch Operation:

1. Normal Operation:

Selector Switch: DRAWBARS
Cymbal-Brush: OFF
Mode Switch: NORMAL
Action: Play upper and lower manual
Result: Organ function should be normal.

2. DRAWBARS position:

Upper Manual: DRAWBAR tab depressed
Key: Hold middle C key
Action: Pull out all drawbars in order, starting with the highest one.
Result: Note that pitch of sound goes down each time with the exception of sub-3rd drawbar. Return upper DRAWBAR tab to OFF.

3. Percussion level:

Mode Switch: VIBRATO position
Selector Switch: MARIMBA position
Lower Manual: DRAWBAR tab depressed
Registration: Lower drawbars registration 8800000
Swell Pedal: Maximum loudness
Result/Action: The level is checked by comparing level of upper manual to level of lower manual when depressing middle C and E keys in a percussive manner. Level should be approximately equal. Variation heard in level in the reiteration, normal, and delayed vibrato positions of the mode switch are normal. Notice a decrease in level when PERCUSSION SOFT tab is

depressed in all but reiteration modes.

4. Percussion voices of the selector switch are checked for harmonic content by comparison with lower manual registration. Play middle C and E keys except when comparing chimes which should be checked using middle C key only.
5. CHIMES should be identical to drawbar registration 0888000, except that 1-¼ harmonic will be missing from the drawbar registration.
6. GUITAR should be identical to registration 8088800.
7. MARIMBA should be identical to registration 8800000.
8. XYLOPHONE should be identical to registration 8080000.
9. BANJO should be identical to registration 0888800.

NOTE 4-6-9-A

When the harmonic is used to form the percussion voice, then the corresponding drawbar on the upper manual and (keying) drawbar #8 will be inoperative.

NOTE 4-6-9-B

In CHIMES position, drawbar #7 will also be inoperative.

NOTE 4-6-9-C

CHIMES & GUITAR decay time is \approx 3 seconds, other percussion voices slightly less than ½ second.

NOTE 4-6-9-D

In VIBRATO & DELAYED VIBRATO positions of mode switch, all percussions will have the long decay time (3 seconds).

b. Mode Switch Operation (Vibrato Functions)—NORMAL

1. Control Panel Tabs: OFF
Selector switch: GUITAR
Mode switch: NORMAL
Action: Play chord on upper manual

- Result: Notice absence of vibrato effect
- c. Mode Switch Operation (Vibrato Functions)—VIBRATO
1. Control Panel Tabs: OFF
Selector switch: GUITAR
Mode switch: VIBRATO
Action: Play chord on upper manual
Result: Notice vibrato effect
- d. Mode Switch Operation (Vibrato Functions)—DELAYED VIBRATO
1. Control Panel Tabs: OFF
Selector switch: GUITAR
Mode switch: DELAYED VIBRATO
Action: Play chord on upper manual
Result: Notice that vibrato effect begins approximately .6 seconds after chord is pressed.
- e. Mode Switch Operation (Reiteration Functions)—NORMAL
1. Control Panel Tabs: OFF
Selector switch: GUITAR or CHIME
Mode switch: NORMAL
Action: Play chord on upper manual
Result: Percussion repeats at the following rates:
FAST: 11.2 Hz
MEDIUM: 7.7 Hz
SLOW: 5.4 Hz
- f. Mode Switch Operation (Reiteration Functions)—MARIMBA or XYLOPHONE
1. Control Panel Tabs: OFF
Selector switch: MARIMBA or XYLOPHONE
Mode switch: NORMAL
Action: Play chord on upper manual
Result: A reiterative sound of different quality than in step e is heard. The two harmonics used in these voices are turned on and off at opposite times. This is known as “alternate reiteration”.
- g. Cymbal-Brush Switch Operation—OFF
1. Lower Manual: DRAWBARS depressed
Cymbal-Brush switch: OFF
Action: Play lower manual
Result: Lower manual function should be normal.
Drawbar functions should be normal.
- h. Cymbal-Brush Switch Operation—ON (Low, Med, High)—Lower Manual
1. Lower Manual: DRAWBARS depressed
Cymbal-Brush switch: Any position
Action: Play lower manual
Result: Drawbar #7 should be inoperative.
 2. Lower Manual: DRAWBARS up (off)
Cymbal-Brush switch: LOUD
Control Panel Tabs: BRILLIANCE on
Action: Play any lower manual key repeatedly (other than highest 6 keys on right-side of manuals).
Result: The result should be a percussive hiss sound of 1.0 V ± 3 db rms measured across 12” speaker leads. R602 may be adjusted to obtain the proper levels. R602 is located on terminal strip assembly, AO-31213-1.
- i. Cymbal-Brush Switch Operation—ON (Low, Med, High)—Pedals
1. Cymbal-Brush switch: LOUD
Control Panel Tabs: BRILLIANCE on
Action: Play any pedal repeatedly
Result: The result should be a percussive hiss sound of 1.25 V ± 3db rms.

NOTE 4-6-A

When the BRILLIANCE tab is turned off, volume of Brush and Cymbal is decreased.

4-7 L-100-1 SIX-VOICE PERCUSSION PERFORMANCE CHECK AND TROUBLESHOOTING

4-7-1 OUTPUT LEVEL ADJUSTMENTS

The rhythm volume levels are set at the factory, and will normally require no adjustment. In case it is found necessary to replace a part on the rhythm board, 124-000114, adjustment will be required. To adjust output levels, proceed according to the following. A multimeter, oscilloscope, or equivalent is required. See *Figure 5-4* for locations of controls.

- a. Set all tabs and rocker switches to “up” or “off” positions. Set swell pedal and RHYTHM VOLUME control to maximum output. Connect multimeter across main speaker leads.
- b. Press CYMBAL push button at about 5 times per second. Adjust R113 to obtain a meter indication of 2.2 to 2.8 V rms.
- c. Press BRUSH push button at about 5 times per second. Adjust R126 to obtain a meter indication of 2.2 to 2.8 V rms.
- d. Press TOM-TOM push button at about 5 times per second. Adjust R134 to obtain a meter indication of 1.3 to 1.7 V.

4-7-2 ONE VOICE IS SILENT

Check the following:

- a. Connection to corresponding pin of PWB, 124-000114. See *Figure 5-4*.
- b. If connections are okay, check for +15VDC at pin when push button of missing voice is held down.
- c. If voltage is missing, check connections to push button switch, rocker tab, and rhythm power supply.
- d. If voltage is present, trace associated voice circuitry.

NOTE 4-7-D-A

If failure is in Brush and/or Cymbal voice, check Q101.

4-7-3 PROGRAMMED VOICE DOES NOT SPEAK

If any voice speaks when push button is pressed, but not from programmed source (manual or pedal, as applicable), check rocker switch and associated wiring. See paragraphs 4-7-6 *No Voice Response From Pedals* and 4-7-7 *No Voice Response From Manual* as well.

4-7-4 ALL PERCUSSIVE VOICES SILENT—HISS VOICES SPEAK

Check Q107, Q105, and associated circuitry.

4-7-5 BOTH HISS VOICES SILENT—PERCUSSIVE VOICES SPEAK

Check Q106 and associated circuitry. Check Q101.

4-7-6 NO VOICE RESPONSE FROM PEDALS

Check pedal keying pulse circuits (cf. 2-8-4 *Pedal Keying Circuit*).

4-7-7 NO VOICE RESPONSE FROM MANUAL

Check manual keying pulse circuits (cf. 2-8-3 *Lower Manual Keying Circuits*).

4-7-8 NO PERCUSSION OUTPUT

Check connections to percussion power supply. Check power supply outputs.

4-7-9 TROUBLESHOOTING

The following sections describe troubleshooting techniques for the L-100-1 Six-Voice Percussion system.

4-7-10 ORGAN DOES NOT PLAY

If the generator motor is not turning and the tubes do not light when the switch is in the “on” position, check the power wiring, power switch, line cord, line cord plug, and wall outlet.

If the generator turns and the tubes light, but no sound can be obtained with all controls in playing position, the most likely source of trouble is the amplifier.

In most respects this is a conventional amplifier circuit, and the schematic diagrams, *Figure 5-2 Interactive L-100 Series Schematic*, will enable the technician to locate the problem.

4-7-11 KEY DOES NOT PLAY OR HARMONIC IS MISSING

This may mean a dirty key contact, a broken connection, or a dead note in the generator. The steps below will serve to isolate the trouble.

NOTE 4-7-A

The following checks must be performed with the DRAWBARS tab depressed.

- a. Ordinarily only one of the several frequencies used on the key will be missing. This can be determined by holding the key and operating each drawbar for that manual, observing on which drawbar the key fails to play. Reference to the manual wiring chart, *Figure 1-8*, will tell which frequency number is missing.
- b. See whether the same frequency is missing where it is used on other keys of the same manual. The wiring chart will tell with what other key and what other drawbar you should get the same frequency. If it is missing on one key but not on others, a key contact is probably dirty. In some cases it may be cleared by striking the key 15 or 20 times in a rapid staccato manner to loosen the dirt.
- c. If this procedure is not effective, adjustment of the busbar shifter for that manual will clear it. (See Paragraph 1-5 *Manuals*.) This will slide the busbars endwise so they present a clean contact surface. In extreme cases, it may be necessary to hold down the faulty key while making the adjustment.

- d. If the frequency is missing on all keys of one manual but not on the other manual, look for a break in the cable connecting one manual to the other.
- e. If the frequency is missing on both manuals, check the manual-to-generator cable or the generator itself.
- f. The output of any single frequency on the tone generator may be checked by pulling out any drawbar and connecting a clip lead from the back end of the drawbar to the generator terminal in question. See *Figure 1-7* for location of all generator terminals. If the generator is all right, the note will play loudly.

CAUTION

Never test the tone generator with an outside source of current such as a continuity meter, as serious damage may result to the sensitive filter transformers and permanent magnets. By the above method, all necessary tests of the tone generator may be made with the current supplied by the generator itself.

- g. If it fails to play, try touching the clip to the input side of the filter coil (not the grounded tap) and the input side of the filter condenser (*Figure 1-7*) in order to check these parts. Disconnect the condenser to eliminate the possibility of a grounded transformer. If the signal is still missing at the magnet coil terminal, it means that the tone wheel is not turning, the coil is defective, or the magnet is not properly adjusted.
- h. If the tone wheel is not turning, the frequency of the other wheel on the same shaft will also be missing (with the exception of a few wheels which are alone). On the generator magnet location drawing (*Figure 1-6*), the two frequencies whose numbers are connected by a dotted line are on the same shaft.
Another way to check the wheel is to remove the dampening pad under the generator (it is held by the two long channels which form the generator frame) and feel the wheel with your

finger to see if it is turning. Each wheel is located directly behind its magnet, shown in *Figure 1-6*.

- i. If the magnet coil is defective, the generator must be returned to the factory, as replacement of a coil necessitates dismantling the entire generator.
- j. It is possible, although unlikely, that the magnet may have become loose and moved so far from the wheel as to make the note inaudible. It may be adjusted as described in the following paragraph.

SECTION V DIAGRAMS

5-1 GENERAL

This section contains schematic diagrams to illustrate the text and provide information necessary to proper organ servicing.

5-2 INTERACTIVE SCHEMATIC INSTRUCTIONS

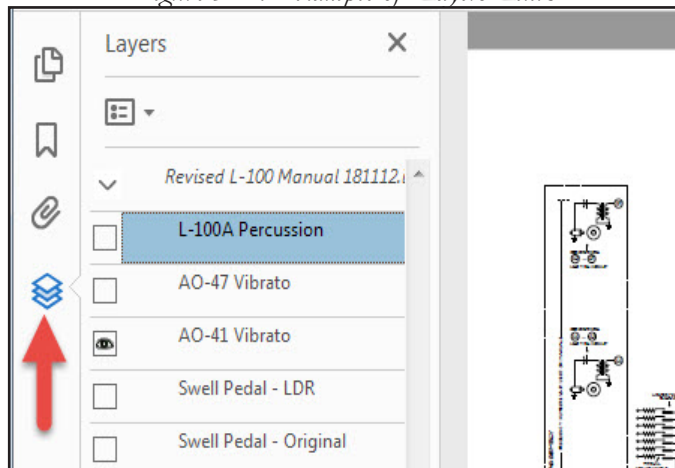
The schematics for all series of L-100 have been combined into a series of layers in a single schematic. You may select which components and other matter to view by controlling these layers in your PDF application.

Select the Layers link in your PDF application to change the visibility of layers. The image below shows an example from Adobe Acrobat CC:

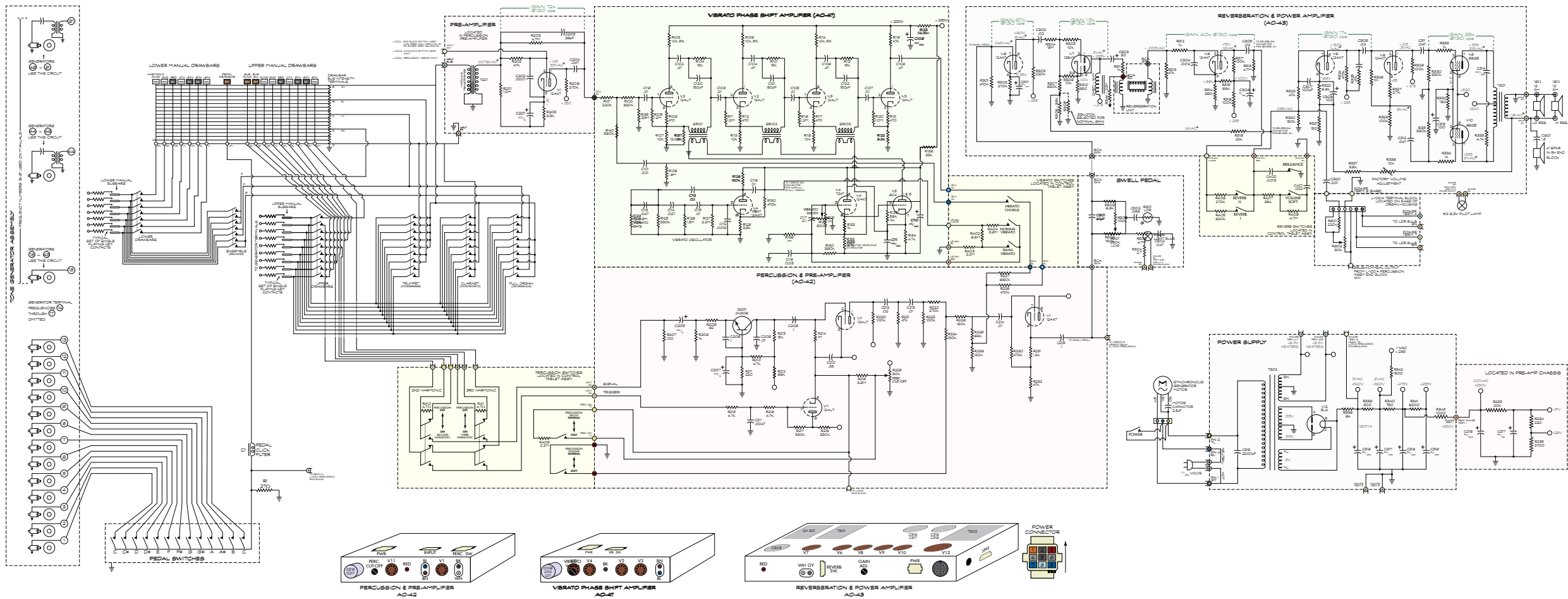
For example, to view the changes between the AO-41 and AO-47 Vibrato you would zoom in to the Vibrato region of the schematic. Then, alternately enable/disable the AO-41 and AO-47 layers.

Unfortunately, all the layers throughout the document are grouped together. You may need to experiment with enabling/disabling layers to understand what changes are applied.

Figure 5-1: Example of Layers Link



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RELEASE NOTES

- R1, near Pedal Click Filter, was 15Ω in earlier models. Later models use 39Ω. Higher values increase bass.
- C402 Brilliance capacitor only, no tablet in models:
 - L-101 Serial #41622 and above
 - L-102 Serial #42028 and above
 - L-103 Serial #43102 and above
- LDR (Photocell) Swell Pedal added in models:
 - L-111 Serial #64145 and above
 - L-112 Serial #64644 and above

TESTING NOTES

- All switches shown in Off position
- All voltages shown are + from ground except where notes
- All voltages measured with no keys or pedals pressed except:
 - * Lowest upper manual C key pressed, solo "Drawbar" on, 1st brown drawbar (Sub.Fundamental) at position 8, and expression medal at maximum.
 - ** Lowest upper manual C key pressed, solo "Drawbar" on, "2nd Harmonic" percussion only, grey keying wire disconnected
 - *** "Vibrato Normal" tablet on

COMPONENT LOCATIONS

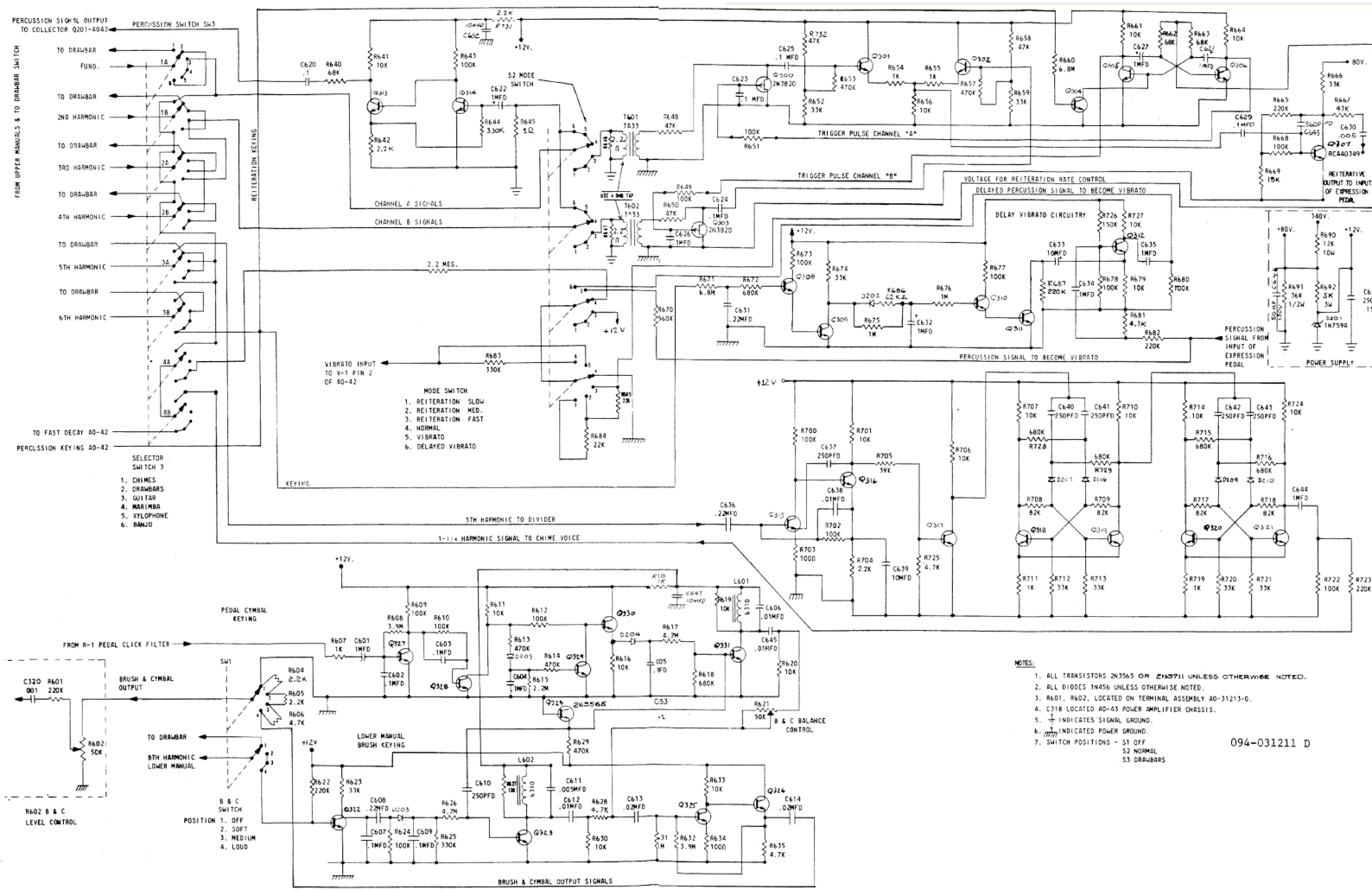
- 100 Series — Vibrato Chassis
- 200 Series — Percussion & Pre-Amp Chassis
- 300 Series — Reverb & Power Chassis
- 400 Series — Control Tablet Assy.
- 500 Series — Expression Pedal Assy.
- 600 Series — L-100A Percussion Terminal Block

LEGEND

WIRES	CONNECTORS
BA Bare/Unshielded	Unknown
BK Black	Amphenol
BL Blue	Amphenol - Round
BR Brown	
CL Clear	
GN Green	
GY Grey	
OR Orange	
RD Red	
YL Yellow	

Example: Amphenol connector with black wire

Figure 5-2: Interactive L-100 Series Schematic



NOTES:
 1. ALL TRANSISTORS 2N3565 OR 2N2971 UNLESS OTHERWISE NOTED.
 2. ALL DIODES 1N456 UNLESS OTHERWISE NOTED.
 3. R601, R602, LOCATED ON TERMINAL ASSEMBLY 20-31213-0.
 4. C418 LOCATED 20-45 POWER AMPLIFIER CHASSIS.
 5. + INDICATES SIGNAL GROUND.
 6. - INDICATED POWER GROUND.
 7. SWITCH POSITIONS - S1 OFF S2 NORMAL S3 DRAWBARS

094-031211 D

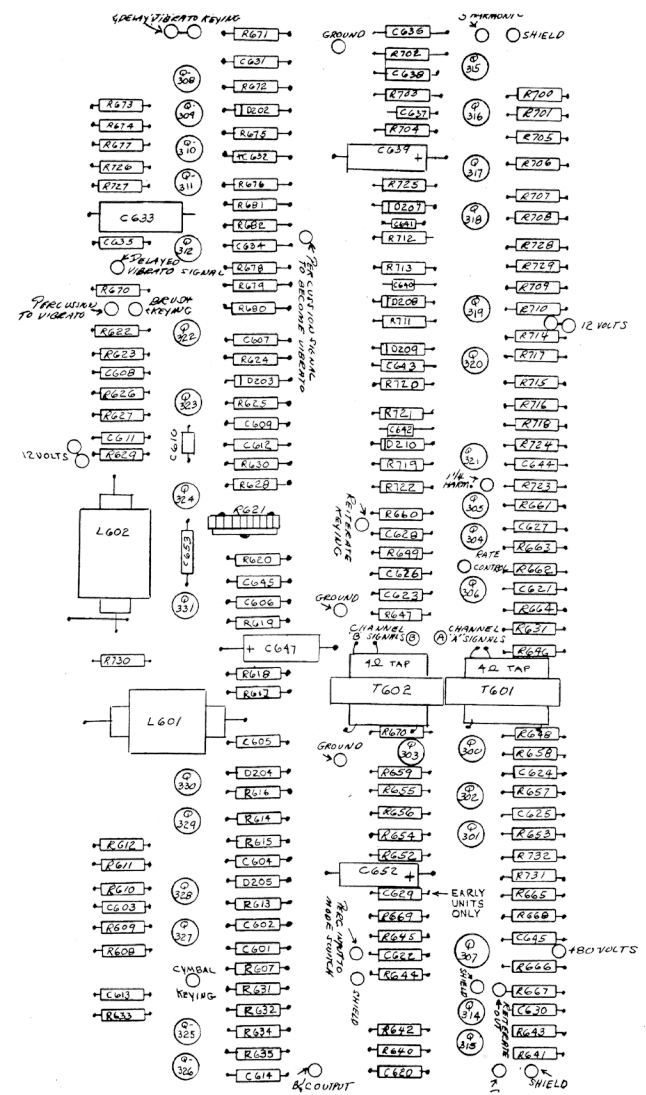
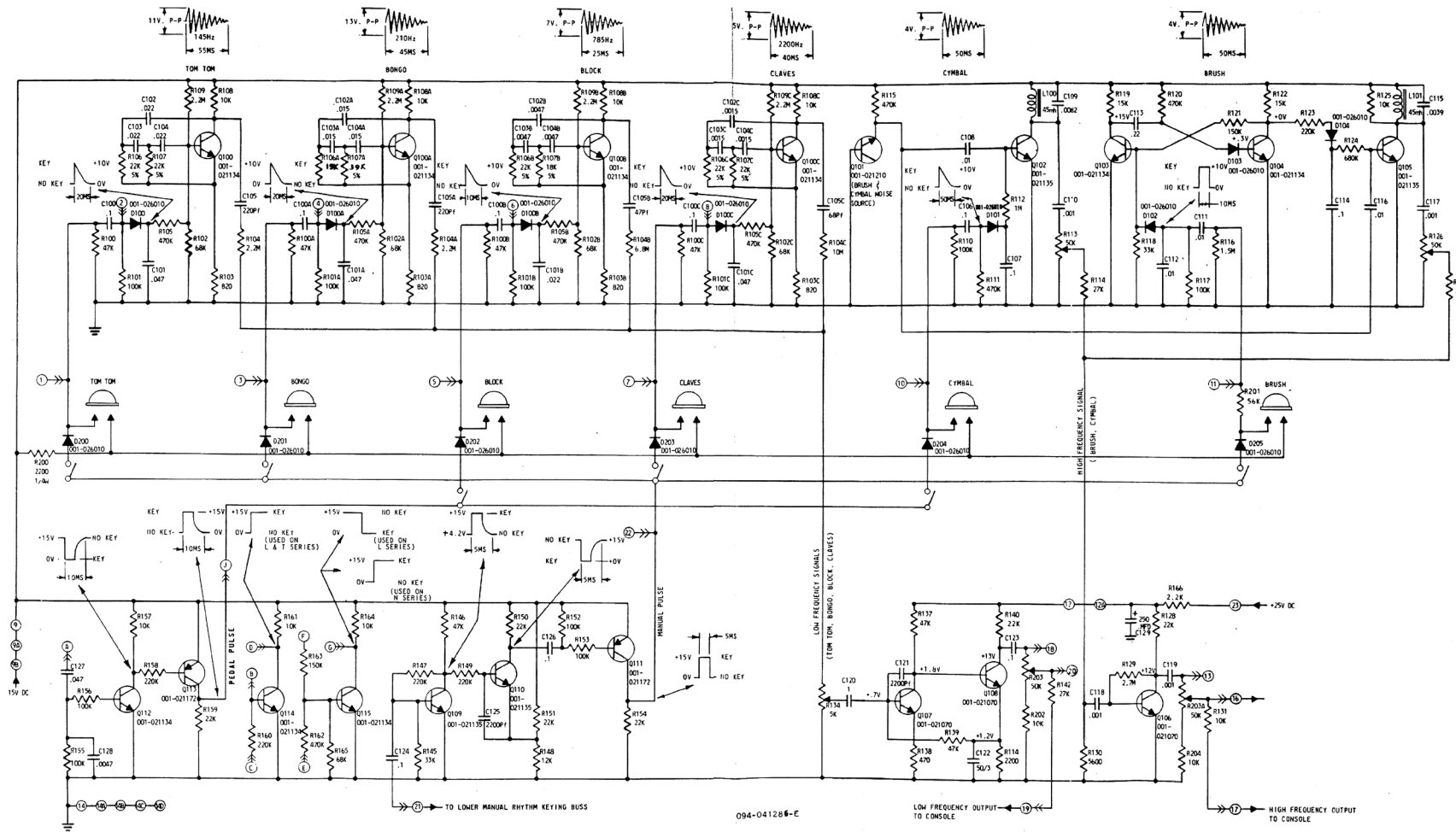


Figure 5-3: Schematic Diagram, L-100A Percussion Unit

Figure 5-3A: Parts Layout, L-100A Percussion Unit



- NOTES:
1. ◀ SYMBOL DENOTES PUSH-ON TERMINALS & ○ PINS.
 2. UNLESS OTHERWISE SPECIFIED:
ALL RESISTORS ARE IN OHMS, 1/2 WATT;
ALL CAPACITORS ARE IN MICROFARADS.
 3. 200 SERIES COMPONENTS LOCATED IN END BLOCK ASSEMBLY.

4. 1-200-1,2 CONSOLE SERIES JUMPER REQUIRED BETWEEN A TO D . PEDAL INPUT C.
5. PINS 2,4,6,8 FACTORY TEST POINTS ONLY.
6. L-100-1,2 CONSOLE SERIES JUMPER REQUIRED BETWEEN A TO D, AND C TO G, PEDAL INPUT TO F.
7. H-100, H-200, H-300 CONSOLE SERIES JUMPER REQUIRED BETWEEN 9B TO E, AND A TO G WITH PEDAL INPUT TO F.
8. HAVE FORMS OF TOM TOM, BONGO, BLOCK AND CLAVES AT TERM. #18.
9. HAVE FORMS OF BRUSH & CYMBAL AT TERM. #15.

Figure 5-4: Schematic Diagram, L-100-1 Six-Voice Percussion

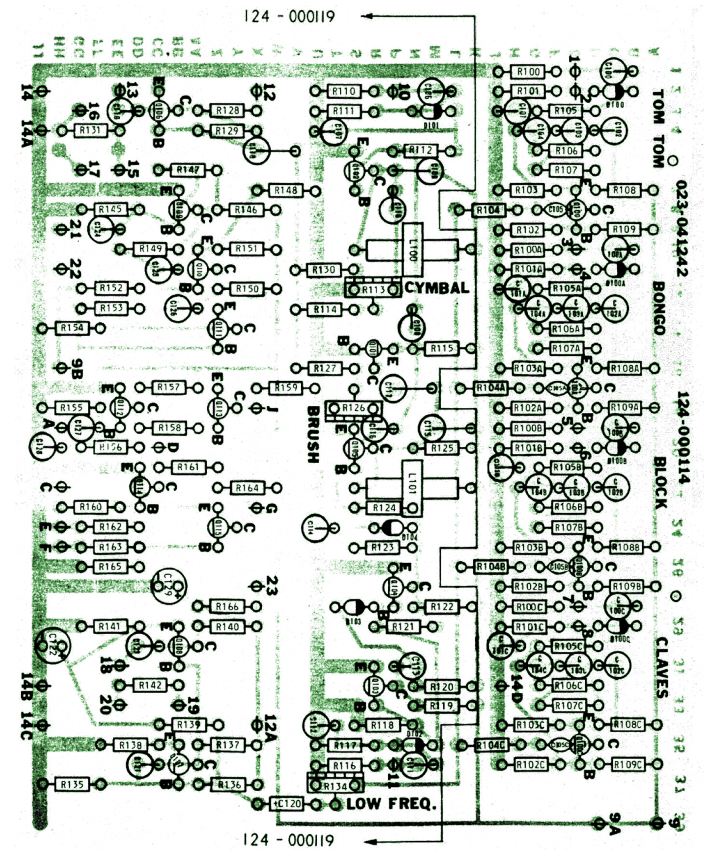
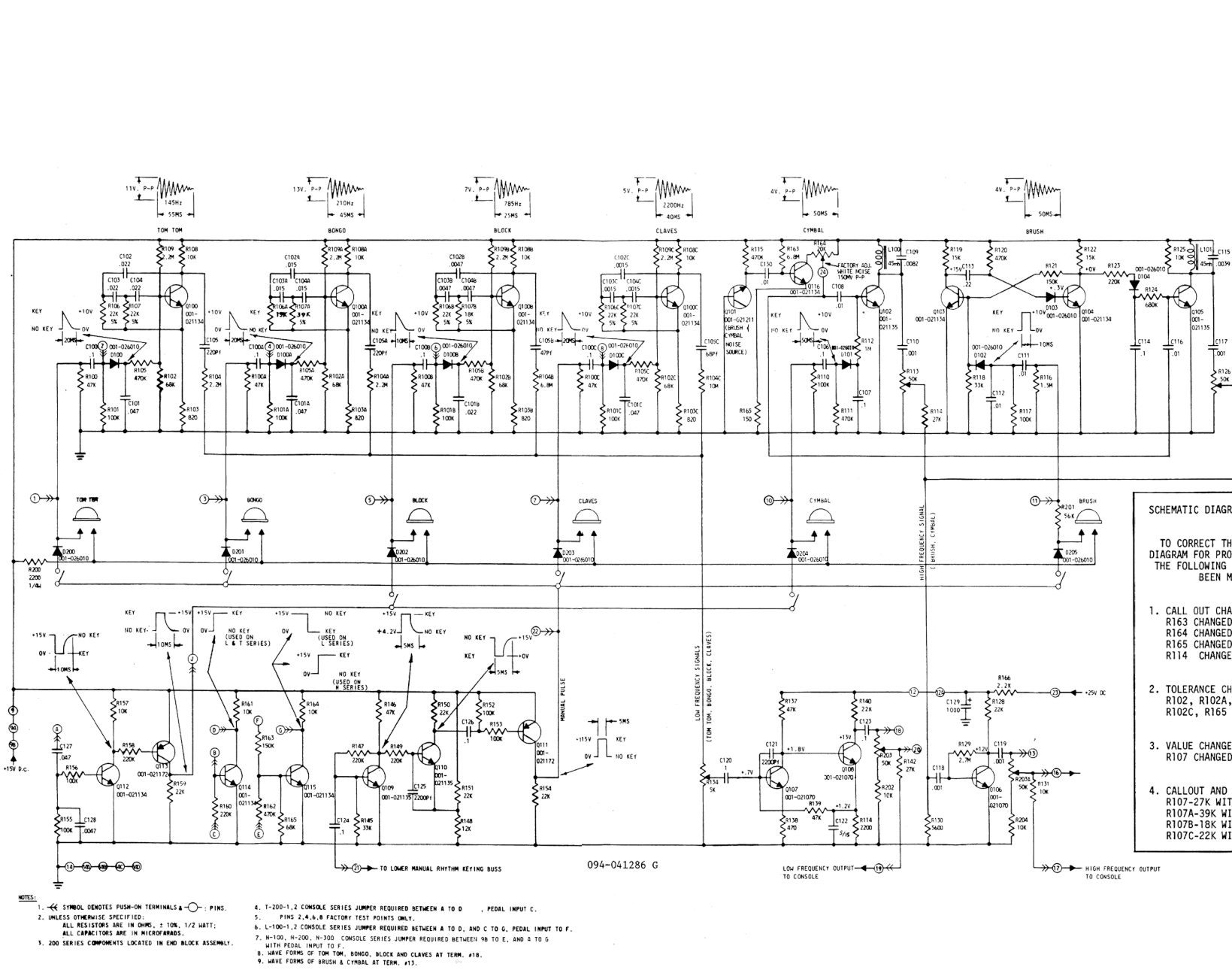


Figure 5-4A: Parts Layout, L-100-1 Six-Voice Percussion



- NOTES:
1. ◀ SYMBOL DENOTES PUSH-ON TERMINALS & ○ PINS.
 2. UNLESS OTHERWISE SPECIFIED:
 ALL RESISTORS ARE IN OHMS, 10K, 1/2 WATT;
 ALL CAPACITORS ARE IN MICROFARADS.
 3. 200 SERIES COMPONENTS LOCATED IN END BLOCK ASSEMBLY.
 4. T-200-1, 2 CONSOLE SERIES JUMPER REQUIRED BETWEEN A TO D PEDAL INPUT C.
 5. PINS 2, 4, 6, 8 FACTORY TEST POINTS ONLY.
 6. L-100-1, 2 CONSOLE SERIES JUMPER REQUIRED BETWEEN A TO D, AND C TO G, PEDAL INPUT TO F.
 7. M-100, M-200, M-300 CONSOLE SERIES JUMPER REQUIRED BETWEEN 9B TO E, AND A TO D WITH PEDAL INPUT TO F.
 8. HAVE FORMS OF TOM TOM, BONGO, BLOCK AND CLAVES AT TERM. #18.
 9. HAVE FORMS OF BRUSH & CYMBAL AT TERM. #13.

SCHEMATIC DIAGRAM CORRECTIONS

TO CORRECT THE SCHEMATIC DIAGRAM FOR PROPER SERVICING THE FOLLOWING CHANGES HAVE BEEN MADE.

1. CALL OUT CHANGE:
 R163 CHANGED TO R168
 R164 CHANGED TO R169
 R165 CHANGED TO R167
 R114 CHANGED TO R141
2. TOLERANCE CHANGE:
 R102, R102A, R102B, R102C, R165 CHANGED TO 5%
3. VALUE CHANGE:
 R107 CHANGED TO 27K
4. CALLOUT AND VALUE INTERCHANGE:
 R107-27K WITH R106-22K
 R107A-39K WITH R106A-15K
 R107B-18K WITH R106B-22K
 R107C-22K WITH R106C-22K

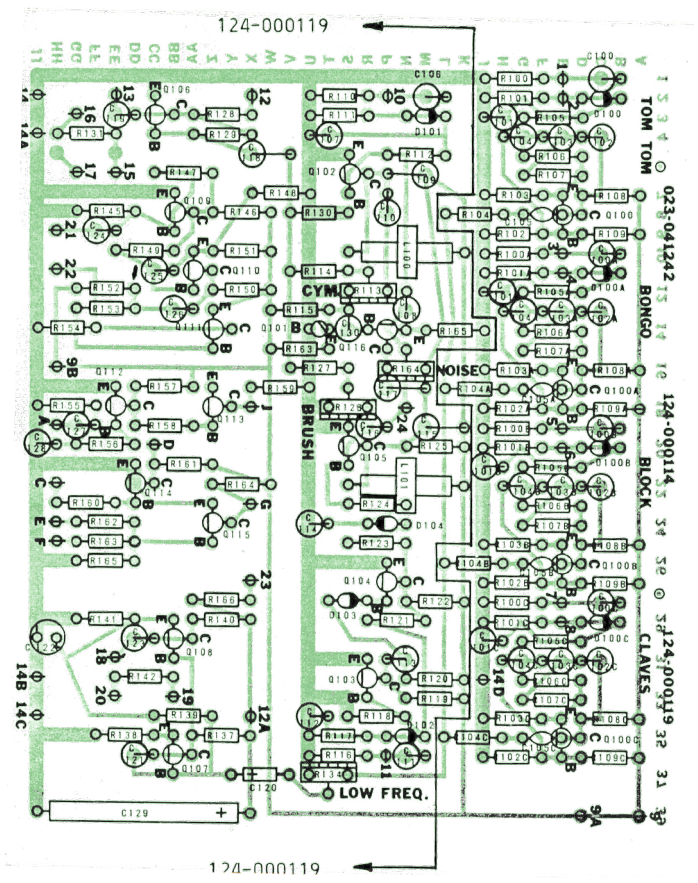


Figure 5-4C: Board Layout Six-Voice Percussion, Early 1970 Production

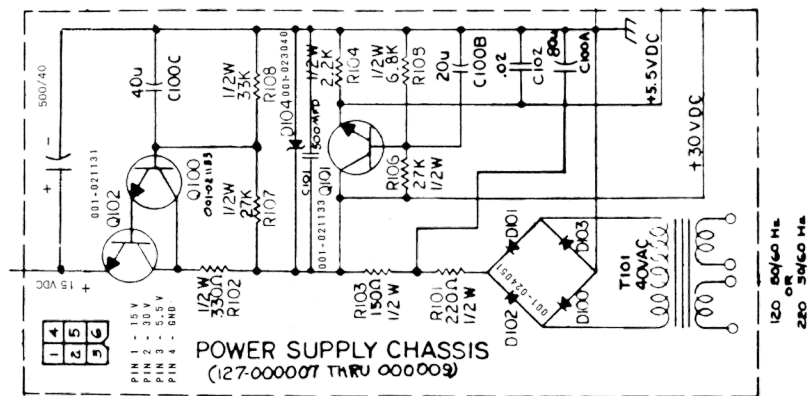


Figure 5-5: Schematic Diagram, L-100-1 Percussion Power Supply

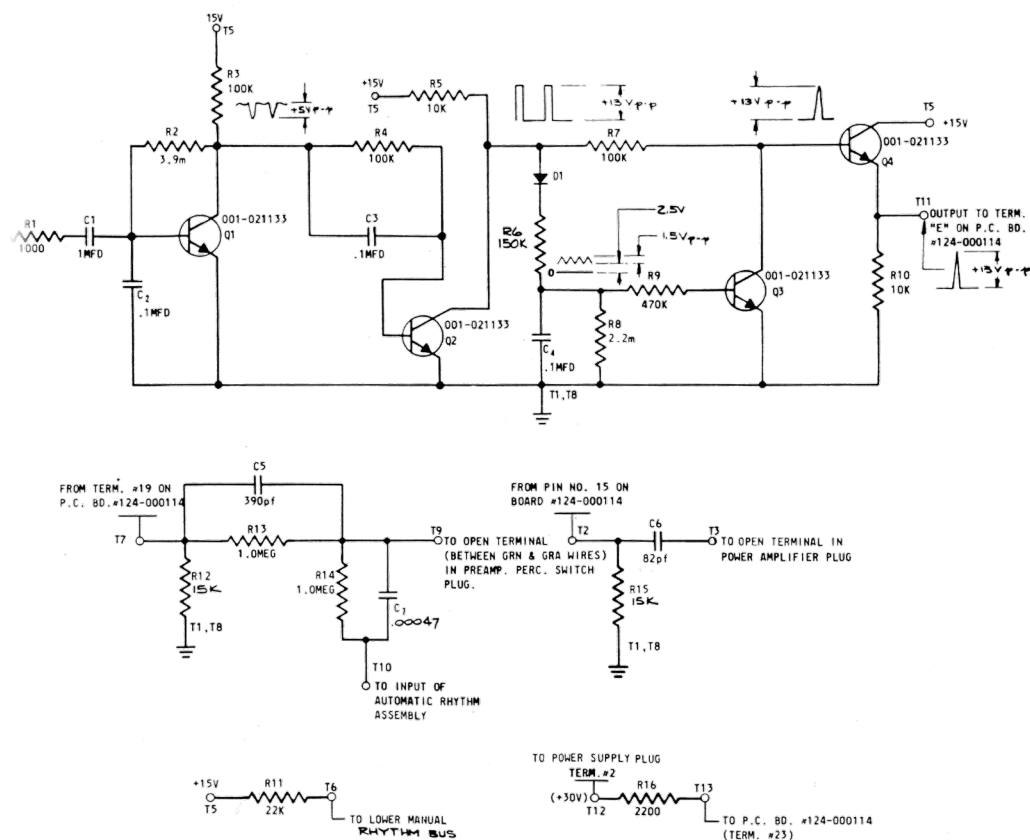


Figure 5-6: Schematic, Pedal Control Board

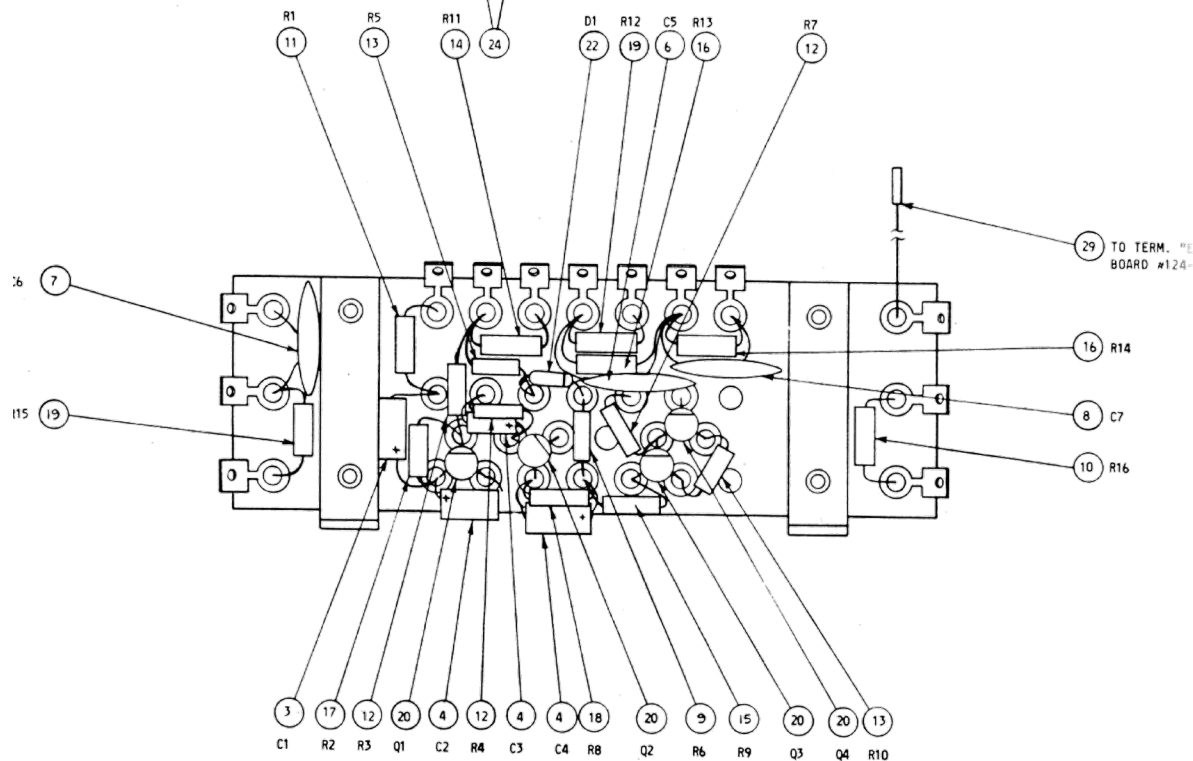
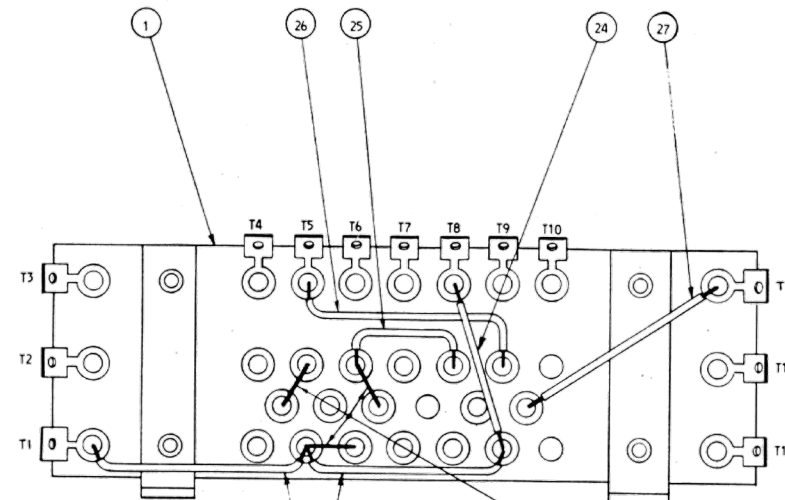


Figure 5-6A: Parts Layout, Pedal Control Board

063-042051 A

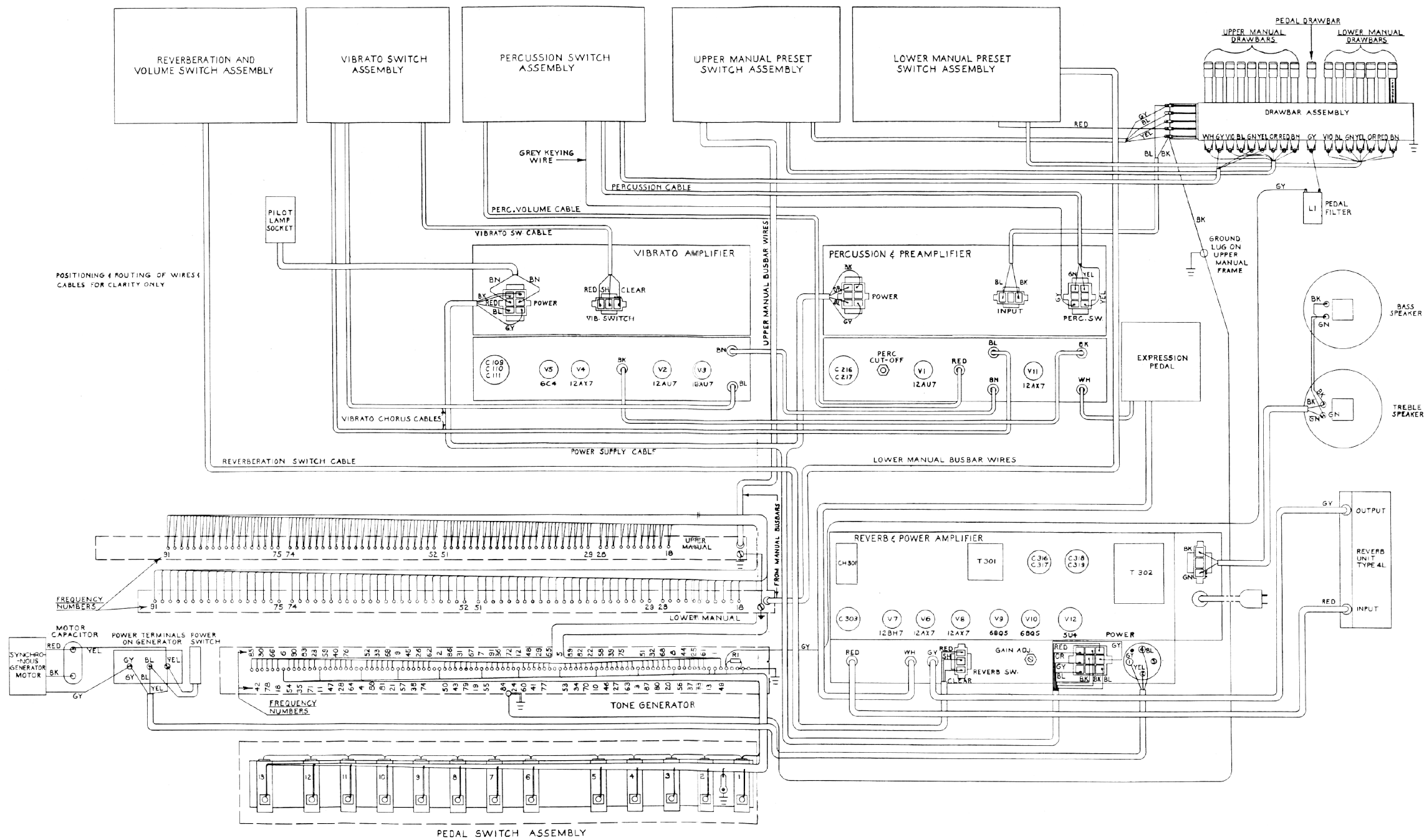
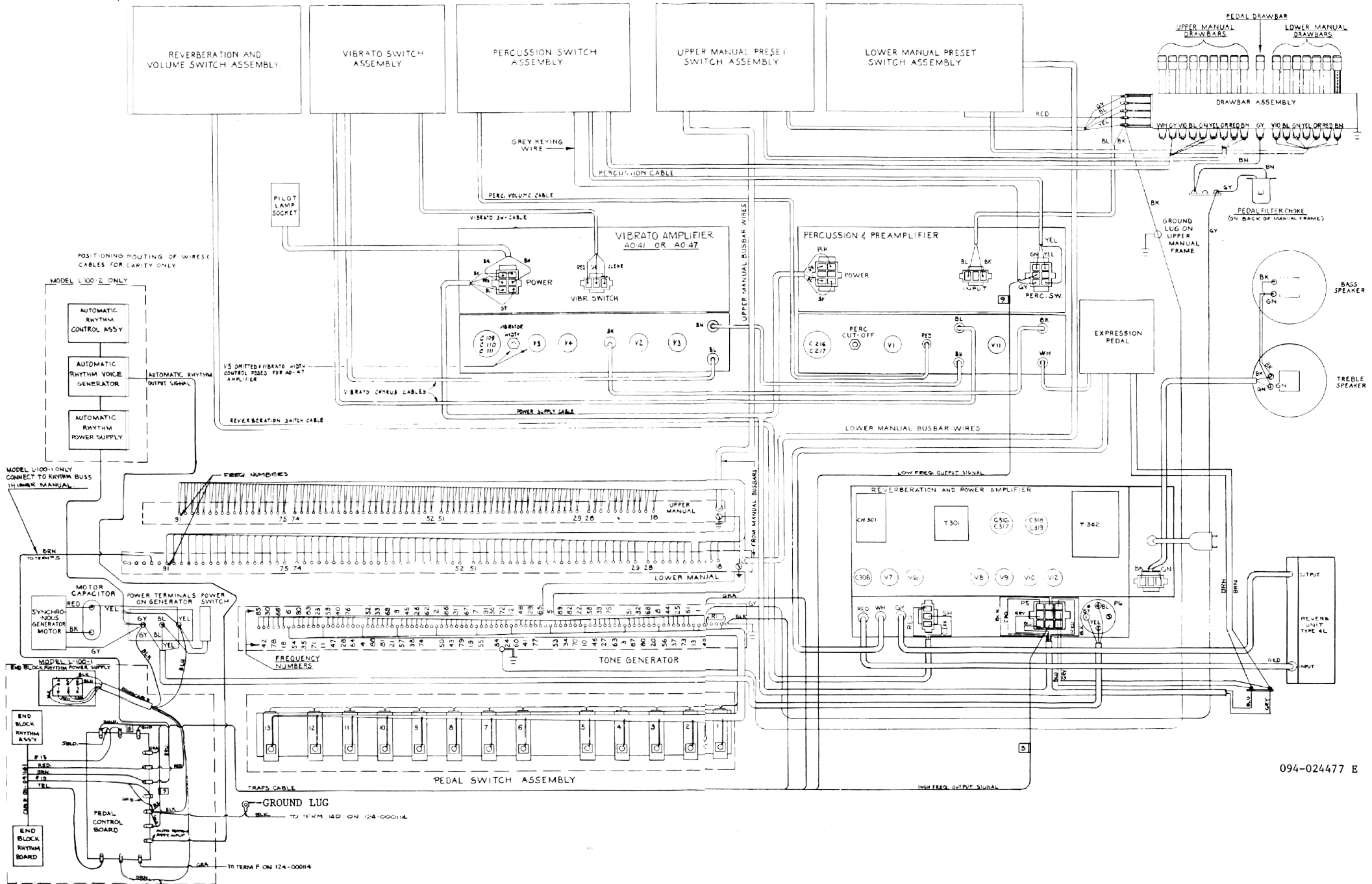


Figure 5-7: Wiring Diagram, L-100 Organ



094-024477 E

Figure 5-8: Wiring Diagram, L100-1 and L-100-2 Organs

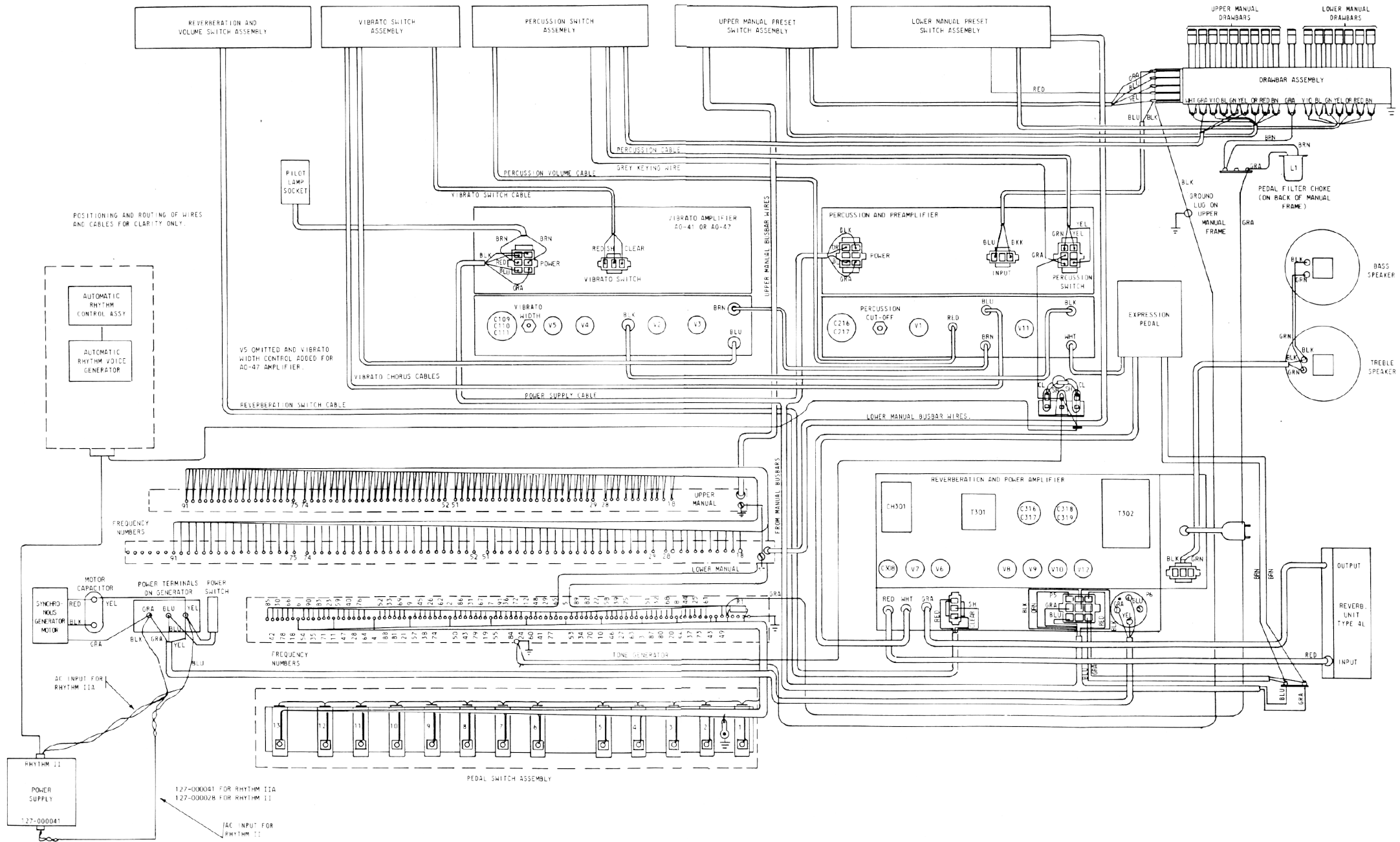
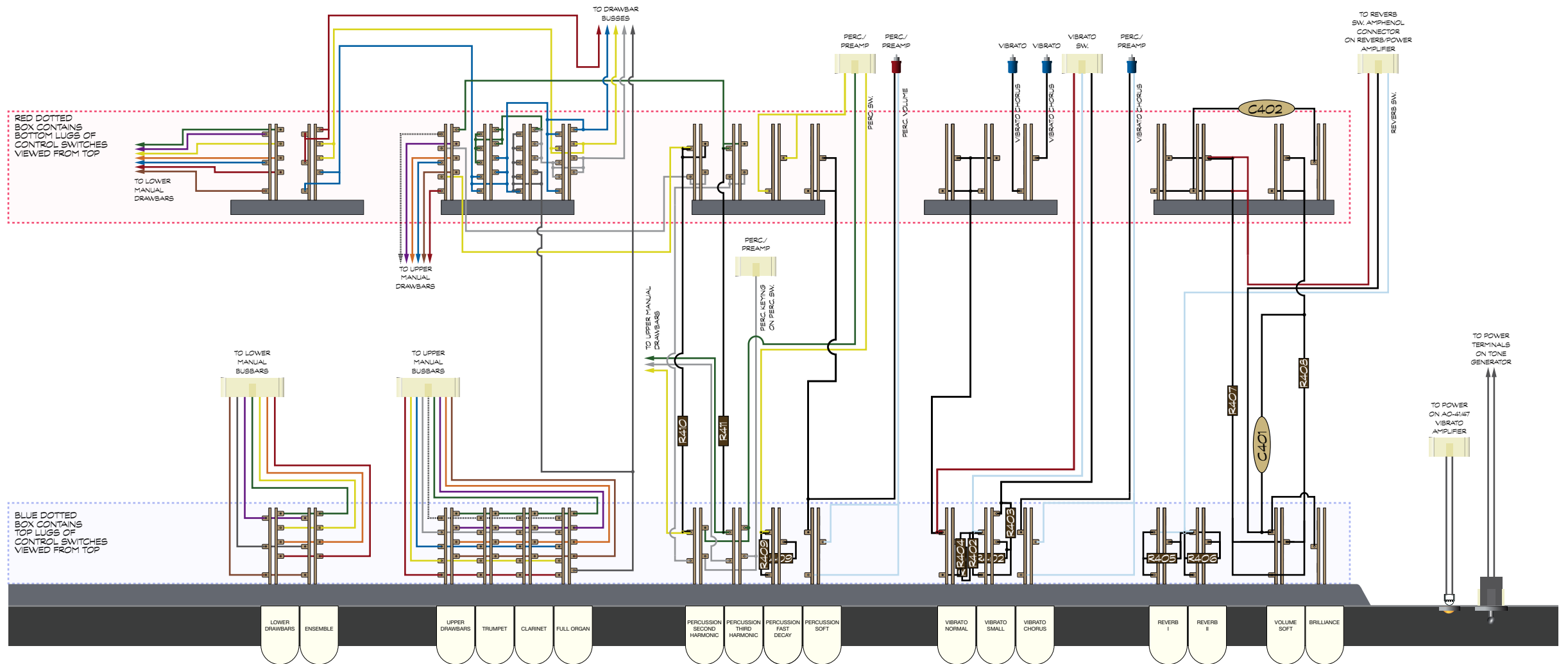


Figure 5-9: Wiring Diagram, L-200 Organ



RED DOTTED BOX CONTAINS BOTTOM LUGS OF CONTROL SWITCHES VIEWED FROM TOP

BLUE DOTTED BOX CONTAINS TOP LUGS OF CONTROL SWITCHES VIEWED FROM TOP

LEGEND	
WIRES	
-	Unknown
BA	Bare/Unshielded
BK	Black
BL	Blue
BR	Brown
CL	Clear
GN	Green
GY	Grey
OR	Orange
RD	Red
VI	Violet
YL	Yellow

Figure 5-10: Wiring Diagram, Control Panel, L-100 Series

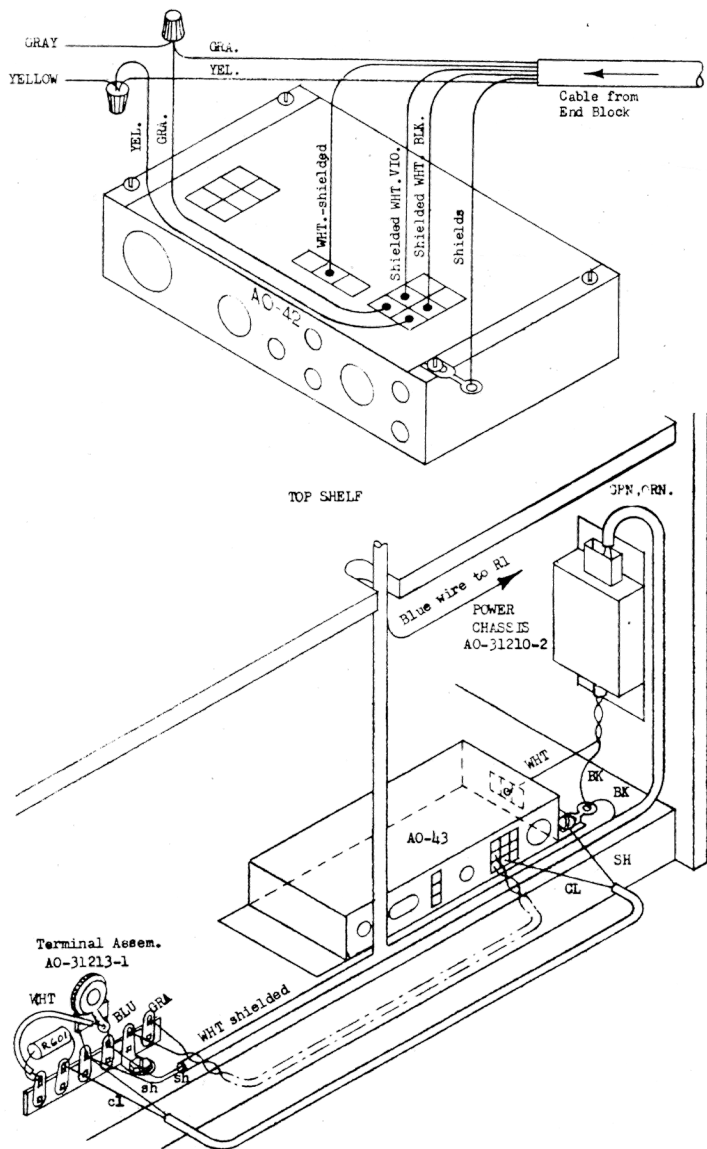


Figure 5-11: Wiring Diagram, Percussion Unit, L-100A

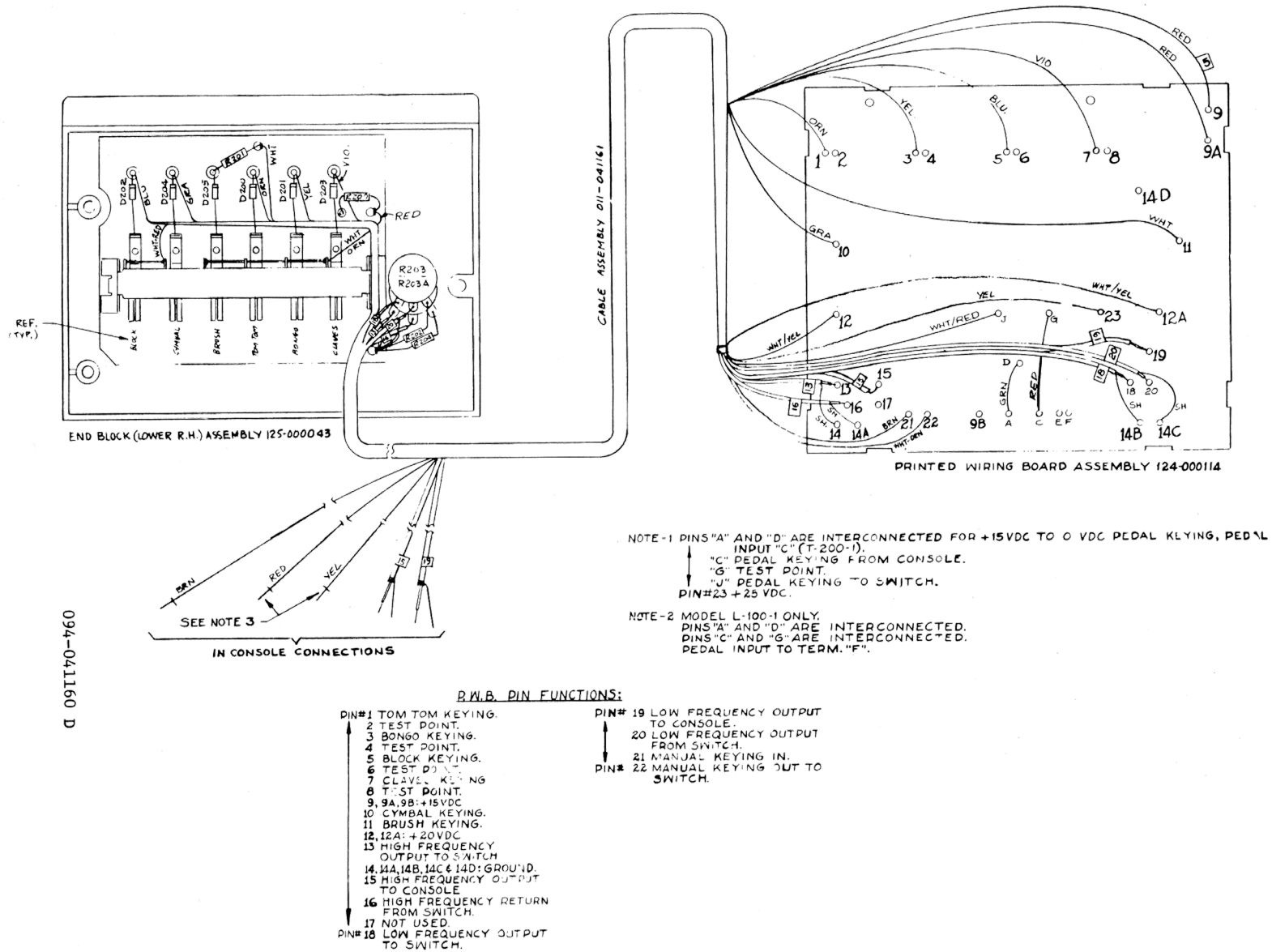


Figure 5-12: Wiring Diagram, Six-Voice Percussion, L-100-1

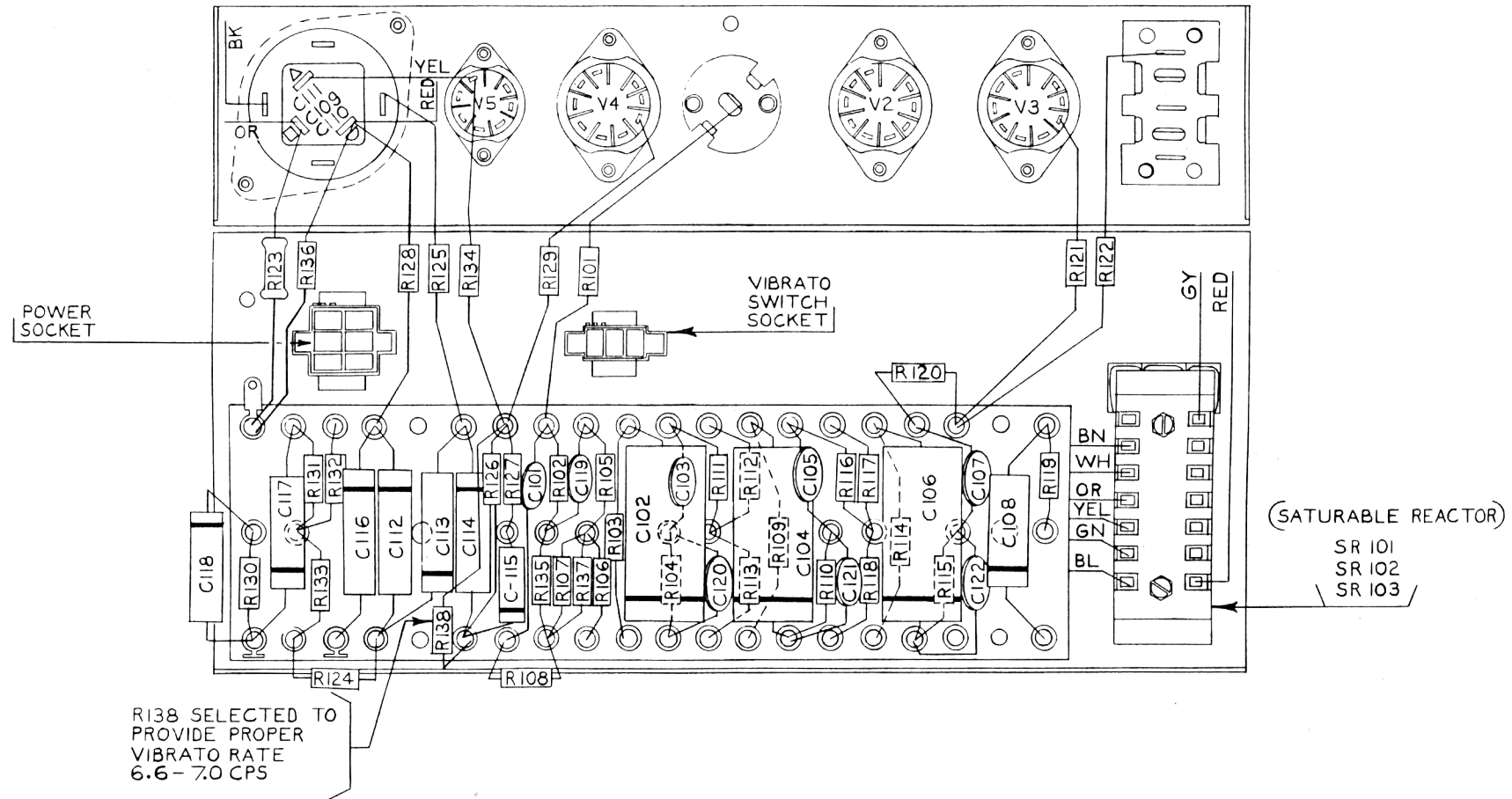


Figure 5-13: Parts Layout, AO-41 Vibrato Amplifier

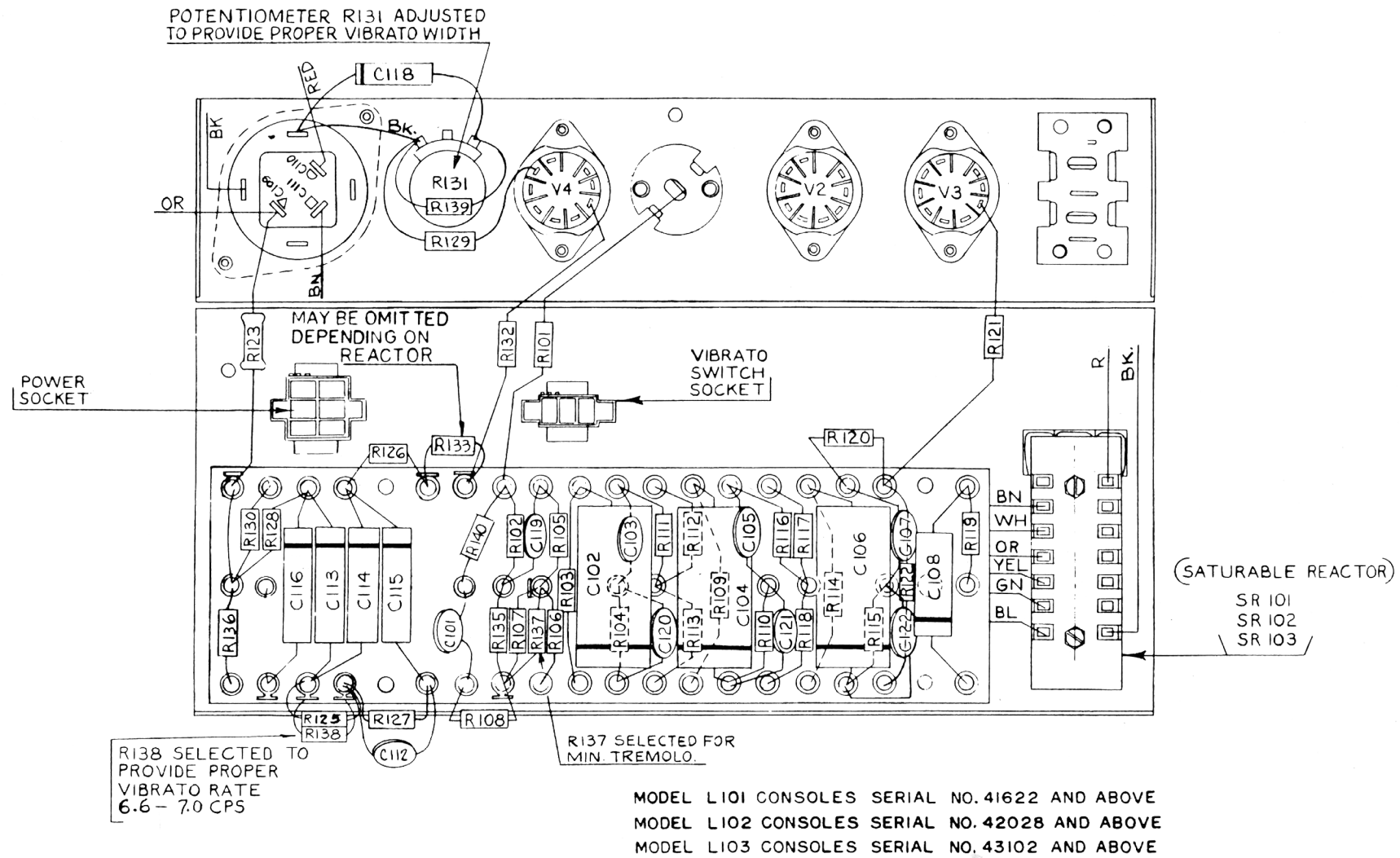


Figure 5-14: Parts Layout, AO-47 (126-00023) Vibrato Amplifier

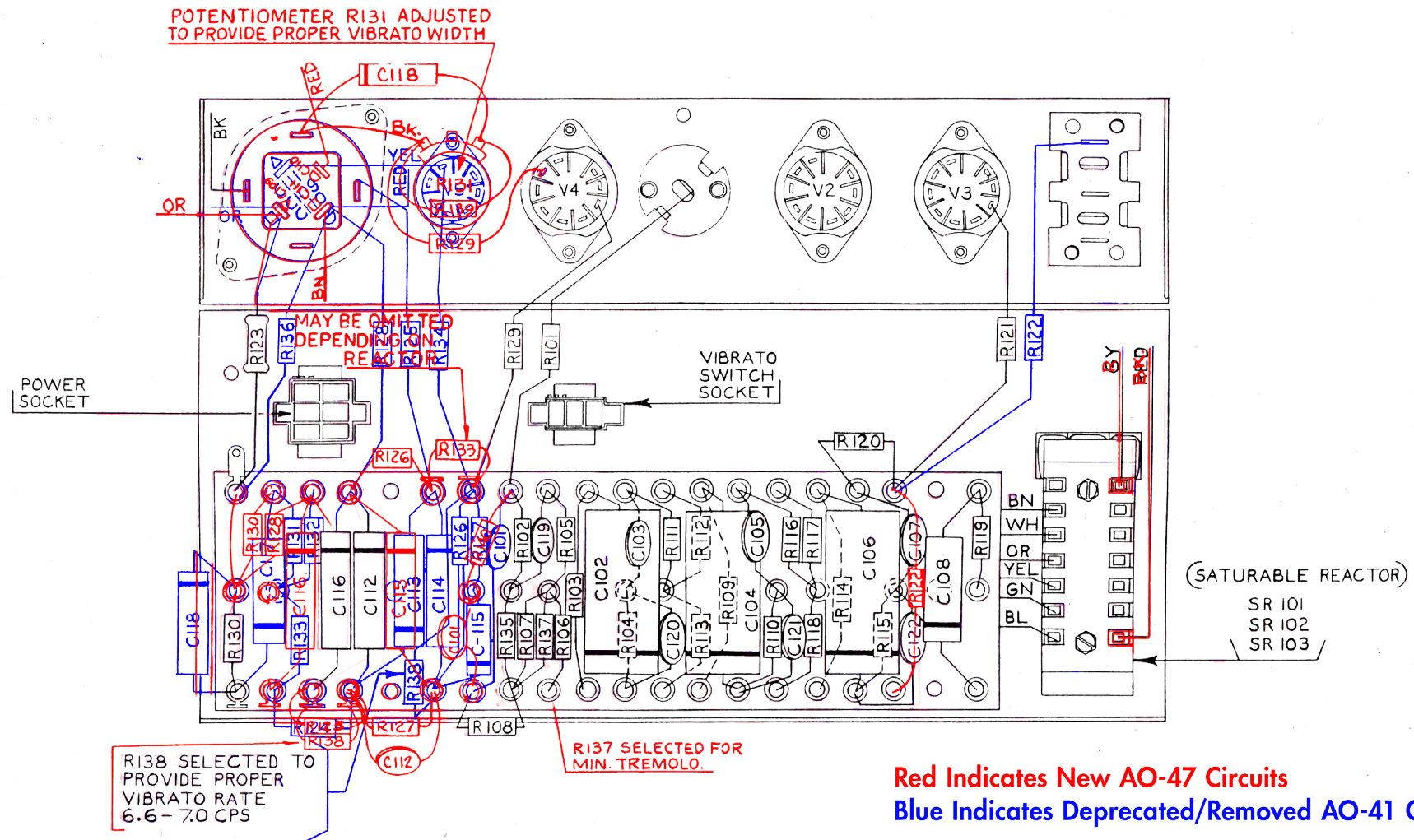


Figure 5-14A: Comparison Between AO-41 and AO-47 Vibrato Amplifiers

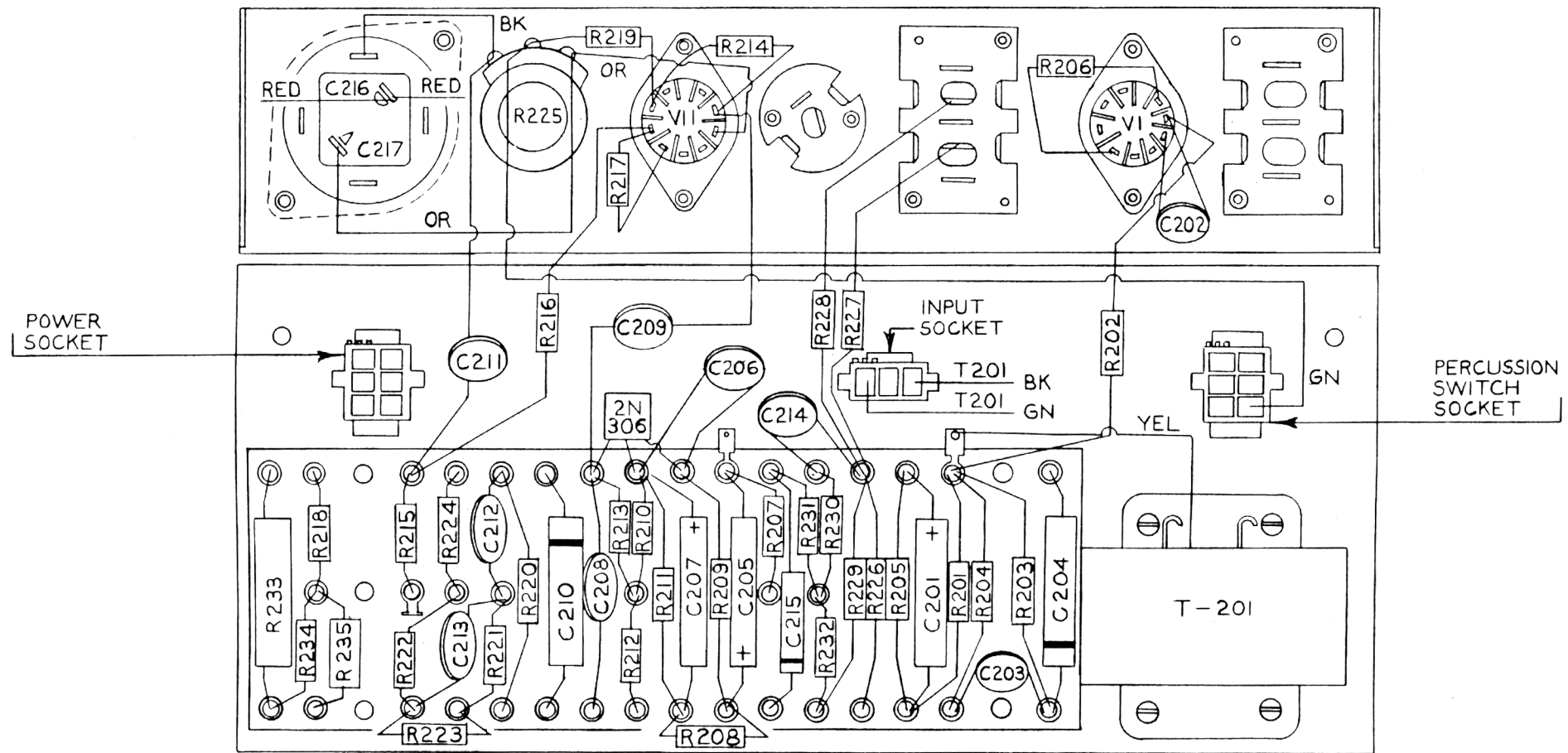


Figure 5-15: Parts Layout, AO-42 (117-000019) Percussion Amplifier

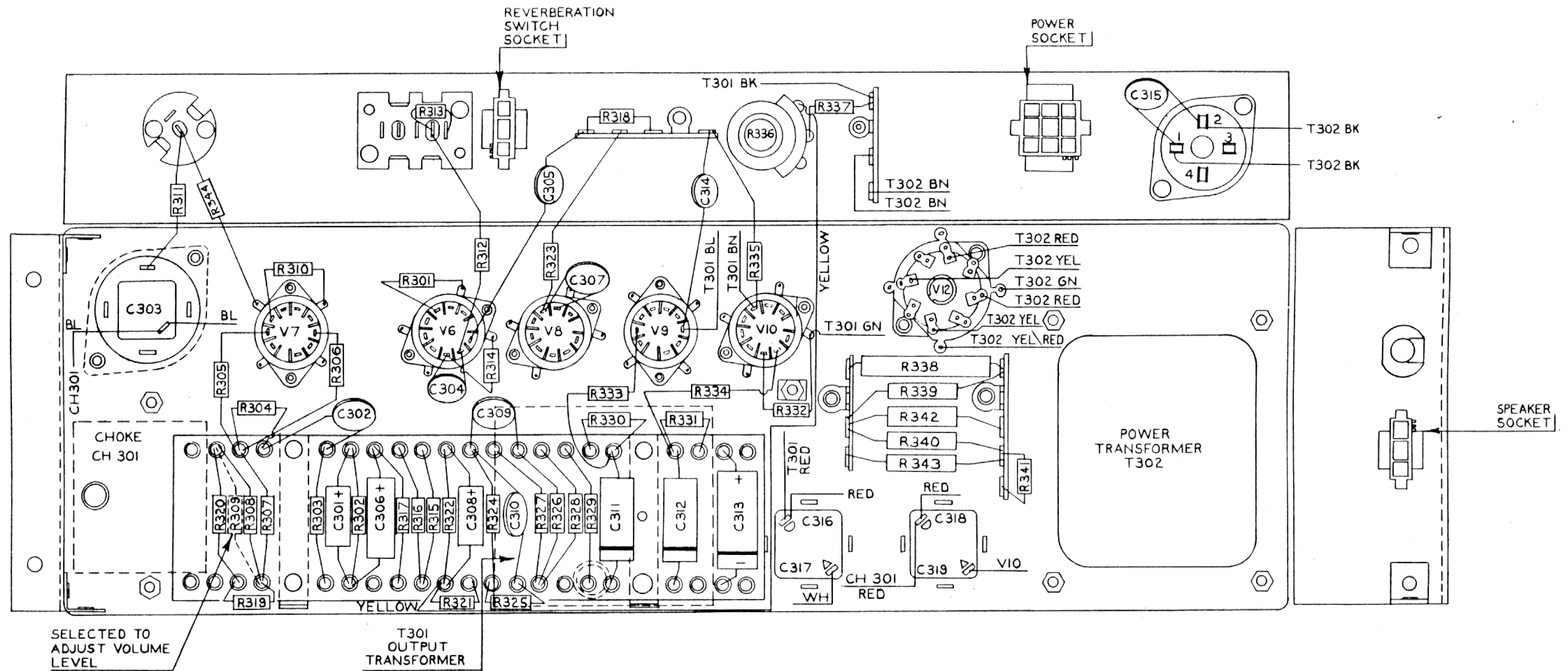


Figure 5-16: Parts Layout, AO-43 (126-000017) Power Amplifier

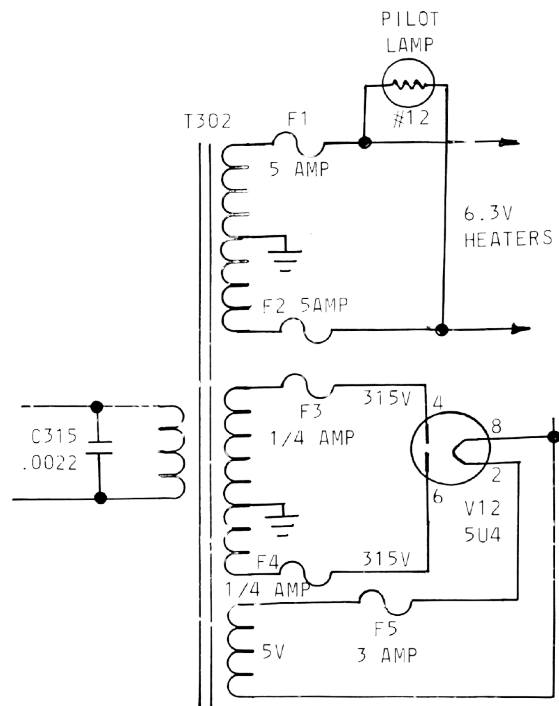


Figure 5-17: Power Amplifier Fuse Location (Canadian, 101-000130)

SECTION VI

L-SERIES PARTS LIST

6-1 OVERVIEW

This section contains a list of all parts used in the L-Series organs.

6-2 CHANGES FROM SOURCE DOCUMENT

The source document contained a list of parts that were manually typeset. The revision has been loaded into an Excel spreadsheet. All data has been arranged and standardized.

If desired, please contact Michael Hightower (mphtower@gmail.com) for a copy of the source Excel spreadsheet.

6-2-1 ORGANIZATION

The source document groups parts by assembly (e.g., upper manual, lower manual). This revised parts list does the same, but adds an Assembly table as well as Assembly references.

6-2-2 USAGE

Refer to the Assembly table to identify the appropriate collection of parts for which you are searching. Then move to the Parts List tables and look for the Assembly. From there you can more easily find the part you need.

6-3 ASSEMBLY LIST

Below is a list of the Assemblies referenced in the Parts Lists.

ID	Assembly Name	Part	Description	Revision	Part #
1	Control Panel	Control Panel Assembly			120-000011
2	Preset Tabs - Lower Manual	Preset Switch Assembly	Lower Manual		008-024391
3	Preset Tabs - Lower Manual	Preset Switch Assembly	Lower Manual	2	008-034391
4	Preset Tabs - Upper Manual	Preset Switch Assembly	Upper Manual		008-024392
5	Percussion Tabs	Percussion Switch Assembly			008-024393
6	Percussion Tabs	Switch Panel & Bracket Assembly	Second Harmonic, Third Harmonic		008-024615
7	Percussion Tabs	Switch Panel & Bracket Assembly	Fast Decay, Percussion Soft		008-024617
8	Vibrato Tabs	Vibrato Switch Assembly			008-024394
9	Vibrato Tabs	Switch Panel & Bracket Assembly	Vibrato Small		008-024616
10	Vibrato Tabs	Switch Panel & Bracket Assembly	Vibrato Normal, Vibrato Chorus		008-024617
11	Reverb, Volume, and Brilliance Tabs	Reverberation, Volume, Brilliance Switch Assembly			008-025549
12	Upper and Lower Manuals	Percussion Cable Assembly	Percussion Cable		011-036640
13	Upper and Lower Manuals	Cable Assembly	Lower Manual Plug		011-036749
14	Upper and Lower Manuals	Cable Assembly	Upper Manual Plug		011-036750
15	Upper and Lower Manuals	Lower Manual Assembly			119-000045
16	Upper and Lower Manuals	Upper Manual Assembly			119-000009
17	Generator & Motor	Generator & Motor Assembly			
18	Pedal Keyboard & Switch	Pedal Keyboard & Switch Assembly			116-000010
19	Preamplifier (AO-42)	Preamplifier Assembly	AO-42		117-000009
20	Vibrato Amplifier (AO-47)	Vibrato Amplifier Assembly	AO-47		126-000023
21	Power Amplifier	Power Amplifier Assemblies	AO-43-1, AO-43-2, AO-43-3		
22	Preset Percussion (L-100A)	Percussion Preset Assembly	L-100A		121-000105
23	Six-Voice Percussion PCB	Rhythm Printed Wiring Board Assembly	Used With 6-Button Rhythm Endblock		124-000114
24	Six-Voice Percussion Switches	Lower Right Hand Endblock Assembly	Rhythm Six-Button T-200-1-2, T-400		125-000043
25	Power Supply	Power Supply Assembly	120V 60Hz		127-000007
26	Power Supply	Power Supply Assembly	120V 50Hz		127-000008
27	Power Supply	Power Supply Assembly	220V 50-60Hz		127-000009
28	Power Supply	Power Supply Assembly	120V 60Hz	2	127-000041
29	Power Supply	Power Supply Assembly	120V 5%Hz	2	127-000042
30	Power Supply	Power Supply Assembly	220V 5%Hz	2	127-000043
31	Pedal Control Board	Pedal Control Board Assembly	Endblock Rhythm		
32	Rhythm II Drawer	Automatic Rhythm Assembly	RHYTHM II Drawer		
33	Woodwork	Woodwork			

ID	Assembly Name	Part	Description	Revision	Part #
34	Miscellaneous	Miscellaneous			
35	Speakers	Speakers			
36	Photozell Swell Pedal	Swell Pedal Assembly		2	123-000021
37	Rhythm II & Extrusion	Rhythm II & Extrusion Assembly		2	125-000050

6-4 PARTS LIST

Below is the comprehensive parts list for L-Series organs. Use the Assembly List to identify the locations of parts.

ID	Orig. Pg. #	Assembly	Rev-ision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
2	55	Control Panel		Panel Assembly						061-027350
3	55	Control Panel		Stop Switch Base						041-025778
4	55	Control Panel		Screw	Stop Switch Base Mounting					823-041714
5	55	Control Panel		S-Clip	For Control Panel Switch Cover					013-024298
6	55	Control Panel		Line Switch						008-034791
7	55	Control Panel		Lampholder Assembly						016-034440
8	55	Control Panel		Lamp		6.3V				016-022885
9	55	Control Panel		Pilot Light Lens						016-031454
10	55	Control Panel		Push on Clip	For Lens					013-031468
11	55	Control Panel		Felt Washer						042-020820
12	55	Control Panel		Aluminum Foil Tape						039-031450
13	55	Control Panel		Shim	For Line Switch					033-043006
14	55	Control Panel		Screw	Control Panel Mounting				10	845-070318
15	55	Control Panel		Washer	Used on Control Panel Screws				10	999-000061
16	55	Control Panel		Manual Stop Switch Assembly						120-000041
17	55	Control Panel		Mounting Block Assembly						063-025776
18	55	Control Panel		Contact Spring Assembly						012-027488
19	55	Control Panel		Stop Slide						028-032049
20	55	Control Panel		Stop Channel						025-027829
21	55	Control Panel		Drawbar Stop						025-040198
22	55	Control Panel		Round Head Screw	Drawbar Knob Mounting	#4-24x $\frac{3}{8}$				901-030514
23	55	Control Panel		Stamped Stop Knob 16'						031-034331
24	55	Control Panel		Stamped Stop Knob 8'						031-034333
25	55	Control Panel		Stamped Stop Knob 5- $\frac{1}{2}$ '						031-034337
26	55	Control Panel		Stamped Stop Knob 4'						031-034338
27	55	Control Panel		Stamped Stop Knob 2- $\frac{3}{4}$ '						031-034339
28	55	Control Panel		Stamped Stop Knob 2'						031-034340
29	55	Control Panel		Stamped Stop Knob 1- $\frac{3}{8}$ '						031-034341
30	55	Control Panel		Stamped Stop Knob 1- $\frac{1}{2}$ '						031-034342
31	55	Control Panel		Stamped Stop Knob 1'						031-034343
32	55	Control Panel		Stop Knob	Early Production Only		Black			025-035570

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
33	55	Control Panel		Stop Knob	Early Production Only		Ivory			025-035571
34	55	Control Panel		Stop Knob	Early Production Only		Brown			025-035572
35	55	Control Panel		Clamp Spring						012-027613
36	55	Control Panel		Terminal Lug						007-022320
37	55	Control Panel		Twisted Pair & Cap Assembly	Console Output to Preamplifier					011-036624
38	55	Control Panel	1	Binder Head Machine Screw	For Drawbar Stops	#2				846-010414
40	55	Preset Tabs - Lower Manual		Switch Panel & Bracket Assembly						008-024614
41	55	Preset Tabs - Lower Manual		Cancel Lever Assembly						060-037187
42	55	Preset Tabs - Lower Manual		Mounting Bracket						035-024205
43	55	Preset Tabs - Lower Manual		Lever Mounting Bracket						035-024335
44	55	Preset Tabs - Lower Manual		Control Tab	Drawbars					031-036481
45	55	Preset Tabs - Lower Manual		Control Tab	Ensemble					031-036482
46	55	Preset Tabs - Lower Manual		Plastic Tie						013-031744
47	55	Preset Tabs - Lower Manual		Tubular Clip						013-028002
48	55	Preset Tabs - Lower Manual		Shaft						020-037240
49	55	Preset Tabs - Lower Manual		Spring Washer						999-000151
50	55	Preset Tabs - Lower Manual		Sems. Round Head Machine Screw						821-040314
51	55	Preset Tabs - Lower Manual		Flat Head Machine Screw						839-040214
53	55	Preset Tabs - Upper Manual		Switch Panel & Bracket Assembly	Drawbars, Trumpet, Clarinet					008-024613
54	55	Preset Tabs - Upper Manual		Switch Panel & Bracket Assembly	Full Organ					008-024626
55	55	Preset Tabs - Upper Manual		Cancel Linkage Assembly						060-037190
56	56	Preset Tabs - Upper Manual		Mounting Bracket						035-024205
57	56	Preset Tabs - Upper Manual		Lever Mounting Bracket						035-024335
58	56	Preset Tabs - Upper Manual		Control Tab	Drawbars					031-036481
59	56	Preset Tabs - Upper Manual		Control Tab	Trumpet					031-036483

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
60	56	Preset Tabs - Upper Manual		Control Tab	Clarinet					031-036484
61	56	Preset Tabs - Upper Manual		Control Tab	Full Organ					031-036485
62	56	Preset Tabs - Upper Manual		Tubular Clip						013-028002
63	56	Preset Tabs - Upper Manual		Shaft						020-037238
64	56	Preset Tabs - Upper Manual		Spring Washer						999-000151
65	56	Preset Tabs - Upper Manual		Terminal Lug						007-035151
66	56	Preset Tabs - Upper Manual		Sems. Round Head Machine Screw						821-040314
70	56	Percussion Tabs		Mounting Bracket						035-024205
71	56	Percussion Tabs		Lever Mounting Bracket						035-024335
72	56	Percussion Tabs		Control Tab	Second Harmonic					031-036486
73	56	Percussion Tabs		Control Tab	Third Harmonic					031-036487
74	56	Percussion Tabs		Control Tab	Fast Decay					031-036488
75	56	Percussion Tabs		Control Tab	Percussion Soft					031-036489
76	56	Percussion Tabs		Spring Washer						999-000151
77	56	Percussion Tabs		Tubular Clip						013-028002
78	56	Percussion Tabs		Shaft						020-037238
79	56	Percussion Tabs		Terminal Lug						007-024137
80	56	Percussion Tabs		Flat Head Machine Screw						839-040214
81	56	Percussion Tabs		Sems. Round Head Machine Screw						821-040314
82	56	Percussion Tabs		Resistor		2.2M Ω		R409		600-021291
83	56	Percussion Tabs		Resistor		4.7 Ω		R410, R411		600-021561
88	56	Vibrato Tabs		Mounting Bracket						035-024205
89	56	Vibrato Tabs		Lever Mounting Bracket						035-024335
90	56	Vibrato Tabs		Control Tab	Vibrato Normal					031-036490
91	56	Vibrato Tabs		Control Tab	Vibrato Small					031-036491
92	56	Vibrato Tabs		Control Tab	Vibrato Chorus					031-036492
93	56	Vibrato Tabs		Plastic Tie						013-031744
94	56	Vibrato Tabs		Terminal Lug						007-024137
95	56	Vibrato Tabs		Shaft						020-037238
96	56	Vibrato Tabs		Tubular Clip						013-028002

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
97	56	Vibrato Tabs		Spring Washer						999-000151
98	56	Vibrato Tabs		Flat Head Machine Screw						839-040214
99	56	Vibrato Tabs		Resistor		2.2MΩ		R403		600-021291
100	56	Vibrato Tabs		Resistor		3.9MΩ		R404		600-021351
101	56	Vibrato Tabs		Resistor		6.8MΩ		R402		600-021411
103	56	Reverb, Volume, and Brilliance Tabs		Switch Panel & Bracket Assembly	Reverb II Volume Soft					008-024617
104	57	Reverb, Volume, and Brilliance Tabs		Switch Panel & Bracket Assembly	Reverb I					008-024604
105	57	Reverb, Volume, and Brilliance Tabs		Switch Panel & Bracket Assembly	Brilliance					008-024610
106	57	Reverb, Volume, and Brilliance Tabs		Mounting Bracket						035-024351
107	57	Reverb, Volume, and Brilliance Tabs		Lever Mounting Bracket						035-024335
108	57	Reverb, Volume, and Brilliance Tabs		Control Tab	REVERB I					031-036493
109	57	Reverb, Volume, and Brilliance Tabs		Control Tab	REVERB II					031-036494
110	57	Reverb, Volume, and Brilliance Tabs		Control Tab	VOLUME SOFT					031-036495
111	57	Reverb, Volume, and Brilliance Tabs		Control Tab	BRILLIANCE					031-036496
112	57	Reverb, Volume, and Brilliance Tabs		Plastic Tie						013-031744
113	57	Reverb, Volume, and Brilliance Tabs		Shaft						020-037239
114	57	Reverb, Volume, and Brilliance Tabs		Spring Washer						999-000151
115	57	Reverb, Volume, and Brilliance Tabs		Tubular Clip						013-028002
116	57	Reverb, Volume, and Brilliance Tabs		Tie Strap						041-027176
117	57	Reverb, Volume, and Brilliance Tabs		Flat Head Machine Screw						839-040314
118	57	Reverb, Volume, and Brilliance Tabs		Sems. Round Head Machine Screw						821-040314
119	57	Reverb, Volume, and Brilliance Tabs		Resistor		100KΩ		R407		600-020971
120	57	Reverb, Volume, and Brilliance Tabs		Resistor		270KΩ		R406		600-021071
121	57	Reverb, Volume, and Brilliance Tabs		Resistor		820KΩ		R405		600-021191

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
122	57	Reverb, Volume, and Brilliance Tabs		Resistor		4.7MΩ		R408		600-021371
123	57	Reverb, Volume, and Brilliance Tabs		Capacitor	Ceramic	0.0015μF		C402		425-010542
124	57	Reverb, Volume, and Brilliance Tabs		Capacitor		0.022μF		C401		401-020342
125	57	Reverb, Volume, and Brilliance Tabs		Shielded Lead Assembly	Vibrato Chorus Cable - Blue Plug					011-034752
126	57	Reverb, Volume, and Brilliance Tabs		Shielded Lead Assembly	Percussion Volume Cable - Red Plug					011-034753
127	57	Reverb, Volume, and Brilliance Tabs		Shielded Cable & Cap assembly	Vibrato Switch Cable					011-036621
128	57	Reverb, Volume, and Brilliance Tabs		Shielded Cable & Cap Assembly	Reverb Switch Cable					011-036622
134	57	Upper and Lower Manuals		Switch Cover Assembly						060-033397
135	57	Upper and Lower Manuals		Top Cover Assembly						060-033405
136	57	Upper and Lower Manuals		Key Comb Assembly	12 Keys					057-045053
137	57	Upper and Lower Manuals		Key Comb Assembly	8 Keys					057-045052
138	57	Upper and Lower Manuals		Key & Channel Assembly	Sharp Key					060-024286
139	57	Upper and Lower Manuals		Key & Channel Assembly	One Set of Seven Ivory					057-042770
140	57	Upper and Lower Manuals		Bracket & Channel Assembly						060-033392
141	57	Upper and Lower Manuals		Sems. Bind Head Machine Screw						850-000002
142	57	Upper and Lower Manuals		Sharp Key - Black						025-032672
143	57	Upper and Lower Manuals		Natural Key - Ivory "C"						025-042279
144	57	Upper and Lower Manuals		Natural Key - Ivory "D"						025-042280
145	57	Upper and Lower Manuals		Natural Key - Ivory "E"						025-045053
146	57	Upper and Lower Manuals		Natural Key - Ivory "F"						025-042282
147	57	Upper and Lower Manuals		Natural Key - Ivory "G"						025-042283
148	57	Upper and Lower Manuals		Natural Key - Ivory "A"						025-042284
149	57	Upper and Lower Manuals		Natural Key - Ivory "B"						025-042285
150	57	Upper and Lower Manuals		Natural Key - Ivory "CX"	Last Key on Manual					025-042286
151	57	Upper and Lower Manuals		Mounting Bracket	Left Hand					060-040192
152	57	Upper and Lower Manuals		Mounting Bracket	Right Hand					060-040193
153	57	Upper and Lower Manuals		Strain Relief						013-034999
154	57	Upper and Lower Manuals		Screw	Key Comb					831-070314
155	57	Upper and Lower Manuals		Screw	Top Cover					925-050314
156	57	Upper and Lower Manuals		Screw	Switch Top Cover					831-070414

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
158	58	Generator & Motor		Generator & Motor Assembly		120V	60Hz			112-000021
159	58	Generator & Motor		Generator & Motor Assembly		120V	50Hz			112-000022
160	58	Generator & Motor		Generator & Motor Assembly		220V	60Hz			112-000023
161	58	Generator & Motor		Generator & Motor Assembly		220V	50Hz			112-000024
162	58	Generator & Motor		Generator Assembly			60Hz			113-000011
163	58	Generator & Motor		Generator Assembly			50Hz			113-000012
164	58	Generator & Motor		Synchronous Motor		120V	60Hz			021-033801
165	58	Generator & Motor		Synchronous Motor		120V	50Hz			021-033802
166	58	Generator & Motor		Synchronous Motor		220V	60Hz			021-033803
167	58	Generator & Motor		Synchronous Motor		220V	50Hz			021-033804
168	58	Generator & Motor		Motor Capacitor		120V	60Hz			499-033806
169	58	Generator & Motor		Motor Capacitor		120V	50-60Hz			499-033807
170	58	Generator & Motor		Motor Capacitor		220V	50-60Hz			499-033805
171	58	Generator & Motor		Generator Cover Assembly						115-000031
172	58	Generator & Motor		Terminal Panel Assembly	AC Panel with GY, BL, YEL.					006-024326
173	58	Generator & Motor		Motor Mounting Bracket						035-027354
174	58	Generator & Motor		Capacitor Clamp						013-024313
175	58	Generator & Motor		Motor Clamp						013-024427
176	58	Generator & Motor		Motor Coupling Spring						012-029132
177	58	Generator & Motor		Motor Coupler						017-024242
178	58	Generator & Motor		Insulator Strip	AC Panel					036-024328
179	58	Generator & Motor		Post	For Mounting Cover					044-031434
180	58	Generator & Motor		Terminal Cover						041-022076
181	58	Generator & Motor		Oval End Cap	Motor Capacitor					041-024838
183	58	Pedal Keyboard & Switch		Pedal Keyboard Frame Assembly						060-024270
184	58	Pedal Keyboard & Switch		Cover Assembly						046-025208
185	58	Pedal Keyboard & Switch		Cable Assembly						011-024210
186	58	Pedal Keyboard & Switch		Actuator					13	045-024198
187	58	Pedal Keyboard & Switch		Extension Spring					13	012-020404
188	58	Pedal Keyboard & Switch		Stop Post					13	044-020398
189	58	Pedal Keyboard & Switch		Up Stop Felt					26	042-020410
190	58	Pedal Keyboard & Switch		Down Stop Felt						042-031898
191	58	Pedal Keyboard & Switch		Terminal Lug						007-015197
192	58	Pedal Keyboard & Switch		Pivot Bracket					8	035-036094

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
193	58	Pedal Keyboard & Switch		Pivot Bracket					5	035-036095
194	58	Pedal Keyboard & Switch		Terminal Panel Assembly	Long					063-036553
195	58	Pedal Keyboard & Switch		Terminal Panel						045-024196
196	58	Pedal Keyboard & Switch		Stationary Contact Assembly					8	030-033305
197	58	Pedal Keyboard & Switch		Contact Spring Assembly					8	012-033541
198	58	Pedal Keyboard & Switch		Actuator Spring					8	012-024199
199	58	Pedal Keyboard & Switch		Eyelet					24	999-026552
200	58	Pedal Keyboard & Switch		Terminal Panel Assembly	Short					063-036542
201	58	Pedal Keyboard & Switch		Terminal Panel						006-024197
203	58	Pedal Keyboard & Switch		Key Channel Assembly	Long					057-035978
204	58	Pedal Keyboard & Switch		Key Channel	Long					041-020402
205	58	Pedal Keyboard & Switch		Long Key	Brown					025-031666
206	58	Pedal Keyboard & Switch		Guide Felt						042-021255
207	58	Pedal Keyboard & Switch		Eyelet						999-017454
208	58	Pedal Keyboard & Switch		Sems. Bind Head Machine Screw	Mounting Key					850-100514
209	58	Pedal Keyboard & Switch		Key Channel Assembly	Short					057-035982
210	58	Pedal Keyboard & Switch		Key Channel	Short					041-020403
211	58	Pedal Keyboard & Switch		Short Key	Black					025-031469
212	58	Pedal Keyboard & Switch		Guide Felt						042-021255
213	58	Pedal Keyboard & Switch		Eyelet						999-017454
214	58	Pedal Keyboard & Switch		Sems. Bind Head Machine Screw	Mounting Key					850-100714
216	59	Preamplifier (AO-42)		Chassis Pan Assembly						009-024416
217	59	Preamplifier (AO-42)		Chassis Housing Assembly						009-024417
218	59	Preamplifier (AO-42)		Matching Transformer Assembly T201						003-024469
219	59	Preamplifier (AO-42)		Plug Assembly		3 Pin				011-036632
220	59	Preamplifier (AO-42)		Plug Assembly	Power	6 Pin				011-024376
221	59	Preamplifier (AO-42)		Plug Assembly	Percussion Switch	6 Pin				011-036637
222	59	Preamplifier (AO-42)		Tube		12AU7				002-012300
223	59	Preamplifier (AO-42)		Tube		12AX7				002-012301
224	59	Preamplifier (AO-42)		Tube Shield						010-041481
225	59	Preamplifier (AO-42)		Set of Capacitors & Resistors	Chassis Mounted					063-024412
226	59	Preamplifier (AO-42)		Resistor		270KΩ		R206		600-021071
227	59	Preamplifier (AO-42)		Resistor		1MΩ		R214		600-021211
228	59	Preamplifier (AO-42)		Resistor		330KΩ		R217		600-021091

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
229	59	Preamplifier (AO-42)		Potentiometer		30K Ω		R225		676-000144
230	59	Preamplifier (AO-42)		Resistor & Capacitor Panel Assembly						063-024414
231	59	Preamplifier (AO-42)		Terminal Board						006-024407
232	59	Preamplifier (AO-42)		Resistor		68K Ω		R212, R229		600-040931
233	59	Preamplifier (AO-42)		Resistor		390 Ω		R211		600-020391
234	59	Preamplifier (AO-42)		Resistor		20K Ω		R233		626-060861
235	59	Preamplifier (AO-42)		Resistor		2.7K Ω		R235		600-030591
236	59	Preamplifier (AO-42)		Resistor		3.9M Ω		R219		600-021351
237	59	Preamplifier (AO-42)		Resistor		82 Ω		R209		600-020231
238	59	Preamplifier (AO-42)		Resistor		100 Ω		R207		600-020251
239	59	Preamplifier (AO-42)		Resistor		220 Ω		R234		600-020331
240	59	Preamplifier (AO-42)		Resistor		1K Ω		R208		600-020491
241	59	Preamplifier (AO-42)		Resistor		1.2K Ω		R231		600-020511
242	59	Preamplifier (AO-42)		Resistor		3.3K Ω		R205		600-020611
243	59	Preamplifier (AO-42)		Resistor		4.7K Ω		R210, R215, R216		600-020651
244	59	Preamplifier (AO-42)		Resistor		15K Ω		R213		600-020771
245	59	Preamplifier (AO-42)		Resistor		47K Ω		R202, R221, R232		600-020891
246	59	Preamplifier (AO-42)		Resistor		100K Ω		R220, R223		600-020971
247	59	Preamplifier (AO-42)		Resistor		150K Ω		R224		600-021011
248	59	Preamplifier (AO-42)		Resistor	Selected for Proper Gain	180K Ω		R226		600-021031
248.1	59	Preamplifier (AO-42)		Resistor	Selected for Proper Gain	220K Ω		R226		600-021051
248.2	59	Preamplifier (AO-42)t		Resistor	Selected for Proper Gain	270K Ω		R226		600-021071
249	59	Preamplifier (AO-42)		Resistor		270K Ω		R222		600-021070
250	59	Preamplifier (AO-42)		Resistor		330K Ω		R218		600-021011
251	59	Preamplifier (AO-42)		Resistor		470K Ω		R228, R230		600-021131
252	59	Preamplifier (AO-42)		Resistor		680K Ω		R227		600-021171
253	59	Preamplifier (AO-42)		Resistor		1M Ω		R201		600-021211
254	59	Preamplifier (AO-42)		Resistor	Selected at Time of Inspection	4.7M Ω		R203		600-021371
254.1	59	Preamplifier (AO-42)		Resistor	Selected at Time of Inspection	5.6M Ω		R203		600-021391
255	59	Preamplifier (AO-42)		Resistor		120K Ω		R236		600-020991
256	59	Preamplifier (AO-42)		Capacitor		0.1 μ F	200V	C215		401-020533
257	59	Preamplifier (AO-42)		Capacitor		0.047 μ F	400V	C204		403-030452
258	59	Preamplifier (AO-42)		Capacitor		0.33 μ F	100V	C210		406-010172

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
259	59	Preamplifier (AO-42)		Capacitor		100µF	3V	C201, C205, C207		407-010029
260	59	Preamplifier (AO-42)		Capacitor		39pF	500V	C203		425-010151
261	59	Preamplifier (AO-42)		Capacitor		0.0047µF	100V	C211		413-010042
262	59	Preamplifier (AO-42)		Capacitor		0.01µF	100V	C208, C209, C213, C214		413-010072
263	59	Preamplifier (AO-42)		Capacitor		0.02µF	100V	C212		425-010763
264	59	Preamplifier (AO-42)		Capacitor		0.1µF	10V	C206		427-030025
265	59	Preamplifier (AO-42)		Transistor		NPN		Q201		001-021070
267	59	Vibrato Amplifier (AO-47)		Chassis Pan Assembly						009-036649
268	59	Vibrato Amplifier (AO-47)		Chassis Housing Assembly						009-024417
269	60	Vibrato Amplifier (AO-47)		Saturable Reactor Assembly						063-025246
270	60	Vibrato Amplifier (AO-47)		Plug Assembly		3 Pin				011-036630
271	60	Vibrato Amplifier (AO-47)		Plug Assembly		6 Pin				011-024376
272	60	Vibrato Amplifier (AO-47)		Capacitor		30µF	350V	C109		450-040200
272	60	Vibrato Amplifier (AO-47)		Capacitor		40µF	400V	C111		450-040200
272	60	Vibrato Amplifier (AO-47)		Capacitor		40µF	450V	C110		450-040200
273	60	Vibrato Amplifier (AO-47)		Potentiometer		500KΩ		R131		676-000152
274	60	Vibrato Amplifier (AO-47)		Tube		7247				002-006307
275	60	Vibrato Amplifier (AO-47)		Tube		12AU7				002-012300
276	60	Vibrato Amplifier (AO-47)		Tube Shield						010-041481
277	60	Vibrato Amplifier (AO-47)		Terminal Board Assembly	Resistor & Capacitor					063-027083
278	60	Vibrato Amplifier (AO-47)		Terminal Board						006-036647
279	60	Vibrato Amplifier (AO-47)		Resistor		5KΩ		R123		603-060761
280	60	Vibrato Amplifier (AO-47)		Resistor		56KΩ		R136		600-030911
281	60	Vibrato Amplifier (AO-47)		Resistor		10KΩ		R103, R107, R113, R114, R118, R109		600-030732
282	60	Vibrato Amplifier (AO-47)		Resistor	Use With Red Dot Reactors	470Ω		R106, R112, R117		600-020411
283	60	Vibrato Amplifier (AO-47)		Resistor		560Ω		R133		600-020431
284	60	Vibrato Amplifier (AO-47)		Resistor		1KΩ		R132		600-020491
285	60	Vibrato Amplifier (AO-47)		Resistor		1.2KΩ		R121		600-020511
286	60	Vibrato Amplifier (AO-47)		Resistor		8.2KΩ		R122		600-020711
287	60	Vibrato Amplifier (AO-47)		Resistor		15KΩ		R104, R110, R115		600-020771
288	60	Vibrato Amplifier (AO-47)		Resistor		47KΩ		R119		600-020891

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
289	60	Vibrato Amplifier (AO-47)		Resistor		180K Ω		R102		600-021031
290	60	Vibrato Amplifier (AO-47)		Resistor		220K Ω		R101		600-021051
291	60	Vibrato Amplifier (AO-47)		Resistor		330K Ω		R135		600-021091
292	60	Vibrato Amplifier (AO-47)		Resistor		470K Ω		R130, R125, R126, R127		600-021131
293	60	Vibrato Amplifier (AO-47)		Resistor		1M Ω		R120, R139, R105, R111, R116		600-021211
294	60	Vibrato Amplifier (AO-47)		Resistor		1.8M Ω		R108		600-021271
295	60	Vibrato Amplifier (AO-47)		Resistor		1.2K Ω	0.05	R129		600-020512
296	60	Vibrato Amplifier (AO-47)		Resistor		150K Ω	0.05	R128		600-021012
297	60	Vibrato Amplifier (AO-47)		Resistor	Select For Proper Phase Shift	12K Ω		R137		600-020751
298	60	Vibrato Amplifier (AO-47)		Resistor	Select For Proper Phase Shift	15K Ω		R137		600-020771
299	60	Vibrato Amplifier (AO-47)		Resistor	Select For Proper Phase Shift	18K Ω		R137		600-020791
300	60	Vibrato Amplifier (AO-47)		Resistor	Select For Proper Phase Shift	22K Ω		R137		600-020811
301	60	Vibrato Amplifier (AO-47)		Resistor	Select For Proper Phase Shift	27K Ω		R137		600-020831
302	60	Vibrato Amplifier (AO-47)		Resistor	Select For Proper Phase Shift	33K Ω		R137		600-020851
303	60	Vibrato Amplifier (AO-47)		Resistor	Select For Proper Vibrato Rate: 6.6-7.0 Hz	1.2M Ω		R138		600-021231
304	60	Vibrato Amplifier (AO-47)		Resistor	Select For Proper Vibrato Rate: 6.6-7.0 Hz	1.5M Ω		R138		600-021251
305	60	Vibrato Amplifier (AO-47)		Resistor	Select For Proper Vibrato Rate: 6.6-7.0 Hz	1.8M Ω		R138		600-021271
306	60	Vibrato Amplifier (AO-47)		Resistor	Select For Proper Vibrato Rate: 6.6-7.0 Hz	2.2M Ω		R138		600-021291
307	60	Vibrato Amplifier (AO-47)		Resistor	Select For Proper Vibrato Rate: 6.6-7.0 Hz	2.7M Ω		R138		600-021311
308	60	Vibrato Amplifier (AO-47)		Resistor	Select For Proper Vibrato Rate: 6.6-7.0 Hz	3.3M Ω		R138		600-021331
309	60	Vibrato Amplifier (AO-47)		Resistor	Select For Proper Vibrato Rate: 6.6-7.0 Hz	3.9M Ω		R138		600-021351
310	60	Vibrato Amplifier (AO-47)		Resistor	Select For Proper Vibrato Width	270 Ω		R133		600-020351
311	60	Vibrato Amplifier (AO-47)		Resistor	Select For Proper Vibrato Width	330 Ω		R133		600-020371
312	60	Vibrato Amplifier (AO-47)		Resistor	Select For Proper Vibrato Width	390 Ω		R133		600-020391
313	60	Vibrato Amplifier (AO-47)		Resistor	Select For Proper Vibrato Width	470 Ω		R133		600-020411
314	60	Vibrato Amplifier (AO-47)		Resistor	Select For Proper Vibrato Width	560 Ω		R133		600-020431

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
315	60	Vibrato Amplifier (AO-47)		Capacitor		0.047 μ F	100V	C118		406-010112
316	60	Vibrato Amplifier (AO-47)		Capacitor		0.02 μ F	100V	C114, C115		406-010182
317	60	Vibrato Amplifier (AO-47)		Capacitor		0.02 μ F	400V	C113		422-032012
318	60	Vibrato Amplifier (AO-47)		Capacitor		0.047 μ F	400V	C108		422-032022
319	60	Vibrato Amplifier (AO-47)		Capacitor		0.1 μ F	400V	C116		422-032032
320	60	Vibrato Amplifier (AO-47)		Capacitor		0.47 μ F	400V	C102, C104, C106		422-032092
321	60	Vibrato Amplifier (AO-47)		Capacitor		150 pF	500V	C120, C121, C122		425-010292
322	60	Vibrato Amplifier (AO-47)		Capacitor		0.001 μ F	500V	C101		425-010502
323	60	Vibrato Amplifier (AO-47)		Capacitor		0.0018 μ F	500V	C112		425-010562
324	60	Vibrato Amplifier (AO-47)		Capacitor		0.01 μ F	500V	C103, C105, C107, C119		425-010752
326	61	Power Amplifier		Power Amplifier Assembly	AO-43-1	120V	60Hz			126-000017
327	61	Power Amplifier		Power Amplifier Assembly	AO-43-2	120V	50Hz			126-000018
328	61	Power Amplifier		Power Amplifier Assembly	AO-43-3	234V				126-000019
330	61	Power Amplifier		Chassis Pan Assembly						009-024410
331	61	Power Amplifier		Power Transformer Assembly T-302		120V	60Hz			003-024157
332	61	Power Amplifier		Power Transformer Assembly T-302		120V	50Hz			003-036548
333	61	Power Amplifier		Power Transformer Assembly T-302		234V	50-60Hz			003-036549
334	61	Power Amplifier		Output Transformer Assembly T-301						003-036550
335	61	Power Amplifier		Filter Choke Assembly CH-301		14 Henry				003-024159
336	61	Power Amplifier		AC Cord & Plug Assembly						011-033233
337	61	Power Amplifier		AC Strain Relief						013-034998
338	61	Power Amplifier		Plug Assembly	Output	3 Pin Female				011-036628
339	61	Power Amplifier		Plug Assembly		9 Pin				011-024379
340	61	Power Amplifier		Plug Assembly	Reverb	3 Pin Female				011-036633
341	61	Power Amplifier		Tube		12BH7		V7		002-012302
342	61	Power Amplifier		Tube		12AX7		V6, V8		002-012301
343	61	Power Amplifier		Tube		6BQ5		V9, V10		002-006700
344	61	Power Amplifier		Tube		5U4		V12		002-005201
346	61	Power Amplifier		Resistor		64 Ω		R338		604-070071
347	61	Power Amplifier		Resistor		4.7K Ω		R335		600-030651
348	61	Power Amplifier		Resistor		8.2K Ω		R341		600-030711
349	61	Power Amplifier		Resistor		390 Ω		R310, R314		600-020391

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
350	61	Power Amplifier		Resistor		1K Ω		R311, R312		600-020491
351	61	Power Amplifier		Resistor		3.9K Ω		R337		600-020631
352	61	Power Amplifier		Resistor		47K Ω		R313, R323		600-020891
353	61	Power Amplifier		Resistor		470K Ω		R301		600-021131
354	61	Power Amplifier		Resistor		4.7M Ω		R318		600-021371
355	61	Power Amplifier		Resistor		220K Ω		R344		600-021051
356	61	Power Amplifier		Resistor		300 Ω		R339		602-050081
357	61	Power Amplifier		Resistor		750 Ω		R340		602-050121
358	61	Power Amplifier		Resistor		1K Ω		R343		602-050141
359	61	Power Amplifier		Resistor		130 Ω		R332		606-050022
360	61	Power Amplifier		Resistor	Selected for Nominal Gain	33K Ω		R309		600-020851
361	61	Power Amplifier		Resistor	Selected for Nominal Gain	39K Ω		R309		600-020871
362	61	Power Amplifier		Resistor	Selected for Nominal Gain	56K Ω		R309		600-020911
363	61	Power Amplifier		Resistor	Selected for Nominal Gain	82K Ω		R309		600-020951
364	61	Power Amplifier		Resistor	Selected for Nominal Gain	120K Ω		R309		600-020991
365	61	Power Amplifier		Resistor	Selected for Nominal Gain	270K Ω		R309		600-021071
366	61	Power Amplifier		Capacitor		100pF	500V	C307		425-010252
367	61	Power Amplifier		Capacitor		0.0022 μ F	500V	C315		425-010583
368	61	Power Amplifier		Capacitor		0.0012 μ F	500V	C304		425-010522
369	61	Power Amplifier		Capacitor		0.02 μ F	500V	C305		425-010763
370	61	Power Amplifier		Capacitor		0.001 μ F	2000V	C314		425-030503
371	61	Power Amplifier		Capacitor		50 μ F	450V	C303		450-010070
372	61	Power Amplifier		Capacitor		50 μ F	450V	C316, C317, C318, C319		450-040401
373	61	Power Amplifier		Capacitor		0.001 μ F	500V	C320		425-010502
374	61	Power Amplifier		Resistor & Capacitor Panel Assembly						063-024411
375	61	Power Amplifier		Resistor		150 Ω		R321		600-020291
376	61	Power Amplifier		Resistor		1K Ω		R333, R334		600-020491
377	61	Power Amplifier		Resistor		2.7K Ω		R302, R327		600-020591
378	61	Power Amplifier		Resistor		6.8K Ω		R322		600-020691
379	61	Power Amplifier		Resistor		10K Ω		R305, R306		600-020731
380	61	Power Amplifier		Resistor		39K Ω		R308		600-020871
381	61	Power Amplifier		Resistor		47K Ω		R325		600-020891
382	61	Power Amplifier		Resistor		68K Ω		R315		600-020931

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
383	61	Power Amplifier		Resistor		100KΩ		R316, R317, R328, R329		600-020971
384	62	Power Amplifier		Resistor		150KΩ		R320		600-021011
385	62	Power Amplifier		Resistor		180KΩ		R304		600-021031
386	62	Power Amplifier		Resistor		220KΩ		R303, R319		600-021051
387	62	Power Amplifier		Resistor		330KΩ		R307, R330, R331		600-021091
388	62	Power Amplifier		Resistor		470KΩ		R324		600-021131
389	62	Power Amplifier		Resistor		1 MΩ		R326		600-021211
390	62	Power Amplifier		Capacitor		0.047 μF	400V	C311, C312		403-030452
391	62	Power Amplifier		Capacitor		100 μF	3V	C301, C308		407-010029
392	62	Power Amplifier		Capacitor		220 pF	500V	C310		425-010332
393	62	Power Amplifier		Capacitor		0.02 μF	500V	C302, C309		425-010763
394	62	Power Amplifier		Capacitor		5 μF	150V	C306		450-040083
395	62	Power Amplifier		Capacitor		100 μF	25V	C313		450-040084
396	62	Power Amplifier		Potentiometer		10KΩ		R336		676-000143
399	62	Preset Percussion (L-100A)		Printed Circuit Board Chassis						121-000102
400	62	Preset Percussion (L-100A)		Power Supply Chassis						121-000103
401	62	Preset Percussion (L-100A)		Speaker Assembly						121-000104
402	62	Preset Percussion (L-100A)		Marked Endblock						025-031201
403	62	Preset Percussion (L-100A)		Knob Large	Percussion Endblock					031-033591
404	62	Preset Percussion (L-100A)		Knob Small						031-033594
407	62	Six-Voice Percussion PCB		Printed Wiring Board						023-041242
408	62	Six-Voice Percussion PCB		Resistor		470 Ω		R138		600-020411
409	62	Six-Voice Percussion PCB		Resistor		820 Ω		R103, R103A, R103B, R103C		600-020471
410	62	Six-Voice Percussion PCB		Resistor		2200 Ω		R141, R160		600-020571
411	62	Six-Voice Percussion PCB		Resistor		5600 MΩ		R130		600-020671
412	62	Six-Voice Percussion PCB		Resistor		10KΩ		R108, R108A, R108B, R125, R131, R157, R161, R164		600-020731
413	62	Six-Voice Percussion PCB		Resistor		12KΩ		R148		600-020751

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
414	62	Six-Voice Percussion PCB		Resistor		15K Ω		R106A		600-020772
415	62	Six-Voice Percussion PCB		Resistor		15K Ω		R119, R122		600-020771
416	62	Six-Voice Percussion PCB		Resistor		18K Ω		R107B		600-020791
417	62	Six-Voice Percussion PCB		Resistor		22K Ω		R106, R106B, R106C, R107C		600-020812
418	62	Six-Voice Percussion PCB		Resistor		22K Ω		R140, R128, R150, R151, R154, R159		600-020811
419	62	Six-Voice Percussion PCB		Resistor		27K Ω		R114, R127, R142		600-020831
420	62	Six-Voice Percussion PCB		Resistor		33K Ω		R118, R145		600-020851
421	62	Six-Voice Percussion PCB		Resistor		39K Ω		R107A		600-020872
422	62	Six-Voice Percussion PCB		Resistor		47K Ω		R100, R100A, R100B, R100C, R137, R136, R139		600-020891
423	62	Six-Voice Percussion PCB		Resistor		68K Ω		R102, R102A, R102B, R102C, R165		600-020932
424	62	Six-Voice Percussion PCB		Resistor		100K Ω		R101, R101A, R101B, R101C, R110, R117, R152, R153, R155, R156		600-020971
425	62	Six-Voice Percussion PCB		Resistor		150K Ω		R121, R163		600-021011
426	62	Six-Voice Percussion PCB		Resistor		220K Ω		R123, R147, R149, R158, R160		600-021051
427	62	Six-Voice Percussion PCB		Resistor		150 Ω		R167		600-020291
428	62	Six-Voice Percussion PCB		Resistor		470K Ω		R105, R105A, R105B, R105C, R111, R115, R120, R162		600-021131
429	62	Six-Voice Percussion PCB		Resistor		680K Ω		R124		600-021171
430	62	Six-Voice Percussion PCB		Resistor		1M Ω		R112		600-021211
431	62	Six-Voice Percussion PCB		Resistor		2.2M Ω		R104, R104A, R109, R109A, R109B, R109C		600-021291
432	62	Six-Voice Percussion PCB		Resistor		2.7M Ω		R129		600-021311
433	62	Six-Voice Percussion PCB		Resistor		6.8M Ω		R104B, R168		600-021411
434	62	Six-Voice Percussion PCB		Resistor		10M Ω		R104C		600-021451
435	62	Six-Voice Percussion PCB		Resistor		1.5M Ω		R116		600-021251
436	62	Six-Voice Percussion PCB		Resistor		27K Ω		R107		600-020832

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
437	62	Six-Voice Percussion PCB		Potentiometer Trimmer		5K Ω		R134		676-000011
438	62	Six-Voice Percussion PCB		Potentiometer Trimmer		50K Ω		R113, R126		676-000019
439	62	Six-Voice Percussion PCB		Potentiometer Trimmer		20K Ω		R169		676-000015
440	63	Six-Voice Percussion PCB		Capacitor		0.001 μ F		C110, C117, C118, C119		405-340012
441	63	Six-Voice Percussion PCB		Capacitor		0.0015 μ F		C102C, C103C;C104C		405-340022
442	63	Six-Voice Percussion PCB		Capacitor		0.0022 μ F		C121, C125		405-340032
443	63	Six-Voice Percussion PCB		Capacitor		0.0039 μ F		C115		405-340052
444	63	Six-Voice Percussion PCB		Capacitor		0.0047 μ F		C102B, C103B, C104B, C128		405-340062
445	63	Six-Voice Percussion PCB		Capacitor		0.0082 μ F		C109		405-340072
446	63	Six-Voice Percussion PCB		Capacitor		0.01 μ F		C108, C111, C112, C116, C130		405-340082
447	63	Six-Voice Percussion PCB		Capacitor		0.015 μ F		C102A, C103A, C104A		405-340092
448	63	Six-Voice Percussion PCB		Capacitor		0.022 μ F		C101B, C102, C103, C104		405-340112
449	63	Six-Voice Percussion PCB		Capacitor		0.047 μ F		C101, C101A, C127		405-340142
450	63	Six-Voice Percussion PCB		Capacitor		0.1 μ F		C100, C100A, C100B, C100C, C108, C107, C114, C123, C124, C126		405-340182
451	63	Six-Voice Percussion PCB		Capacitor		0.22 μ F		C113		405-340212
452	63	Six-Voice Percussion PCB		Capacitor		0.056 μ F		C101C		405-340162
453	63	Six-Voice Percussion PCB		Capacitor		47pF		C105B		426-010172
454	63	Six-Voice Percussion PCB		Capacitor		68pF		C105C		426-010212
455	63	Six-Voice Percussion PCB		Capacitor		220pF		C105, C105A		426-010332
456	63	Six-Voice Percussion PCB		Capacitor	Tantalum	1 μ F		C120		414-040092
457	63	Six-Voice Percussion PCB		Capacitor	Tantalum	10 μ F		C122		414-040152
458	63	Six-Voice Percussion PCB		Capacitor	Electrolytic	1000 μ F		C129		407-060149
459	63	Six-Voice Percussion PCB		Transistor		NPN		Q106, Q107, Q108		001-021070
460	63	Six-Voice Percussion PCB		Transistor		NPN		Q100, Q100A, Q100B, Q100C, Q103, Q104, Q112, Q114, Q115, Q116		001-021134

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
461	63	Six-Voice Percussion PCB		Transistor		NPN		Q102, Q105, Q109, Q110		001-021135
462	63	Six-Voice Percussion PCB		Transistor		PNP		Q111, Q113		001-021172
463	63	Six-Voice Percussion PCB		Transistor	Noise	NPN		Q101		001-021211
464	63	Six-Voice Percussion PCB		Diode				D100, D100A, D100B, D100C, D101, D102, D103, D104		001-026010
465	63	Six-Voice Percussion PCB		Choke				L100, L101		003-030753
467	63	Six-Voice Percussion Switches		Endblock Lower Right Hand						025-041129
468	63	Six-Voice Percussion Switches		Cushion						043-041131
469	63	Six-Voice Percussion Switches		Push Button						025-033453
470	63	Six-Voice Percussion Switches		Compression Spring						012-033464
471	63	Six-Voice Percussion Switches		Knob						031-031755
472	63	Six-Voice Percussion Switches		Cable Assembly						011-041161
473	63	Six-Voice Percussion Switches		Cable Clip						013-025297
474	63	Six-Voice Percussion Switches		Potentiometer	Duel Construction					676-000269
475	63	Six-Voice Percussion Switches		Resistor		2200Ω				600-010571
476	63	Six-Voice Percussion Switches		Resistor		10KΩ				600-010731
477	63	Six-Voice Percussion Switches		Resistor		56KΩ				600-020911
478	63	Six-Voice Percussion Switches		Diode						001-026010
479	63	Six-Voice Percussion Switches		Switch Panel Assembly						008-041158
480	63	Six-Voice Percussion Switches		Switch Panel						006-041135
481	63	Six-Voice Percussion Switches		Contact Spring Assembly						008-021944
482	63	Six-Voice Percussion Switches		Stationary Contact Assembly						030-021927
483	63	Six-Voice Percussion Switches		Riveting Plate						041-020664

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
484	63	Six-Voice Percussion Switches		Contact Spring						030-041132
485	63	Six-Voice Percussion Switches		Pivot Bracket						041-041133
486	63	Six-Voice Percussion Switches		Felt Stop						042-041130
487	63	Six-Voice Percussion Switches		Stop Post						030-033690
488	63	Six-Voice Percussion Switches		Spring						012-032408
489	63	Six-Voice Percussion Switches		Shaft						020-037239
490	63	Six-Voice Percussion Switches		Spring Bridge						041-041134
491	63	Six-Voice Percussion Switches		Support	Shaft					041-041157
492	63	Six-Voice Percussion Switches		Rocker Tab Block Pedal						031-041143
493	63	Six-Voice Percussion Switches		Rocker Tab Cymbal Pedal						031-041144
494	63	Six-Voice Percussion Switches		Rocker Tab Brush Lower						031-041145
495	64	Six-Voice Percussion Switches		Rocker Tab Bongo Lower						031-041146
496	64	Six-Voice Percussion Switches		Rocker Tab Tom Tom Lower						031-041147
497	64	Six-Voice Percussion Switches		Rocker Tab Claves Lower						031-041148
498	64	Six-Voice Percussion Switches		Felt Washer						042-032415
499	64	Six-Voice Percussion Switches		Retaining Ring	For Shaft					013-041163
500	64	Six-Voice Percussion Switches		Terminal Lug						007-022974
504	64	Power Supply		Power Supply Chassis						041-033661
505	64	Power Supply		Terminal Strip Assembly						006-028913
506	64	Power Supply		Transformer		120V	60Hz			003-033473
507	64	Power Supply		Transformer		120-220V 50-60Hz				003-033474
508	64	Power Supply		Capacitor	Electrolytic	500µF				407-090329
509	64	Power Supply		Capacitor	Electrolytic - Select best value	20µF		C100		450-070050
509	64	Power Supply		Capacitor	Electrolytic - Select best value	40µF		C100		450-070050
509	64	Power Supply		Capacitor	Electrolytic - Select best value	80µF		C100		450-070050

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
510	64	Power Supply		Printed Wiring Board Assembly						124-000022
511	64	Power Supply		Printed Wiring Board & Pin Assembly						023-033482
512	64	Power Supply		Diode				D100, D101, D102, D103		001-024051
513	64	Power Supply		Transistor		NPN		Q100, Q101		001-021133
514	64	Power Supply		Transistor		NPN		Q102		001-021111
515	64	Power Supply		Zener Diode			30V	D104		001-023040
516	64	Power Supply		Resistor		150Ω		R103		600-020291
517	64	Power Supply		Resistor		220Ω		R101		600-020331
518	64	Power Supply		Resistor		330Ω		R102		600-020371
519	64	Power Supply		Resistor		2.2KΩ		R104		600-020571
520	64	Power Supply		Resistor		6.8KΩ		R105		600-020692
521	64	Power Supply		Resistor		27KΩ		R106		600-020832
522	64	Power Supply		Resistor		33KΩ		R108		600-020852
523	64	Power Supply		Capacitor	Ceramic	0.02μF		C102		426-010763
524	64	Power Supply		Spacer					4	044-033662
525	64	Power Supply		Cable Assembly						011-040032
527	64	Pedal Control Board		Pedal Control Board Assembly						063-042051
528	64	Pedal Control Board		Capacitor		1μF		C1		414-040092
529	64	Pedal Control Board		Capacitor		0.1μF		C2, C3, C4		414-040012
530	64	Pedal Control Board		Capacitor		390pF		C5		425-010392
531	64	Pedal Control Board		Capacitor		82pF		C6		425-010232
532	64	Pedal Control Board		Capacitor		470pF		C7		425-010412
533	64	Pedal Control Board		Resistor		1000Ω		R1		600-020491
534	64	Pedal Control Board		Resistor		2200Ω		R16		600-020571
535	64	Pedal Control Board		Resistor		10KΩ		R5, R10		600-020731
536	64	Pedal Control Board		Resistor		15KΩ		R12, R15		600-020771
537	64	Pedal Control Board		Resistor		22KΩ		R11		600-020811
538	64	Pedal Control Board		Resistor		100KΩ		R3, R4, R7		600-020971
539	64	Pedal Control Board		Resistor		150KΩ		R6		600-021011
540	64	Pedal Control Board		Resistor		470KΩ		R7		600-021131
541	64	Pedal Control Board		Resistor		1MΩ		R13, R14		600-021211
542	64	Pedal Control Board		Resistor		2.2MΩ		R8		600-021291
543	64	Pedal Control Board		Resistor		3.9MΩ		R2		600-021351

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
544	64	Pedal Control Board		Transistor		NPN		Q2, Q4		001-021133
545	64	Pedal Control Board		Transistor		NPN		Q1, Q3		001-021135
546	64	Pedal Control Board		Diode				D1		001-026030
548	65	RHYTHM II Drawer		Automatic Rhythm Assembly		120V	60Hz			110-000047
549	65	RHYTHM II Drawer		Power Supply Assembly						127-000028
550	65	RHYTHM II Drawer		Automatic Rhythm Assembly		120V	50Hz			110-000049
551	65	RHYTHM II Drawer		Power Supply Assembly						127-000029
552	65	RHYTHM II Drawer		Automatic Rhythm Assembly		220V 60Hz	60Hz			110-000050
553	65	RHYTHM II Drawer		Power Supply Assembly						127-000030
554	65	RHYTHM II Drawer		Automatic Rhythm Assembly		220V 50Hz	50Hz			110-000051
555	65	RHYTHM II Drawer		Power Supply Assembly						127-000030
556	65	RHYTHM II Drawer		Shield	Power Supply					010-042054
557	65	RHYTHM II Drawer		Control Assembly						125-000045
558	65	RHYTHM II Drawer		Voice Generator Assembly						063-042080
559	65	RHYTHM II Drawer		Shield	Voice Generator Assembly					010-042082
560	65	RHYTHM II Drawer		Wire & Plug Assembly						011-042083
561	65	RHYTHM II Drawer		Screw	4 Power Supply-4 Voice Generator	#6			8	884-050734
562	65	RHYTHM II Drawer		Screw	Mounting Rail					884-050933
563	65	RHYTHM II Drawer		Adhesive Backed Felt						042-035141
564	65	RHYTHM II Drawer		Washer						999-000065
565	65	RHYTHM II Drawer		Clip	Adhesive Backed					013-042242
567	65	Woodwork		Cabinet Assembly	L-111-1					111-000024
568	65	Woodwork		Case Assembly						050-036894
569	65	Woodwork		Top Panel						050-036890
570	65	Woodwork		Music Panel						050-038294
571	65	Woodwork		Baffle & Grille Cloth						052-036886
572	65	Woodwork		Rear Cover						056-040229
573	65	Woodwork		Bench Assembly						152-000023
574	65	Woodwork		Cabinet Assembly	L-112-1					111-000025
575	65	Woodwork		Case Assembly						050-036895
576	65	Woodwork		Top Panel						050-036891
577	65	Woodwork		Music Panel						050-038295
578	65	Woodwork		Baffle & Grille Cloth						052-036887

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
579	65	Woodwork		Rear Cover						056-040228
580	65	Woodwork		Bench Assembly						152-000024
581	65	Woodwork		Cabinet Assembly	L-122-1					111-000026
582	65	Woodwork		Case Assembly						050-025470
583	65	Woodwork		Top Panel						050-036891
584	65	Woodwork		Music Panel						050-025427
585	65	Woodwork		Baffle & Grille Cloth						052-036887
586	65	Woodwork		Rear Cover						056-040228
587	65	Woodwork		Bench Assembly						152-000027
588	65	Woodwork		Cabinet Assembly	L-133-1					111-000027
589	65	Woodwork		Case Assembly						050-025500
590	65	Woodwork		Top Panel						050-036893
591	65	Woodwork		Music Panel						050-025428
592	65	Woodwork		Baffle & Grille Cloth						052-036888
593	65	Woodwork		Rear Cover						056-040228
594	65	Woodwork		Bench Assembly						152-000025
595	65	Woodwork		Cabinet Assembly	L-143-1					111-000028
596	65	Woodwork		Case Assembly						050-025530
597	65	Woodwork		Top Panel						050-036892
598	65	Woodwork		Music Panel						050-036905
599	65	Woodwork		Baffle & Grille Cloth						052-036889
600	65	Woodwork		Rear Cover						056-040230
601	65	Woodwork		Bench Assembly						152-000026
602	65	Woodwork		Cabinet Assembly	L-212-1					111-000115
603	66	Woodwork		Case Assembly						050-036895
604	66	Woodwork		Top Panel						050-000840
605	66	Woodwork		Music Panel						050-038295
606	66	Woodwork		Baffle & Grille Cloth						052-036887
607	66	Woodwork		Rear Cover						056-040228
608	66	Woodwork		Bench Assembly						152-000024
609	66	Woodwork		Cabinet Assembly	L-222-1					111-000116
610	66	Woodwork		Case Assembly						050-025470
611	66	Woodwork		Top Panel						050-000840
612	66	Woodwork		Music Panel						050-025427

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
613	66	Woodwork		Baffle & Grille Cloth						052-036887
614	66	Woodwork		Rear Cover						056-040228
615	66	Woodwork		Bench Assembly						152-000027
617	66	Miscellaneous		Pedal Filter Choke Assembly						003-025333
618	66	Miscellaneous		Cable Assembly	Generator To Manuals					011-024352
619	66	Miscellaneous		Reverberation Unit Assembly						121-000002
620	66	Miscellaneous		Trim Strip	Grille Cloth					061-031029
621	66	Miscellaneous		Speed Nut						999-024841
622	66	Miscellaneous		Cover	Control Switch					041-024211
623	66	Miscellaneous		Felt	Adhesive Backed					042-033312
624	66	Miscellaneous		Endblock Upper Right Hand	Textured					025-035707
625	66	Miscellaneous		Endblock Upper Right Hand	Smooth					025-024307
626	66	Miscellaneous		Endblock Lower Left Hand	Textured					025-028406
627	66	Miscellaneous		Endblock Lower Left Hand	Smooth					025-024848
628	66	Miscellaneous		Endblock Lower Right Hand	Textured					025-028407
629	66	Miscellaneous		Endblock Lower Right Hand	Smooth					025-024847
631	66	Speakers		L100, L100-1, -2	Early Production					014-024346
632	66	Speakers		L100, L100-1, -2	Early Production					014-027293
633	66	Speakers		L100A	Early Production					014-024346
634	66	Speakers		L100A	Early Production					014-024347
635	66	Speakers		L100, L100-1, -2	12" (R.H. Viewed from Rear)					014-030812
636	66	Speakers		L100, L100-1, -2	12" (L. H. Viewed from Rear)					014-027293
637	66	Speakers		L100A	12" (R.H. Viewed from Rear)					014-030812
638	66	Speakers		L100A						014-024347
639	67	Control Panel	2	Tap Tite Screw		#2-56				939-010434
641	74	Photocell Swell Pedal	2	Base Bracket Assembly						060-030207
642	74	Photocell Swell Pedal	2	Shutter Assembly						060-033749
643	74	Photocell Swell Pedal	2	Bearing Bracket						035-031429
644	74	Photocell Swell Pedal	2	Bearing Bracket with Dowel						035-031428
645	74	Photocell Swell Pedal	2	Pedal Bearing	Slotted					017-031431
646	74	Photocell Swell Pedal	2	Pedal Shaft						020-021725
647	74	Photocell Swell Pedal	2	Machine Screw						843-081113
648	74	Photocell Swell Pedal	2	Lock Washer						999-000729
649	74	Photocell Swell Pedal	2	Square Nut						999-001343

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
650	74	Photocell Swell Pedal	2	Cell & Housing Wiring Assembly						040-030216
651	74	Photocell Swell Pedal	2	Diffuser						016-030153
652	74	Photocell Swell Pedal	2	Photo Cell Housing Cover						025-032880
653	74	Photocell Swell Pedal	2	Light Bulb Socket Assy.						034-033419
654	74	Photocell Swell Pedal	2	Spring						012-030154
655	74	Photocell Swell Pedal	2	Light Bulb						016-031748
656	74	Photocell Swell Pedal	2	Pedal Assembly	With Mat					060-033289
658	74	Rhythm II & Extrusion	2	Rhythm II Unit	Inbuilt Automatic					125-000049
659	74	Rhythm II & Extrusion	2	Screened Panel	Painted Part					061-042579
660	74	Rhythm II & Extrusion	2	End Cap	Right Hand					045-042507
661	74	Rhythm II & Extrusion	2	End Cap	Left Hand					045-042508
665	74	Power Supply	2	Power Supply Chassis						041-033662
671	74	Power Supply	2	Resistor		1 K Ω	3W			602-050141
672	74	Power Supply	2	Resistor		68 Ω	3W			602-050021
673	76	Miscellaneous	2	Generator Pad						036-024354
674	76	Miscellaneous	2	Speed Clip						013-024843
675	76	Miscellaneous	2	Reverberation Unit Assembly						121-000002
676	76	Miscellaneous	2	Power Supply Cable						011-024357
677	76	Miscellaneous	2	Terminal Panel Assembly	Between Reverb & Amp					006-034306
678	76	Miscellaneous	2	Cable & Cap Assembly)	Speaker to Amp					011-036623
679	76	Miscellaneous	2	Cable & Contact Assembly)	Between Speakers					011-036741
680	76	Miscellaneous	2	Shielded Lead & Plug Assy. (between Preamp & Vib. Amp)						200-010327
681	76	Miscellaneous	2	Shielded Lead & Plug Assy. (between Preamp & Vib. Amp)						200-010328
682	76	Miscellaneous	2	Shielded Lead & Plug Assy. (Red Reverb Cable)						011-036643
683	76	Miscellaneous	2	Shielded Lead & Plug Assy. (gray Reverb Cable)						011-036644
684	76	Miscellaneous	2	Shield	Rhythm II Power Supply					010-042054
687	76	Miscellaneous	2	Cable & Plug Assembly	BLK plug cable at Amp					011-036388
688	76	Miscellaneous	2	Terminal Cover (lower manual)						041-024164
689	76	Miscellaneous	2	Grommet (lower manual)						043-039553
690	76	Miscellaneous	2	Swell Pedal Housing Assembly						046-025206
691	76	Miscellaneous	2	Amplifier Base						009-024824
693	76	Miscellaneous	2	End Block Bracket						035-031459

ID	Orig. Pg. #	Assembly	Revision	Part	Description	Value /Unit	Spec.	Ref.	Units	Part #
695	76	Miscellaneous	2	Terminal Strip Assembly	Shelf					006-043833
696	76	Miscellaneous	2	Generator Tee-Nut						999-032998
697	76	Miscellaneous	2	Generator Grommet						043-024246
698	76	Miscellaneous	2	Generator Washer						999-000104
699	76	Miscellaneous	2	Generator Mounting Screw						824-121114
700	76	Miscellaneous	2	Plastic Tie						013-031744
701	76	Miscellaneous	2	Oil Tube Assembly						015-025581
702	76	Miscellaneous	2	Trim Strip (Swell Pedal)						055-025648
703	76	Miscellaneous	2	Front Strip (manual)						061-031029
704	76	Miscellaneous	2	Cable Clip						013-024296
707	76	Woodwork	2	Cabinet Assembly	L-212					111-000115
708	76	Woodwork	2	Case Assembly						050-036895
709	76	Woodwork	2	Rear Cover						056-040228
710	76	Woodwork	2	Fastener						013-040269
711	76	Woodwork	2	Brad						999-040271
712	76	Woodwork	2	Fastener "Clip"	Rear Cover					013-036811
713	76	Woodwork	2	Baffle & Grille Cloth						052-036887
714	76	Woodwork	2	Lock Nut	Speaker & Baffle Mounting					999-001437
715	76	Woodwork	2	Baffle	Only					054-025432
716	76	Woodwork	2	Grille Cloth						053-038428
717	76	Woodwork	2	Standard Mounting Screw						999-006116
718	76	Woodwork	2	Plastic Bumper						025-023329
719	76	Woodwork	2	Top & Music Panel Assembly						050-002778
721	76	Woodwork	2	Music Panel						050-038295
722	76	Woodwork	2	Hinge						032-033414
723	76	Woodwork	2	Screw						880-030537
724	76	Woodwork	2	Top Rail Screw						832-081814
725	76	Woodwork	2	Stud	Top Panel					044-042417
726	76	Woodwork	2	Bench Assembly						152-000024

SECTION VII MODIFICATIONS

7-1 OVERVIEW

Being one of the more inexpensive tonewheel Hammonds, the L-100 has rich aftermarket support for modifications and improvements. These range from simple modifications like connecting a Leslie to more complex changes like sculpting a more B3-like tone or adding unique tonal changes like overdrive.

7-2 CONNECTING A LESLIE OR OTHER EXTERNAL SPEAKER

The factory-standard way of connecting a Leslie or other external speaker system is to use the ¼" output modification described in *1-19 External Sound Source*. However, a Switchcraft SF-JAX #25 or #55 is now obsolete. Additionally, this design relies exclusively on the swell pedal to adjust the output volume.

Instead, you may use the switchable line-out circuit as shown in *Figure 7-1*. This circuit adds a switch and uses any commonly available ¼" phone jack. The schematic shows a TRS-style female connector, but only the TS junctions are used.

Ground noise can be a problem when connecting these instruments, so you may wish to add a 1:1 audio isolation transformer to the output circuit

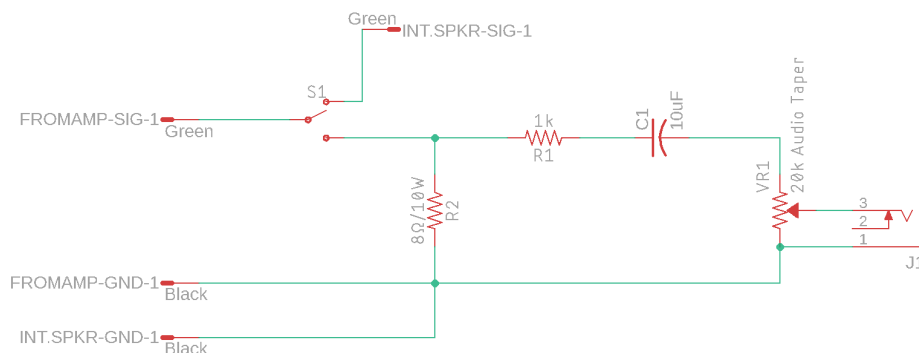


Figure 7-1: Switchable Line-Out Schematic

7-2-1 CONNECTING A LESLIE VIA A NO. 27-1 ADAPTER

Use the following steps from the Leslie installation guide if you want to connect a Leslie 6-pin connector (6H, 6W) and can source the cable, No. 27-1 Leslie Adapter and No. 26-1 Chassis.

For more details, please refer to the installation guide for your Leslie model.

- Plug the 5-contact socket of the No. 27-1 Console Adapter into the No. 26-1 Chassis.
- Cut off the 5-pole plug and socket assembly, cutting the red, green, and black wires at a point just above the screw terminal connections.
- Discard this plug and socket assembly, but save one of the plastic insulating sleeves for future use.

- d. Strip the ends of the red, green, and black wires so that the special connectors (in envelope) may be attached, i.e., clamped and soldered, as follows:
 - Red wire - male connector
 - Green wire - female connector
 - Black wire - female connector.
- e. Disconnect the green wire (from the amplifier) at the speaker terminal and fit the plastic insulating sleeve over it. Connect this green wire to the red adapter wire by means of the special connector. Pull the plastic sleeve over the connection.
- f. Connect the green adapter wire to the speaker terminal just vacated by the green wire.
- g. A second speaker operates in parallel with the speaker mentioned in Step e. The black adapter wire is to be connected to this “second speaker” at the same terminal to which the black wire from the other speaker is already connected.
- h. Connect the blue and grey adapter wires to the two AC terminals on the console amplifier which are under the control of the console power switch.
- i. The 6-conductor connecting cable is supplied in a standard 30-foot length complete with plug and socket. This is Leslie Part No. 727. For longer console-to-speaker runs, two or more of these standard 30-foot assemblies may be connected together in series.

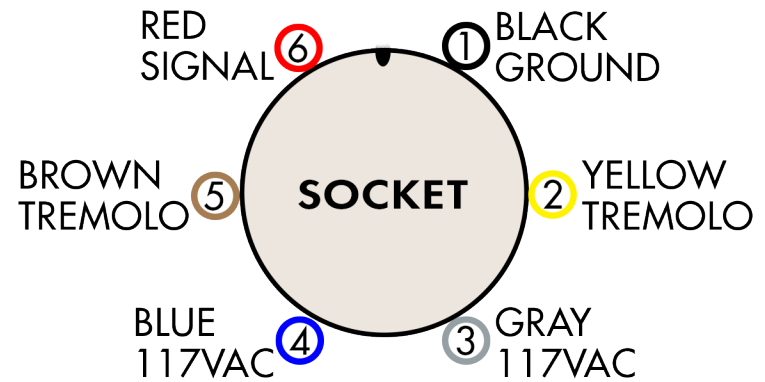


Figure 7-2: Leslie 6W Connector Pin-Out

7-3 OTHER RESOURCES

At the time of this writing, the following resources contain a number of terrific modifications.

- Hammond Wiki — Hammond Modifications page: <http://www.dairiki.org/HammondWiki/HammondModifications>
- Captain Foldback — Great source of Hammond information <http://www.captain-foldback.com/>

7-4 REVISED RH END-PANEL LAYOUT TEMPLATE

The drilling template shown in *Figure 7-3* is designed to add the following modifications in a clean and almost factory-original way:

- Kon Zissis’ Chorus Depth Control
- Kon Zissis’ Treble Boost
- Kon Zissis’ Overdrive (documentation missing)
- Line Out as described in 7-2

7-4-1 PARTS LIST

The following parts are used for the panel. If you choose to use different switches, then naturally the drill holes will need to be adjusted for their mounting dimensions.

Mod	Part	Value	Quantity	Digi-Key Part #
N/A	Knob		3	1568-1601-ND
Line Out	Potentiometer	20k Ω , Audio Taper	1	987-1716-ND
Line Out	Switch	SPDT	1	401-1300-ND
Overdrive	Potentiometer	100k Ω , Audio Taper	1	987-1717-ND
Overdrive	Potentiometer	50k Ω , Linear Taper	1	987-1733-ND
Overdrive	Switch	SPST	3	401-1300-ND
Treble Boost	Switch	SPDT	1	RRA1534400-ND

7-4-2 METHOD

Print the drawing in *Figure 7-3* first on plain paper and ensure the dimensions are printing correctly. Use a caliper, ideally, or a ruler to ensure the printed dimensions match the design (i.e., 20mm = 20mm).

After finalizing the print setup, print the page on sticky-backed transparency paper, preferably with a matte finish. This will ensure the layout stays in place during drilling or punching.

Drill the panel holes with the appropriate size Forstner bits, or use a punch if suitable sizes are available.

Test the fit of the components. Once everything snaps in place, remove the transparency paper. You may need a solvent such as Goof-Off to remove all of the glue.

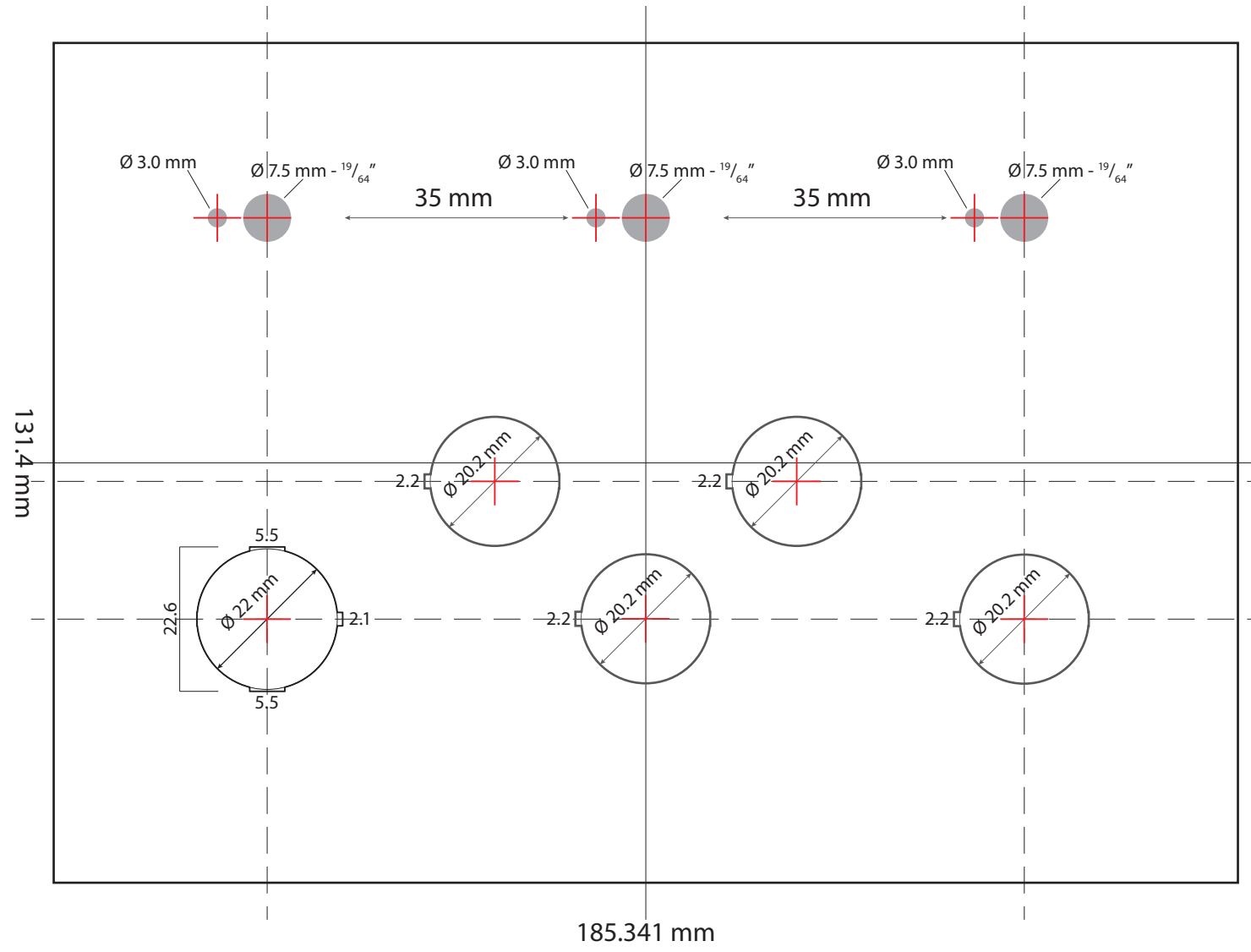


Figure 7-3: Modified RH End-Panel Template

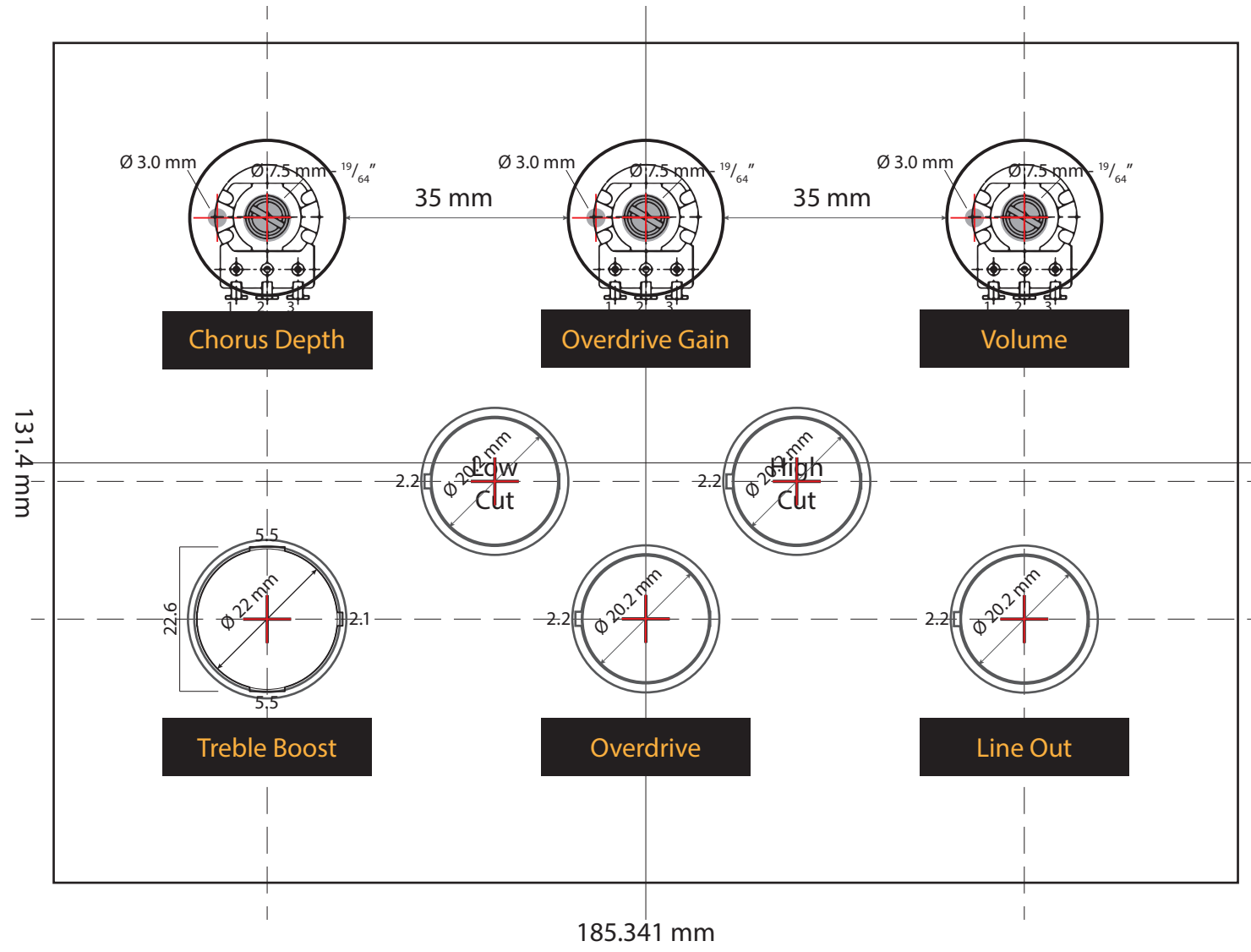


Figure 7-4: Modified RH End-Panel Template, with Parts and Labels

7-5 KON ZISSIS CHORUS DEPTH CONTROL

This modification improves the L100's chorus tone and adds control over chorus depth.

A 500K linear taper potentiometer can work as a Chorus Depth Control by mixing the straight signal with the vibrato signal.

The 0.0047 μ F capacitor wired across potentiometer pins 1 and 2 emphasizes the midrange and treble frequencies of the straight signal above those same frequencies in the vibrato signal. This results in the rich, shimmering chorus effect similar to that of a scanner vibrato.

You can experiment with different capacitor values to alter the chorus effect. Suggested capacitors to try are: 560pF, 0.001 μ F, 0.0022 μ F, etc., through 0.01 μ F.

The figure below (*Figure 7-5*) shows Kon's modifications to the original circuit in red.

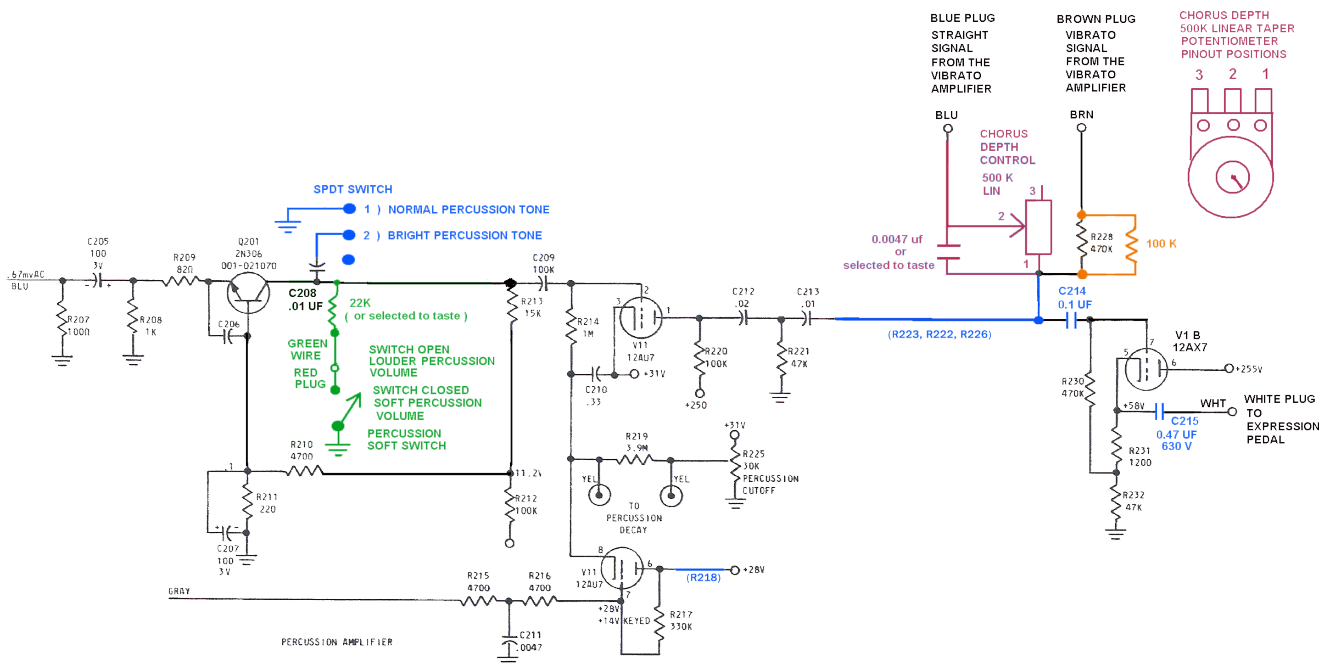


Figure 7-5: Kon Zissis Chorus Depth Control and Percussion Modification

7-6 KON ZISSIS PERCUSSION MOD

This modification improves the L100's Percussion tone, volume, and attack. Refer to the blue changes in the figure above (*Figure 7-5*). Removed components are shown in parentheses.

Remove R128 (330k Ω) at the 12AU7 tube (V11) and replace it with a jumper so the percussion fast decay volume is the same as the percussion slow decay.

Remove the R223 100kΩ grounding resistor connected to C213 to fatten the percussion signal and the main organ signals.

Short R222 (270kΩ) and R226 (180kΩ) to increase the volume level of the percussion signal so that it is better matched with the boosted main organ signals.

Replace C214 (0.01μF) with a 0.1μF 100V capacitor. Replace C204 (0.047μF, see *Figure 7–6* below) and C215 (0.1μF) with 0.47μF 630V capacitors to allow the lowest bass frequencies to pass unattenuated.

Re-locate the percussion soft switch to the output of the Q201 transistor (see green edits *Figure 7–5*). Because the R222, the R226 and the R229 resistors were removed as part of the main organ signals and the percussion signal volume level boost modification, the main organ signal volume levels is lowered when the percussion soft switch was set to the “soft” setting. Relocation of the soft switch path restores the correct volume levels.

The stock L100 series and Porta-B percussion fast decay duration is longer than that of the B3/C3. Add a 1MΩ resistor in parallel with R409 (2.2MΩ) which is located on the percussion decay switch (see orange edits *Figure 7–5*). This produces a duration similar to the B3/C3 percussion fast decay. This does not affect the percussion slow decay duration which is controlled by the R219 3.9MΩ resistor.

7-7 KON ZISSIS TREBLE BOOST MOD

More treble and mid-range is added with this modification.

Replace the output of C203 (39pF) that connects to C204 (.047μF) with an SPDT On/Off/On switch. Connect one On lead to the original output of C203 for normal brightness. Connect the other On lead to a 1.8MΩ resistor for high treble boost.

Replace R203 (4.7MΩ) with a 10MΩ resistor. Add another SPDT On/Off/On switch and connect one One lead to the original output of R203 for normal bass. Add a 39pF capacitor to the other On lead for added bass.

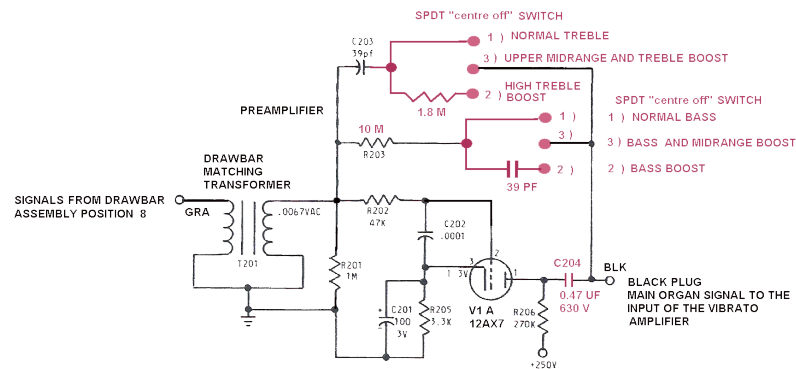


Figure 7–6: Kon Zissis Treble Boost Mod