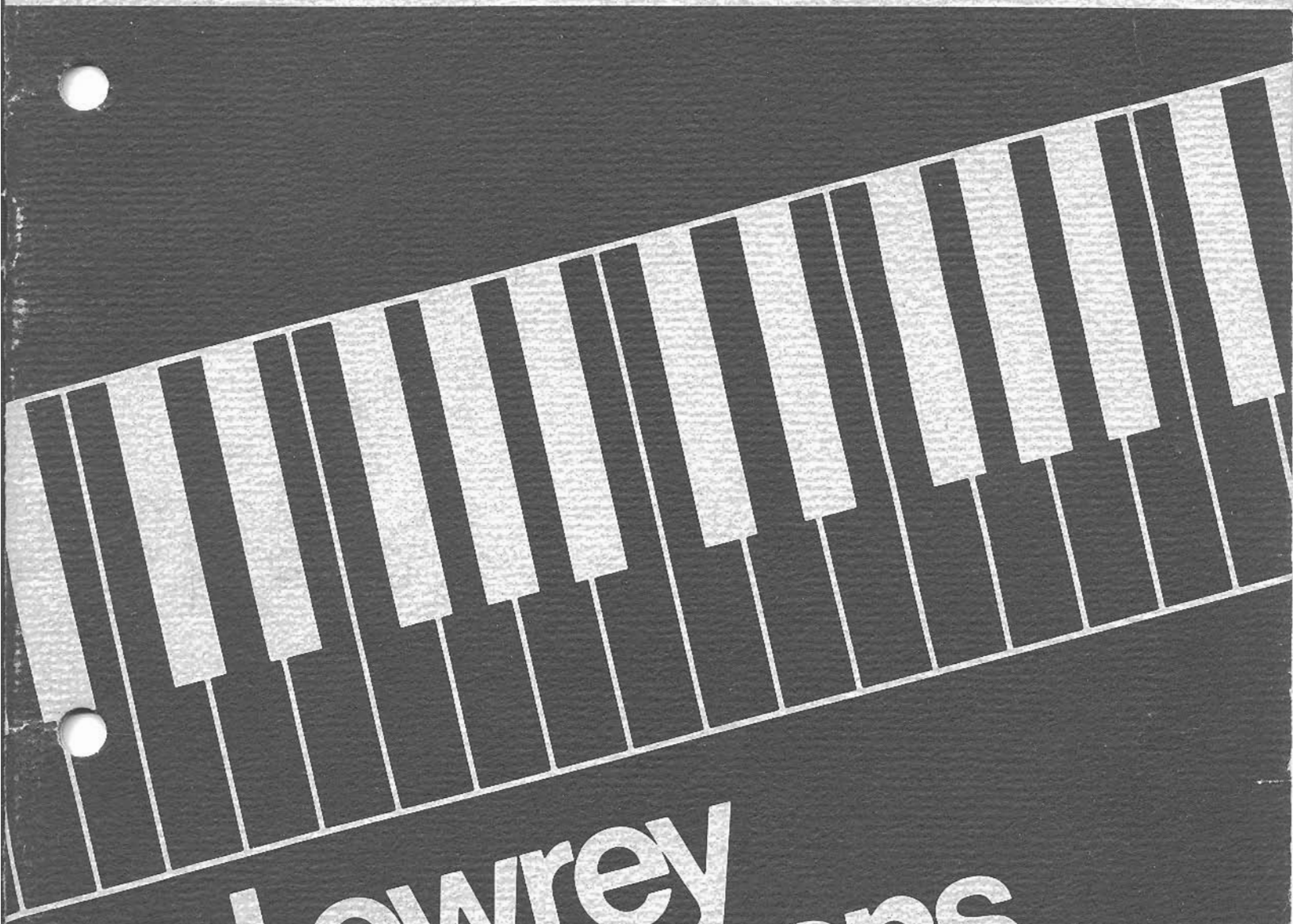
MODEL TG-44 SERVICE MANUAL



# Lowrey organs

# GENIE 44

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**MODEL TG-44**

## SERVICE INFORMATION



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1974


993-022822

# SPECIFICATIONS

**LOWREY GENIE 44 (Model TG-44). . . One-Finger Genie Chords in a New Dimension.**

Introducing a full-size spinet organ especially designed for the contemporary family. Adults and children will delight in playing the magical One-Finger Genie Chords. "Just lift a finger" and the Genie Chord feature will provide you with full, rich chords — complete with Automatic Rhythm, Automatic Accompaniment and Automatic Bass! For those preferring the standard Genie feature, it too is available on this exciting, new, entertaining model. . . along with Custom Voicing and Sustain, Percussion and Slow Attack Presets, Auto and Vibra Wow, plus the famous Lowrey Glide and more. Depending on your preference, the Bass Pedals can be played manually, automatically or even together!

A completely solid-state, Large Scale Integrated Circuit (L.S.I.C.) and transistor, self-contained home spinet organ with two 44-note keyboards and a 13-note pedalboard.

The organ includes one 25-watt amplifier, two speakers (one 12" heavy-duty Bass and an 8" Main), a headphone jack and an auxiliary input jack for special hookups.

Dimensions: 36-1/2" high (without music rack), 46-1/8" wide and 24-1/4" deep.

Available in Mediterranean Pecan, Contemporary Walnut and Early American Fruitwood.

# SPECIFICATIONS

## UPPER KEYBOARD

*CUSTOM VOICING*
Flute
Horn
Reed
String
Vibrato

*CUSTOM SUSTAIN*
Sustain Slider Control. . . Short-Long

*SUSTAIN/PERCUSSION PRESETS*
Vibra Harp
Hawaiian Guitar
Piano
Harpsichord
Mandolin
Banjo
Percussion. . . Repeat/Solo Percuss

*SLOW ATTACK PRESET*
Accordion

*AUTO WOW EFFECTS*
Auto Wow
Vibra Wow

## LOWER KEYBOARD

*GENIE/ORGAN*
Piano/Horn
Guitar/String
Banjo/Reed
Genie Voices. . . Normal/Plus Organ
Accompaniment. . . Genie/Genie Chords

*LOWER KEYBOARD VOLUME*
Volume Slider Control. . . Soft-Full

## BASS

*PEDAL BASS*
Pedal. . . String Bass/Guitar Bass
Pedal Sustain

*KEYBOARD BASS*
String Bass
Guitar Bass

*BASS CONTROLS*
Bass. . . Soft/Medium
Bass. . . Full

## AUTOMATIC RHYTHMS

*RHYTHM PATTERNS*
Latin
Rock
Country Western
Swing
Waltz
March

*RHYTHM CONTROLS*
Rhythm Start. . . Normal/Auto
Rhythm Slider Control. . . Volume
Rhythm/Repeat Slider Control. . . Speed

## GENERAL CONTROLS

Expression Pedal
Glide Control
On/Off Switch with Pilot Light

## GENIE CHORDS

*KEYS AND CHORDS*

| Key Note | Provides This Chord |
|---|---|
| $A_1$ | A Major |
| $A\#_1$ | A Minor |
| B | B Major |
| C | C Major |
| C# | C Minor |
| D | D Major |
| D# | D Minor |
| E | E Major |
| F | F Major |
| F# | F Minor |
| G | G Major |
| G# | G Minor |
| $A_2$ | $E_b$ Major |
| $A\#_2$ | $B_b$ Major |

# CIRCUIT DESCRIPTION

## TONE GENERATORS
(See Dwg. 1)

The Tone Generators consists of the Master Oscillator Q2, the Top Octave Synthesizers IC1 & IC2, the IC Dividers IC3, IC4, IC5, IC6 and IC7 (IC7 is located on the Pedal & Percussion board and divides only the lowest 3 Lower Keyboard notes) and the Vibrato Oscillator Q1. The Master Oscillator creates a high frequency signal which is applied to the Top Octave Synthesizers IC1 & IC2. Here the signal is divided to create thirteen specific octave frequencies which are applied to the IC Dividers where these frequencies are divided in half twice creating lower octave frequencies. These signals are then connected through diodes to Upper and Lower Keyboard Diode Keying circuits and also directly to the High-Low, Root-Fifth Bass Keyswitches and Solo & Pedal Diode Keying circuits.

### Q1 VIBRATO OSCILLATOR
The Vibrato Oscillator develops a continual sine wave of sufficient amplitude to shift the frequency of the Master Oscillator high and low creating a vibrato effect. The output from the Vibrato Oscillator Q1 is applied to the base of the Master Oscillator through a series of tabswitch contacts (see Dwg. 2), when either the Vibra Harp or the Hawaiian Guitar tabswitches are on, giving the Vibrato effect needed for these voices. Full vibrato is obtained on Hawaiian Guitar and Vibra Harp only. Turning on the Vibrato tabswitch with String, Flute, Reed or Horn will give a Vibrato effect to these voices but the Vibrato for these voices will be cancelled when turning on either the Piano, Harpsichord, Mandolin, Banjo or Accordion tabswitches.

The output from the Vibrato Oscillator Q1 is also applied via the Vibra & Auto Wow tabswitches to the base of the L.E.D. Driver Q49. (See Q49.)

### Q2, IC1 & IC2 MASTER OSCILLATOR & TOP OCTAVE SYNTHESIZERS
Q2 develops a continual high frequency signal which is sent to the Top Octave Synthesizers IC1 & IC2. Here the signal is divided simultaneously to produce thirteen specific audio frequency signals. These signals are connected to the Upper & Lower Keyboard Diode Keying circuits and also the IC Dividers IC3, IC4, IC5 & IC6 where they are divided down to produce lower organ tones. The signal outputs are of a particular octave frequency and are shown boxed on Schematic 1. (The letter-number designation within these boxes refer to a specific Octave Frequency and should not be confused with a keyboard designation.)

### IC DIVIDERS IC3, IC4, IC5 & IC6
Each IC Divider IC3-IC6 has two two-stage dividers and two interconnected individual dividers. Input signals from the TOS IC1 & IC2 are applied to these dividers where each signal is divided exactly in half twice, creating lower organ tones. These signals are then connected to Upper & Lower Keyboard, Solo & Pedal Diode Keying circuits and also to the High-Low, Root-Fifth Bass Keyswitches. Some signals from IC3 & IC4 are sent to IC Divider IC7.

### IC DIVIDER IC7
The B3, A#3 & A3 frequencies from IC3 & IC4 are applied to IC Divider IC7 where they are divided exactly in half before being applied to the Lower Keyboard Diode Keying circuits. These divided frequencies are used for the lowest three Lower Keyboard notes.

## UPPER KEYBOARD SOLO KEYING
(See Dwg. 4)

Solo keying refers to the first seven Upper Keyboard notes (F1-B1) which can only be played individually. Pressing a solo keyswitch allows signal from the tone generators to be applied to the Solo Divider drivers and then to the Solo Divider where the signal is divided down one octave (or in half). The solo keyer opens the signal path and allows the signal to reach the R/S & Flute filter circuits. Each time a solo key is pressed, the 7-note cancel transistor Q37 conducts and neutralizes any voltage that may be present in a sustain capacitor from a previously played note. This is done to shut off the signal diode from the previous note, making sure only one signal is applied to the solo divider at any one time. (Pressing a solo keyswitch also keys the percussion and slow attack circuits. (See Percussion & Slow Attack circuit description.)

### Q33, Q34 SOLO DIVIDER DRIVERS
Signal from the Tone Generators via Diodes D18 & D19 is applied through D27 to the base of Driver Q33. Q33 & Q34 amplify the signal producing a proper drive signal for the Solo Divider IC10. The signal is applied to Pin 5 of IC10 where it is divided down one octave before being applied to the cathode of Diode D34 at its output (Pin 4). The series combination of Diode D34 & D35 are turned on by the Solo Keyer Q35.

### Q35 SOLO KEYER
Pressing a solo keyswitch applies a positive voltage through Diode D20 to the base of the Solo Keyer Q35. This voltage is also applied through Diode D31 to the emitter of Q35, turning Q35 on and applying a positive voltage to the anodes of Diodes D34 & D35. This allows signal from the Solo Divider IC10 to pass to the R/S & Flute filter circuits. The voltage through the Solo Keyer Q35 also charges an 8.2 UF capacitor which, upon releasing a key, slowly discharges holding Diodes D34 & D35 open for the duration of its discharge creating a sustain effect. The discharge rate of the 8.2 UF capacitor is controlled by the bias voltage applied to the Sustain Length Regulator Q9. (See Q9.) Pressing another solo note after one has been played, will cancel the sustain of the previously played note by turning off the signal path through Diodes D18 & D19. This is done by the 7-note Solo Cancel Q37.

### Q37 7-NOTE SOLO CANCEL
Each time a solo keyswitch is pressed a pulse is developed across the 1 UF capacitor at the base of the 7-note Solo Percussion Keydown Detector Q36. This momentarily lowers the voltage on the base of Q36 causing it to turn off, allowing its collector to deliver a positive voltage pulse to the 7-note Solo Cancel Q37. (A pulse is also applied to the Percussion Modulator Driver Q40. See Percussion Keying Circuit description.) Q37 conducts grounding the solo keying line neutralizing any charge that may be present in a 5.6 UF capacitor thus cancelling the sustain of any previously played solo note.

## UPPER KEYBOARD KEYING
(See Dwg. 2)

Pressing an Upper Keyboard Keyswitch C1-C4 applies a positive voltage through a Diode D6 and a Diode D3 (see Dwg. 1) while charging a 5.6 UF capacitor. The voltage applied through the series combination of D3 & D6 turns them on allowing signal from the tone generators to pass through and be applied to the Flute Groups and R&S collector line. The

signal is filtered and amplified before being applied to the Upper Keyboard Tabswitches where it is routed to various voicing circuits and preamps and then to the amplifier. Upon releasing a key the 5.6 UF capacitor discharges holding Diodes D3 & D6 on momentarily - creating a sustain effect. The rate at which the 5.6 UF discharges is controlled by altering the bias voltage on the base of the Sustain Length Regulator Q9.

## FLUTE FILTERING
(See Dwg. 2)

Signal from the Tone Generators via the Upper Keyboard Keying & Solo Keying are separated into Flute Groups. Pressing any upper keyboard keyswitch allows an audio signal to be applied to the appropriate RC filter, which produces the correct Flute tonal quality for that group of notes. The output of the Flute filtering circuits are then tied together and applied to the Flute Collector Amp.

### Q7, Q8 FLUTE COLLECTOR AMP & EMITTER FOLLOWER

Signal from the Flute Filtering Circuits is applied to these transistors where it is amplified and transformed into a low impedance output signal. The signal is then applied to the Main Preamp Q12 via the Vibra Harp or Flute tabswitches.

### *REED/STRING FILTERING

The Flute Groups are combined together through resistors producing the Reed/String signal. This signal is then applied to the Reed/String Collector Amp.

### Q4, Q5 *REED/STRING COLLECTOR AMP & EMITTER FOLLOWER

Signal from the R/S Collector line is applied to these transistors where it is amplified and transformed into a low impedance output signal. The signal is then applied to the Percussion & Slow Attack Modulator IC8 and various voicing circuits via the Upper Keyboard *Reed/String tabswitches.

*Reed/String refers to all reed or string-type voices.

### IC8 PERCUSSION & SLOW ATTACK MODULATOR

Reed/String signal is applied to the input (Pin 3) of the Percussion & Slow Attack Modulator IC8. The Reed/String signal is amplified by, and passes through, the Modulator each time a positive pulse from either the Repeat Percussion Modulator Driver Q131, the Percussion Modulator Driver Q40 or the Slow Attack Modulator Driver Q41, is applied to Pin 5. The output signal from Pin 6 of IC8 is then applied to the Percussion Emitter Follower Q6.

### Q6 PERCUSSION EMITTER FOLLOWER

Signal from the Percussion & Slow Attack Modulator IC8 is applied to this Transistor where it is transformed to a low impedance output signal which is applied to either the Main or Banjo preamps via the Mandolin, Banjo or Accordion tabswitches.

### Q9 SUSTAIN LENGTH REGULATOR

The discharge rate of the 5.6 UF upper keyboard sustain capacitors is controlled by the bias voltage applied to the base of the Sustain Length Regulator Q9. As the bias on the base of Q9 varies, the voltage on the Sustain Control Line varies which in turn varies the discharge rate of the 5.6 UF sustain capacitors. Turning on the Vibra Harp, Hawaiian Guitar or Mandolin tabswitches leaves the base of Q9 open, removing it from the circuit which gives a long sustain. Turning on the Banjo or Accordion tabswitch applies ground to the base of Q9 causing it to conduct grounding the sustain control line and giving no sustain. When the Piano & Harpsichord tabswitches are turned on, a positive voltage is applied to the base of this transistor causing it to conduct slightly and gives a medium sustain length. When using the Horn, Reed, String or Flute voices, the bias voltage on the base of Q9 is controlled by the Custom Sustain Control VR3. If the Banjo or Mandolin tabs are on with the Percuss tab in the solo position, their sustain length is also controlled by VR3. Turning on either the Banjo, Mandolin, Accordion or Auto Wow tabswitch, also connects grounding pulses from the Percussion Sustain Cancel Transistor Q46 to the base of Q9. This causes Q9 to conduct each time a key is pressed and cancels the sustain of any previously played note giving a monophonic sustain on these voices. When more than one of the upper keyboard tabswitches are on, the sustain length of the tabswitch located farthest left will be predominate. (For example, if the Flute and Piano tab are on, the Custom Sustain Control will have no effect and the Piano Preset sustain length will dominate.

### Q10, Q11 BANJO AMP & EMITTER FOLLOWER

Audio signals from the Upper & Lower Keyboard Banjo and Lower Keyboard Guitar Bass tabswitches are applied to these transistors where they are amplified, voiced and transformed to low impedance output signals before being applied to the Main Preamp.

### Q12, Q13 MAIN PREAMP & EMITTER FOLLOWER

All audio signals pass through these transistors where the signal is amplified and transformed to a low impedance output signal before being applied to the amplifier. The output of this circuit is controlled by the output of the amplifier through Limiter Photocell P1 and prevents any signal from overdriving the amplifier causing distortion.

## LOWER KEYBOARD KEYSWITCHES & TABSWITCHES
(See Dwg. 3)

There are five rows of keyswitch contacts which make up the Lower Keyboard Keyswitches. They are:

1) Forty-four accompaniment keyswitch contacts — the first fourteen (A1-A#2) of which are also Genie Chord (One-note chord) keyswitch contacts.
2) Twenty-eight High-Bass Keyswitch Contacts.
3) Twenty-eight Low-Bass Keyswitch Contacts.
4) Fourteen Root Bass Keyswitch Contacts. (Root refers to the root of a chord. For example: C would be the root of a C chord.)
5) Fourteen Fifth Bass Keyswitch Contacts. (Fifth refers to a note which is five notes higher than a root. For example: In a C chord G would be considered the fifth.)

The following is a general description of what takes place with the Accomp. Tabswitch in the Genie position with and without using a Rhythm Tabswitch.

1) With the Accomp. Tabswitch in the Genie position, only the 44 Lower Keyboard Accomp. Keyswitch Contacts and the High and Low Bass Keyswitch Contacts have an output.

2) The Lower Keyboard Accomp. Keyswitch Contacts apply voltage to Diode D8 allowing signal from the tone generators to pass to the Lower Keyboard Accomp. Collector Line. This signal is then applied to Accomp. Modulator IC9. If a rhythm is on, the signal

is gated through the modulator at the speed of the rhythm creating Automatic Accompaniment. If no rhythm is used, the Modulator is biased on and the Lower Keyboard voices play normally. After passing through Modulator IC9, the signal is applied to voicing circuits via the Lower Keyboard Tabswitches before being applied to the Main Preamp Q12.

3) With the Lower Keyboard Tabswitches and Rhythm Tabswitches off and the Guitar Bass or String Bass Tabswitches on, the 28 Low-Bass Keyswitch Contacts will play individually as bass tones. If more than one note is being held, the lowest note held will play. Turning on a rhythm alternates the bass tone at the speed of the rhythm between the highest and lowest note of the notes being held.

The following is a general description of what takes place with the Accompaniment Tabswitch in the Genie Chord position with and without a rhythm tabswitch on.

1) With the Accomp. Tabswitch in the Genie Chord position, only the fourteen Genie Chord (one-note chord) Keyswitch contacts and the Root and Fifth Bass Keyswitch contacts have an output. The remaining 30 Lower Keyboard keys play as in the Genie position described above.

2) Holding down any one note (A1-A#2) applies voltage through three diodes D7 to three diodes D9 causing three audio signals which form a specific chord to pass to the Genie Chord Collector Line. These signals are then applied to the Modulator IC9. If a rhythm tabswitch is on, these signals are gated through the Modulator at the speed of the rhythm - creating one-note chord automatic accompaniment. If no rhythm tabswitch is on, these signals have a constant path through Modulator IC9 and play as one-note chords. After passing through Modulator IC9, the signals are applied to various voicing circuits via the Lower Keyboard Tabswitches before being applied to the Main Preamp Q12.

3) Holding down any one note (A1-A#2) with the Lower Keyboard Tabswitches off and the String Bass or Guitar Bass Tabswitches on, the Root Bass note will play. Turning on a rhythm alternates the bass tone between the Root and the Fifth Bass Keyswitch Contacts at the speed of the rhythm, giving Automatic Bass.

## AUTOMATIC ACCOMPANIMENT
(See Dwg. 3)

### IC9, Q19 ACCOMPANIMENT MODULATOR & EMITTER FOLLOWER

Audio signal from the Lower Keyboard Accomp. Keyswitch Contacts is applied to the input of Modulator IC9. Here the signal is amplified before being applied to the Accomp. Emitter Follower Q19. Signal can only pass through the Modulator when a positive voltage is applied to Pin 5 from the Accomp. Modulator Driver Q144 (see Q144). With no rhythm on, a steady positive voltage is applied to Pin 5 biasing the Modulator on allowing signal to pass through. With a Rhythm Tabswitch on, positive voltage pulses are applied to Pin 5 from the Accomp. Modulator Driver Q144, gating the signal through the Modulator at the speed of the rhythm. Putting the Organ Voices Tabswitch in the Plus Organ position, applies a small steady voltage to the Accomp. Modulator. This turns on the Modulator slightly, allowing a small amount of signal to pass through the Modulator. This causes the Lower Keyboard voices to play steadily between pulses from the Accomp. Modulator Driver Q144. The Organ Voices tab will only have an effect when playing Lower Keyboard voices with a rhythm tabswitch on. The signal from the Modulator is then applied to the Accomp. Emitter Follower Q19 where it is transformed to a low impedance output signal before being applied to various voicing circuits and the Main Preamp Q12 via the Lower Keyboard Tabswitches.

## AUTOMATIC BASS
(See Dwgs. 3 & 4)

### Q20, Q21 HIGH, FIFTH & LOW, ROOT BASS KILLERS

Audio signal from either the Root & Fifth Bass or High & Low Bass Keyswitch Contacts are alternately applied to the base of the Bass Divider Driver Q22 depending on the position of the Genie/Accompaniment/Genie Chord Tabswitch. Positive voltage pulses from either the Latin, Rock, March or Swing, Waltz, Country Western, Bass Selectors (see Q135 & Q136) are applied to the bases of the High, Fifth & Low, Root Bass Killers Q20 & Q21. When a pulse is present, the High & Fifth Bass Killer Q21 conducts, grounding out the high signal while the Low & Root Bass Killer Q21 opens, allowing only the low signal to reach Bass Divider Driver Q22. When no pulse is present, the Low & Root Bass Killer Q21 conducts, grounding out the low signal while the High & Fifth Bass Killer Q20 opens, allowing only high signal to reach Bass Divider Driver Q22.

### Q22 BASS DIVIDER DRIVER

Signal from the High, Low & Root Bass Keyswitch Contacts is amplified to a signal capable of driving the Bass Divider IC21. Here the signal is divided exactly in half and then is applied to the Auto Bass Keyer Q137.

### Q137 AUTOMATIC BASS KEYER

Divided signal from Bass Divider IC21 is applied to the base of the Automatic Bass Keyer Q137 but cannot be amplified and passed through it until a pulse is received from the Automatic Bass Driver Q146 (see Q146). The signal then passes to the Automatic Bass Emitter Follower Q138.

### Q138 AUTOMATIC BASS EMITTER FOLLOWER

The Automatic Bass Emitter Follower Q138 transforms the signal from the Automatic Bass Keyer Q137 to a low impedance output signal before being applied to the String Bass Preamps (Q126 & Q127) & Guitar Bass voicing via the String Bass & Guitar Bass Tabswitches.

### Q126 & Q127 STRING BASS PREAMPS

Audio signals from the Auto Bass Emitter Follower Q138 & the Pedal String Bass Preamp Q31 are applied to these preamps. Here the signal is amplified before being applied to the String Bass voicing and then on to the Main Preamp Q12.

## AUTOMATIC RHYTHM START
(See Dwg. 3)

The function of the Automatic Rhythm start circuitry is to:

1) Start the Rhythm when a Lower Keyboard Keyswitch is pressed.

2) Stop the rhythm and reset the shift register to be sure the rhythm starts at the first timing point each time a Lower Keyboard Keyswitch is played.

3) Hold the Rhythm on for a short period of time and then stop it after releasing the Lower Keyboard Keyswitch.

With the Rhythm Start Tabswitch in the normal position, the Audio Killer Q18 is not conducting and the rhythm starts normally by placing a Rhythm Tabswitch on. Placing the Rhythm Start Tabswitch in the Automatic position removes a resistor to ground from the base of the Keydown Detector Q16 and if no Lower Keyboard Keyswitch is held, it causes a voltage rise that will turn off the normally conducting Q16. When Q16 turns off, it removes positive voltage from the base of Accomp. Reset Driver Q17 causing it to turn off, applying a positive voltage to the base of the Audio Killer Q18 causing it to conduct, grounding the Rhythm Output. The positive voltage at the collector of Q17 is also applied to the Shift Register Reset Q132 (see Q132) causing the Shift Register IC20 to reset to the first timing point each time the Rhythm stops. When a Lower Keyboard Keyswitch is pressed, it loads the base of Q16, lowering the voltage and causing it to conduct. When Q16 conducts, it charges the capacitor through Diode D10 while applying a positive voltage to the base of Q16. The positive voltage on the base of Q17 causes it to conduct, lowering the voltage on the base of Q18, which causes it to open, removing ground from the rhythm output allowing it to play. When the Lower Keyboard Keyswitch is released, the capacitor - which was charged by Q16 - discharges into the base of Q17 holding it on, preventing the collector of Q18 from going to ground thus allowing the rhythm to play for a short period of time after the Lower Keyboard Keyswitch is released.

## BASS PEDALS
(See Dwg. 4)

Pressing a Bass Pedal switch allows signal from the tone generators to be applied to the Pedal Divider Drivers and then to the Pedal Divider where the signal is divided down one octave (or in half). The Pedal Guitar Bass Keyer & Pedal String Bass Keyer open the signal path and allows the signal to reach the String Bass & Guitar Bass voicing circuits. Each time a pedal switch is pressed, the pedal cancel transistors conduct and neutralize any voltage that may be present in a sustain capacitor from a previously played note. This is done to shut off the signal diode from the previous note making sure only one signal is applied to the Pedal Divider at any one time.

### Q29, Q30 PEDAL DIVIDER DRIVERS
Signal from the tone generators via Diodes D16 & D17 is applied through Diode D29 to the base of Driver Q29. Q29 & Q30 amplify the signal producing a proper drive signal for the Pedal Divider IC10. The signal is applied to Pin 2 of IC10 where it is divided down one octave before being applied to the cathodes of Diodes D32 & D33 at its output (Pin 3). Diodes D32 & D33 are turned on by the Pedal Guitar Bass & Pedal String Bass Keyers Q27 & Q28.

### Q27, Q28 PEDAL GUITAR BASS & STRING BASS KEYERS
Pressing a pedal switch applies a positive voltage through a Diode D15 to the base of the Pedal Guitar Bass Keyer Q27. This voltage is also applied through Diode D28 to the Emitter of Q27, turning Q27 on and applying a positive voltage through Diode D30 to the base of the Pedal String Bass Keyer and also to the anode of Diode D32. The voltage applied to the anode of D32 turns on D32 and allows signal from the Pedal Divider IC10 to pass to the Pedal Guitar Bass Preamp Q32. The voltage applied to the base of the Pedal String Bass Keyer Q28 charges a .22 capacitor and also turns on Q28 which applies a positive voltage to the anode of Diode D33 turning it on and allowing signal from the Pedal Divider IC10 to pass to the Pedal String Preamp Q31. Releasing a pedal with the pedal tabswitch in the Guitar Bass position or with the pedal sustain tab on causes the .22 capacitor at the base of Q28 to discharge holding Q28 on for a short period of time giving a sustain effect.

### Q31, Q32 PEDAL GUITAR & STRING BASS PREAMPS
Signal from the Pedal Divider IC10 is amplified by these transistors before being applied to various String Bass & Guitar Bass voicing circuits.

### Q25 & Q26 PEDAL CANCEL
Each time a Pedal Keyswitch is pressed a pulse is developed across the 1 UF capacitor at the base of cancel transistor Q25 momentarily lowering the voltage and causing Q25 to turn off. This applies a positive voltage pulse to the base of Q26 causing it to conduct which grounds the pedal keying line neutralizing any charge that may be present in a 5.6 UF capacitor thus cancelling the sustain of any previously played note. This assures that only one signal at a time can be applied to the Pedal Divider IC10.

## PERCUSSION
(See Dwg. 4)

Placing the Percuss Tabswitch in the Solo Percuss position with the Mandolin or Banjo Tabswitches on, causes the Percussion & Slow Attack Modulator IC8 to receive positive pulses from the Percussion Modulator Driver Q40, each time an Upper Keyboard Keyswitch is played.

### Q36 7-NOTE SOLO PERCUSSION KEYDOWN DETECTOR
Pressing an Upper Keyboard Solo Keyswitch (F1-B1) develops a pulse across the 1 UF capacitor at the base of Q36. This momentarily lowers the voltage on the base of the 7-note Solo Percussion Keyer Q36 causing it to turn off. When Q36 turns off it applies a positive voltage from its collector to the base of the Percussion Modulator Driver Q40 causing it to turn on applying a positive voltage pulse via the Percussion & Slow Attack Keying Contacts (see Dwg. 2) to the Percussion & Slow Attack Modulator IC8. This causes signal to be gated through the Modulator IC8 for the length of the pulse giving the percussion effect for the Upper Keyboard Solo Keyswitches (F1-B1). Also, when Q36 turns off, a positive voltage is applied to the base of the 7-note Solo Cancel Q37 (see Q37).

### Q39 37-NOTE PERCUSSION KEYDOWN DETECTOR
Pressing an Upper Keyboard Keyswitch (C1-C4) develops a pulse across the 1 UF capacitor at the base of Q39. This momentarily lowers the voltage on the base of the 37-note Percussion Keydown Detector Q39 causing it to turn off. When Q39 turns off, a positive voltage pulse from its collector is applied to the base of the Percussion Modulator Driver Q40 causing Q40 to turn on. This applies a positive voltage pulse via the Percussion & Slow Attack Keying Contacts (see Dwg. 2) to the Percussion & Slow Attack Modulator IC8, gating the signal through IC8 for the length of the pulse and giving the percussion effect for the Upper Keyboard Keyswitches C1-C4.

### Q40 PERCUSSION MODULATOR DRIVER
Positive voltage pulses from either the 7-note or 37-note Percussion Keydown Detectors Q36 & Q39 are applied to the base of the Percussion Modulator Driver Q40. These pulses cause Q40 to conduct applying a percussion keying pulse via the Percussion & Slow Attack Keying Contacts (see Dwg. 2) to the Percussion & Slow Attack Modulator IC8. The percussion keying pulse can only reach the Mod-

ulator IC8 with the Percuss Tabswitch in the Solo Percuss position and either the Banjo or Mandolin Tabswitches on.

**Q46 PERCUSSION SUSTAIN CANCEL**
Pressing any upper keyboard keyswitch causes the Percussion/Sustain Cancel Transistor Q46 to receive a positive pulse on its base from the Auto Wow & Slow Attack Keydown Detector Q38, causing Q46 to turn on. When Q46 turns on it grounds the base of the Sustain Length Regulator Transistor Q9 via the Monophonic Sustain Contacts (see Dwg. 2) causing Q9 to conduct cancelling the sustain of any previously played note. Q46 is also used to drive the Auto Wow Reset Q47 (see Q47).

## SLOW ATTACK
**(See Dwg. 4)**

Placing the Mandolin & Bongo Tabswitches in the off position connects voltage pulses from the Slow Attack Modulator Driver Q41 to the Percussion & Slow Attack Modulator IC8.

**Q38 AUTO WOW & SLOW ATTACK KEYDOWN DETECTOR**
Pressing any upper keyboard keyswitch lowers the voltage on the base of PNP Transistor Q38 causing it to conduct. This applies a positive voltage through a 2.2M resistor and charges a .047 capacitor. The RC time constant of this capacitor and resistor cause a slowly rising voltage to be applied to the base of the Slow Attack Modulator Driver Q41. (Q38 also applies a positive voltage to the Percussion Sustain Cancel Q46 (see Q46) and the Auto Wow Keyer Q42 (see Q42).

**Q41 SLOW ATTACK MODULATOR DRIVER**
A slowly rising voltage is applied to the base of the Slow Attack Modulator Driver Q41 causing it to turn on slowly. This applies a steadily increasing voltage to the Percussion & Slow Attack Modulator IC8 gating the signal through it and creating the Slow Attack effect used for the Accordion voice.

Note: The Slow Attack effect is only present when the Banjo & Mandolin Tabswitches are off. Turning on one of these voices overrides the Slow Attack effect and only the Percussion effect is heard.

## AUTO WOW
**(See Dwg. 4)**

Pressing an upper keyboard keyswitch activates the Auto Wow Keying circuitry. The purpose of the Keyer Envelope Modifiers and Shaper is to vary the voltage on the LED Driver by varying the discharge rate of the 1 UF capacitor at the collector of the Auto Wow Reset, thus giving the proper Auto Wow wave form.

**Q38 AUTO WOW & SLOW ATTACK KEYDOWN DETECTOR**
Pressing an upper keyboard keyswitch lowers the voltage on the base of the Auto Wow & Slow Attack Keyer Q38 causing it to conduct. This applies a positive voltage pulse to the Percussion Sustain Cancel Q46 and the Auto Wow Keyer Q42. (A positive voltage is also applied to the Slow Attack Modulator Driver Q46 (see Q46).

**Q47 AUTO WOW RESET**
A positive voltage applied to the base of the Percussion Sustain Cancel Q46 from the Auto Wow & Slow Attack Keydown Detector Q38 causes Q46 to conduct. This develops a pulse across the .05 capacitor at the base of the Auto Wow Reset Q47 causing Q47 to conduct which charges the 1 UF capacitor at its collector. This is done to insure the 1 UF capacitor is fully charged each time a key is pressed. (Q46 also delivers a Percussion Sustain Cancel Pulse (see Q46).

**Q42 AUTO WOW KEYER**
A positive voltage pulse applied to the base of the Auto Wow Keyer Q42 from the Auto Wow & Slow Attack Keydown Detector Q38 causes Q42 to turn on momentarily lowering the voltage on the base of Envelope Modifier Q43.

**Q43 AUTO WOW ENVELOPE MODIFIER**
The voltage on the base of Envelope Modifier Q43 is momentarily lowered causing Q43 to turn off. This applies a positive voltage to the base of the Auto Wow Shaper Q45.

**Q45 AUTO WOW SHAPER**
The Auto Wow Shaper Q45 receives positive voltage pulses from Envelope Modifier Q43. This causes Q45 to conduct, discharging the 1 UF capacitor at the collector of the Auto Wow Reset Q47. This applies a voltage of varying amplitude to the base of LED Driver Q49 when the Auto Wow Tabswitch is on.

**Q49 LED DRIVER**
The LED Driver Q49 has voltage applied to its base from the Auto Wow Keying Circuitry or the Vibrato Oscillator, depending on which tabswitch is on Auto or Vibra Wow. (If both tabs are on, Vibra Wow will override Auto Wow). The varying voltages applied to the LED Driver cause it to conduct which applies a varying voltage to the light-emitting diode in Photocell P2. This causes the photocell's resistance to fluctuate, thereby varying the circuit output and giving the Vibra or Auto Wow effect.

**Q48 WOW PREAMP**
Audio signal from the R/S Emitter Follower Q5 is applied to the Wow Preamp Q48. The Wow Preamp is a variable tuned circuit that amplifies only the audio signals at the frequency at which it is tuned. The frequency range of the Wow Preamp is adjusted by the Wow Photocell P2. The wow output is connected via the Auto & Vibra tabswitches to the Main Preamp Q12.

**Q50 WOW EMITTER FOLLOWER**
This circuit determines the frequency that the Wow Preamp Q48 is tuned by electrically changing the effective value of the .01 UF capacitor attached to its emitter.

## POWER SUPPLY
**(See Dwg. 5)**

AC line source voltage is converted into positive and negative DC supply voltages using Transformer T1 and Rectifier Diodes D40-D43. Zener Diodes Z1-Z3 are used as voltage regulators on several voltage lines. Some of the voltage divider circuits are located on various boards throughout the organ. They are designated by being to the right of plug and socket numbers on the power supply drawing and a chart is supplied for their location. A 1-amp, Slo-Blo fuse is employed in the primary circuit of the power supply to prevent component damage which may be caused by a short circuit.

## AMPLIFIER
**(See Dwg. 5)**

The function of the preamp is to boost the signal voltages to a point where they can be used by the driver and pre-driver circuits. The Differential Preamp senses the signal at the output of the amplifier and controls it by regulating the signal input at the preamp. The pre-driver inverts the audio voltages

so that the drivers work in push-pull. The output transistors convert the audio voltages from the drivers into high-current, low-voltage output signal that is connected via the headphone jack to the speakers.

## RHYTHM CLOCK
**(See Dwg. 6)**

The Clock Multivibrator is the source of all rhythm timing and Upper Keyboard Repeat Percussion pulses. These pulses are applied to all Automatic Rhythm, Bass and Chord circuits, some directly and some through the Shift Register IC20. The Shift Register converts pulses from the Clock Multivibrator to negative and positive output pulses that occur in a specific pattern. These pulses are connected to the Rhythm Tabswitches where they are routed to various Instrumentation circuits. Turning on a Rhythm Tabswitch connects the pulses for that rhythm to the desired Instrumentation, Automatic Bass and Automatic Accompaniment sequence. The output of each circuit is then connected to the Main Preamp Q12.

### Q128, Q129 CLOCK MULTIVIBRATOR
The Clock Multivibrator is a continuously running multivibrator. It is the source of all rhythm timing pulses. The speed of the clock controls the rate at which the Automatic Bass, Automatic Accompaniment and the Upper Keyboard Repeat Percussion circuits are keyed. It also produces a square wave output at the collector of Q129 which is applied to the Shift Register IC20. The Clock Multivibrator's speed is controlled by the Rhythm Speed Control VR15.

## SHIFT REGISTER
The output from the Shift Register IC20 is a square wave which shifts from Pins 1, 3, 4, 5, 6, 10, 11 and 12 respectively. The positive and negative swing of the square wave is used to key the bass select, reset and instrumentation circuits.

## UPPER KEYBOARD REPEAT PERCUSSION KEYING
The Repeat Percussion Keying Circuitry Q130 & Q131 is the control circuit for the Upper Keyboard Repeat Banjo and Mandolin voices. Pulses developed by the Clock Multivibrator produce a series of positive output pulses at the emitter of Q131. These positive pulses are applied to the Percussion & Slow Attack Modulator IC8 if the Percuss Tabswitch is in the Repeat position, gating the signal through the Modulator at the speed of the Clock Multivibrator, creating the repeat effect used for the Banjo and Mandolin voices.

### Q130, Q131 UPPER KEYBOARD REPEAT PERCUSSION TRIGGER & MODULATOR DRIVER
Each alternation of the Clock Multivibrator develops a pulse across the .05 capacitor at the base of the Repeat Percussion Trigger Q130. This repeatedly lowers the voltage on the base of Q130 causing it to open. Each time Q130 opens, it applies a positive voltage to the base of the Repeat Percussion Modulator Driver Q131 causing it to conduct, applying positive voltage pulses to the Percussion & Slow Attack Modulator IC8 (see IC8). These pulses gate the signal through IC8 and create the repeat effect for the banjo and Mandolin voices.

When the Swing Rhythm switch is turned on, a positive voltage is applied to the cathode of Diode D120 preventing a pulse from being developed across the .05 capacitor on this alternation of the clock. This causes the speed of the repeat to be cut in half since only one side of the clock causes a positive output pulse at the emitter of Q131.

## TRIPLET TIMING
The Waltz, Swing & Country Western Rhythms are Triplet Timing Rhythms. They use only six of the available eight timing pulses from the Shift Register IC20. The purpose of the Triplet Timing Circuitry is to reset the Shift Register to the first timing point after it has reached the sixth timing point.

### Q133 & Q134 RESET DRIVER & TRIPLET RESET ENABLE
Turning on either the Swing, Waltz or Country Western Rhythm Tabswitches applies a positive voltage to the base of the Triplet Reset Enable Q134, causing it to conduct which grounds out the seventh timing pulse from Pin 11 of the Shift Register IC20. The base of the Reset Driver Q133 is normally (when a triplet rhythm is not in use) held positive by pulses via Diodes D127-D133, through eight timing points of the Shift Register IC20, thereby holding its collector at ground. When the seventh timing point is grounded out by the Triplet Reset Enable Q133, the base of Q134 does not receive a positive pulse which causes it to cease conducting allowing its collector to go positive after the sixth timing point. This positive voltage is then applied to the Shift Register Reset Q132.

Note: When the Swing, Waltz & Country Western Tabswitches are off, a positive voltage disables the sixth timing pulse.

### Q132 SHIFT REGISTER RESET
The Shift Register Reset Q132 is turned on when a positive voltage is applied to its base, causing its collector to go to ground which resets the Shift Register IC20 to the first timing point. Positive voltage is applied to the base of Q132 from three different circuits:

1) The Accomp. Reset Driver Q17 (see Q17) applies a positive voltage to the base of Q132 each time an Accomp. Keyswitch is released with the Rhythm Start Tabswitch in the automatic position.
2) The Reset Driver Q133 applies a positive voltage to the base of Q132 each time the Shift Register IC20 completes eight timing points or, in the case of a triplet rhythm (Waltz, Swing & Country Western), six timing points.
3) Turning all the rhythm tabswitches off applies a positive voltage to the base of Q132.

Resetting is done to ensure that the rhythm always starts at the first timing point.

## SWING, WALTZ, COUNTRY WESTERN & LATIN, ROCK, MARCH, BASS SELECTORS
The output (collector) pulses from the Swing, Waltz, Country Western & Latin, Rock, March, Bass Selectors Q135 & Q136 are connected via the Rhythm Tabswitches to the junction of the Bass Killer Transistors Q20 & Q21 (see Q20 & Q21) and determine whether the high or low bass signal is passed to the Bass Divider Driver Q22 (see Q22).

### Q136 SWING, WALTZ & COUNTRY WESTERN BASS SELECTOR
Pin 3 of the Shift Register IC20 applies a square wave output to the base of the Swing, Waltz & Country Western Bass Selector Q136. When the base is high the collector is low and when the base is low the collector is high. The collector output is applied to Pin 5 of the Bass Divider IC21 where it is divided exactly in half. This means that the collector output from Q136 must go high and low before Pin 4 of the Bass Divider IC21 has an output pulse. This output pulse is then

connected to the junction of the Bass Killers Q20 & Q21 (see Q20 & Q21) only when the Swing, Waltz & Country Western Tabswitches are on. This determines which of the bass signals high or low is allowed to pass to the Bass Divider Driver Q22.

**Q135 LATIN, ROCK & MARCH BASS SELECTOR**
The positive swing of the square wave output from Pins 1, 10, 11 & 12 are applied through Diodes to the base of the Latin, Rock & March Bass Selector Q135. When a positive pulse is applied to the base of Q135, it conducts and the collector goes low. When no pulse is felt, Q135 opens and the collector goes high. The output (collector) pulses from Q135 are then connected to the junction of the Bass Killers Q20 & Q21 (see Q20 & Q21) only when the Latin, Rock & March tabswitches are on. This determines which of the bass signals high or low is allowed to pass to the Bass Divider Driver Q22 (see Q22).

## INSTRUMENTATION
**(See Dwg. 7)**

The negative swing of the square wave output from Pins 1, 3, 4, 5, 6, 10, 11 & 12 of the Shift Register IC20 are applied to the instrumentation circuits through Diodes and the Rhythm Tabswitches. These pulses make up the Eight Timing Points for each rhythm; these points are shown boxed on Schematic 6 & 7. Turning on a Rhythm Tabswitch connects the sequence of timing pulses for that rhythm to the proper Automatic Bass, Automatic Accompaniment & Instrumentation circuits. For example, turning on the Waltz Rhythm Tabswitch connects Timing Pulses 1, 3 & 5 to the Instrumentation circuits. Each time Pulse 1 is keyed, a Bass Drum & a Bass note will be heard. Each time Pulses 3 & 5 are keyed, the Snare noise and Banjo (creating a Snare Drum) and Automatic Accompaniment (chord) will be heard.

### INSTRUMENTS
The Instrument Circuits are tuned to a certain resonant frequency (by component values). These circuits are activated by negative pulses from the Shift Register IC20 and act as Tone Generators which produce the Bongo, Block and Bass Drum tones.

**Q147 INSTRUMENT PREAMP**
Audio signals created by the Bass Drum, Bongo Drum & Block circuits are applied to this preamp where they are amplified before being applied to the Rhythm Preamp Q154.

### NOISE
The noise circuitry creates a random noise signal for use with the brush and snare drum circuits.

**Q148, Q149 & Q150 NOISE GENERATOR, PREAMP & AMP**
A positive voltage at the emitter of the Noise Generator Q148 causes it to produce a constant random noise signal which is then connected to the Noise Preamp Q149 & Noise Amp Q150 where it is amplified and applied to the cathode of Diodes D174 & D175. This signal cannot pass through Diodes D174 & D175 until a positive voltage from either the Brush or Snare Noise Keyers Q141 & Q152 is applied to the anode of either Diode D174 or D175.

### BRUSH KEYING
The purpose of the Brush Keying circuitry is to allow random noise signal from the Noise Amp Q150 to pass through Diode D175 and be applied to the Brush Noise Voicing Amp Q153 before reaching the Rhythm Preamp Q154. The length of the brush pulse is determined by varying the discharge rate of the .33 capacitor at the base of the Brush Noise Keyer Q152.

**Q151 BRUSH NOISE TRIGGER**
Negative pulses from the Shift Register IC20 via the Rhythm Tabswitches or negative going pulses from the Clock Multivibrator are applied to the .05 capacitor at the base of the Brush Noise Trigger Q151. A pulse is developed across this capacitor which momentarily lowers the voltage on the base of Q151 causing it to open. This collector then goes positive and charges the .33 capacitor at the base of the Brush Noise Keyer Q152.

**Q152 BRUSH NOISE KEYER**
Turning on any Rhythm Tabswitch applies positive voltage through a resistor at the cathode of Diode D166. The voltage at this point varies depending on the rhythm used. The higher the voltage at this point the longer the discharge rate of the .33 capacitor at the base of Brush Noise Keyer Q152. As the capacitor (which has been charged by the Brush Noise Trigger Q151) discharges, it applies positive voltage to the base of Q152 holding it on for the duration of discharge time, causing a positive voltage to be applied to Diode D175 and allowing noise signal to pass to the Brush Noise Voicing Amp Q153.

**Q153 BRUSH NOISE VOICING AMP**
Signal from the Noise Amp Q150 is applied to the base of the Brush Noise Voicing Amp Q153 where it is amplified and voiced for proper brush tonality before being applied to the Rhythm Preamp Q154.

### SNARE NOISE KEYING
The purpose of the Snare Noise Keying circuitry is to allow random noise signal from the Noise Amp Q150 to pass through Diode D174 and be applied to the Snare Noise Voicing Amp Q142 before reaching the Main Preamp Q154.

**Q140 SNARE NOISE TRIGGER**
Negative pulses from the Shift Register IC20 via the Rhythm Tabswitches are applied to the .05 capacitor at the base of the Snare Noise Trigger Q140. A pulse is developed across the capacitor which momentarily lowers the voltage on the base of Q140 causing it to open which applies a positive voltage to the base of the Snare Noise Keyer Q141.

**Q141 SNARE NOISE KEYER**
A positive voltage pulse from the Snare Noise Trigger Q140 is applied to the base of the Snare Noise Keyer Q141 causing it to conduct, which applies a positive voltage to Diode D174 and allows signal from the Noise Amp Q150 to pass through D174 and be applied to the Snare Noise Voicing Amp Q142.

**Q142 SNARE NOISE VOICING AMP**
Signal from the Noise Amp Q150 is applied to the base of the Snare Noise Voicing Amp Q142 where it is amplified and voiced for proper snare tonality before being applied to the Rhythm Preamp Q154.

### AUTOMATIC ACCOMPANIMENT KEYING
The purpose of this circuitry is to deliver a positive output pulse to the Accomp. Modulator IC8. Modulating the Lower Keyboard Accomp. signal at the speed of the rhythm.

**Q143 ACCOMPANIMENT MODULATOR TRIGGER**
Negative pulses from the Shift Register IC20 via the Rhythm Tabswitches are applied to the .05 capacitor at the base of

the Accomp. Modulator Trigger Q143. A pulse is developed across this capacitor which momentarily lowers the voltage on the base of Q143, causing it to open, which applies a positive pulse to the base of the Accomp. Modulator Driver Q144.

**Q144 ACCOMPANIMENT MODULATOR DRIVER**
A positive pulse from the Accomp. Modulator Trigger Q143 is applied to this base causing the Accomp. Modulator Driver Q144 to conduct, which applies a positive pulse to the Accomp. Modulator IC9 (see IC9) gating the accompaniment signal through the Modulator at the speed of the rhythm.

Turning all the Rhythm Tabswitches off, applies a positive voltage to the base of Q144 through Diode D172 holding it on, which in turn biases open the Modulator allowing the accompaniment to play unmodulated when no rhythm is used.

### AUTOMATIC BASS KEYING

The purpose of this circuitry is to deliver a positive output pulse to the Automatic Bass Keyer Q137, allowing the Lower Keyboard bass signal to pass via the Bass Tabswitches to the base voicing circuits and on to the Main Preamp Q12.

**Q145 AUTOMATIC BASS TRIGGER**
Negative pulses from the Shift Register IC20 via the Rhythm Tabswitches are applied to the .05 capacitor at the base of the Automatic Bass Trigger Q145. A pulse is developed across this capacitor which momentarily lowers the voltage on the base of Q145, causing it to open, which applies a positive pulse to the base of the Automatic Bass Driver Q146.

**Q146 AUTOMATIC BASS DRIVER**
A positive pulse from the Automatic Bass Trigger Q145 is applied to the base of the Automatic Bass Driver Q146, causing it to conduct which applies a positive pulse to the Automatic Bass Keyer Q137 (see Q137) gating the base signal through the keyer at the speed of the rhythm. Turning all the Rhythm Tabswitches off applies a positive voltage to the base of Q146 through Diode D173 holding it on, creating a constant signal path through the Keyer Q137 and allowing the bass notes to play unmodulated when no rhythm is used.

**Q154 RHYTHM PREAMP**
Audio signal from the Snare, Brush and Instrument circuits are applied to the base of the Rhythm Preamp Q154 via the Rhythm Volume Control VR17. Here the signal is amplified and then applied to the Main Preamp Q12.

# ADJUSTMENTS

**VR1 VIBRATO SPEED ADJUSTMENT**
Vibrato speed may be adjusted by using a small screwdriver. Proper speed is between 6-7 Hertz with the Vibrato speed tabswitch in Fast position. The Vibrato Oscillator will not oscillate if adjustment is extreme.

**L1 TUNING COIL**
This adjustment is carefully set at the factory. Should tuning be necessary, it is suggested a tuning fork for a certain note be used (C for example). By holding a key down (C for example), adjust the tuning coil with a non-metalic screwdriver until the proper pitch or frequency is acquired. When this note is properly tuned, the TOS tuning is automatically locked in.

**VR2 PERCUSSION ADJUSTMENT**
The Percussion length is factory-set by component values. The purpose of the Percussion Adjustment is to eliminate any DC transient that may occur when playing the Banjo or Mandolin voices.

**VR4 AUTOMATIC ACCOMPANIMENT ADJUSTMENT**
The Automatic Accompaniment length is factory-set by component values. The purpose of the Automatic Accompaniment Adjustment is to eliminate any DC transient that may occur when playing the Accompaniment voices.

**VR6 VIBRA WOW ADJUSTMENT**
This adjustment should be made for the best Vibra Wow effect. Too extreme an adjustment will cause a shallow wow effect or loss of the Vibrato effect.

**VR16 SNARE ADJUSTMENT**
**VR18 BRUSH ADJUSTMENT**
The best setting of these adjustments is one at which the instruments sound balanced. Proper Snare adjustment is achieved when the Drum sound blends with the Snare producing the most realistic Snare Drum.

# TROUBLESHOOTING GUIDE

**Q1 VIBRATO OSCILLATOR**

No Vibrato.

**Q2 MASTER OSCILLATOR**

All notes dead or weak.

**Q4, Q5 REED/STRING COLLECTOR AMP & REED/ STRING EMITTER FOLLOWER**

All Percussion and Reed/String voices dead or weak.

**Q6 IC8 PERCUSSION & SLOW ATTACK EMITTER FOLLOWER & MODULATOR**

Mandolin, Banjo and Accordion voices dead or weak.

**Q7, Q8 FLUTE COLLECTOR AMP & FLUTE COLLECTOR EMITTER FOLLOWER**

Vibra Harp and Flute voices dead or weak.

**Q9 SUSTAIN LENGTH REGULATOR**

1. Sustain length control has no effect on Horn, Reed, String & Flute voices.
2. No sustain.
3. Long sustain on all voices.

**Q10, Q11 BANJO AMP & BANJO EMITTER FOLLOWER**

1. Banjo dead or weak on Upper and Lower Keyboard.
2. Bass Guitar missing harmonic.

**Q12, Q13 MAIN PREAMP & MAIN PREAMP EMITTER FOLLOWER**

Entire organ dead or weak.

**Q16-Q18 ACCOMPANIMENT KEYDOWN DETECTOR, RESET DRIVER & AUDIO KILLER**

1. No Automatic Rhythm.
2. No Rhythm Automatic start.

**Q19 IC9 AUTOMATIC ACCOMPANIMENT EMITTER FOLLOWER & MODULATOR**

1. Automatic Accompaniment dead or weak.
2. Automatic Accompaniment plays constantly.

**Q20 HIGH & FIFTH BASS KILLER**

1. Low automatic bass note is distorted.
2. No high automatic bass note.

**Q21 LOW AND ROOT BASS KILLER**

1. High bass note is distorted.
2. No low automatic bass note.

**Q22 BASS DIVIDER DRIVER**

No Automatic Bass.

**Q25, Q26 PEDAL CANCEL**

1. Pedals burble.
2. Bass pedals weak or dead.

**Q27 PEDAL GUITAR BASS KEYER**

1. Pedals sustain at a constant volume for 5-10 seconds.
2. Pedals dead.

**Q28 PEDAL STRING BASS KEYER**

1. No pedal sustain on String Bass.
2. No pedal String Bass voice.

**Q29, Q30 PEDAL DIVIDER DRIVERS**

Pedals dead or rumble in all pedals.

**Q31 PEDAL STRING BASS PREAMP**

Pedal String Bass dead or weak.

**Q32 PEDAL GUITAR BASS PREAMP**

Bass Guitar harmonic missing.

**Q33, Q34 SOLO DIVIDER DRIVERS**

Upper keyboard F1-B1 weak or dead.

**Q35 SOLO KEYER**

Upper keyboard F1-B1 weak or dead.

**Q36 7-NOTE SOLO PERCUSSION KEYDOWN DETECTOR**

1. Upper keyboard F1-B1 weak or dead.
2. No solo percussion on all upper manual keys.

**Q37 7-NOTE SOLO CANCEL**

1. No percussion on upper keyboard F1-B1.
2. Percussion distorted on upper keyboard F1-B1.

**Q38 AUTO WOW & SLOW ATTACK KEYDOWN DETECTOR**

1. No Auto Wow or Accordion voices.
2. No monophonic sustain on percussion voices.

**Q39 37-NOTE PERCUSSION KEYDOWN DETECTOR**

1. No solo percussion C1 through C4.
2. No solo percussion upper manual keyboard, no monophonic sustain.

**Q40 PERCUSSION MODULATOR DRIVER**

No percussion with percuss tab in solo position.

**Q41 SLOW ATTACK MODULATOR DRIVER**

Accordion voice weak or dead.

**Q42 AUTO WOW KEYER**

1. Shallow Wow effect.
2. Auto Wow voice plays, but no Wow.

**Q43 AUTO WOW ENVELOPE MODIFIER**

Auto Wow voice plays but no Wow.

**Q45 AUTO WOW SHAPER**

1. Shallow Wow effect.
2. Auto Wow voice plays but no Wow.

**Q46 PERCUSSION SUSTAIN CANCEL**

1. No sustain on Percussion voices.
2. No monophonic sustain on percussion voices.

# TROUBLESHOOTING GUIDE

**Q47 AUTO WOW RESET**

In complete Wow.

**Q48 AUTO WOW PREAMP**

No Vibra Wow or Auto Wow.

**Q49 LED DRIVER**

No Vibra Wow or Auto Wow.

**Q50 AUTO WOW EMITTER FOLLOWER**

Vibra Wow & Auto Wow has shallow effect.

**Q52-Q58 PREAMPS, DRIVERS & OUTPUTS**

Entire organ dead, weak or distorted & may blow fuses.

**Q126, Q127 STRING BASS PREAMPS**

Pedal String Bass & Lower keyboard String Bass weak or dead.

**Q128, Q129 CLOCK MULTIVIBRATOR**

Automatic Rhythm, Bass & Accompaniment dead; Banjo & Mandolin weak in volume and do not repeat.

**Q130, Q131 REPEAT PERCUSSION TRIGGER & MODULATOR DRIVER**

1. Repeat Mandolin & Banjo voices weak or dead.
2. Mandolin & Banjo voices play, but have no repeat.

**Q132, Q133 SHIFT REGISTER RESET, RESET DRIVER**

Rhythm dead on Swing, Waltz and March; only Brush plays on Latin, Rock & Country Western rhythms. Automatic Accompaniment and Bass dead.

**Q134 TRIPLET RESET ENABLE**

Hesitation in Latin, Rock and March rhythms.

**Q135 LATIN, ROCK AND MARCH BASS SELECTOR**

1. High Bass missing in Latin, Rock & March rhythms.
2. Low Bass missing in Latin, Rock & March rhythms.

**Q136 SWING, WALTZ & COUNTRY WESTERN BASS SELECTOR**

1. High Bass missing in Country Western, Waltz & Swing rhythms.
2. Low Bass missing in Country Western, Waltz & Swing rhythms.

**Q137, Q138 AUTOMATIC BASS KEYER & EMITTER FOLLOWER**

No Automatic Bass.

**Q140 SNARE NOISE TRIGGER**

1. Continuous Snare Noise in Rhythms.
2. Brush noise missing in Snare Drum.

**Q141 SNARE NOISE KEYER**

1. Continuous Snare Noise in Rhythms.
2. Brush noise missing in Snare Drum.

**Q142 SNARE NOISE VOICING AMP**

Brush & Snare Noise missing in all rhythms.

**Q143, Q144 ACCOMPANIMENT MODULATOR TRIGGER & DRIVER**

1. No Automatic Accompaniment.
2. Automatic Accompaniment plays constantly (does not modulate).

**Q145, Q146 AUTOMATIC BASS TRIGGER & DRIVER**

1. No High or Low Automatic Bass.
2. High & Low Bass does not percuss.

**Q147 INSTRUMENT PREAMP**

Bass Drum, Bongo & Block missing in all rhythms.

**Q148 NOISE GENERATOR**

Weak or dead Brush & Snare beats in all rhythms.

**Q149, Q150 NOISE PREAMP AND NOISE AMP**

No Brush or Snare beats in rhythm.

**Q151, Q152 BRUSH NOISE TRIGGER & BRUSH NOISE KEYER**

1. Continuous Brush Noise.
2. Brush Noise missing in all rhythms.

**Q153 BRUSH NOISE VOICING AMP**

Brush & Snare noise missing in all rhythms.

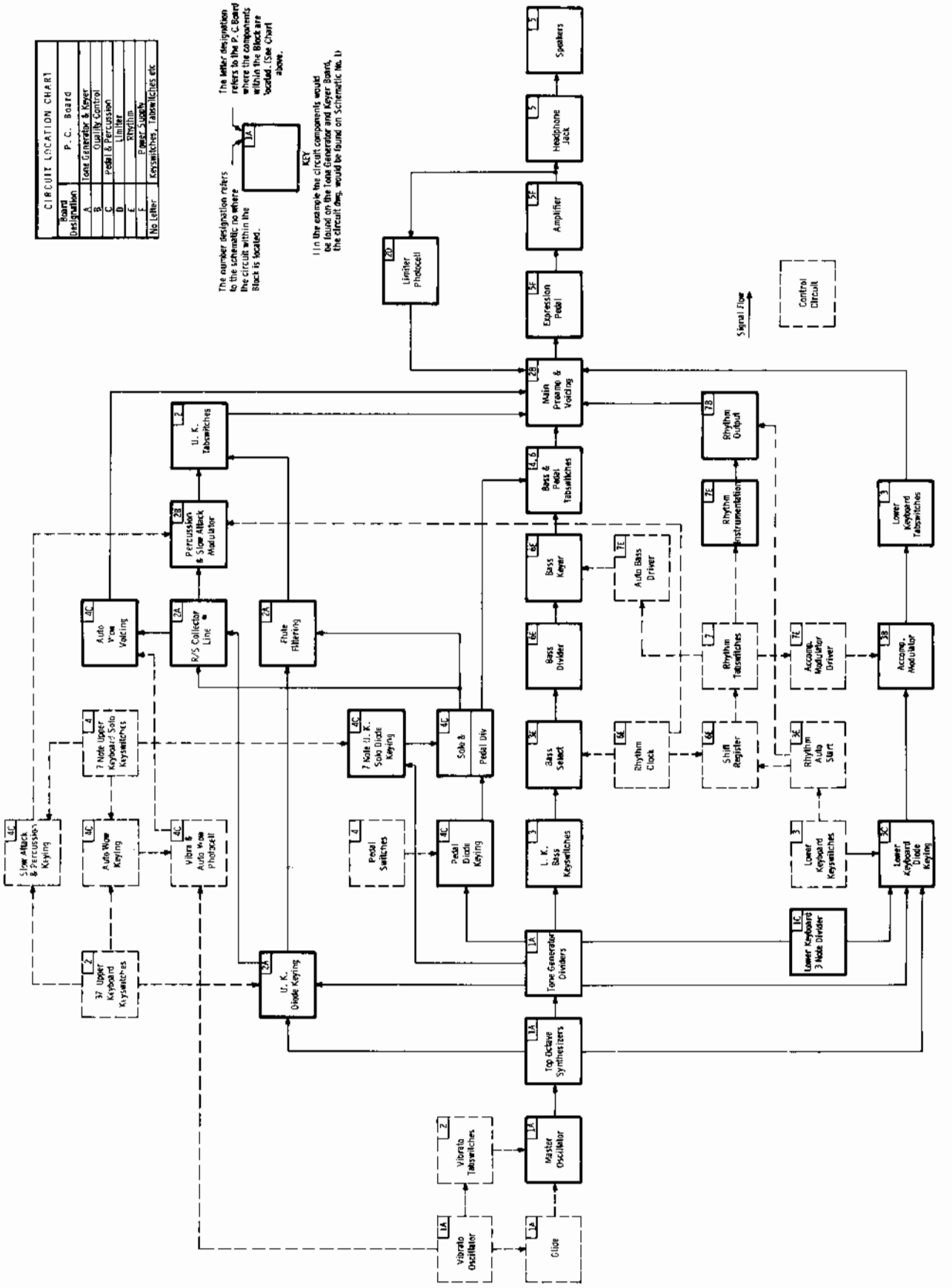
**D6 UPPER KEYBOARD KEYING DIODES**

If D6 is shorted, Lower Keyboard keyswitches will play Upper Keyboard voices.

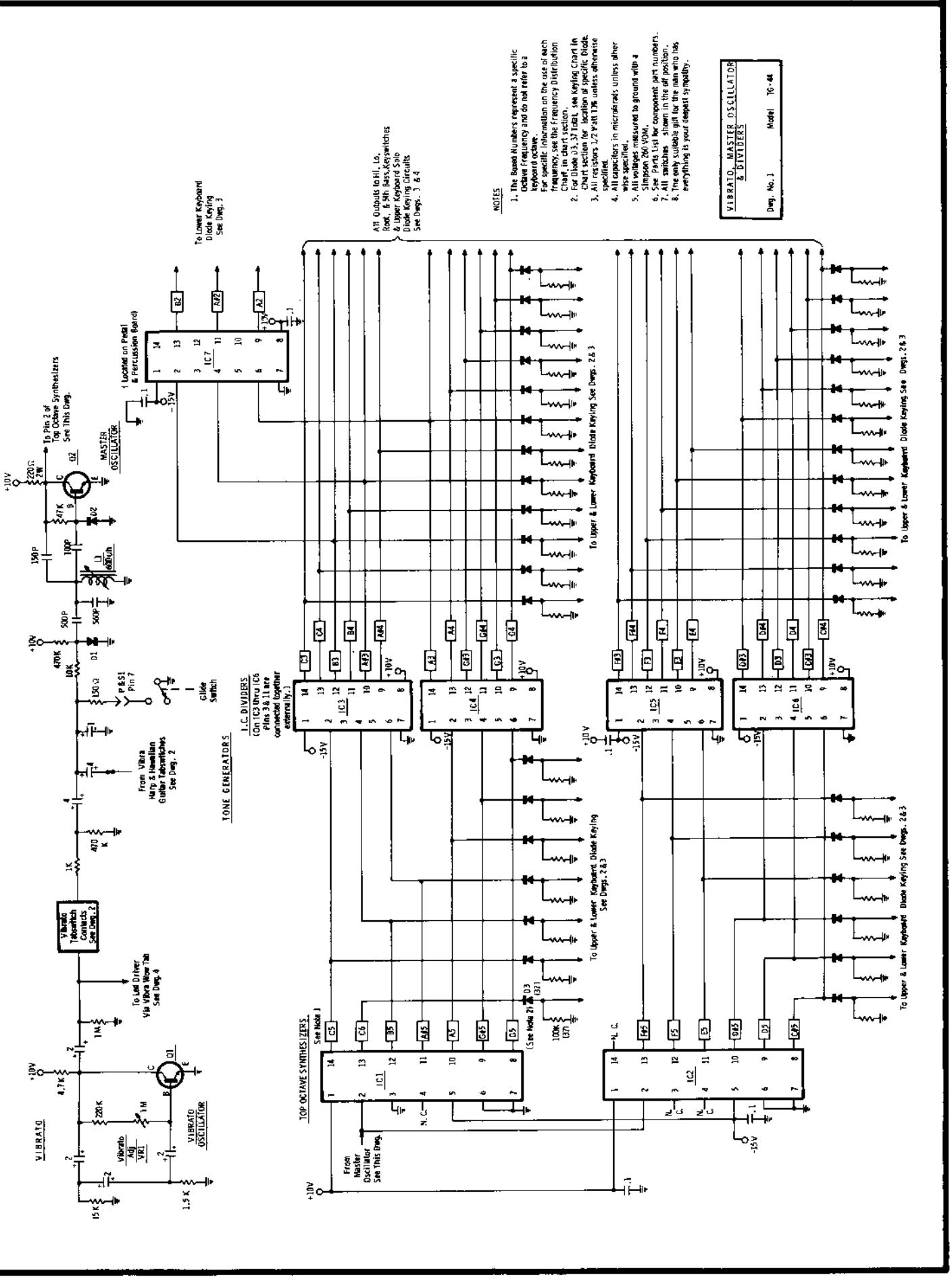
**D8, D9 LOWER KEYBOARD KEYING DIODES**

If Diode D8 or D9 is shorted, Upper Keyboard keyswitches will play Lower Keyboard voices.

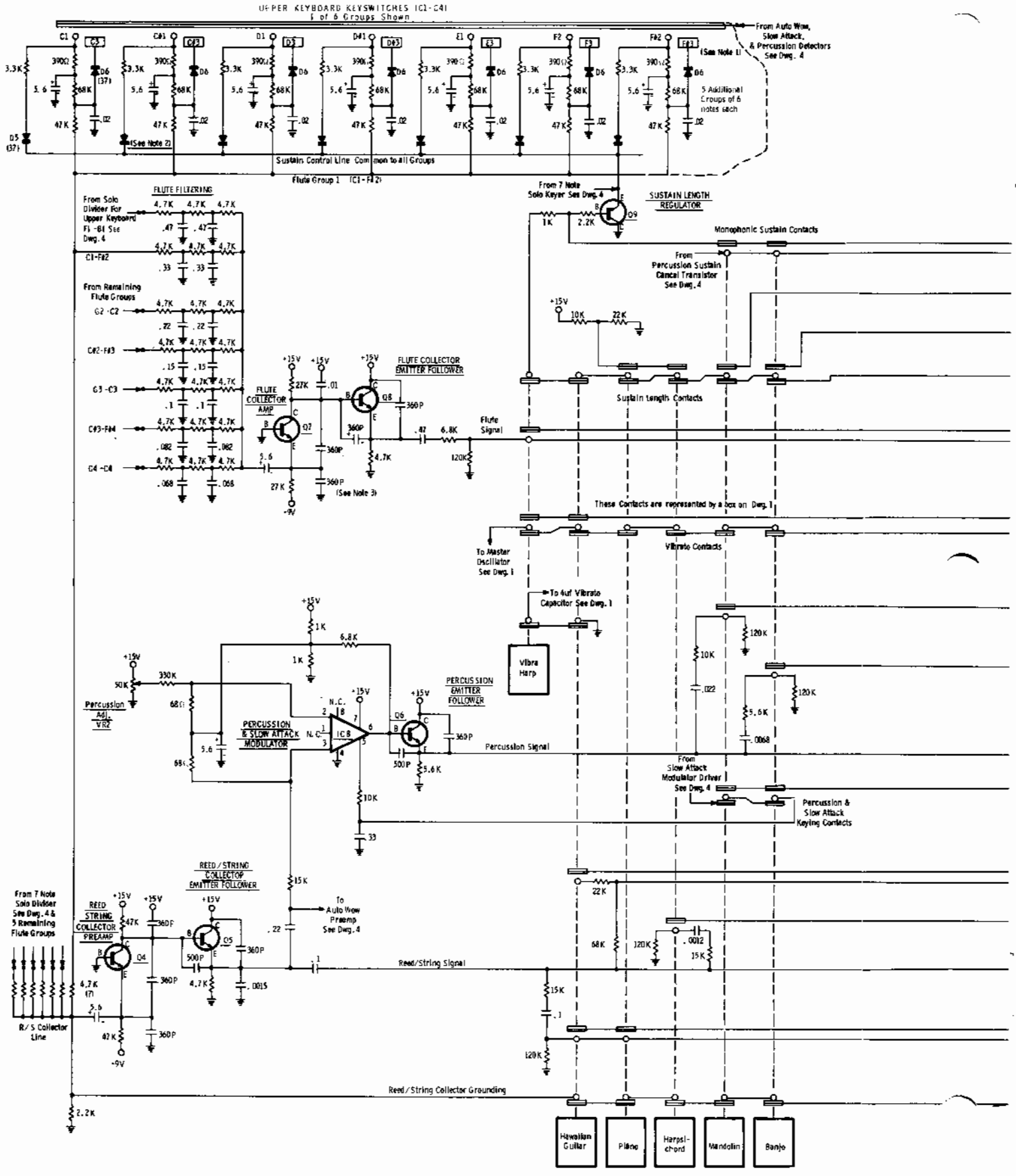
# BLOCK DIAGRAM



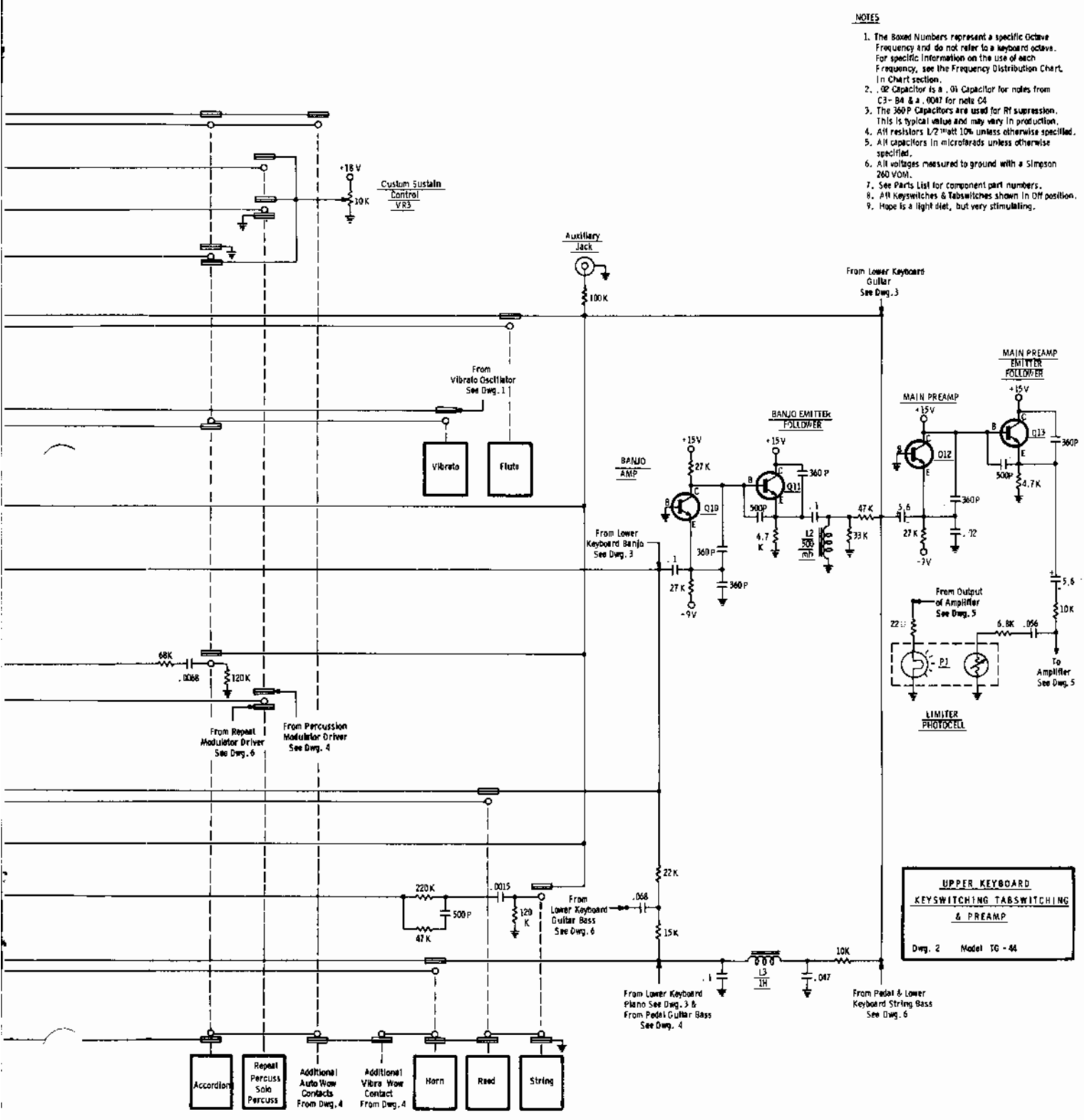
# SCHEMATIC 1


NOTES
1. The Boxed Numbers represent a specific Octave Frequency and do not refer to a keyboard octave. For specific information on the use of each frequency, see the Frequency Distribution Chart, in chart section.
2. For Diode D3, 37 Total, see Keying Chart in Chart section for location of specific Diode.
3. All resistors 1/2 Watt 10% unless otherwise specified.
4. All capacitors in microfarads unless other wise specified.
5. All voltages measured to ground with a Simpson 260 VOM.
6. See Parts List for component part numbers.
7. All switches shown in the off position.
8. The only suitable gift for the man who has everything is your deepest sympathy.
VIBRATO, MASTER OSCILLATOR & DIVIDERS
Dwg. No. 1 Model TG-44
All Outputs to Hi, Lo, Root, & 5th Bass Keyswitches & Upper Keyboard Solo Diode Keying Circuits See Dwgs. 3 & 4
To Lower Keyboard Diode Keying See Dwg. 3
(Located on Pedal & Percussion Board)
To Pin 2 of Top Octave Synthesizers See This Dwg.
MASTER OSCILLATOR
Glide Switch
P & S1 Pin 7
From Vibra Harp & Hawaiian Guitar Tabswitches See Dwg. 2
I.C. DIVIDERS
(On IC3 thru IC6 Pins 3 & 11 are connected together externally.)
To Upper & Lower Keyboard Diode Keying See Dwgs. 2 & 3
TONE GENERATORS
Vibrato Tabswitch Contacts See Dwg. 2
To Lead Driver Via Vibra Wow Tab See Dwg. 4
TOP OCTAVE SYNTHESIZERS
See Note 1
From Master Oscillator See This Dwg.
VIBRATO
VIBRATO OSCILLATOR
Vibrato Adj. VR1
IC1
IC2
IC3
IC4
IC5
IC6
IC7
Q1
Q2
D1
D2
D3
L1
+10V
-15V

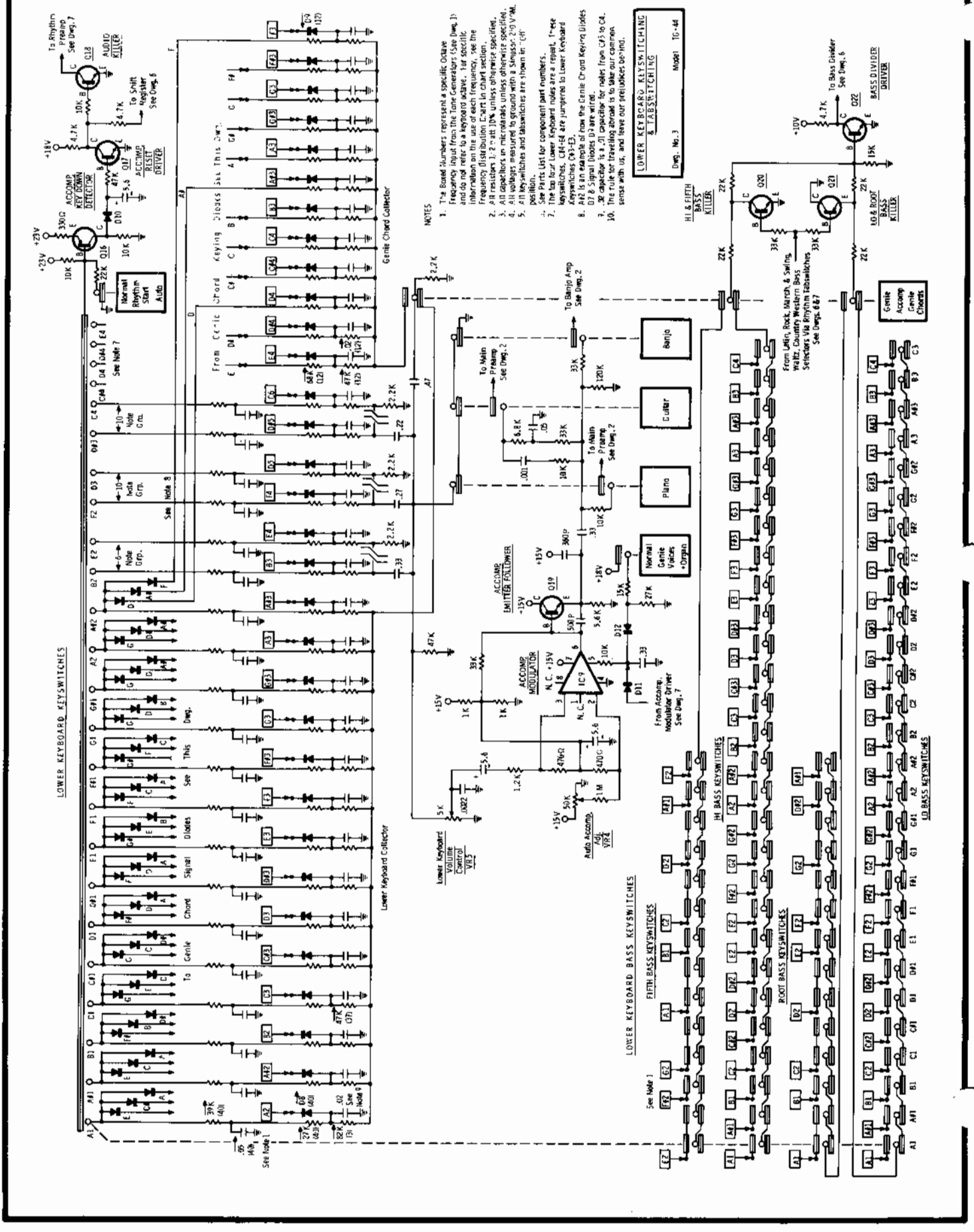
# SCHEMATIC 2


UPPER KEYBOARD KEYSWITCHES (C1-C4)
5 of 6 Groups Shown
From Auto Wow, Slow Attack, & Percussion Detectors See Dwg. 4
(See Note 1)
5 Additional Groups of 6 notes each
Sustain Control Line Common to all Groups
Flute Group 1 (C1-F#2)
FLUTE FILTERING
From Solo Divider For Upper Keyboard F1 -B1 See Dwg. 4
C1-F#2
From Remaining Flute Groups
G2 -C2
C#2-F#3
G3 -C3
C#3-F#4
G4 -C4
FLUTE COLLECTOR AMP
FLUTE COLLECTOR EMITTER FOLLOWER
Flute Signal
(See Note 3)
From 7 Note Solo Keyer See Dwg. 4
SUSTAIN LENGTH REGULATOR
Monophonic Sustain Contacts
From Percussion Sustain Cancel Transistor See Dwg. 4
Sustain Length Contacts
These Contacts are representated by a box on Dwg. 1
To Master Oscillator See Dwg. 1
Vibrato Contacts
To 4uf Vibrato Capacitor See Dwg. 1
Vibra Harp
Percussion Adj. VR2
PERCUSSION & SLOW ATTACK MODULATOR
IC8
PERCUSSION EMITTER FOLLOWER
Percussion Signal
From Slow Attack Modulator Driver See Dwg. 4
Percussion & Slow Attack Keying Contacts
From 7 Note Solo Divider See Dwg. 4 & 5 Remaining Flute Groups
REED / STRING PREAMP
REED / STRING COLLECTOR EMITTER FOLLOWER
To Auto Wow Preamp See Dwg. 4
Reed/String Signal
R/S Collector Line
Reed/String Collector Grounding
Hawaiian Guitar
Piano
Harpsi-chord
Mandolin
Banjo

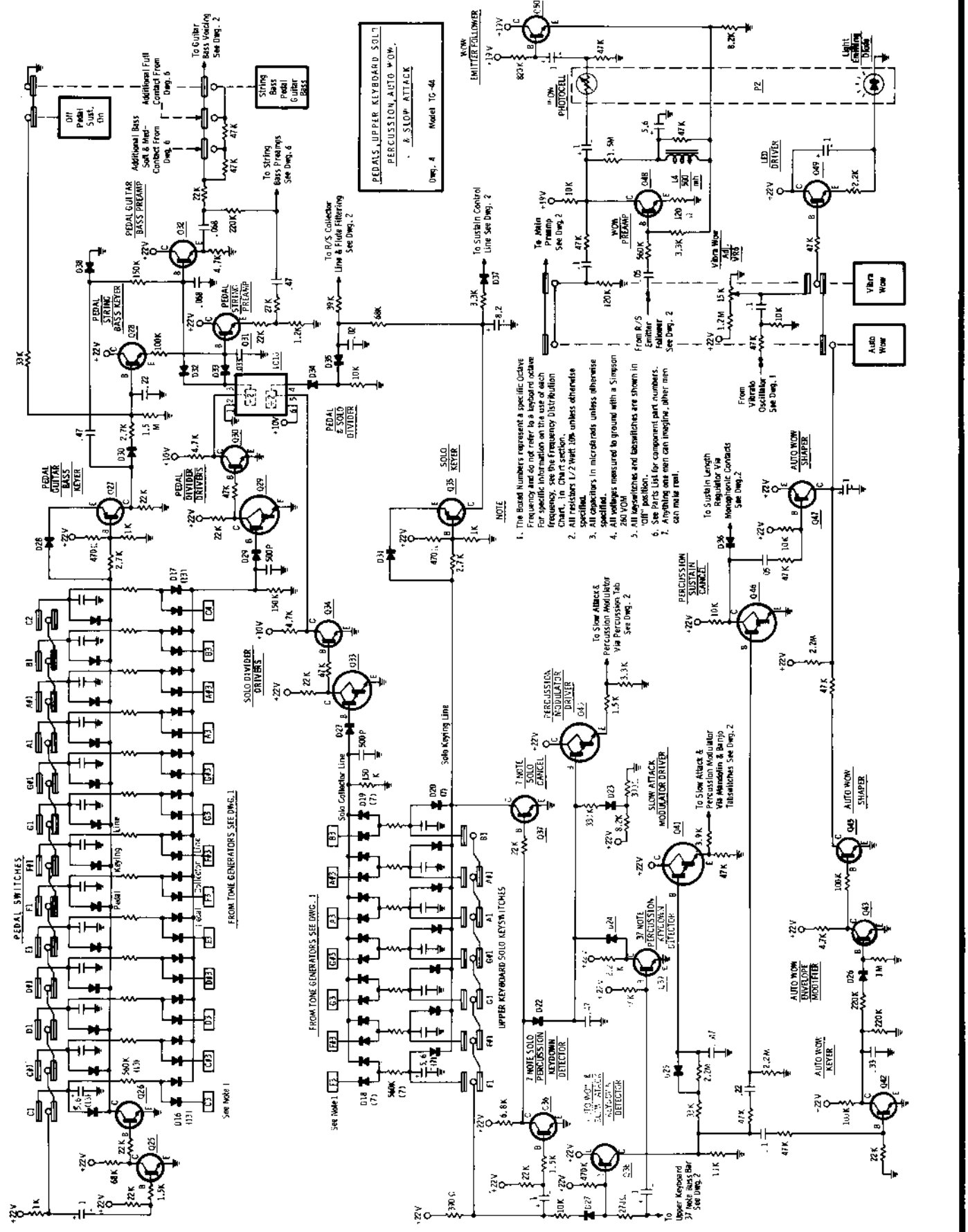
# SCHEMATIC 2


NOTES
1. The Boxed Numbers represent a specific Octave Frequency and do not refer to a keyboard octave. For specific information on the use of each Frequency, see the Frequency Distribution Chart, In Chart section.
2. .02 Capacitor is a .01 Capacitor for notes from C3- B4 & a .0047 for note C4
3. The 360 P Capacitors are used for Rf supression. This is typical value and may vary in production.
4. All resistors 1/2 watt 10% unless otherwise specified.
5. All capacitors in microfarads unless otherwise specified.
6. All voltages measured to ground with a Simpson 260 VOM.
7. See Parts List for component part numbers.
8. All Keyswitches & Tabswitches shown in Off position.
9. Hope is a light diet, but very stimulating.
+18 V
Custom Sustain Control VR3
10K
Auxiliary Jack
100K
From Lower Keyboard Guitar See Dwg. 3
From Vibrato Oscillator See Dwg. 1
Vibrato
Flute
BANJO AMP
BANJO EMITTER FOLLOWER
MAIN PREAMP
MAIN PREAMP EMITTER FOLLOWER
+15V
27 K
Q10
Q11
Q12
Q13
360 P
500P
4.7 K
47K
33K
L2 500 mh
5.6
.1
.72
-9V
From Lower Keyboard Banjo See Dwg. 3
From Output of Amplifier See Dwg. 5
22K
6.8K
.056
10K
To Amplifier See Dwg. 5
P1
LIMITER PHOTOCELL
68K
.0068
120K
From Repeat Modulator Driver See Dwg. 6
From Percussion Modulator Driver See Dwg. 4
220K
.0015
500 P
47 K
120 K
From Lower Keyboard Guitar Bass See Dwg. 6
.068
22K
15K
10K
L3 1H
.047
From Lower Keyboard Piano See Dwg. 3 & From Pedal Guitar Bass See Dwg. 4
From Pedal & Lower Keyboard String Bass See Dwg. 6
UPPER KEYBOARD KEYSWITCHING TABSWITCHING & PREAMP
Dwg. 2 Model TG - 44
Accordion
Repeat Percuss Solo Percuss
Additional Auto Wow Contacts From Dwg. 4
Additional Vibra Wow Contact From Dwg. 4
Horn
Reed
String

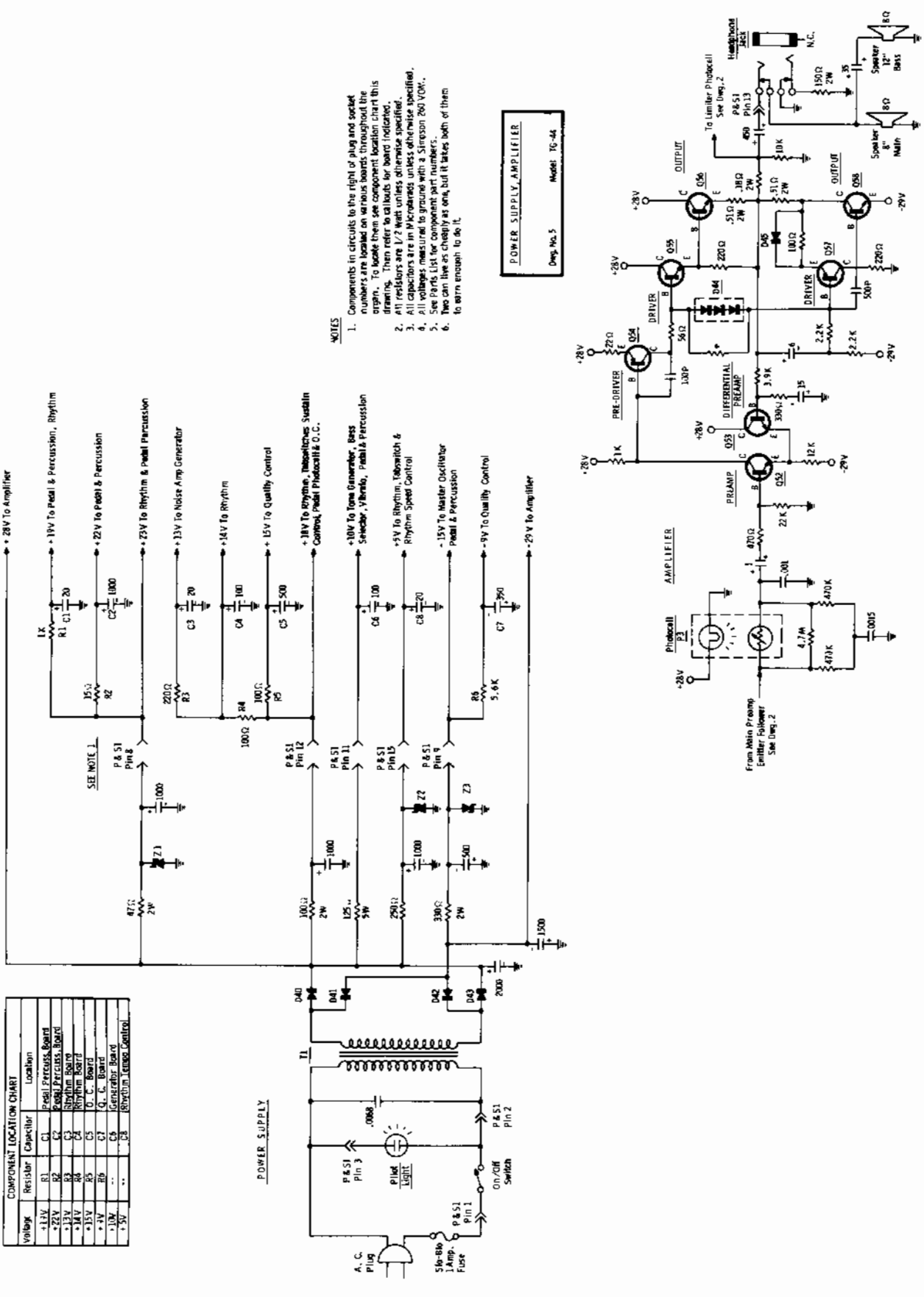
# SCHEMATIC 3


LOWER KEYBOARD KEYSWITCHES
Lower Keyboard Collector
Genie Chord Collector
From Genie Chord Keying Diodes
See This Diagram
To Genie Chord Signal Diodes
ACCOMP KEY DOWN DETECTOR
ACCOMP RESET DRIVER
AUDIO KILLER
To Rhythm Preamp See Dwg. 7
To Shift Register See Dwg. 6
Normal Rhythm Start Audio
ACCOMP EMITTER FOLLOWER
ACCOMP MODULATOR
IC9
Lower Keyboard Volume Control VR5
Audio Accomp. Adj. VR4
From Accomp. Modulator Driver See Dwg. 7
To Main Preamp See Dwg. 2
To Banjo Amp See Dwg. 2
Banjo
Guitar
Piano
Normal Genie Voices +Organ
LOWER KEYBOARD KEYSWITCHING & TABSWITCHING
Dwg. No. 3 Model TG-44
HI & FIFTH BASS KILLER
LO & ROOT BASS KILLER
BASS DIVIDER DRIVER
To Bass Divider See Dwg. 6
From Latin, Rock, March & Swing, Waltz, Country Western Bass Selectors Via Rhythm Tabswitches See Dwgs. 6&7
Genie Accomp Genie Chords
HI BASS KEYSWITCHES
LO BASS KEYSWITCHES
FIFTH BASS KEYSWITCHES
ROOT BASS KEYSWITCHES
LOWER KEYBOARD BASS KEYSWITCHES
NOTES
1. The Boxed Numbers represent a specific Octave Frequency Input from the Tone Generators (See Dwg. 1) and do not refer to a keyboard octave. For specific information on the use of each frequency, see the Frequency Distribution Chart in chart section.
2. All resistors 1/2 watt 10% unless otherwise specified.
3. All capacitors are microfarads unless otherwise specified.
4. All voltages measured to ground with a Simpson 260 VOM.
5. All keyswitches and tabswitches are shown in "OFF" position.
6. See Parts List for component part numbers.
7. The top four Lower Keyboard notes are a repeat, three keyswitches, C#4-F4 are jumpered to Lower Keyboard keyswitches C#3-F3.
8. All is an example of how the Genie Chord Keying Diodes D1 & Signal Diodes D1 are wired.
9. .02 capacitor is a .01 capacitor for notes from C#3 to C4.
10. This rule for traveling abroad is to take our common sense with us, and leave our prejudices behind.

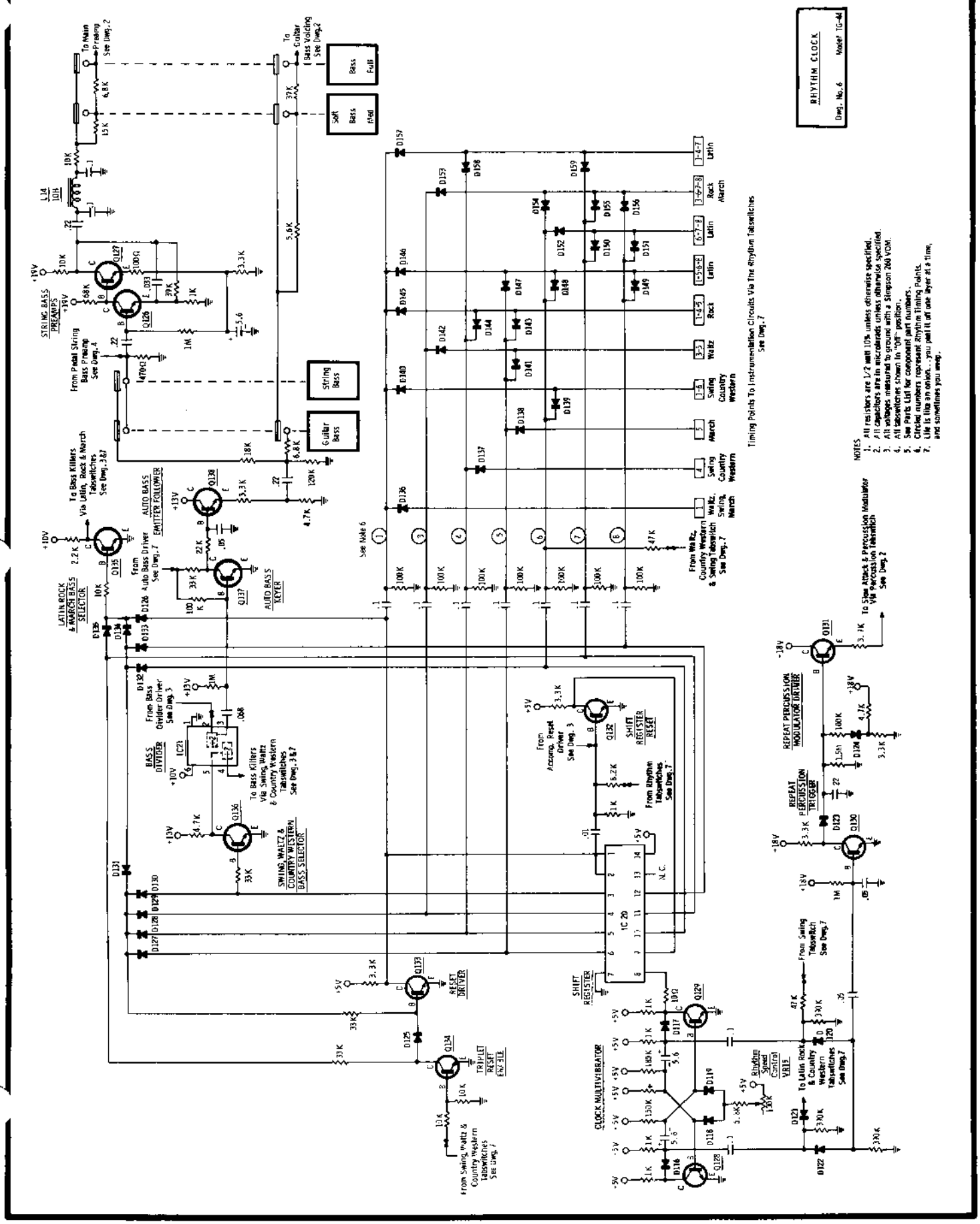
# SCHEMATIC 4


PEDALS, UPPER KEYBOARD SOLO
PERCUSSION, AUTO WOW,
& SLOW ATTACK
Dwg. 4 Model TG-44
NOTE
1. The Boxed Numbers represent a specific octave Frequency and do not refer to a keyboard octave For specific information on the use of each frequency, see the Frequency Distribution Chart, in Chart section.
2. All resistors 1/2 Watt 10% unless otherwise specified.
3. All capacitors in microfarads unless otherwise specified.
4. All voltages measured to ground with a Simpson 260 VOM
5. All keyswitches and tabswitches are shown in "Off" position.
6. See Parts List for component part numbers.
7. Anything one man can imagine, other men can make real.
PEDAL SWITCHES
FROM TONE GENERATORS SEE DWG. 1
UPPER KEYBOARD SOLO KEYSWITCHES
PEDAL GUITAR BASS KEYER
PEDAL STRING BASS KEYER
PEDAL GUITAR BASS PREAMP
PEDAL STRING BASS PREAMP
PEDAL DIVIDER DRIVERS
PEDAL & SOLO DIVIDER
SOLO KEYER
SOLO DIVIDER DRIVERS
SOLO KEYING LINE
7 NOTE SOLO PERCUSSION KEYDOWN DETECTOR
7 NOTE SOLO CANCEL
PERCUSSION MODULATOR DRIVER
SLOW ATTACK MODULATOR DRIVER
37 NOTE PERCUSSION KEYDOWN DETECTOR
PERCUSSION SUSTAIN CANCEL
AUTO WOW SHAPER
AUTO WOW ENVELOPE MODIFIER
AUTO WOW KEYER
WOW LIMITER FOLLOWER
WOW PHOTOCELL
WOW PREAMP
LED DRIVER
Vibra Wow
Auto Wow
To Main Preamp See Dwg. 2
From R/S Emitter Follower See Dwg. 2
From Vibrato Oscillator See Dwg. 1
To Sustain Control Line See Dwg. 2
To R/S Collector Line & Fuse Filtering See Dwg. 2
To Sustain Length Regulator Via Monophonic Contacts See Dwg. 2
To Slow Attack & Percussion Modulator Via Tabswitches See Dwg. 2
To Slow Attack & Percussion Modulator Via Percussion Tab See Dwg. 2
To String Bass Preamps See Dwg. 4
To Guitar Bass Voicing See Dwg. 2
Additional Full Contact From Dwg. 6
Additional Bass Soft & Med. Contact From Dwg. 6
Off Pedal Sust. Sw.
String Bass Pedal Guitar Bass
Upper Keyboard 37 Note Bass See Dwg. 2

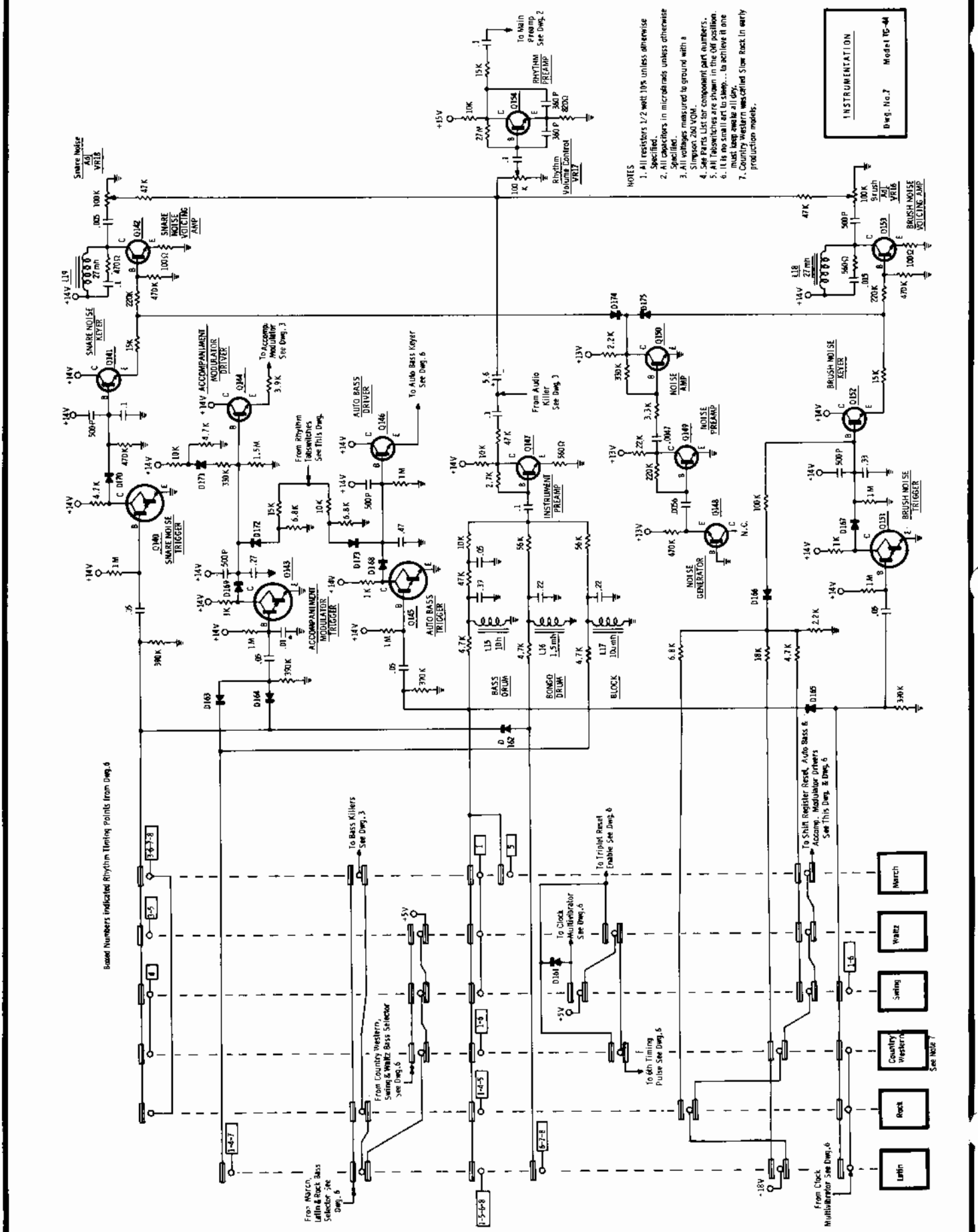
# SCHEMATIC 5


POWER SUPPLY, AMPLIFIER
Dwg. No. 5
Model TG-44
NOTES
1. Components in circuits to the right of plug and socket numbers are located on various boards throughout the organ. To locate them see component location chart this drawing. Then refer to callouts for board indicated.
2. All resistors are 1/2 Watt unless otherwise specified.
3. All capacitors are in Microfarads unless otherwise specified.
4. All voltages measured to ground with a Simpson 260 VOM.
5. See Parts List for component part numbers.
6. Two can live as cheaply as one, but it takes both of them to earn enough to do it.
COMPONENT LOCATION CHART
Voltage | Resistor | Capacitor | Location
+11V | R1 | C1 | Pedal Percuss. Board
+22V | R2 | C2 | Pedal Percuss. Board
+13V | R3 | C3 | Rhythm Board
+14V | R4 | C4 | Rhythm Board
+15V | R5 | C5 | O. C. Board
+4V | R6 | C7 | Q. C. Board
+10V | -- | C6 | Generator Board
+5V | -- | C8 | Rhythm Tempo Control
+28V To Amplifier
+11V To Pedal & Percussion, Rhythm
+22V To Pedal & Percussion
+23V To Rhythm & Pedal Percussion
+13V To Noise Amp Generator
+14V To Rhythm
+15V To Quality Control
+18V To Rhythm, Tabswitches Sustain Control, Pedal Photocell & O.C.
+10V To Tone Generator, Bass Selector, Vibrato, Pedal & Percussion
+5V To Rhythm, Tabswitch & Rhythm Speed Control
-15V To Master Oscillator Pedal & Percussion
-9V To Quality Control
-29V To Amplifier
SEE NOTE 1
P & S1 Pin 8
P & S1 Pin 12
P & S1 Pin 11
P & S1 Pin 15
P & S1 Pin 9
P & S1 Pin 3
P & S1 Pin 2
P & S1 Pin 1
POWER SUPPLY
A. C. Plug
Slo-Blo 1 Amp. Fuse
On/Off Switch
Pilot Light
T1
D40
D41
D42
D43
Z1
Z2
Z3
AMPLIFIER
PREAMP
DIFFERENTIAL PREAMP
PRE-DRIVER
DRIVER
OUTPUT
Photocell P3
From Main Preamp Emitter Follower See Dwg. 2
To Limiter Photocell See Dwg. 2
Headphone Jack
N.C.
Speaker 12" Bass
Speaker 8" Main
8Ω

# SCHEMATIC 6


RHYTHM CLOCK
Dwg. No. 6 Model TG-44
NOTES
1. All resistors are 1/2 watt 10% unless otherwise specified.
2. All capacitors are in microfarads unless otherwise specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. All tabswitches shown in "Off" position.
5. See Parts List for component part numbers.
6. Circled numbers represent Rhythm Timing Points.
7. Like is like an onion... you peel it off one layer at a time, and sometimes you weep.
Timing Points To Instrumentation Circuits Via The Rhythm Tabswitches See Dwg. 7
LATIN ROCK & MARCH BASS SELECTOR
AUTO BASS EMITTER FOLLOWER
AUTO BASS KEYER
BASS DIVIDER
SWING, WALTZ & COUNTRY WESTERN BASS SELECTOR
SHIFT REGISTER RESET
SHIFT REGISTER
RESET DRIVER
TRIGGER RESET ENABLE
CLOCK MULTIVIBRATOR
REPEAT PERCUSSION TRIGGER
REPEAT PERCUSSION MODULATOR DRIVER
STRING BASS PREAMPS
To Main Preamp See Dwg. 2
To Guitar Bass Voicing See Dwg. 2
Bass Full
Soft Bass Mod
String Bass
Guitar Bass
From Petal String Bass Preamp See Dwg. 4
To Bass Killers Via Latin, Rock & March Tabswitches See Dwg. 3&7
From Auto Bass Driver See Dwg. 7
From Bass Divider Driver See Dwg. 3
To Bass Killers Via Swing, Waltz & Country Western Tabswitches See Dwg. 3&7
From Accomp. Reset Driver See Dwg. 3
From Rhythm Tabswitches See Dwg. 7
From Waltz, Country Western & Swing Tabswitch See Dwg. 7
To Slow Attack & Percussion Modulator Via Percussion Tabswitch See Dwg. 2
From Swing Tabswitch See Dwg. 7
To Latin Rock & Country Western Tabswitches See Dwg. 7
From Swing, Waltz & Country Western Tabswitches See Dwg. 7
Rhythm Speed Control VR15
Latin
Rock
March
Swing
Waltz
Country Western

# SCHEMATIC 7


INSTRUMENTATION
Dwg. No.7 Model TG-44
NOTES
1. All resistors 1/2 watt 10% unless otherwise Specified.
2. All capacitors in microfarads unless otherwise Specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. See Parts List for component part numbers.
5. All Tabswitches are shown in the Off position.
6. It is no small art to sleep... to achieve it one must keep awake all day.
7. Country Western was offed Slow Rock in early production models.
Based Numbers Indicated Rhythm Timing Points from Dwg.6
Latin
Rock
Country Western
Swing
Waltz
March
BASS DRUM
BONGO DRUM
BLOCK
RHYTHM PREAMP
INSTRUMENT PREAMP
NOISE PREAMP
NOISE AMP
NOISE GENERATOR
SNARE NOISE TRIGGER
SNARE NOISE KEYER
SNARE NOISE VOICING AMP
BRUSH NOISE TRIGGER
BRUSH NOISE KEYER
BRUSH NOISE VOICING AMP
ACCOMPANIMENT MODULATOR TRIGGER
ACCOMPANIMENT MODULATOR DRIVER
AUTO BASS TRIGGER
AUTO BASS DRIVER
AUTO BASS KEYER
To Main Preamp See Dwg. 2
To Accomp. Modulator See Dwg. 3
To Audio Bass Keyer See Dwg. 6
From Audio Killer See Dwg. 3
From Rhythm Tabswitches See This Dwg.
To Bass Killers See Dwg. 3
To Triplet Reset Enable See Dwg. 6
To Clock Multivibrator See Dwg. 6
To 4th Timing Pulse See Dwg. 6
To Shift Register Reset, Auto Bass & Accomp. Modulator Drivers See This Dwg. & Dwg. 6
From Country Western, Swing & Waltz Bass Selector See Dwg. 6
From March, Latin & Rock Bass Selector See Dwg. 6
From Clock Multivibrator See Dwg. 6
See Note 7

# TRANSISTOR BASING DIAGRAM

FIG. A

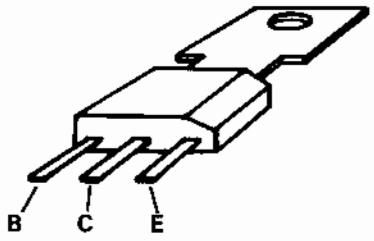



FIG. B

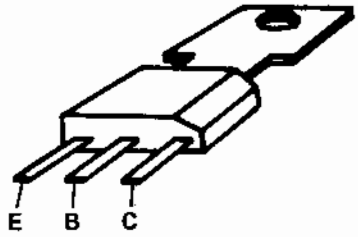



FIG. C

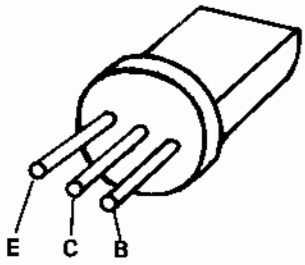



FIG. D

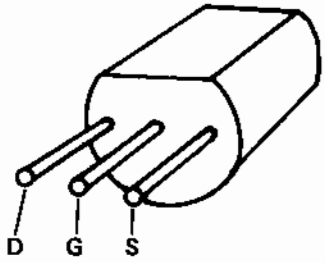



FIG. E

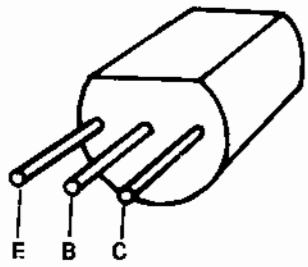



FIG. F

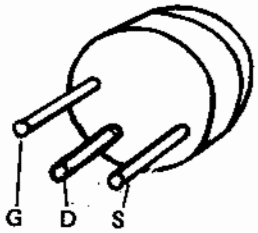



FIG. G

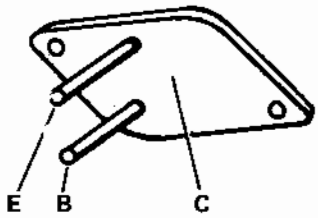



FIG.H

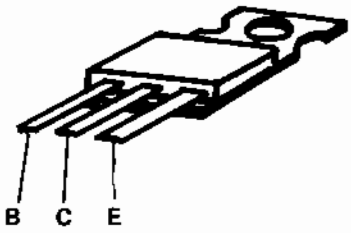
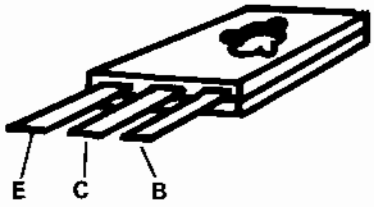
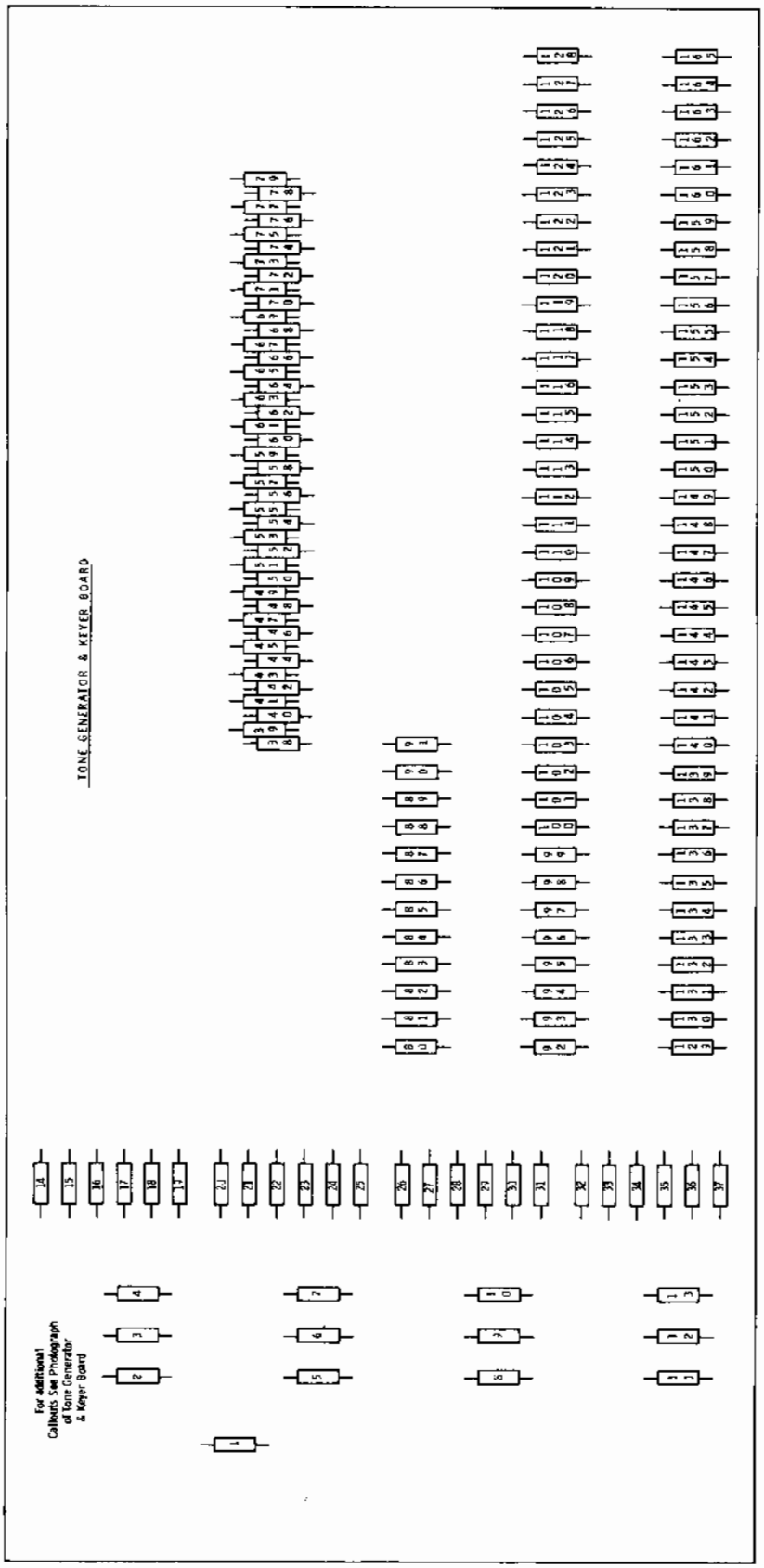



FIG.J




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


TONE GENERATOR & KEYER BOARD
For additional Callouts See Photograph of Tone Generator & Keyer Board

## GENERATOR DIODE

| KEY | DIODE D3 |
|---|---|
| C4 | 1 |
| C3 | 2 |
| B4 | 3 |
| A#4 | 4 |
| A4 | 5 |
| G#4 | 6 |
| G4 | 7 |
| F#4 | 8 |
| F4 | 9 |
| E3 | 10 |
| D#3 | 11 |
| D3 | 12 |
| C#3 | 13 |
| C1 | 14 |
| C2 | 15 |
| B1 | 16 |
| B2 | 17 |
| A#2 | 18 |
| A#1 | 19 |
| A2 | 20 |
| A3 | 21 |
| G#2 | 22 |
| G#3 | 23 |
| G2 | 24 |
| G3 | 25 |
| F#2 | 26 |
| F#3 | 27 |
| F2 | 28 |
| F3 | 29 |
| E1 | 30 |
| E2 | 31 |
| D#1 | 32 |
| D#2 | 33 |
| D1 | 34 |
| D2 | 35 |
| C#1 | 36 |
| C#2 | 37 |

## SUSTAIN & UPPER MANUAL KEYING DIODE

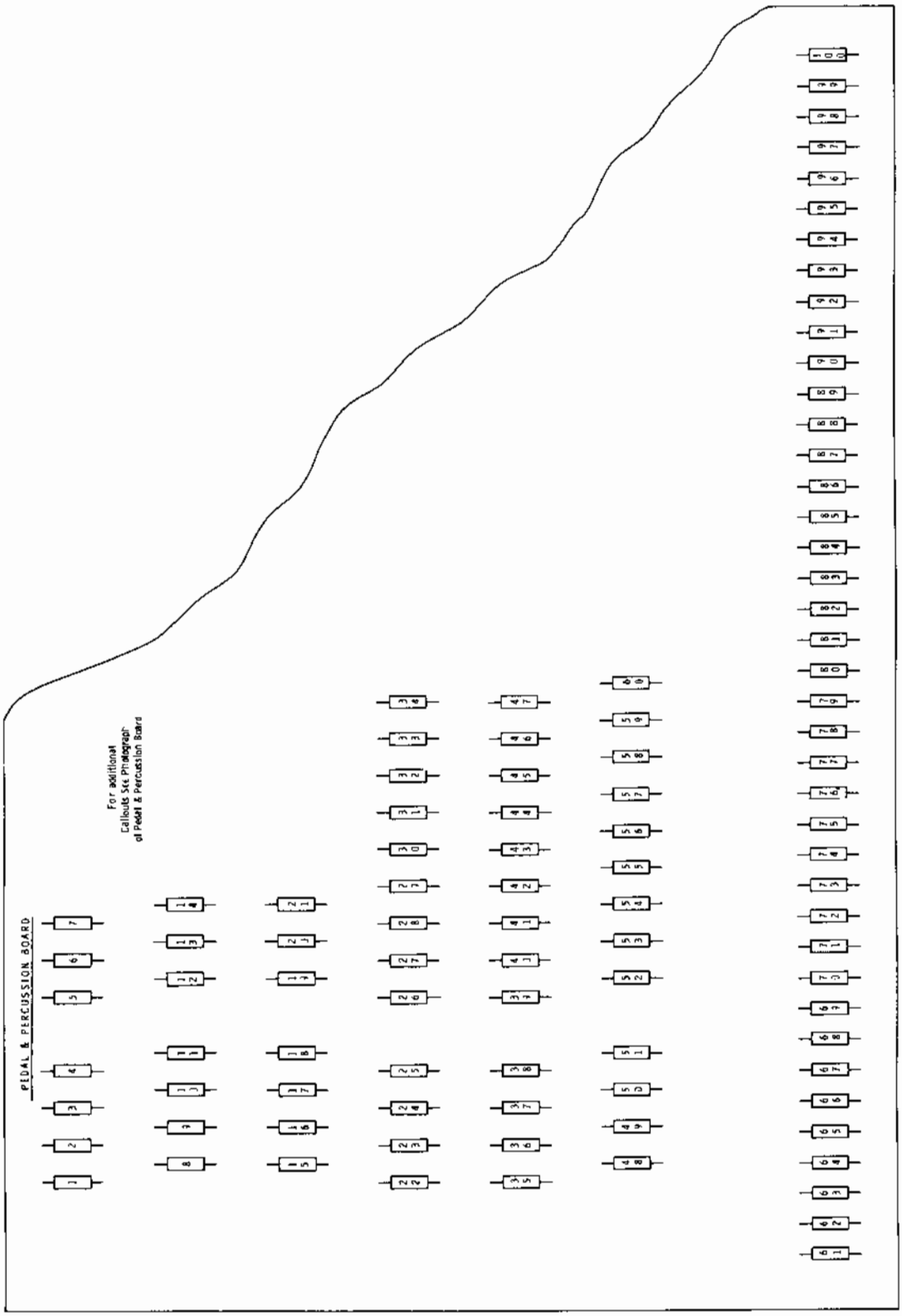
| U. M. KEY | KEYING DIODE D6 | SUSTAIN DIODE D5 |
|---|---|---|
| C4 | 92 | 129 |
| B3 | 93 | 130 |
| A3 | 94 | 131 |
| A3 | 95 | 132 |
| G#3 | 96 | 133 |
| G3 | 97 | 134 |
| F#3 | 98 | 135 |
| F3 | 99 | 136 |
| E3 | 100 | 137 |
| D#3 | 101 | 138 |
| D3 | 102 | 139 |
| C#3 | 103 | 140 |
| C3 | 104 | 141 |
| B2 | 105 | 142 |
| A#2 | 106 | 143 |
| A2 | 107 | 144 |
| G#2 | 108 | 145 |
| G2 | 109 | 146 |
| F#2 | 110 | 147 |
| F2 | 111 | 148 |
| E2 | 112 | 149 |
| D#2 | 113 | 150 |
| D2 | 114 | 151 |
| C#2 | 115 | 152 |
| C2 | 116 | 153 |
| B1 | 117 | 154 |
| A#1 | 118 | 155 |
| A1 | 119 | 156 |
| G#1 | 120 | 157 |
| G1 | 121 | 158 |
| F#1 | 122 | 159 |
| F1 | 123 | 160 |
| E1 | 124 | 161 |
| D#1 | 125 | 162 |
| D1 | 126 | 163 |
| C#1 | 127 | 164 |
| C1 | 128 | 165 |

## GENIE CHORD KEYING

| KEY | KEYING DIODE D7 | NOTE KEYED | SIGNAL DIODE D9 |
|---|---|---|---|
| A1 | 79 | C#2 | 83 |
| | 78 | A2 | 87 |
| | 77 | E2 | 80 |
| A#1 | 76 | A2 | 87 |
| | 75 | E2 | 80 |
| | 74 | C2 | 84 |
| B1 | 73 | B2 | 85 |
| | 72 | F#1 | 90 |
| | 71 | D#2 | 81 |
| C1 | 70 | E2 | 80 |
| | 69 | C2 | 84 |
| | 68 | G1 | 89 |
| C#1 | 67 | C2 | 84 |
| | 66 | G1 | 89 |
| | 65 | D#2 | 81 |
| D1 | 64 | F#1 | 90 |
| | 63 | D2 | 82 |
| | 62 | A2 | 87 |
| D#1 | 61 | D2 | 82 |
| | 60 | A2 | 87 |
| | 59 | F1 | 91 |
| E1 | 58 | E2 | 80 |
| | 57 | G#1 | 88 |
| | 56 | B2 | 85 |
| F1 | 55 | A2 | 87 |
| | 54 | F1 | 91 |
| | 53 | C2 | 84 |
| F#1 | 52 | F1 | 91 |
| | 51 | C2 | 84 |
| | 50 | G#1 | 88 |
| G1 | 49 | B2 | 85 |
| | 48 | D2 | 82 |
| | 47 | G1 | 89 |
| G#1 | 46 | D2 | 82 |
| | 45 | G1 | 89 |
| | 44 | A#2 | 86 |
| A2 | 43 | G1 | 89 |
| | 42 | A#2 | 86 |
| | 41 | D#2 | 81 |
| A#2 | 40 | A#2 | 86 |
| | 39 | F1 | 91 |
| | 38 | D2 | 82 |

## FREQUENCY DISTRIBUTION CHART

| DIVIDER | FREQUENCY OCTAVE in Hertz | U. M. KEY | L. M. KEY | I. C. # |
|---|---|---|---|---|
| TOS | C6-1046 | C4 | C4 | 1 |
| TOS | C5-523 | C3 | C3 | 1 |
| 1ST | C4-261 | C2 | C2 | 3 |
| 2ND | C3-130 | C1 | C1 | 3 |
| TOS | B5-987 | B4 | B4 | 1 |
| 1ST | B4-493 | B3 | B3 | 3 |
| 2ND | B3-246 | B2 | B2 | 3 |
| 3RD | B2-123 | | B1 | 7 |
| SOLO | B2-123 | B1 | | 10 |
| TOS | A#5-932 | A#4 | A#4 | 1 |
| 1ST | A#4-466 | A#3 | A#3 | 3 |
| 2ND | A#3-233 | A#2 | A#2 | 3 |
| 3RD | A#2-116 | | A#1 | 7 |
| SOLO | A#2-116 | A#1 | | 10 |
| TOS | A5-880 | A4 | A4 | 1 |
| 1ST | A4-440 | A3 | A3 | 4 |
| 2ND | A3-220 | A2 | A2 | 4 |
| 3RD | A2-110 | | A1 | 7 |
| SOLO | A2-110 | A1 | | 10 |
| TOS | G#5-830 | G#4 | G#3 | 2 |
| 1ST | G#4-415 | G#3 | G#2 | 6 |
| 2ND | G#3-207 | G#2 | G#1 | 4 |
| SOLO | G#2-103 | G#1 | | 10 |
| TOS | G5-783 | G4 | G3 | 1 |
| 1ST | G4-392 | G3 | G2 | 4 |
| 2ND | G3-196 | G2 | G1 | 4 |
| SOLO | G2-97 | G1 | | 10 |
| TOS | F#5-739 | F#4 | F#3 | 2 |
| 1ST | F#4-369 | F#3 | F#2 | 5 |
| 2ND | F#3-185 | F#2 | F#1 | 5 |
| SOLO | F#2-92 | F#1 | | 10 |
| TOS | F5-698 | F4 | F3 | 2 |
| 1ST | F4-349 | F3 | F2 | 5 |
| 2ND | F3-174 | F2 | F1 | 5 |
| SOLO | F2-87 | F1 | | 10 |
| TOS | E5-659 | E3 | E4 & E3 | 2 |
| 1ST | E4-329 | E2 | E2 | 6 |
| 2ND | E3-164 | E1 | E1 | 6 |
| TOS | D#5-622 | D#3 | D#4 & D#3 | 2 |
| 1ST | D#4-311 | D#2 | D#2 | 6 |
| 2ND | D#3-155 | D#1 | D#1 | 6 |
| TOS | D5-587 | D3 | D4 & D3 | 2 |
| 1ST | D4-293 | D2 | D2 | 6 |
| 2ND | D3-146 | D1 | D1 | 6 |
| TOS | C#5-561 | C#3 | C#4 & C#3 | 2 |
| 1ST | C#4-277 | C#2 | C#2 | 6 |
| 2ND | C#3-138 | C#1 | C#1 | 6 |

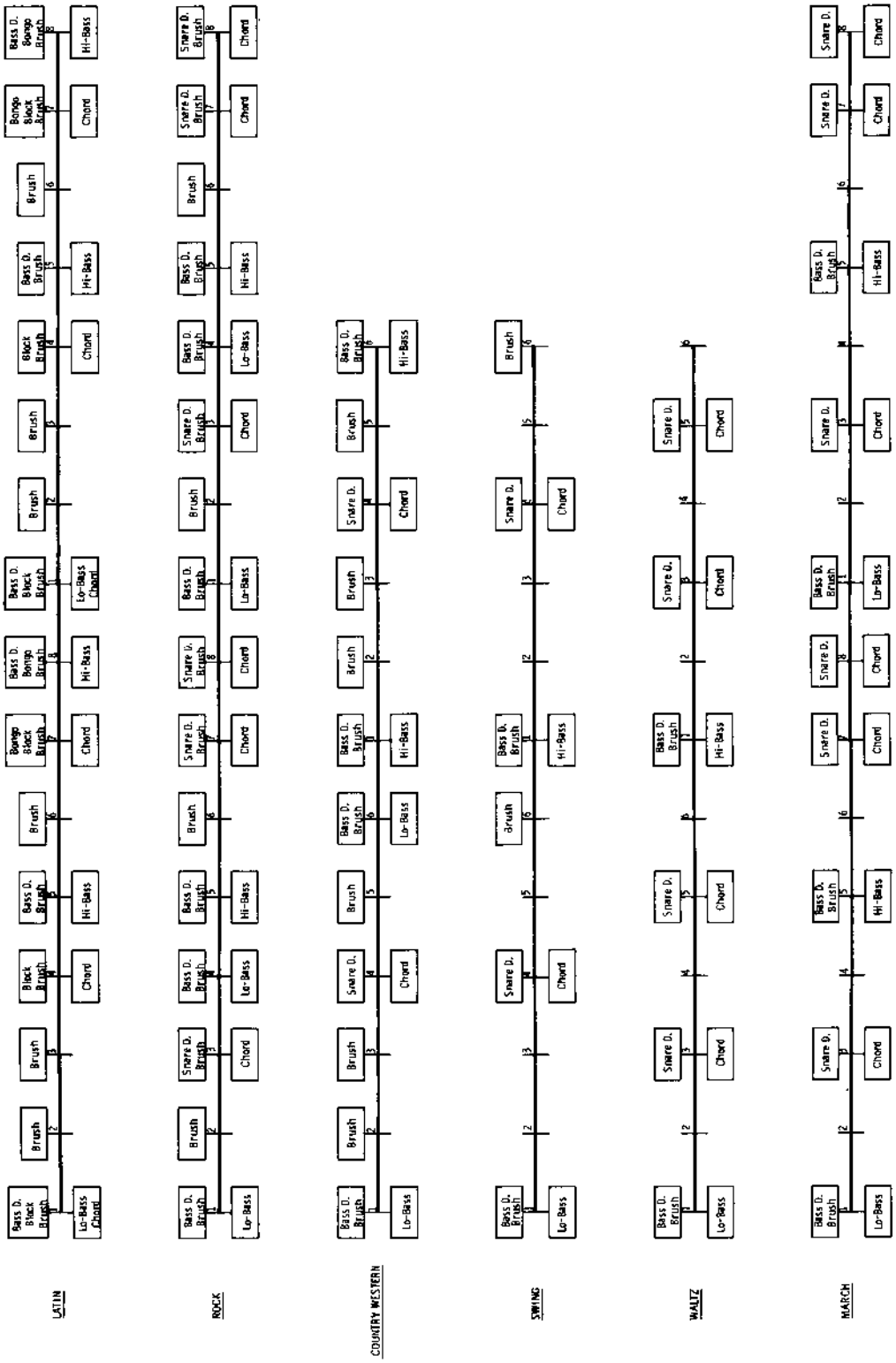

PEDAL & PERCUSSION BOARD
For additional
Callouts See Photograph
of Pedal & Percussion Board

| LOWER MANUAL DIODE KEYING | |
|---|---|
| KEY | DIODE D8 |
| A1 | 61 |
| A#1 | 62 |
| B1 | 63 |
| C1 | 64 |
| C#1 | 65 |
| D1 | 66 |
| D#1 | 67 |
| E1 | 68 |
| F1 | 69 |
| F#1 | 70 |
| G1 | 71 |
| G#1 | 72 |
| A2 | 73 |
| A#2 | 74 |
| B2 | 75 |
| C2 | 76 |
| C#2 | 77 |
| D2 | 78 |
| D#2 | 79 |
| E2 | 80 |
| F2 | 81 |
| F#2 | 82 |
| G2 | 83 |
| G#2 | 84 |
| A2 | 85 |
| A#2 | 86 |
| B2 | 87 |
| C2 | 88 |
| C#3 & C#4 | 89 |
| D3 & D4 | 90 |
| D#3 & D#4 | 91 |
| E3 & E4 | 92 |
| F3 | 93 |
| F#3 | 94 |
| G3 | 95 |
| G#3 | 96 |
| A3 | 97 |
| A#3 | 98 |
| B3 | 99 |
| C4 | 100 |

| PEDAL SUSTAIN & DIODE KEYING CHART | | |
|---|---|---|
| PEDAL KEY | SUSTAIN DIODE D15 | KEYING DIODE D16-D17 |
| C1 | 60 | 34 & 47 |
| C#1 | 59 | 33 & 46 |
| D1 | 58 | 32 & 45 |
| D#1 | 57 | 31 & 44 |
| E1 | 56 | 30 & 43 |
| F1 | 55 | 29 & 42 |
| F#1 | 54 | 28 & 41 |
| G1 | 53 | 27 & 40 |
| G#1 | 52 | 26 & 39 |
| A1 | 51 | 25 & 38 |
| A#1 | 50 | 24 & 37 |
| B1 | 49 | 23 & 36 |
| C2 | 48 | 22 & 35 |

| U.M. SOLO KEYING & SUSTAIN CHART | | |
|---|---|---|
| U. M. KEY | SUSTAIN DIODE D20 | KEYING DIODE D18-D19 |
| F1 | 7 | 14 & 21 |
| F#1 | 6 | 13 & 20 |
| G1 | 5 | 12 & 19 |
| G#1 | 4 | 11 & 18 |
| A1 | 3 | 10 & 17 |
| A#1 | 2 | 9 & 16 |
| B1 | 1 | 8 & 15 |

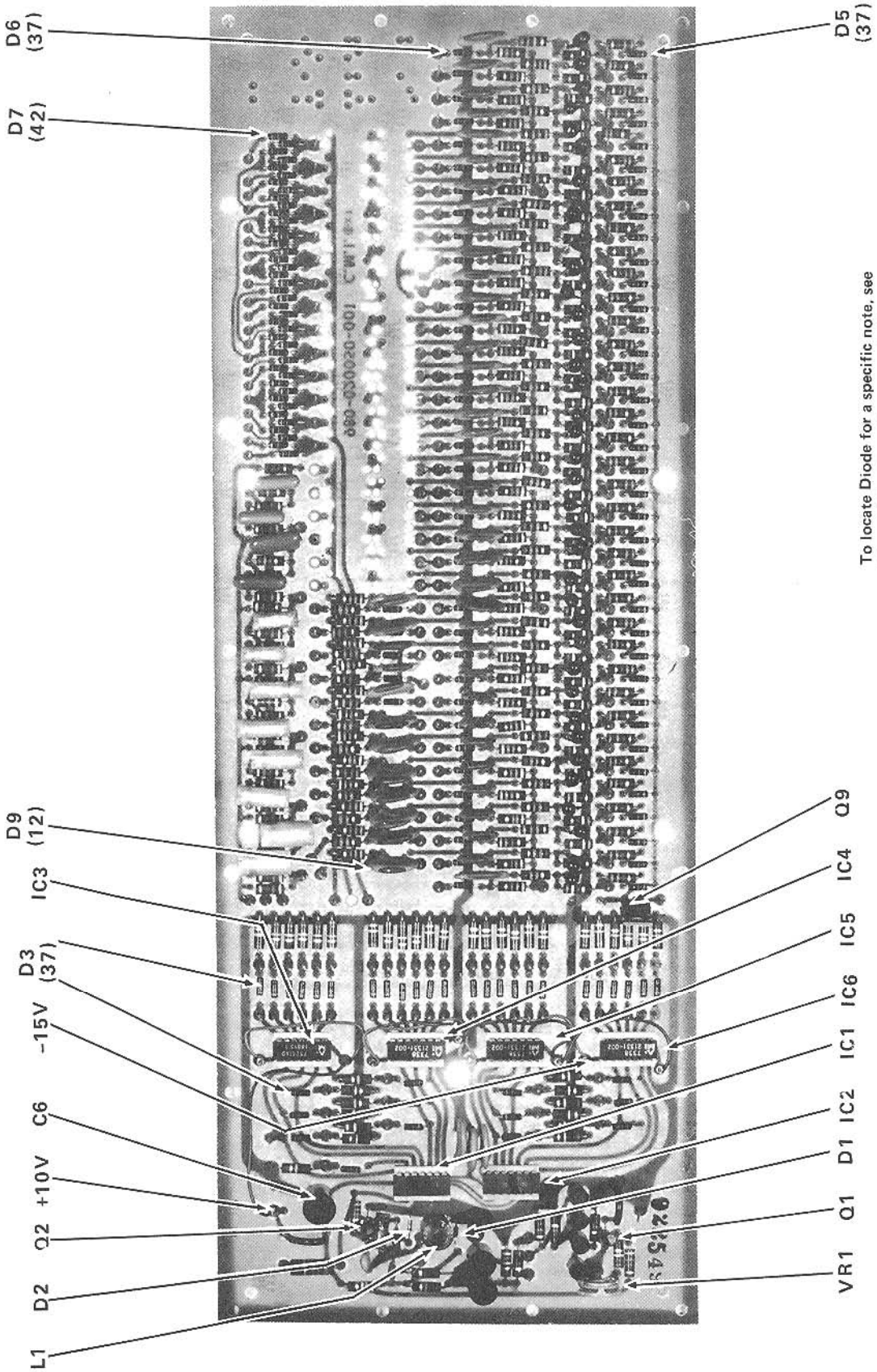
# RHYTHM PATTERNS DIAGRAM



# TRANSISTOR LOCATION CHART

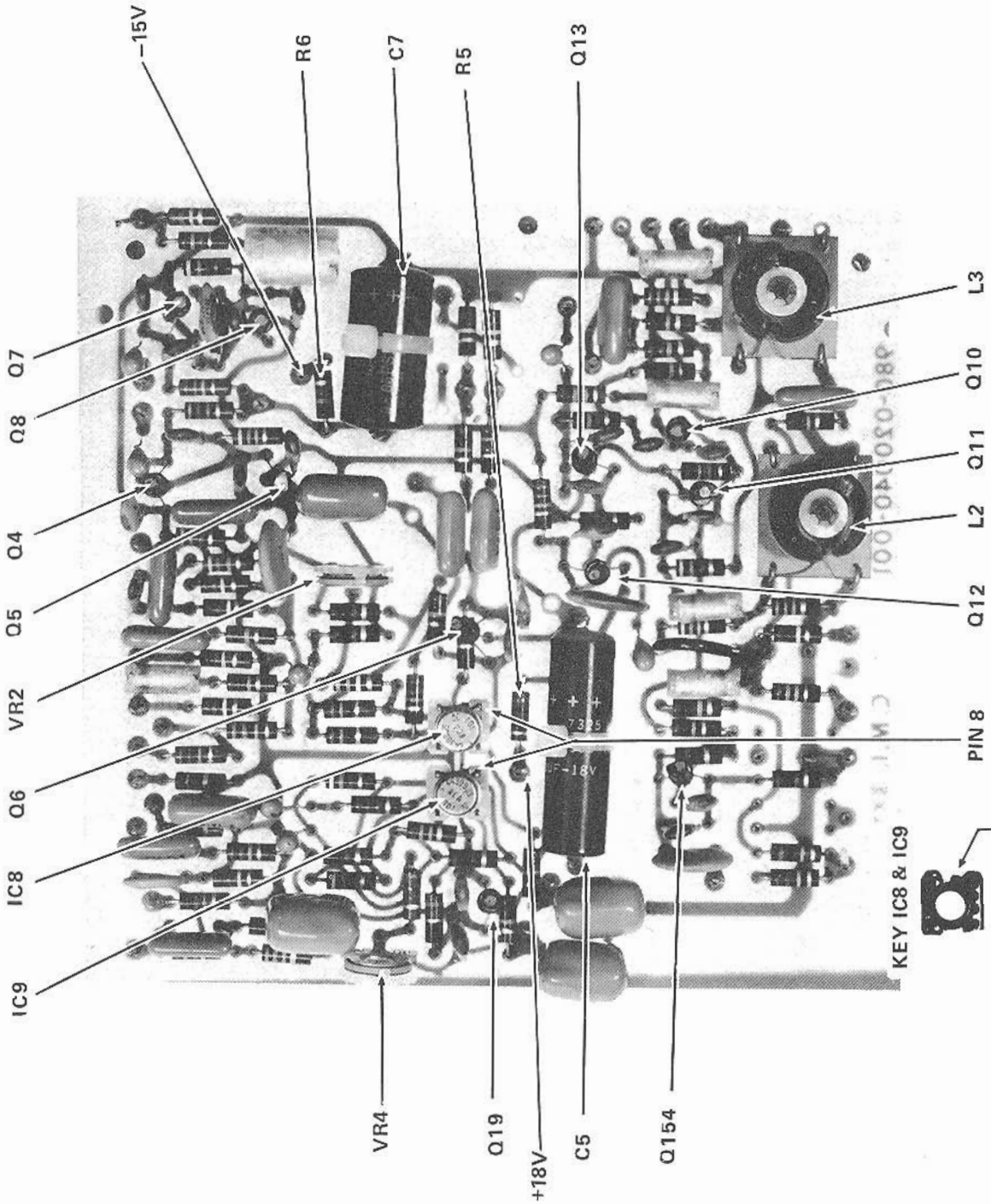
| Q NOS. | NAME OF BOARD | Q NOS. | NAME OF BOARD | Q NOS. | NAME OF BOARD |
|---|---|---|---|---|---|
| 1 | Tone Generator & Keyer Board | 40 | Pedal & Percussion Board | 151 | Rhythm Board |
| 2 | Tone Generator & Keyer Board | 41 | Pedal & Percussion Board | 152 | Rhythm Board |
| 4 | Quality Control Board | 42 | Pedal & Percussion Board | 153 | Rhythm Board |
| 5 | Quality Control Board | 43 | Pedal & Percussion Board | 154 | Quality Control Board |
| 6 | Quality Control Board | 45 | Pedal & Percussion Board | | |
| 7 | Quality Control Board | 46 | Pedal & Percussion Board | | |
| 8 | Quality Control Board | 47 | Pedal & Percussion Board | | |
| 9 | Tone Generator & Keyer Board | 48 | Pedal & Percussion Board | | |
| 10 | Quality Control Board | 49 | Pedal & Percussion Board | | |
| 11 | Quality Control Board | 50 | Pedal & Percussion Board | | |
| 12 | Quality Control Board | 126 | Pedal & Percussion Board | | |
| 13 | Quality Control Board | 127 | Pedal & Percussion Board | | |
| 16 | Rhythm Board | 128 | Rhythm Board | | |
| 17 | Rhythm Board | 129 | Rhythm Board | | |
| 18 | Rhythm Board | 130 | Rhythm Board | | |
| 19 | Quality Control Board | 131 | Rhythm Board | | |
| 20 | Rhythm Board | 132 | Rhythm Board | | |
| 21 | Rhythm Board | 133 | Rhythm Board | | |
| 22 | Rhythm Board | 134 | Rhythm Board | | |
| 25 | Pedal & Percussion Board | 135 | Rhythm Board | | |
| 26 | Pedal & Percussion Board | 136 | Rhythm Board | | |
| 27 | Pedal & Percussion Board | 137 | Rhythm Board | | |
| 28 | Pedal & Percussion Board | 138 | Rhythm Board | | |
| 29 | Pedal & Percussion Board | 140 | Rhythm Board | | |
| 30 | Pedal & Percussion Board | 141 | Rhythm Board | | |
| 31 | Pedal & Percussion Board | 142 | Rhythm Board | | |
| 32 | Pedal & Percussion Board | 143 | Rhythm Board | | |
| 33 | Pedal & Percussion Board | 144 | Rhythm Board | | |
| 34 | Pedal & Percussion Board | 145 | Rhythm Board | | |
| 35 | Pedal & Percussion Board | 146 | Rhythm Board | | |
| 36 | Pedal & Percussion Board | 147 | Rhythm Board | | |
| 37 | Pedal & Percussion Board | 148 | Rhythm Board | | |
| 38 | Pedal & Percussion Board | 149 | Rhythm Board | | |
| 39 | Pedal & Percussion Board | 150 | Rhythm Board | | |

# TONE GENERATOR AND KEYER BOARD

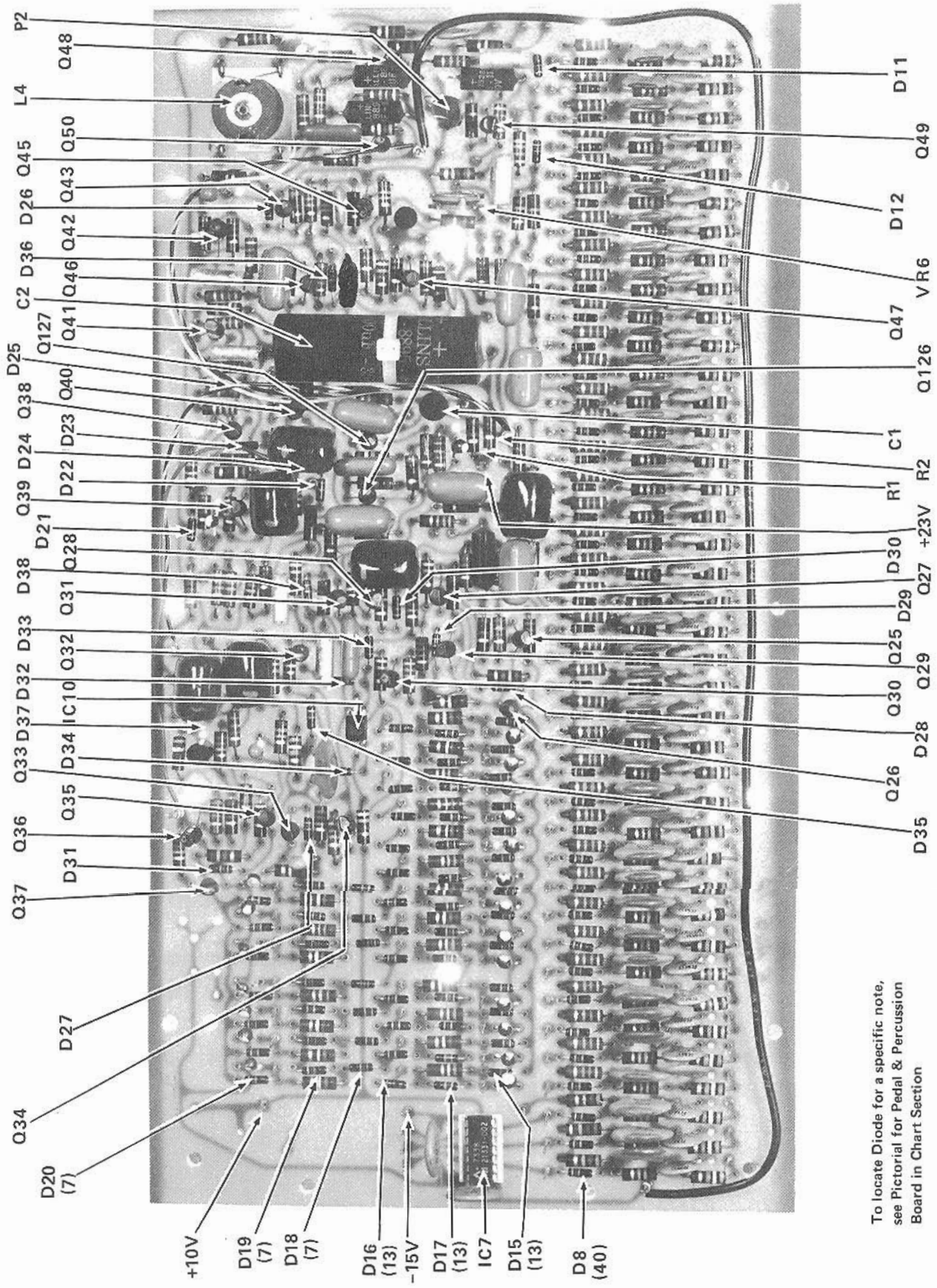



To locate Diode for a specific note, see Pictorial for Tone Generator & Keyer Board in Chart Section.

## QUALITY CONTROL BOARD

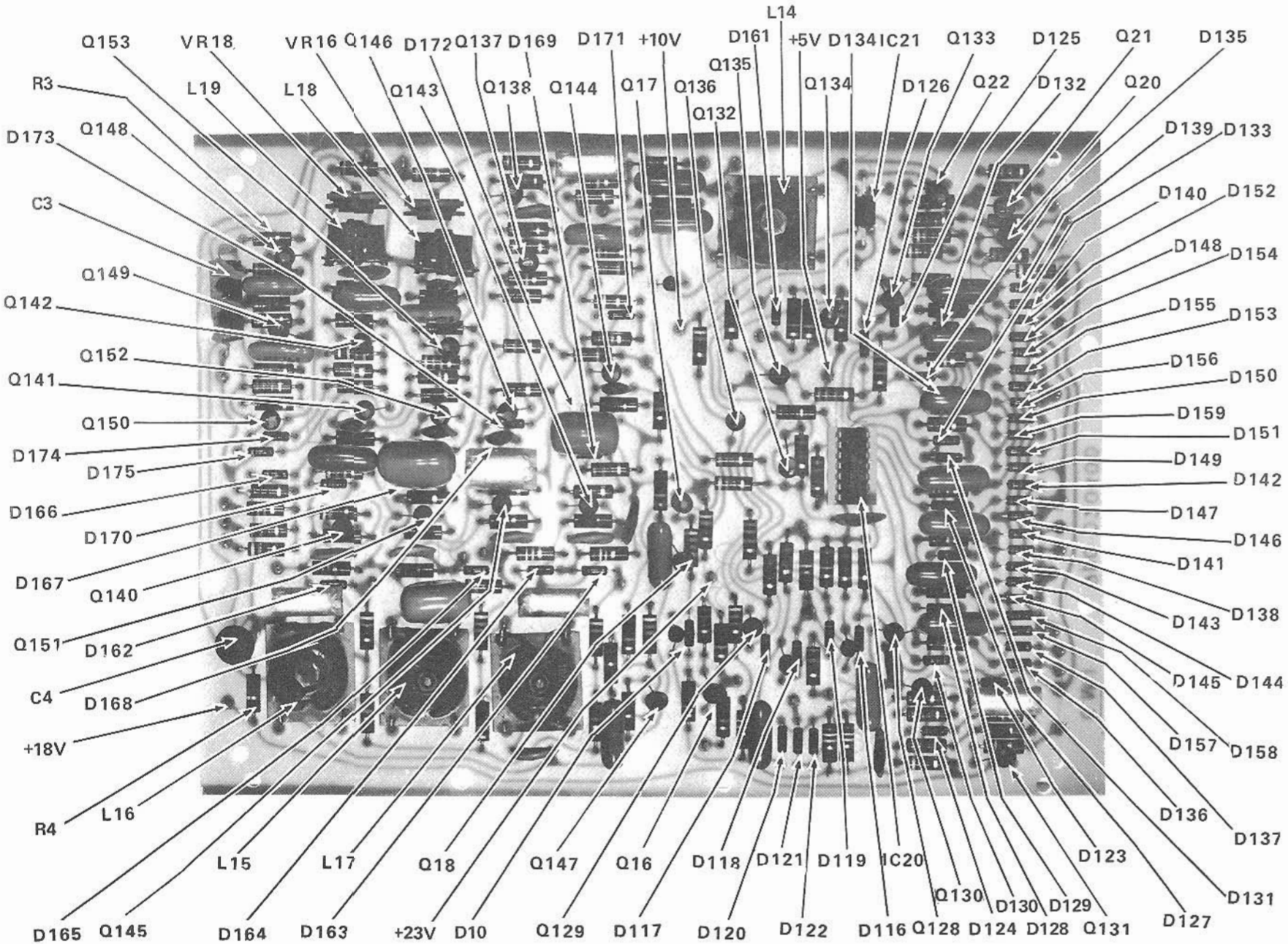


# PEDAL AND PERCUSSION BOARD

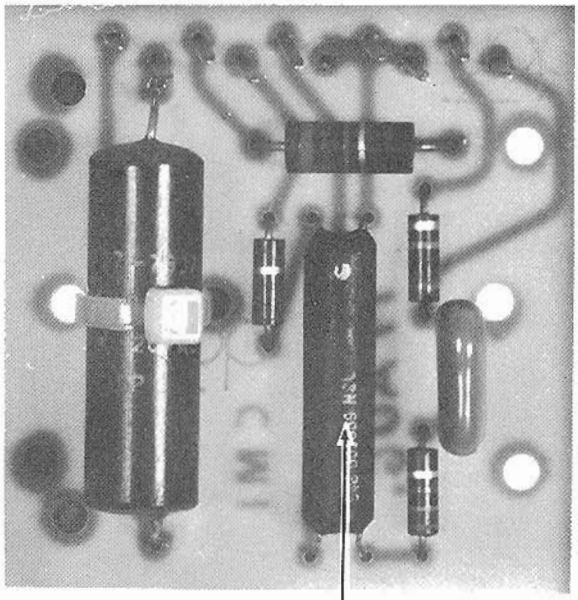



To locate Diode for a specific note, see Pictorial for Pedal & Percussion Board in Chart Section

# RHYTHM BOARD

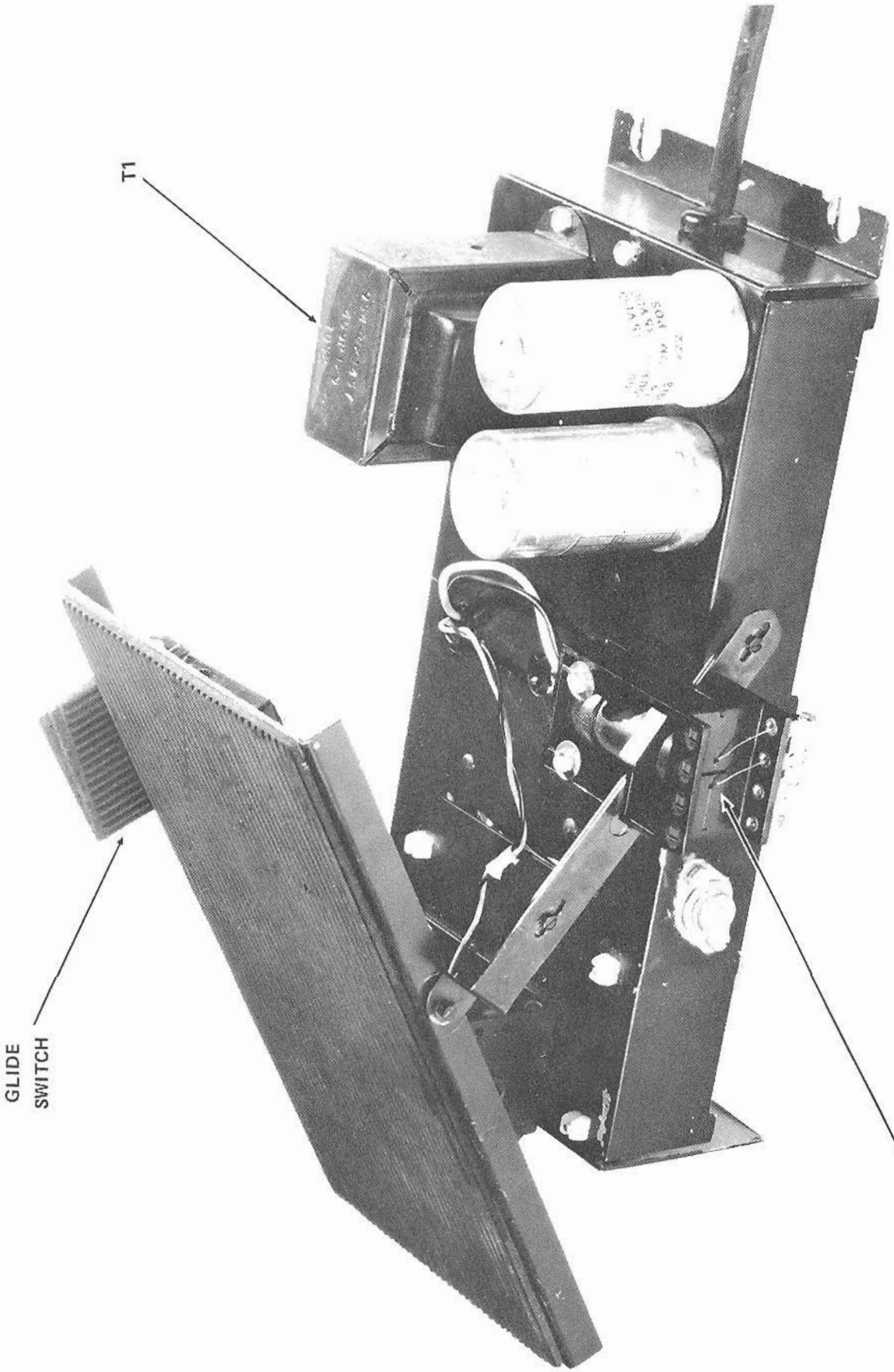


## LIMITER BOARD



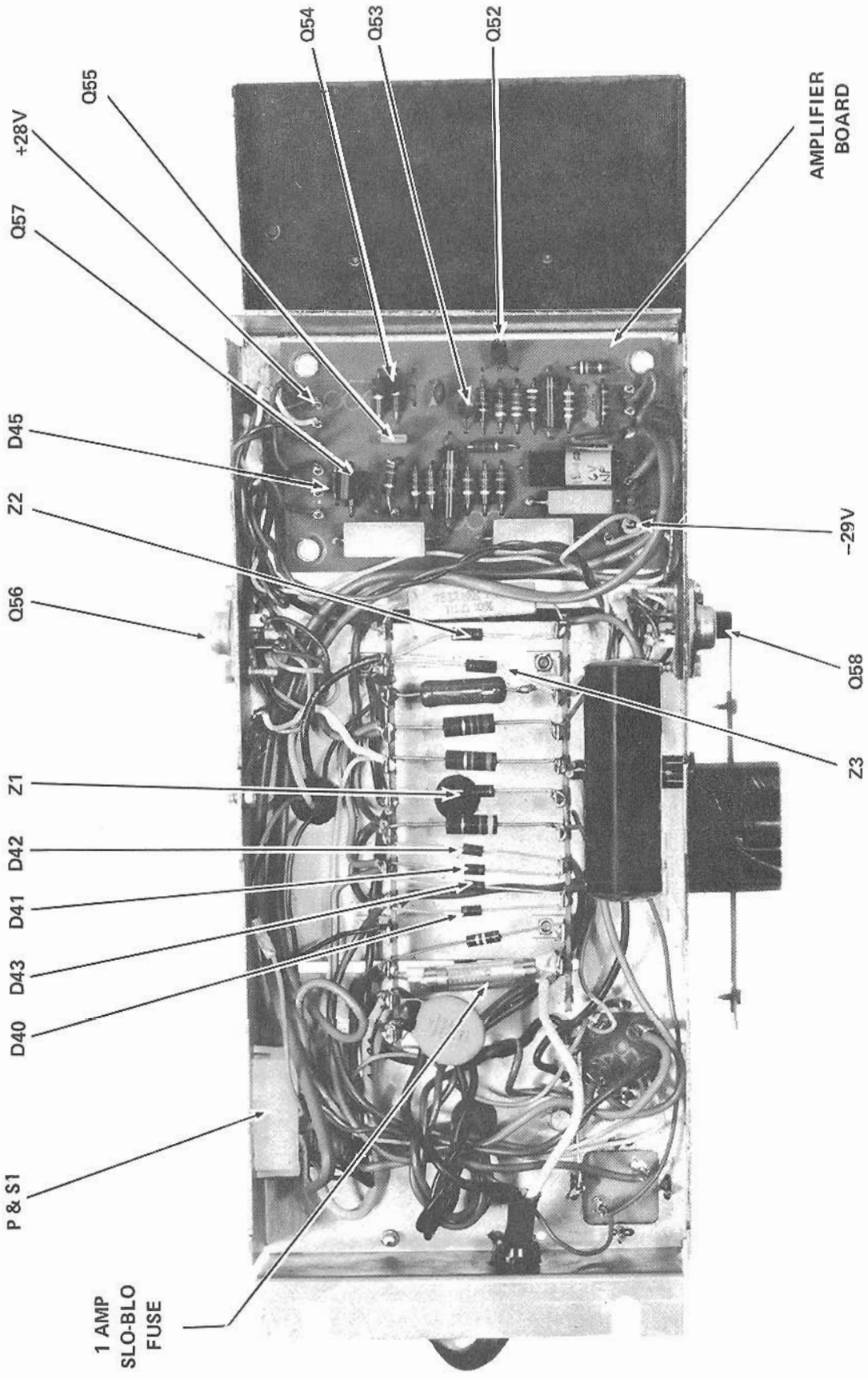
## AMPLIFIER/POWER SUPPLY & EXPRESSION PEDAL ASSEMBLY

(Top View)



## AMPLIFIER/POWER SUPPLY & EXPRESSION PEDAL ASSEMBLY

(Bottom View)



# PARTS INFORMATION

### STANDARD PARTS

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

### SPECIAL PARTS

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

### PARTS ORDERING INFORMATION

When ordering parts be sure to include the following information:

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

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

**ADDRESS PARTS ORDERS TO:**

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

**IMPORTANT**

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

# PARTS LIST

## TABLE OF CONTENTS



THE PARTS LIST CONTAINS THE FOLLOWING INFORMATION:

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

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

# PARTS LIST

## AMPLIFIER/POWER SUPPLY & EXPRESSION PEDAL ASSEMBLY

| Part | Description | Schematic Reference | Part Number |
|---|---|---|---|
| Arm | Actuator | | 967-015934 |
| Assembly | Amplifier/Power Supply & Expression Pedal Complete | | 997-022420 |
| Bulb | Used in Photocell P3 | | 939-003190 |
| Capacitor | Electrolytic 1 UF 25V | | 945-008895-41 |
| Capacitor | Electrolytic 6 UF 20V | | 945-008895-7 |
| Capacitor | Electrolytic 15 UF 6V | | 945-008895-79 |
| Capacitor | Electrolytic 500-1500 @ 35V | | 945-021453 |
| Capacitor | Electrolytic 1000-1000-1000-2000 @ 35V. | | 945-021454 |
| Diffuser | Clear | | 922-015938 |
| Diffuser | White | | 922-015938-1 |
| Diode | Rectifier | D40-43, 45 | 919-010623 |
| Diode | Triple | D44 | 919-010454-1 |
| Diode | Zener 5.1V | Z2 | 919-017406-22 |
| Diode | Zener 15V | Z3 | 919-017406-13 |
| Diode | Zener 22V | Z1 | 919-017406-11 |
| Fuse | Slo-Blo Pigtail | | 939-001120-2 |
| Mat | Expression Pedal | | 959-006337-4 |
| Mat | Glide Switch | | 959-009208-1 |
| Photocell | Expression Pedal | P3 | 948-018479 |
| Resistor | WW .51 Ohm 10% 5W | | 924-008896 |
| Resistor | WW .18 Ohm 10% 2W | | 924-008896-21 |
| Resistor | WW 47 Ohm 10% 2W. | | 924-010471-47 |
| Resistor | WW 100 Ohm 10% 2W | | 924-010471-101 |
| Resistor | WW 125 Ohm 10% 5W | | 924-008896-37 |
| Resistor | WW 250 Ohm 10% 5W | | 924-008896-15 |
| Resistor | WW 330 Ohm 10% 2W | | 924-010471-331 |
| Socket | Transistor | | 906-021455 |
| Switch | Glide | | 960-006340 |
| Transformer | Power | T1 | 954-021457 |
| Transistor | | Q56, 58 | 992-022201 |
| Transistor | Preamps | Q52, 53 | 991-013544 |
| Transistor | Pre-Driver (PNP) | Q54 | 991-015614 |
| Transistor | Driver (NPN) | Q55 | 991-021450-2 |
| Transistor | Driver (PNP) | Q57 | 991-021451-2 |

## BENCH SELECTION

| | | | |
|---|---|---|---|
| Bench | Fruitwood | | 978-022280 |
| Bench | Pecan | | 978-021490 |
| Bench | Walnut | | 978-022251 |

## CONSOLE & MANUAL ASSEMBLIES

| | | | |
|---|---|---|---|
| Back | Console | | 972-022235 |
| Key Cap (1) | Plastic (Black) | | |
| Key Cap (2) | Plastic (White) | | |
| Key (3) | Complete (Black or White) | | |

(1) All are identical.
(2) Include Key Letter designation. (Example: A or F, etc.)
(3) Available on special order only. Include Key Letter designation and Key location. Replacement keys will require special hand-fitting due to the hand-built construction of keyboards.

| | | | |
|---|---|---|---|
| Speaker | 8-inch Main | | 985-003185-1 |
| Speaker | 12-inch Bass | | 985-021459 |

## KEYSWITCH ASSEMBLY

| | | | |
|---|---|---|---|
| Actuator | Keyswitch | | 964-002495 |
| Clip | Spring | | 976-009364-2 |
| Spring | Contact | | 917-009155 |
| Spring | Pulldown | | 975-007085 |

# PARTS LIST

| Part | Description | Schematic Reference | Part Number |
|---|---|---|---|
| **LIMITER BOARD ASSEMBLY** | | | |
| Capacitor | Electrolytic 35 UF @ 20V | | 945-022269 |
| Photocell | Limiter | P1 | 948-001859 |
| Resistor | WW 150 Ohm 10% 2W | | 924-010471-151 |
| **PEDAL & PERCUSSION BOARD ASSEMBLY** | | | |
| Capacitor | Electrolytic 1 UF 20V | | 945-008895-11 |
| Capacitor | Electrolytic 1 UF +20% 50V | | 945-016689 |
| Capacitor | Electrolytic 20 UF 25V | C1 | 945-015384 |
| Capacitor | Electrolytic 1000 UF 30V | C2 | 945-008895-49 |
| Capacitor | Tantalum 8.2 UF 20% 25V | | 946-021452-4 |
| Capacitor | Tantalum 3.3 UF 20% 35V | | 946-012624-335 |
| Capacitor | Tantalum 1.0 UF 20% 35V | | 946-012624-105 |
| Capacitor | Tantalum 5.6 UF 25V | | 946-021452-1 |
| Coil | Toroid 500 MH | L4 | 952-021447-8 |
| Diode | | D8, 11, 12, 15-38 | 919-004799 |
| IC | Lower Keyboard Divider | IC7 | 991-021331-2 |
| IC | Pedal & Solo Divider | IC10 | 991-015942-1 |
| Photocell | Auto & Vibra Wow | P2 | 948-022248 |
| Potentiometer | 250K Vibra Wow Adj. | VR6 | 925-004349-2 |
| Transistor | | Q25,26,28,30,32,34,36,37 42,43,45,48,50,126,127 | 991-008393 |
| Transistor | | Q29, 33, 39-41, 46 | 991-016727 |
| Transistor | | Q27, 35, 38, 47 | 991-010098 |
| Transistor | | Q49 | 991-018238 |
| **QUALITY CONTROL BOARD ASSEMBLY** | | | |
| Capacitor | Electrolytic 350 UF 15V | C7 | 945-008895-42 |
| Capacitor | Electrolytic 500 UF 18V | C5 | 945-008895-80 |
| Capacitor | Tantalum 5.6 UF 25V | | 946-021452-1 |
| Coil | Toroid 1 H | L3 | 952-021447-9 |
| Coil | Toroid 500 MH | L2 | 952-021447-8 |
| IC | Perc/Slow Attack Mod. & Accomp. Modulator | IC8, 9 | 991-021444 |
| Potentiometer | 50K Auto. Accomp. & Percuss. Adj. | VR2, 4 | 925-004349-7 |
| Socket | | IC8, 9 | 906-021448 |
| Transistor | | Q4-8, 10-13, 19, 154 | 991-002298 |
| **RHYTHM BOARD ASSEMBLY** | | | |
| Capacitor | Electrolytic 20 MFD 25V | C1 | 945-008895-30 |
| Capacitor | Electrolytic 100 UF 20V | | 945-022264 |
| Capacitor | Tantalum 5.6 UF 25V | | **946-021452-1** |
| Coil | Toroid 1.5 H Bongo | L16 | 952-021447-3 |
| Coil | Toroid 10 H Bass | L14, 15 | 952-021447-2 |
| Coil | Toroid 100 MH Block | L17 | 952-021447-5 |
| Coil | Toroid 27 MH Brush & Snare | L18, 19 | 952-016273 |
| Diode | | D116-175 | 919-004799 |
| IC | Shift Register | IC20 | 991-022215 |
| IC | Bass Divider | IC21 | 991-015942-1 |
| Potentiometer | 100K Brush & Snare Adj. | VR16, 18 | 925-004349-10 |
| Socket | Shift Register | | 906-018905 |
| Transistor | Detector, Killer | Q16, 21 | 991-010098 |
| Transistor | | Q17,18,20,22,131-138,141, 142,144,146-150,152,153 | 991-008393 |
| Transistor | Darlington Triggers | Q130, 140, 143, 145, 151 | 991-016727 |
| Transistor | Clock Multivibrator | Q128, 129 | 991-018238 |

# PARTS LIST

| Part | Description | Schematic Reference | Part Number |
|---|---|---|---|
| **TAB PANEL ASSEMBLY** | | | |
| Escutcheon | Tab Panel | | 966-022245 |
| Guide | Slider | | 976-005170 |
| Jack | Auxiliary | | 906-006104 |
| Jack | Headphone | | 910-013556-7 |
| Potentiometer | 5K Lower Keyboard Volume | VR5 | 925-021442-3 |
| Potentiometer | 10K Custom Sustain Control | VR3 | 925-021442-2 |
| Potentiometer | 100K Rhythm Speed & Volume | VR15, 17 | 925-021442-1 |
| Pusher | Medium | | 964-001901 |
| Spring | Contact | | 917-005166-1 |
| Spring | Toggle | | 975-002338-1 |
| Switch | Power Off/On | | 960-010669 |
| Tab | Accomp./Genie/Genie Chords | | 915-009876-291 |
| Tab | Accordion | | 915-009876-296 |
| Tab | Auto Wow | | 915-009876-298 |
| Tab | Banjo (Red) | | 915-009876-272 |
| Tab | Banjo (Yellow) | | 915-009876-277 |
| Tab | Bass Full | | 915-009876-287 |
| Tab | Bass Soft/Medium | | 915-009876-299 |
| Tab | Flute | | 915-009876-286 |
| Tab | Genie Voices/Normal/+Organ | | 915-009876-297 |
| Tab | Guitar | | 915-009876-270 |
| Tab | Guitar Bass | | 915-009876-276 |
| Tab | Harpsichord | | 915-009876-278 |
| Tab | Hawaiian Guitar | | 915-009876-271 |
| Tab | Horn | | 915-009876-273 |
| Tab | Latin | | 915-009876-269 |
| Tab | Mandolin | | 915-009876-279 |
| Tab | March | | 915-009876-295 |
| Tab | Pedal String Bass/Guitar Bass | | 915-009876-301 |
| Tab | Pedal Sustain Off/On | | 915-009876-249 |
| Tab | Piano | | 915-009876-282 |
| Tab | Reed | | 915-009876-274 |
| Tab | Percuss/Repeat/Solo Percuss | | 915-009876-300 |
| Tab | Rhythm Start Normal/Auto | | 915-009876-293 |
| Tab | Rock | | 915-009876-275 |
| Tab | Slow Rock | | 915-009876-294 |
| Tab | String | | 915-009876-280 |
| Tab | String Bass | | 915-009876-284 |
| Tab | Swing | | 915-009876-281 |
| Tab | Vibra Harp | | 915-009876-285 |
| Tab | Vibra Wow | | 915-009876-230 |
| Tab | Vibrato | | 915-009876-290 |
| Tab | Waltz | | 915-009876-283 |
| Tab | Country Western | | 915-009876-302 |
| **TONE GENERATOR & KEYER BOARD ASSEMBLY** | | | |
| Capacitor | Electrolytic 1 UF 50V | | 945-016689 |
| Capacitor | Electrolytic 2 UF 25V | | 945-015619 |
| Capacitor | Electrolytic 3 UF 20V | | 945-002333 |
| Capacitor | Electrolytic 100 UF 20V | C6 | 945-022264 |
| Capacitor | Tantalum 5.6 UF 25V | | 946-021452-1 |
| Capacitor | Polystyrene 330 PF 2½% 33V | | 946-013181-331 |
| Coil | Tuning Adj. 600 UH | L1 | 952-018874-5 |
| Diode | Keying | D1, 2 | 919-010873 |
| Diode | | D3, 5-7, 9 | 919-004799 |
| IC | Top Octave Synthesizer | IC1 | 991-018813-1 |
| IC | Top Octave Synthesizer | IC2 | 991-018813-2 |
| IC | Dividers | IC3-6 | 991-021331-2 |
| Potentiometer | 1M Vibrato Adj. | VR1 | 925-004349-4 |
| Resistor | WW 220 Ohm 10% 2W | | 924-010471-221 |
| Socket | IC Pin 14 | | 906-018905 |
| Transistor | Sustain Length Regulator | Q9 | 991-020426-1 |
| Transistor | Vibrato Oscillator | Q1 | 991-008393 |
| Transistor | Master Oscillator | Q2 | 991-018238 |