Rhodes

MAKERS OF FINE KEYBOARD INSTRUMENTS

MARK III EK—10
ELECTRONIC KEYBOARD

PRELIMINARY ELECTRONICS SERVICE MANUAL

MANUAL NO. 240122

The RHODES EK-10 is actually an extension of the standard RHODES piano.

Figure 1. There are six ribbon cables which carry the signals from each separate pickup to the six circuit boards that are mounted on a frame (removed in this photo) above the Tone Bars. These are identical to the pickups and tone bars on a standard RHODES, except for the addition of shields between the pickups. Also shown are the two electronic chassis mounted to the back of the Namerail. The left chassis contains the Filter/Output mixing printed circuit board, the right chassis contains the Tuning/Waveform select printed circuit board (PCB).

Ribbon Cable 1 carries signals from all E's and F's.
Ribbon Cable 2 carries signals from all F#'s and G's.
Ribbon Cable 3 carries signals from all G#'s and A's.
Ribbon Cable 4 carries signals from all A#'s and B's.
Ribbon Cable 5 carries signals from all C's and C#'s.
Ribbon Cable 6 carries signals from all D's and D#'s.

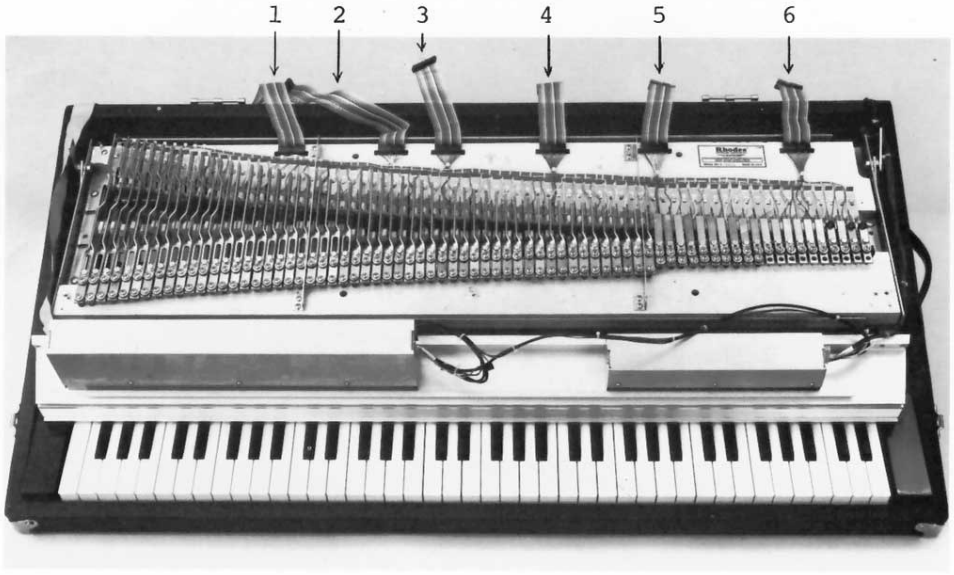


Figure 1. Left and Right Electronic Chassis on Namerail

The six Ribbon Cables shown in Figure 1 are mounted to their appropriate circuit boards by means of Molex plugs. Along the front of the board are mounted six more plugs. These carry signals from a top octave generator located at C (see details at Figure 2). These six circuit boards create DC control voltages from the envelopes of the signal from the pickups (separately for every note), and use the control voltages to control the loudness of the signals from the Top Octave Generator. The resulting envelope controlled electronic waveforms are sent to the Filter/Output Mixing PCB (on the Namerail, left side) on ribbon cable D. This twelve wire cable also supplies ±15 volt power to the six detector/modulator PCB's and carries the unmodified signal from the pickups to the Namerail for the normal RHODES sound.

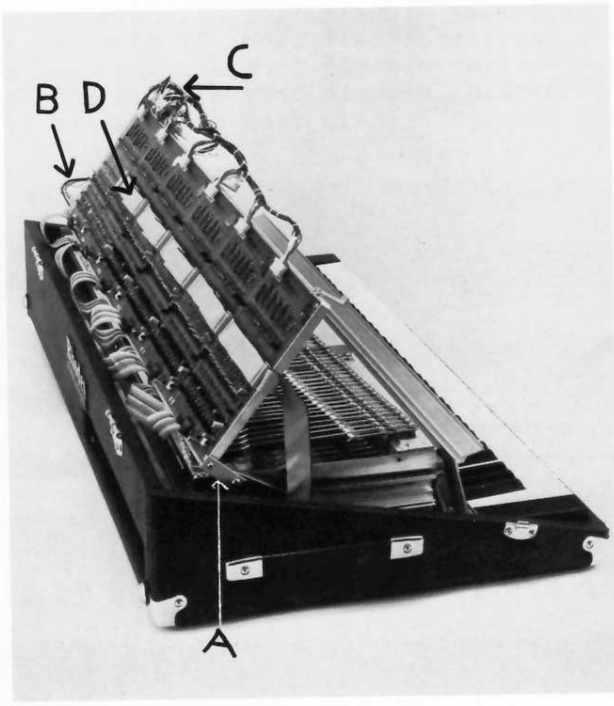


Figure 2. Hinged Tray
Holding Six Circuit Boards Mounted at Points A and B

GENERAL TROUBLE SHOOTING GUIDE

* * *

The following pages describe some of the possible symptoms that may occur, and describes their causes.
They should help locate the circuit board, or assembly, which may be the probable source of a particular problem.
When the area causing the problem has been determined, refer to the following pages of this manual for detailed circuit descriptions.

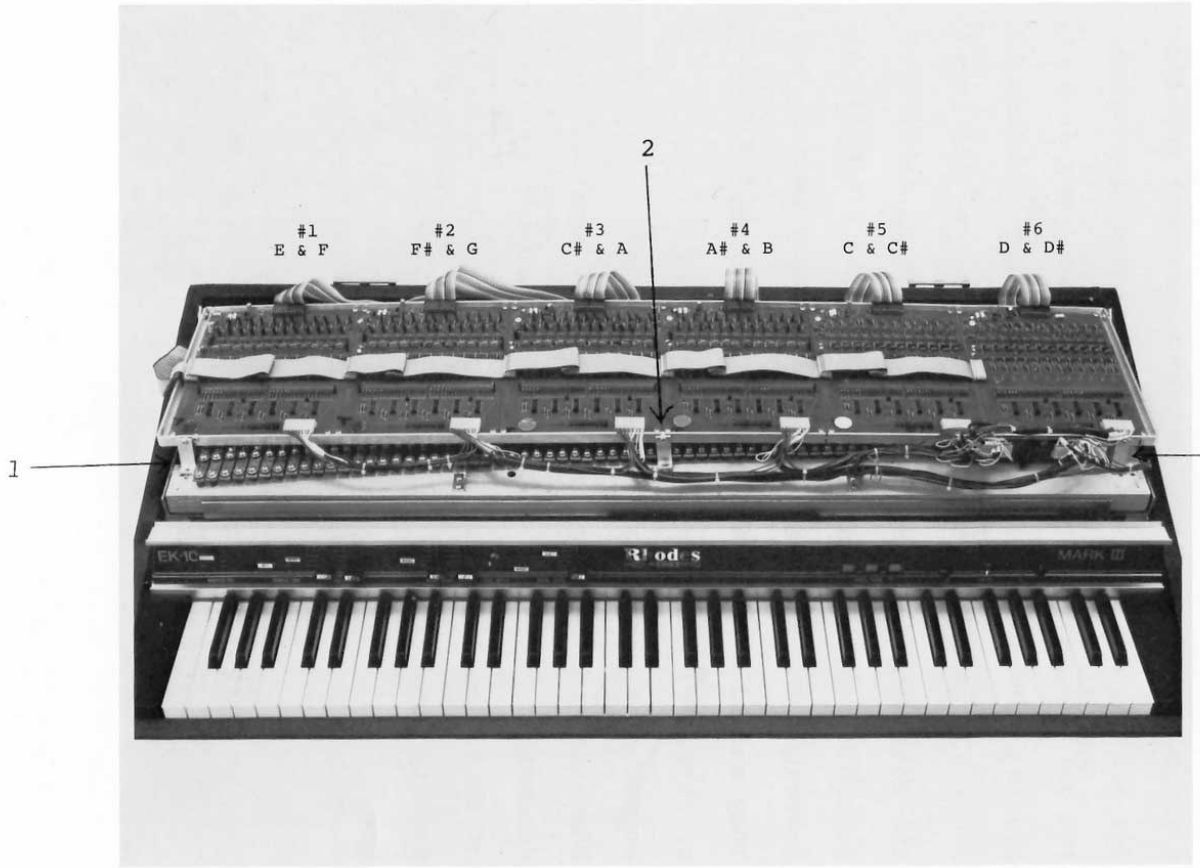


Figure 3. EK-10 Mounted and Ready to Play
with Standoffs 1, 2, & 3 Secured and with Namerail Secured

TROUBLE SHOOTING GUIDE

IF:

ONE NOTE IS COMPLETELY MISSING - (SILENT)

The pickup for that note is open, or the wiring or connector from that note to the detector/modulator board is open. Check the ribbon cable to P1 on the appropriate board, especially.

ONE NOTE IS MISSING ELECTRONIC VOICE, RHODES SIGNAL OK -

The op-amp on the detector/modulator board, or the parts associated with that channel (see detector/modulator circuit description) is bad. The first G below middle C, for example, would be channel 4 on the second detector/modulator board from the left.

ONE NOTE MISSING ONE HARMONIC ON ELECTRONIC VOICES -

Check resistors R101-112, R201-212, R301-312, and dividers U1-U6 on the appropriate detector/modulator board. If the fundamental for the G below middle C was missing, the suspect components would be R304 and U1.

ALL NOTES OF ONE NAME (ALL G's FOR EXAMPLE) MISSING ONE HARMONIC -

Check the divider that creates those harmonics, and make sure it has a clock input from the top octave generator (on Pin 1 of U1-U6), and that Pin 2 of U1-U6 goes low when the appropriate green button on the front panel is pushed. If all the D#'s were missing their 4th harmonic, for example, U1 on the detector/modulator board #6 (on the far right) would be the one to check.

ALL NOTES OF ONE NAME, ELECTRONIC VOICE COMPLETELY MISSING, RHODES SIGNAL FOR THOSE NOTES OK -

The most likely cause is that there is no signal from the top octave generator to the dividers for that note. The top octave generator IC could be bad for just one of is 12 outputs (not too likely), or there might be a short or open in the shielded wire or connectors from the top octave generator circuit board to the detector/modulator circuit board.

ONE ADJACENT PAIR OF NOTES MISSING ELECTRONIC VOICES -

Probably a bad connector at P2 (the long ribbon cable running down the center of the detector/modulator PCB's) on the board for those two notes.

RHODES SIGNAL FOR TWO ADJACENT NOTES MISSING FOR ALL PAIRS EITHER ABOVE OR BELOW KEYBOARD SPLIT POINT, ELECTRONIC VOICES OK -

Check Q4 or Q5 and associated parts, or their connection to the ribbon cable at P2, on the detector/modulator board for those two notes.

ONE NOTE STUCK ON OR LEAKING THROUGH SLIGHTLY -

Check the 'channel' on the detector/modulator PCB for that note, as described in the detailed circuit description.

ALL ELECTRONIC VOICES LEAKING THROUGH SLIGHTLY -

Check the ground wire from the pickup rail (screwed into foil tape at left rear of piano) to the Namerail, (to ground lug at one of the two Namerail mounting screws).

HUM AT A MODERATE LEVEL AT THE OUTPUT, EK-10 OTHERWISE WORKING -

Bad regulator or filter cap on power supply PCB (ripple should be less than 50 mV peak-to-peak) DC supply should be ±14-16 volts.

HUM, MODERATE TO SEVERE ONLY ON RHODES (HUM IS NORMALLY ABOUT EQUAL IN LOUDNESS TO THE NORMAL WHITE NOISE BACKGROUND HISS) -

This problem may be caused by the uninsulated ground wire that zig-zags back and forth on the pickups, if it touches one of the shields AND that particular shield is touching the aluminum arm that the pickup is mounted to. This causes a ground loop. To cure this problem, tilt back the electronic frame, and, one pickup at a time, make sure the zig-zag ground wire is not touching the shield. When and if you find that the hum suddenly stops when you move the wire out of contact with a particular shield, insulate the ground wire at that point to prevent the problem from reoccuring.

The shields are not supposed to be grounded to the support arms, and the clearance is small only on very early EK-10's.

ALL RHODES NOTES MISSING, OR MISSING JUST ABOVE OR BELOW SPLIT, ELECTRONIC VOICES OK -

Check the connection of the ribbon cable to P9 (at the far left side of the Namerail) on the filter/output mixing PCB. Check the connections of the split switch and RHODES main bass level controls to the PCB, and U3 and U5 on the filter/output mixing PCB.

ALL ELECTRONIC VOICES MISSING, RHODES SOUND OK -

This could be caused by:

No master tuning clock from the oscillator on the tuning/ waveform select PCB.

Bad connection from the oscillator to the top octave generator PCB.

Bad top octave generator chip.

No power to top octave generator PCB due to a bad connection in the wire harness.

Jumper from E50 to E51 on the filter output mixing PCB is open. (If this connection is open, there will still be a signal at the volume pedal jack on the rear panel).

A short in the shielded cable from P10, Pin 1 on the filter/output mixing PCB will shut off all electronic voices.

U4B might be bad.

NO OUTPUT AT ALL, ON RHODES OR ELECTRONIC VOICES -

This could be caused by:

No AC power to EK-10. Check to see that AC switch is lighted.

Fuse blown. (To reduce the risk of fire, replace only with same type and rating.)

Bad power supply (transformer, diodes CR1-4, C1, and C2, Q1 and Q2).

Wire harness unplugged from power supply PCB at P2 or transformer unplugged from power supply PCB.

Broken or shorted wiring from filter/output mixing PCB to output jack on rear panel.

Bad IC, U4A on filter output mixing PCB.

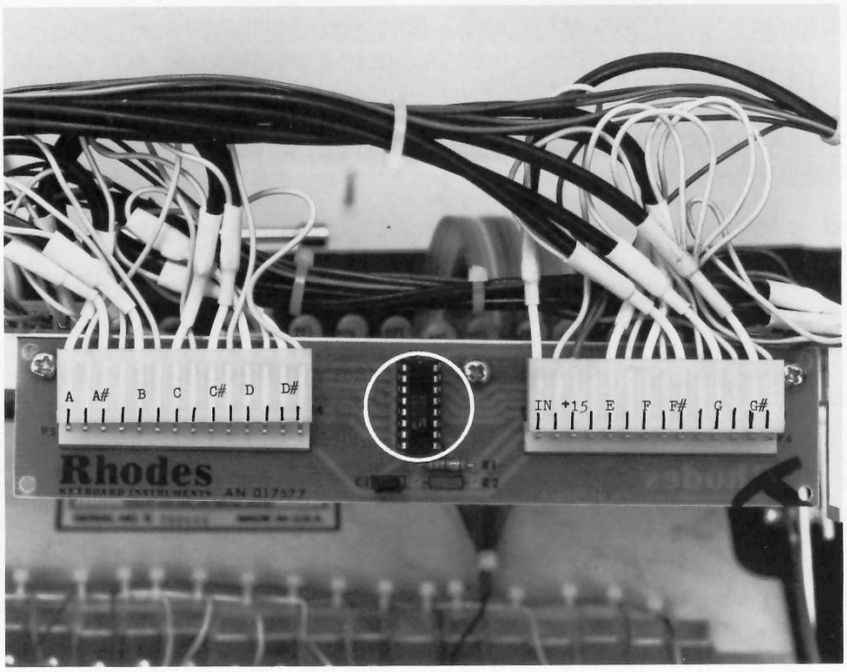


Figure 4. Top Octave Generator

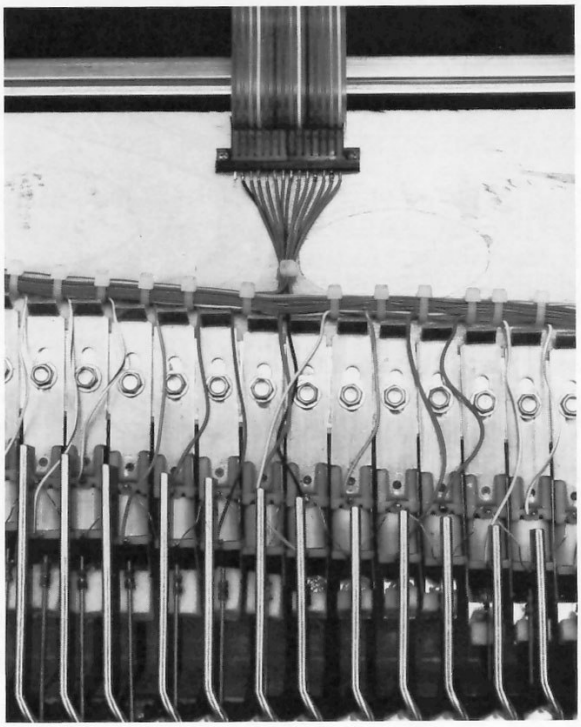


Figure 5. Ribbon Cable Carrying Signals from the Harp
(See Figure 1, Ribbon Cables 1, 2, 3, 4, 5, & 6)

CIRCUIT DESCRIPTION - TOP OCTAVE GENERATOR

In Figure 4 all of the even numbered pins of P4 and P5 are ground (#2, 4, 6, thru 14).

Pin 1 on P4 is the input signal to the Top Octave Generator Chip. This signal is a square wave, alternating between 0 and +14, ±1 volts, at a frequency of less than 1.19 MHz to more than 4.759 Mhz, depending on the tuning controls. When the electronic voices are tuned to the same pitch as the RHODES, this signal will be 2.3795 MHz. The rise and fall time of this square wave must be less than 35 nanoseconds for proper operation of the Top Octave Generator. This signal, ground, and +15V power (on Pin 3 of P4) come from the tuning/waveform select PCB. The ground for the Master Tuning Oscillator, the Top Octave Generator, and all of the divider IC's on the six detector/modulator PCB's (Figure 2) are common, and are kept on a separate return wire to the power supply PCB from the analog signal ground. This prevents crosstalk (from the constantly running oscillators) into the straight RHODES sound. All of the other odd numbered pins on P4 and P5 carry the 12 outputs from the Top Octave Generator to the dividers on the detector/modulator PCB's as labeled on the detail photograph These outpus are also square waves, 0 to +14, ±1V. The outputs are at the following frequencies when the input is 2.3795 MHz:

E	5276 Hz
F	5585 Hz
F#.	5919 Hz
G	6278 Hz
G#.	6647 Hz
A	7040 Hz

A#	7459 Hz
B	7905 Hz
C	8379 Hz
C#	8879 Hz
D	9405 Hz
D#	9956 Hz

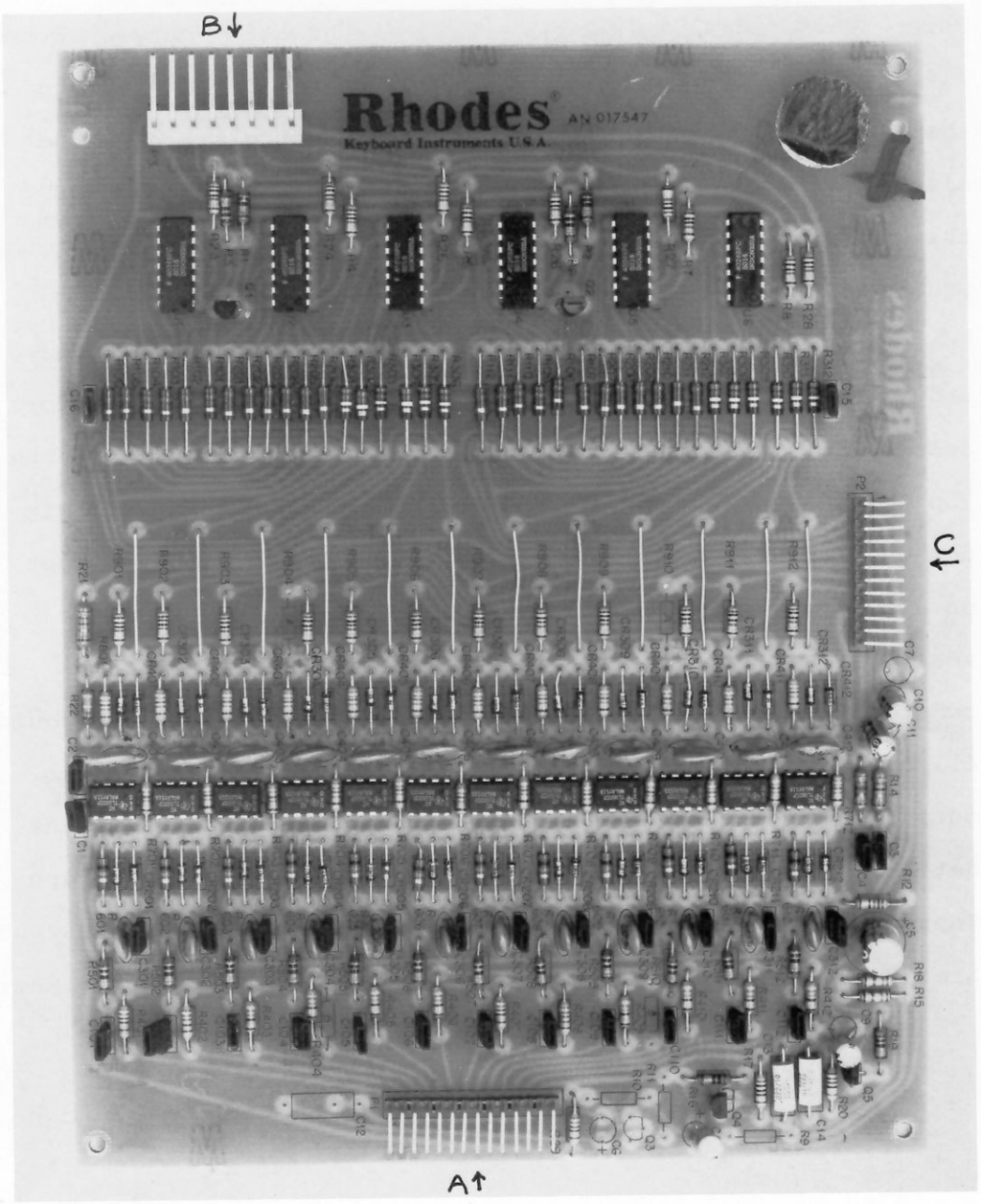


Figure 6. Circuitry Detail

CIRCUIT DESCRIPTION - DETECTOR/MODULATOR PCB

Figure 6 shows a detail of the circuitry on each of the circuit boards shown in Figure 2. Signals from the pickups enter at point A. Signals from the Top Octave Generator enter at point B.

Assuming this to be circuit board 1, then the signals coming in at A will be six E's and six F's.

Each Detector/Modulator PCB is split roughly in half, with the circuits on the left (dividers U4-6 and op-amps u107-112) for the E notes (on board 1) and the circuits on the right (U1-3 and U101-106) for the next higher note (F in this case). Each note from the pickups has an identical circuit channel; and the part numbers on most parts contain the channel number. For example, R901 is R9 on channel 1, R912 is in the same circuit position on channel 12. Parts with short numbers such as C10 or U6, are used outside of the 12 identical channels.

Input signals from the pickups (on connector A, which is P1 on the schematics) are split two ways.

The signal is sent through mixing resistors R401-412 to Q4 or Q5. The amplified signal from Q4 (for notes above the split point) or from Q5 (for notes below the split point) are sent, respectively to Pin 9 and 11 on connector C (labeled P2 on schematic and PCB).

Normal voltage level from a pickup is about 500 millivolts peak-to-peak, depending on how hard the key is struck, and on the pitch, timbre adjustments, and distance of the pickup from the tine.

There is no apparent output on the collectors of Q4 or Q5,

because they are connected directly (through DC blocking caps C10 and C11) to the inverting input of op-amps on the filter output mixing PCB. The DC voltage on the collectors of Q4 and Q5 is about +1 volt, ±0.5 volt.

C13 and C14 prevent radio signals from being amplified and detected by these transistors. They do not affect the treble response for the RHODES signal.

The signal from each of the pickups is also sent to an active rectifier and amplifier formed by half of each dual op-amp U101-112, and diodes CR101-112 and CR201-212. The channels are arranged in order of pitch, high pitches on the right. For circuit board 1 on Figure 6, U101 is the highest "F" note on the piano, U102 is the next to highest, etc., down to U106, which is the lowest "F" on the piano. U107 is the highest "E" note, U112 the lowest.

NOTE: THERE IS AN ERROR ON EARLY COPIES OF THE SCHEMATICS FOR THE DETECTOR/MODULATOR BOARDS. THE PIN NUMBERS FOR THE TWO HALVES OF DUAL OP-AMP U101-U112 WERE REVERSED. THE CORRECT NUMBERING IS:

Pin 1 - To Junction of CR301-312 & CR401-412
Pin 2 - To Junction of R701-712 & R801-812
Pin 3 - To Bias Voltage 'VB'
Pin 4 - To -14V
Pin 5 - To Ground
Pin 6 - To Junction of C201-212 & CR101-112
Pin 7 - To Junction of CR101-112 & CR201-212
Pin 8 - To +14V

When a note is struck, the rectifier creates a DC voltage of -12 volts maximum on C301-312 that corresponds to the loudness of the RHODES tone. The voltage on C301 when the tine is not vibrating should be less than ±10 millivolts. If it is not, the note for that channel may play continuously. If the

voltage is >10 mV C101-112 could be leaky, U101-112 might have excessive offset voltage, or contamination on the surface of the PCB may be allowing current to flow from power supply traces to the sensitive inverting input (Pin 6 of the op-amp). If replacing parts does not cure the offset, wash the board on both sides with hot water and dry thoroughly. It may be necessary to use distilled water if the tap water in your area contains a lot of minerals.

This DC control voltage is sent through R701-712 to the other half of the dual op-amp, where it controls the peak-to-peak amplitude of square waves coming from dividers U1-U6. When all the dividers are turned off (push button on right side of Namerail all black) the output from the modulator (junction of CR401-412 and R901-912) is just the inverse of the voltage on C301-312, so, if voltage on C301 is -6.0 volts, the voltage on the junction of CR401 and R901 should be +6.0 ±0.2 volts. When the dividers are turned on, their outputs force the output of the modulator back down to, but not below (because of diodes CR301-312 and CR401-412) ground. Thus, a signal with a peak-to-peak voltage equal to the DC voltage on C301-312, appears at the junction of CR401-412 and R901-912. These amplitude modulated square waves are combined by pairs onto six lines on the center ribbon cable. Pin 3 carries the signal from the twelve highest notes on the piano (E to D#, no electronics on the highest E). Pin 4, the next highest octave, etc., down to Pin 8, which is the line that carries the signal from the lowest twelve notes on the piano to the filter circuits on the Namerail.

There are not visible signals on these lines; they are connected directly to the inverting inputs of the op-amps on the filter/output mixing PCB, and are therefore at virtual ground.

When the tine is not vibrating but the dividers are on (DC voltage on C301-312 less than ±10 mV), there should be no signal (OVDC and OVAC) at the junction of CR301-312 and R901-912. If there is a signal leaking through, diodes CR301-312 or CR401-412 could be leaky, C401-412 might be open (NOTE: this capacitor has been changed to 47pf - early schematics show 22pf), the op-amp could have excessive offset, or the surface of the circuit board could be contaminated (wash as noted above if necessary). To check the offset of this half of the dual op-amp measure the voltage on Pins 2 and 3. Pin 3 is hooked to a small negative bias voltage (-8 mV) and Pin 2 must be -8 ±6 mV (-2 to -14 mV). Normal leakage signal is less than 200 micro-volts peak-to-peak (about 50μV RMS). Each channel is supplied with three square waves from the dividers U1-U6. Each square wave of the three that are sent to a channel comes from a different counter. For the E notes the fundamental comes from U6, the second harmonic from U5, and the fourth harmonic from U4. For the right half of the board (F notes in this case) the fundamentals are created by U3, the second harmonics by U2, and the fourth harmonics by U1.

These dividers are turned on or off by CMOS logic levels applied to Pin 2 on each divider. A high level (+14V) turns the divider off and sets all outputs at ground. A low level on this pin (<1V) allows the dividers to run. Q1 and Q2 clamp the dividers input to ground on U1 and U4 when the fourth harmonic is turned off. These input signals are

used as the fourth harmonics for the highest octave.
These on/off controls come from the green switches on the right side of the Namerail. Each button corresponds to one harmonic and controls all U6 and U3, or U5 and U2, or U4 and U1. However, when any one of these buttons is pushed, all of the counters on all six detector/modulator boards are momentarily shut off by a positive pulse from a one shot IC on the tuning waveform select PCB (about 10 milliseconds long). This synchronizes all the counters, by allowing all of them to restart at the instant the pulse ends.

CIRCUIT DESCRIPTION - FILTER/OUTPUT MIXING PCB

The Filter/Output Mixing circuit (Figure 1) on the left side of the Namerail is where all of the outputs from the detector/modulator PCB's are combined.
Problems in this area will generally result in a malfunction that affects many notes. Likely symptoms include:

One octave of one electronic voice bad.
All notes of one electronic voice bad.
All notes of one voice bad only above or below split.
RHODES not working, electronic voices OK.
Filter not working, for one electronic voice.
Electronic voice working, RHODES not, etc.

If the problem affects all notes of the same name (all A's or all C#'s for example), the problem is probably on the detector/modulator board for those notes, on the top octave generator board, in the wire harness, or in one of the connectors, not on the Filter/Output PCB.
The only unusual circuits in the Filter/Output Mixing PCB are the low pass filters for the electronic voices.

There are six identically arranged circuits, one for each octave (E to D#). Each circuit has two signal paths, one for each electronic voice, Elec 1 and Elec2.

As onthe detector/modulator PCB's, component part numbers include the circuit number. Parts for the filter for the highest octave end in 01, for the lowest, 06. In the following paragraph, X will stand for 1-6.

The signals from the detector/modulator PCB's are mixed by U10XB. R10X does not affect the gain of this stage, it is for RF suppression. The output from U10XB is split two ways, one path is through the filter for the voice labeled Elec 1 on the Namerail, the other path is through the filter for the voice labeled Elec 2.

Both filters are adjustable two-pole low pass filters, with fixed high pass cutoffs, but the filter for Elec 2 has higher cutoff frequencies.

The low pass cutoff frequency of these filters is controlled by varying the duty cycle of a high frequency gating signal applied to analog switches in series with R40X, R60X, R120X, and R130X. When the duty cycle of the pulse applied to point A on the schematic (Pins 5 and 13 of U20X) is 10%, the effective value of R40X and R60X is ten times the actual value of those resistors, and when the duty cycle is 2%, their effective value is fifty times their actual value. Switches are on when the voltage at point A or B is high, open if the voltage is low.

The duty cycle can be controlled from approximately 2% to 100%. The analog switches (U20X) will only handle signals from 0 to +15 volts, so the average level of the signal after

C20X and C60X is raised to +7.5 volts by bias resistors R30X and R100X. This DC offset is removed at the output of U30X, A and B by C50X and C90X. Everywhere else on this PCB the audio signal is centered on ground.

The duty cycle of the pulse is controlled by varying the on time of the two halves of dual one shot U6A and B. Q5 and Q6 are variable current sources to the timing capacitors for the one shots. The Elec 1 filter control varies the DC control voltage for Q5, Elec 2 filter control varies the DC control voltage for Q6. The one shots are triggered by a clock signal from the tuning oscillator. The tuning signal (approximately 1-5 MHz) is the same as the signal sent to the Top Octave Generator. U7 divides the frequency of this signal by 64, yielding a clock rate that is about 38 KHz at the center of the tuning range.

This method of filter cutoff control results in good tracking of the six filters since the relative differences in their rolloff points are set by fixed components (1% resistors and 10% capacitors), and the same (variable) duty cycle is applied to all the filters. The filters also automatically track the tuning control - when the pitch is raised, the cutoff frequency at the filters also is raised a proportional amount. The twelve outputs from the six filters are combined in U1A and B, and U2A and B. These op-amps also provide additional fixed low-pass filtering.

U3A and B are the summing amp/low-pass filters for the straight RHODES sound.

When the keyboard is split (by S1A-D), signals pass through both the A and B sections of dual op-amps U1-3, when the

keyboard is normal, only U1a, U2A, and U3B are used.
The remainder of the circuits are normal amplifier and mixing stages. The point labeled "Volume Pedal" on the schematic goes to a ¼" phone jack on the real panel. A variable resistor to ground at this point (0-25KΩ) provides level control of both electronic voices, without affecting the normal RHODES sound. There is normally a jumper wire (with connectors) between E50 and E51. If this jumper is removed, the electronic voices will not be mixed with the normal RHODES sound at the output. The Volume Pedal Jack can then be used as an output for the electronic voices, allowing separate amplification of the normal RHODES sound and the electronic voices. However, the Master Volume will not affect the level of the signal at the Volume Pedal Jack. Alternatively, E50 can be connected to E52. This will pass the electronic voices through the RHODES tone (bass and treble) control circuits, so that those controls will also affect the electronic sounds.
Connections are the most likely cause for any malfunction in the Filter/Mixing PCB. There are connectors from the slide pots and split switch to the points labeled E1 - E52 on the PCB. These are push-on connectors, crimped to wires. If they become loose, the receptacle on the wire from the control can be slightly squeezed shut to make it a tighter fit on the pin soldered to the circuit board.
Note that normal operation requires the clock signal from the tuning/waveform select PCB. If the clock is not present, the analog switches (U20X) will never be turned on, and no signal will pass through the filters.

Below is a list of the controls:

R3 - Elec 1 Main Level
R5 - Elec 2 Main Level
R8 - RHODES Main Level
R11 - Elec 1 Bass Level
R13 - Elec 2 Bass Level
R16 - RHODES Bass Level
R31 - RHODES Tone - Bass
R34 - RHODES Tone - Treble
R42 - Filter Elec 1
R46 - Filter Elec 2
R47 - Master Volume

CIRCUIT DESCRIPTION - TUNING/WAVEFORM SELECT PCB

The Tuning Waveform Select circuit (see Figure 1) generates the high frequency master tuning clock (approximately 1-5 MHz), and sends on/off control signals to the divider IC's on the detector/modulator PCB's. The oscillator is an emitter coupled multivibrator formed by two transistors of the five transistor array U1 (Pin 1-5). Two additional transistors of this array, connected as diodes (Pins 6, 7, 8, 9, 10, & 11 of U1) compensate the bias point of the oscillator pair for changes in temperature. The last transistor in the array (Pins 12, 13, & 14) isolates and amplifies the small square wave (2.5V peak-to-peak) from the collector of the oscillator transistors (Pin 5).

The frequency of oscillation is controlled by C1 and C2 and by the resistance of potentiometer R1 or R2 (tuning controls A and B). There are locations on the board for resistors in parallel with R28 and R29 (label 28B and 29B). These are selected at the factory to control the maximum frequency of the oscillators when the tuning controls are turned full clockwise. Normal maximum is between 4.85 and 5.15 MHz. C1

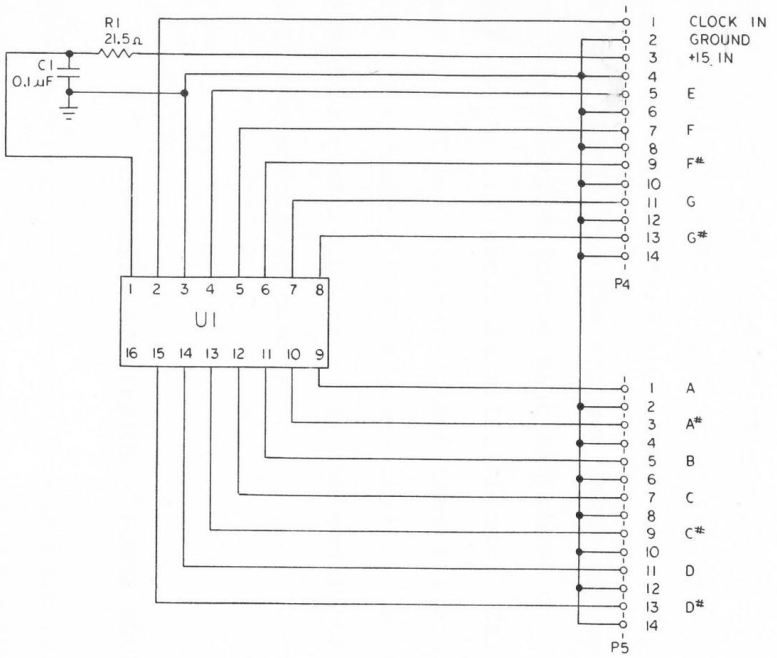
and C2 are 470pf NPO type (very low temperature coefficient). The signal at the output of U1 pin 14 is amplified from about 4V peak-to-peak to 15V peak-to-peak (0 to +15), by Q1-Q3. These transistors are high speed switching types, and the rise and fall time at the junction of the collectors of Q2 and Q3 should be less than 20 nanoseconds (30 ns maximum). The oscillator runs on +5 volts, regulated by zener diode CR5.

S1 switches between tuning control A and B and switches SW2-4 send control signals to the dividers on the detector/modulator boards. When switches SW2-4 are pushed in (switch from black to green) the control voltage goes low, but first a momentary pulse is coupled from the switch through C9, C10, or C11, and diodes CR6-11, to the trigger input of one shot U2. The output of the one shot forces high all three control lines (Pins 6, 7, & 8 of P8) for about 10 milliseconds. This momentarily shuts off all of the dividers, then they all restart in phase when the pulse ends. This ensures that the signals from all dividers combine properly at the modulator op-amps on the detector/modulator boards.

CIRCUIT DESCRIPTION - POWER SUPPLY PCB

The power supply is mounted to the rear panel on the back of the piano. It supplies regulated ±15 volts DC to all the circuits in the EK-10. The total current supplied is approximately 450mA for the +15V, 350mA for the -15V. Input voltage to the two regulator IC's (Q1 and Q2) is approximately ±22 volts DC.

The same transformer is used for three different nominal line voltages. The 100V connection will work from 75 to 115 volts AC, the 120V from 90 to 130 volts AC, and the 240V connection works from 180 to 260 volts AC, at 50 or 60 Hz in all cases. The circuit board locations for an auxillary supply (CR5-8 and C3) are not used on the EK-10.



1. U1 IS MO83 OR AY-3-0215 TOP OCTAVE GENERATOR, SELECTED TO OPERATE AT 4.8 MHz.

NOTES: UNLESS OTHERWISE SPECIFIED

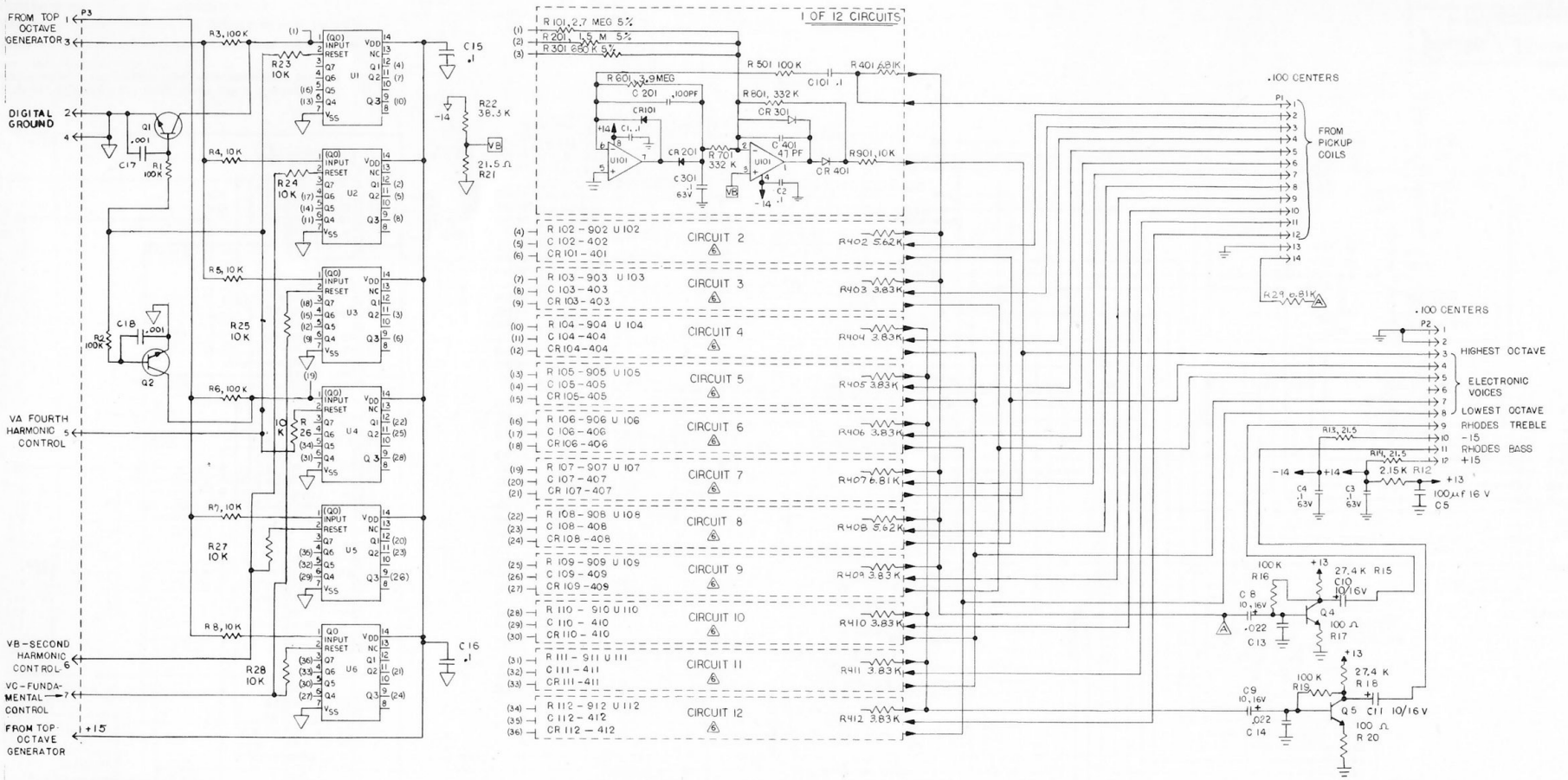
Fender® / ROGERS® / Rhodes®

CBS MUSICAL INSTRUMENTS — A DIVISION OF CBS, INC.
FULLERTON, CALIFORNIA 92631

PART NAME

SCHEMATIC, TOP OCTAVE GENERATOR

RELEASE	SIZE	PART NO. 017703	REV
SCALE ———	MODEL NO. EK-10		



7 NUMBERS SHOWN IN PARENTHESIS SHOW INTERCONNECTIONS BETWEEN U1-6 AND CIRCUITS 1-12.

6 CIRCUITS 1-12 ARE IDENTICAL EXCEPT FOR THE REFERENCE DESIGNATORS WHICH FOLLOWING THE LETTER DESIGNATION ARE SUFIXED W/ THEIR CIRCUIT NO.

5 Q1 & Q2 ARE 2N4401, Q3-5 ARE 2N6429 A

4 U1-U6 ARE CD4024, U101-U1201 ARE LF 353 OR TL082

3 ALL DIODES ARE IN4148.

2 ALL CAPACITORS ARE IN MICROFARADS.

1 ALL RESISTORS ARE 1/4W, 1%.

NOTES: UNLESS OTHERWISE SPECIFIED

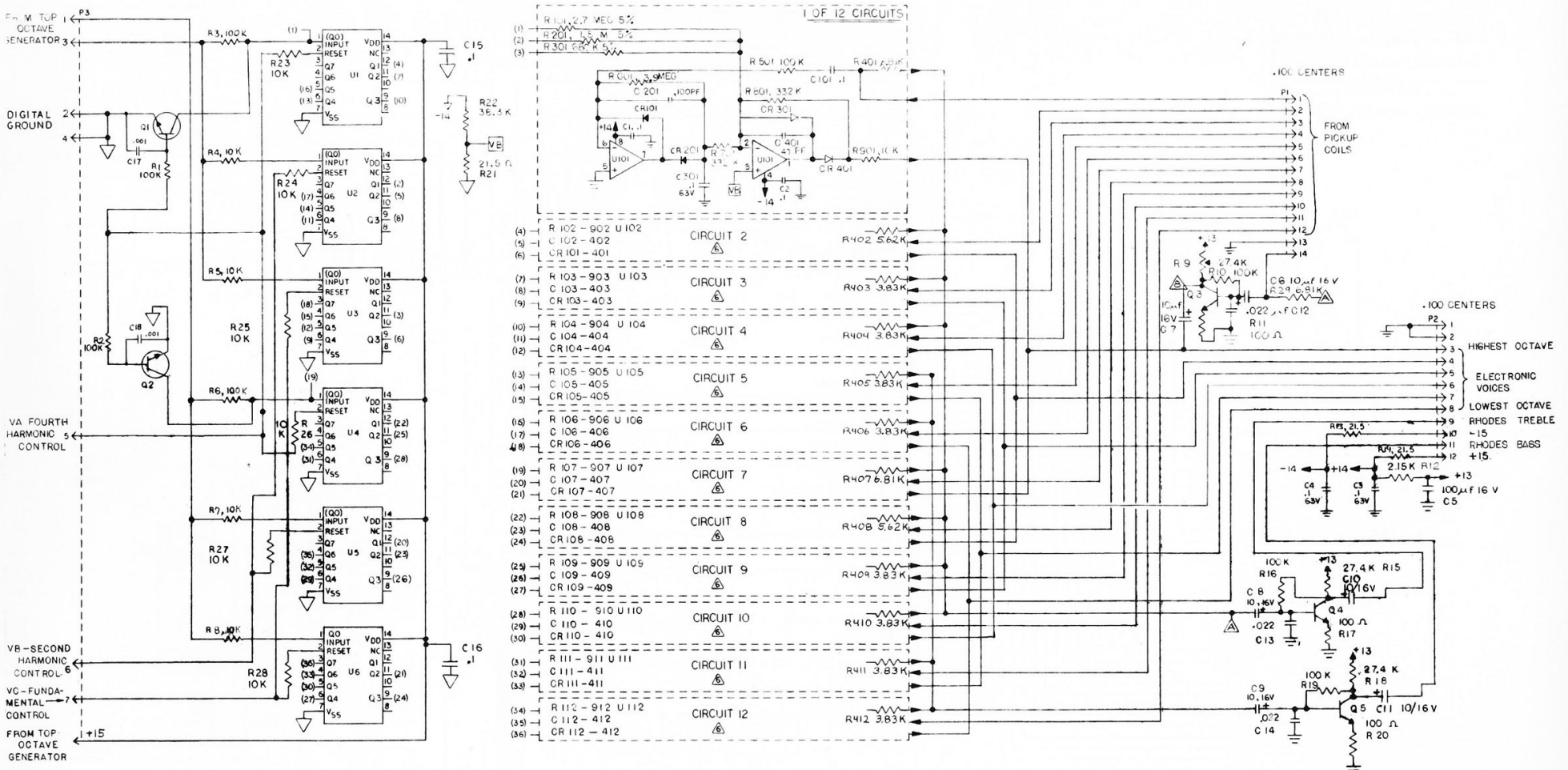
Fender® / ROGERS® / Rhodes®

CBS MUSICAL INSTRUMENTS — A DIVISION OF CBS, INC. FULLERTON, CALIFORNIA 92631

PART NAME

SCHEMATIC - DETECTOR / MODULATORS BELOW SPLIT

RELEASE	SIZE	PART NO.	REV
	D	018070	3
SCALE	MODEL NO.	EK-10	



-24-

Q3,R9-11, &C6,7,12 ARE USED ONLY ON DD BOARD
NUMBERS SHOWN IN PARENTHESIS SHOW INTERCONNECTIONS BETWEEN U1-6 AND CIRCUITS 1-12.

CIRCUITS 1-12 ARE IDENTICAL EXCEPT FOR THE REFERENCE DESIGNATORS WHICH FOLLOWING THE LETTER DESIGNATION ARE SUFIXED W/ THEIR CIRCUIT NO.

5 Q1 & Q2 ARE 2N4401, Q3-5 ARE 2N6429A

4 U1-U6 ARE CD4024, U101-U1201 ARE LF353 OR TL082

3 ALL DIODES ARE IN4148.

2 ALL CAPACITORS ARE IN MICROFARADS.

1 ALL RESISTORS ARE 1/4W, 1%.

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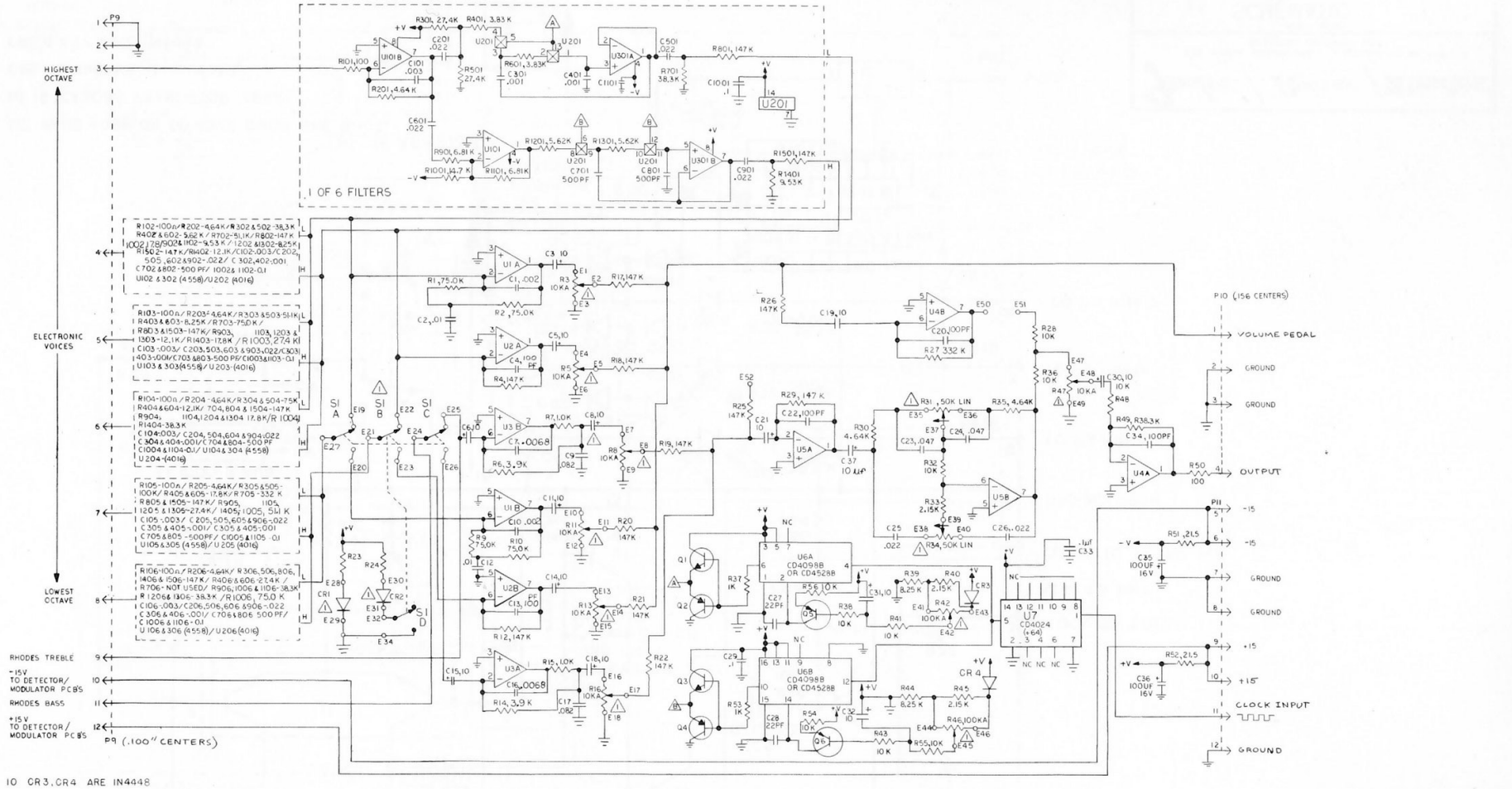
PART NAME
SCHEMATIC - DETECTOR/MODULATORS ABOVE SPLIT

RELEASE	SIZE	PART NO.
		017545
SCALE	MODEL NO.	EK-10



10 CR3, CR4 ARE IN4448

9 U101-106, 301 -306, U1-U6 ARE RC4558

8 U201-206 ARE CD4016.

7 Q2, Q4 Q5 & Q6 ARE 2N4403

6 Q1 & Q3 ARE 2N4401.

5 CR1, CR2 ARE RED LED

4 THREE DIGIT CAPACITORS PREFIXED xx02-xx06 HAVE THE SAME VALUE AS THE THREE DIGIT CAPACITORS PREFIXED xx01.

3 ALL CAPACITORS ARE IN MICROFARADS.

2 ALL RESISTORS ARE IN OHMS, 1/4W, 1%.

1 MOUNTED ON FRONT PANEL

☒ RHODES R & D ENG. BEFORE STARTING PRODUCTION

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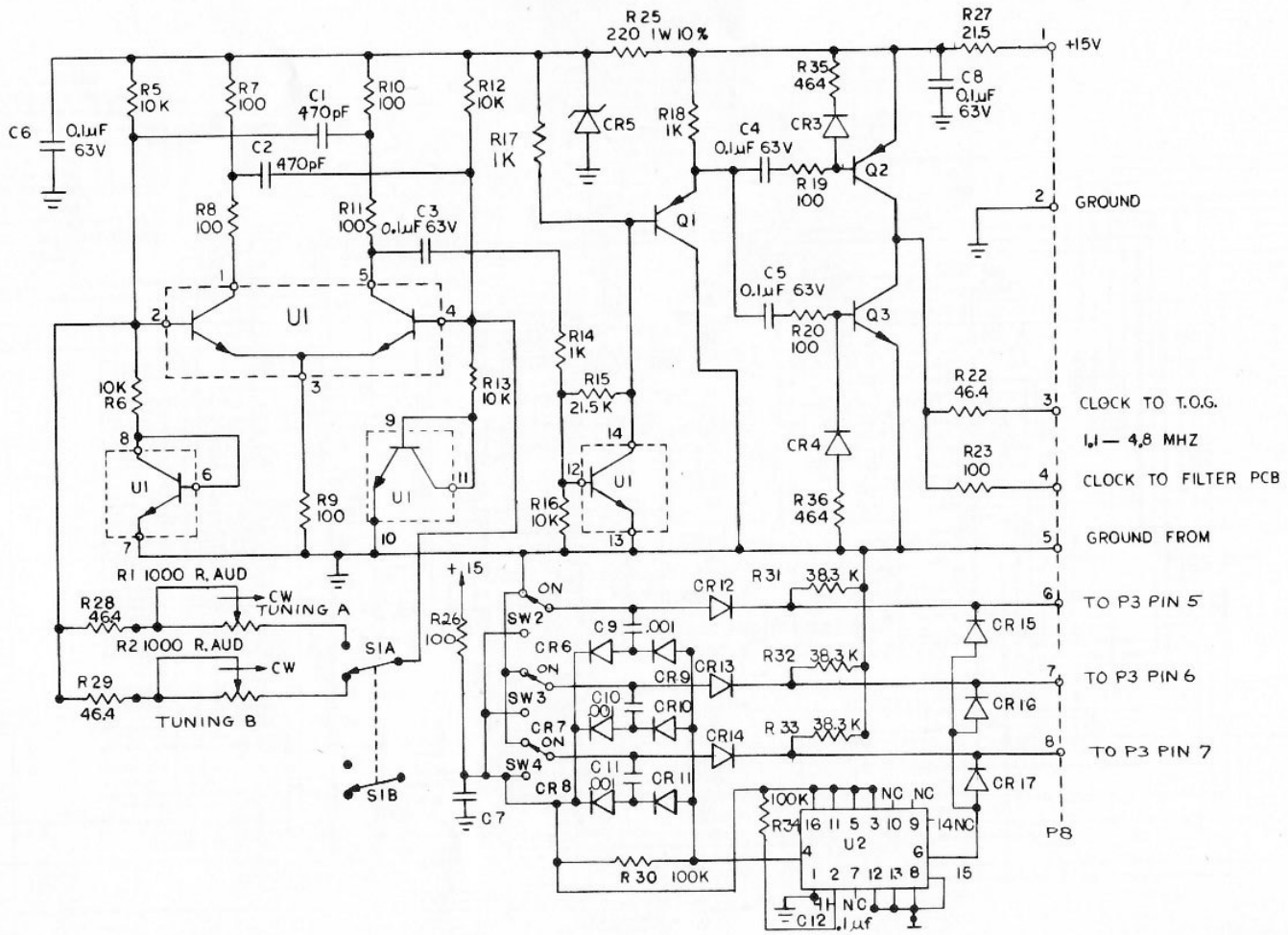
PART NAME

SCHEMATIC –
OUTPUT MIXING FILTER, EK10

RELEASE	SIZE	PART NO.	REV
	D	017643	7
SCALE —	MODEL NO.	EK-10	



8 U2 IS CD 4098 OR CD 4528 CMOS ONE SHOT.

7 U1 IS CA3086 TRANSISTOR ARRAY.

6 CR5 IS IN5231B 5.1 V ZENER.

5 CR3;4,6-17 ARE IN4448

4

3. Q1,2 ARE 2N4403, Q3 IS 2N4401.

2. ALL RESISTORS ARE OHMS, ±1%.

⚠ MOUNTED ON NAMERAIL.

NOTES: UNLESS OTHERWISE SPECIFIED

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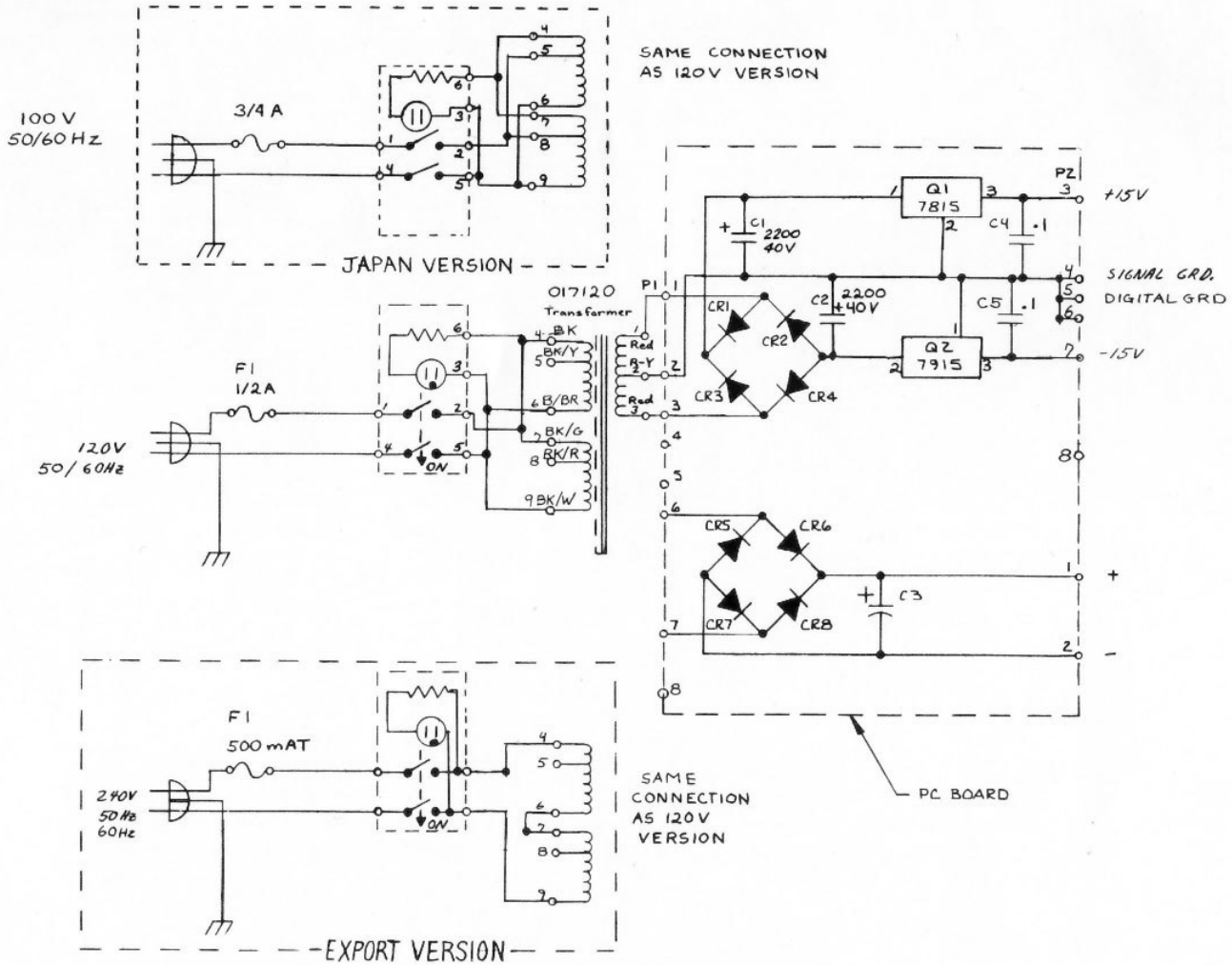
PART NAME
SCHEMATIC
TUNING WAVEFORM SELECT

RELEASE	SIZE	PART NO.	REV
		017625	
SCALE ~NONE~	MODEL NO.	EK-10	



3. ALL DIODES ARE 3A, 100V.
2. ALL CAPACITANCE IN MICROFARADS
1. ALL RESISTORS ARE 1/2 WATT, VALUES IN OHMS ±10%

NOTES: UNLESS OTHERWISE SPECIFIED

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PART NAME
SCHEMATIC DIAGRAM
POWER SUPPLY

RELEASE	SIZE	PART NO.	REV
		017610	
SCALE	MODEL NO.	EK-10	