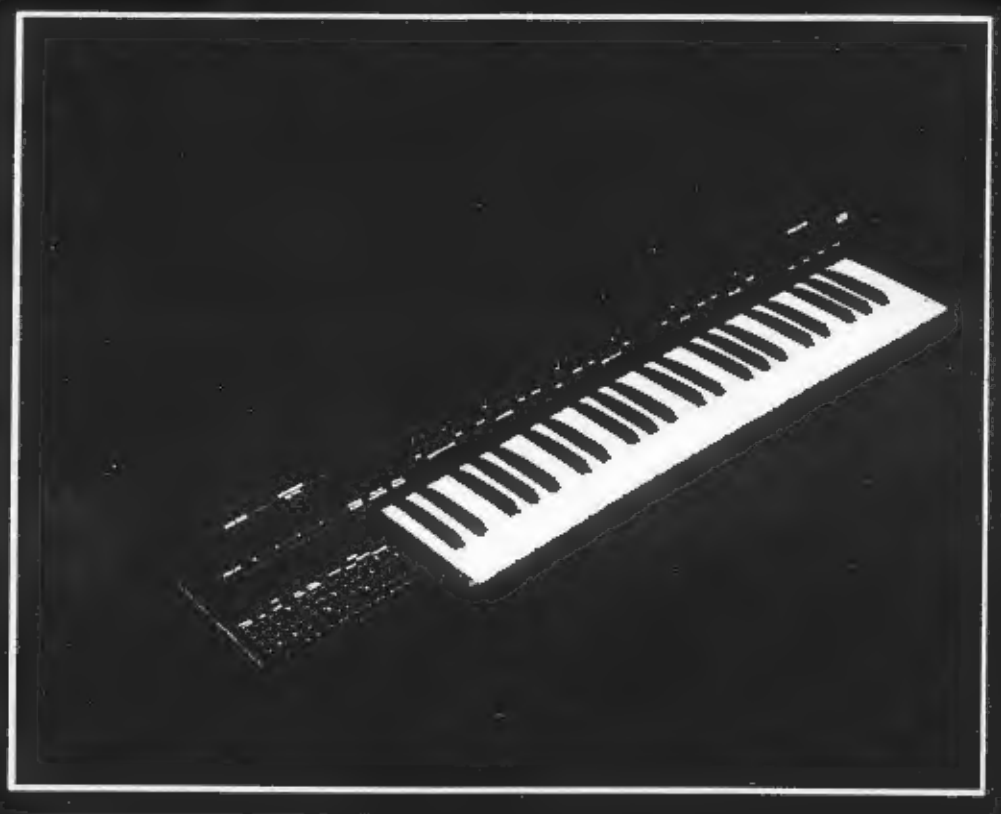
ARP OMNI-2



SERVICE MANUAL

MODELS 2471, 2472, 2473, & 2475

ARP INSTRUMENTS, INC.
45 Hartwell Avenue
Lexington, MA 02173
(617) 861-6000

Document Number 90026

CONTENTS

1.1 Product Description

The ARP OMNI-2 offers the unique combination of polyphonic tone sources and the versatility of synthesizer sound modification. Separate string and synthesizer sections allow orchestral and symphonic sounds simultaneously. The total variability of the synthesizer section permits such sounds as brass, piano, and clavinet without single note limitations.

The string, bass and synthesizer sections have separate outputs located on the rear panel. ARP's now-famous systems interface applies to this product as well. The OMNI-2 can accept external effects or output its own signals to other instruments. The computer-grade switching mechanisms are fast and reliable.

1.2 Specifications

I. Controls

A. String Section
1. Instrument Selection Switches
a. Violin (4')
b. Viola (8')
c. Cello (8')
d. Bass (16')
2. String Envelope Controls
a. Attack Time
b. Release Time

B. Synthesizer Section
1. Synthesizer Waveform Switches
a. 4' and 8'
2. Single Trigger Switch
3. Voltage Controlled Filter
a. VCF Freq
b. Resonance
c. ADSR depth
d. LFO depth
e. Pedal & Acc. depth
4. LFO Speed Slider
5. Synthesizer Waveforms
a. Sawtooth
b. Dynamic Pulse
6. ADSR
a. Attack Time
b. Decay Time
c. Sustain Level
d. Release Time

C. Bass Voices
1. 8' and 16' (monophonic)
2. Staccato

D. General Controls
1. Master Volume
2. Bass Volume
3. String/Synthesizer Mix
4. Hollow Waveform Switch
5. Chorus Phaser Switch

II. Outputs

A. Main Outputs (switchable, high or low)
1. High Level XLR 100 ohms, 1VPP D.C. coupled
2. Low Level ¼" phone, 720 ohms, 200mVPP D.C. coupled

B. Synthesizer, Strings, Bass
1. High Level ¼" phone, 600ohms D.C. coupled 2VPP

→ Can be used simultaneously for discreet stereo effects.

C. Systems Interface
1. Upper Gate Output: Tini D Jack; 0, +10V
2. Trigger Output: Tini D Jack; 0, +10V pulse, 2 microsec. duration
3. Lower Gate Output: Tini D Jack; 0, +10V
4. VCF CV Input: Tini D Jack; 10V max. input

III. Miscellaneous

A. Keyboard
1. Four octave keyboard, split for bass voices at one and a half octaves from low end

B. Pedals
1. Filter control pedal for foot control of filter brightness
2. Volume control of all outputs (except bass)

C. Sustain Switch
1. Foot Switch works like sustain pedal on piano

D. Materials
1. Steel chassis
2. Leather endblocks
3. Glass-epoxy circuit boards
4. Industrial-grade electronic components and controls

E. Weight: 39½ pounds

The OMNI -2's tone generator circuitry consists of a master oscillator at 500 kHz., which drives a large scale integrated circuit top octave divider. The top octave divider produces the highest twelve tones in the instrument. Frequency dividers derive the remaining pitches from the top octave divider. The squarewave outputs of each divider are waveshaped to a sawtooth form (the waveform enhancement alters the waveshape to a differentiated squarewave).

The tones from the waveform generator are fed to transistor gating arrays which route the signal to the string section and the synthesizer section. The transistor gating arrays are 'keyed' on by an RC circuit connected to each key. The release time of each key (how long the note remains after a key release) is determined by the release capacitor on each gating input.

The outputs of all the gating arrays are summed and routed to the string section and the synthesizer section.

The String Section consists of three parallel phase shifters which modulate the sawtooth waveforms from the gating circuits. The phaser outputs are processed through a Voltage Controlled Amplifier to control the attack characteristics. (The release is controlled by the release capacitor on each gating circuit).

The Synthesizer Section processes the gate outputs of the arrays through a Voltage Controlled Filter and Voltage Controlled Amplifier, both of which are controlled by an ADSR Envelope Generator. The synthesizer output can be routed through the string section phasers when the Chorus Phaser Switch is selected. The speed of the phasers is reduced when the Chorus Phaser is selected. The outputs of the string section and the synthesizer section are summed together in the Mix Circuitry and routed to the output of the instrument. Separate outputs are provided for stereo effects.

The Bass Voice Section and the String Bass and Cello Voices derive their frequencies from the 8' pitches that come from the frequency dividers (before the waveshaping circuit). These square wave tones will represent the first 20 notes on the keyboard and are separately processed through a monophonic low note priority bass circuit. Once an 8' pitch has been selected, it is divided again to provide a 16' pitch.

The String Bass and Cello single note pitches (8' and 16') are processed through the phaser and are mixed with the String Voices at the String VCA.

The Bass Voice single note pitches (8' and 16') are processed through their own preset synthesizer and envelope section to provide a distinctive sound different than the String Bass Voices. Furthermore, their preset dynamics can be altered by the Staccato Bass Voice Switch. Its output can be taken directly at the Bass Output Jack; otherwise it is mixed at the Main Output.

The amplitude of the String Bass Voices and the Bass Voices (8' and 16') are controlled by the Bass Volume Slider.

The Synthesizer Section can be selected (via single trigger switch) to be triggered only on the first key depression. This will allow the strings to be played without retriggering the Synthesizer Envelope Generator.

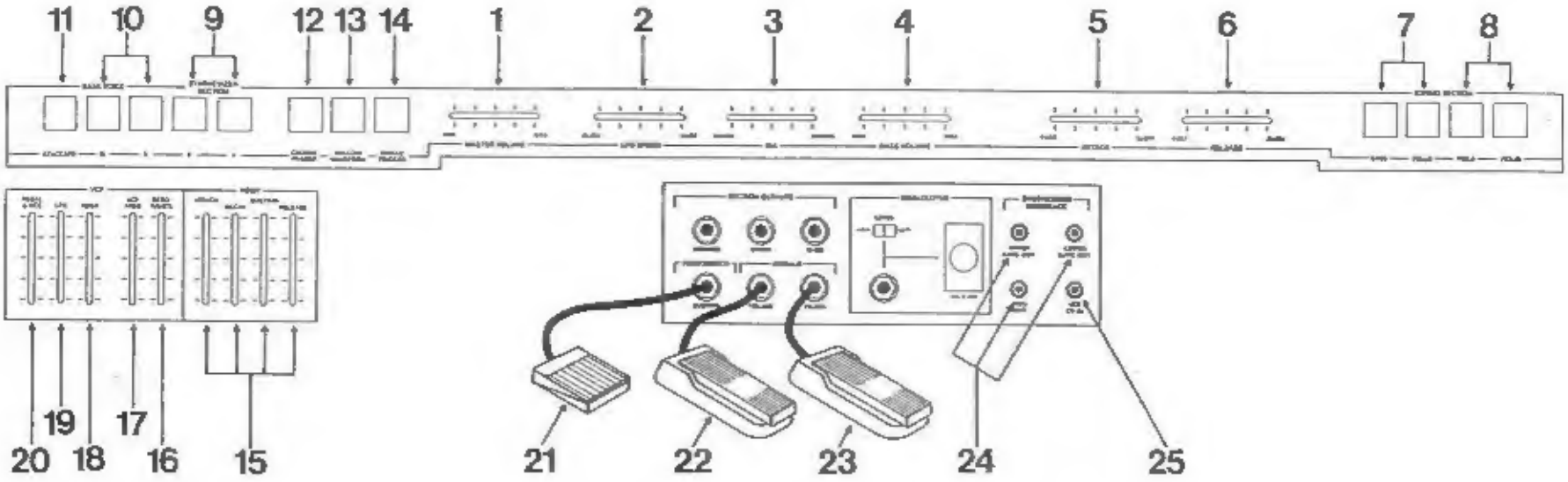
3.1 Upper Voicing Board

GENERAL: The Upper Voicing Board contains the Master Oscillator, Top Octave Divider I.C., Frequency Dividers, Wave Shaping for tones C7 through C4, Keying Circuits for keys 21 through 49 and six of the ten Gate Circuit I.C.'s. The remaining Wave Shaping, Keying Circuits and Gate I.C.'s are located on the Lower Voicing Board. (Note: There are two schematics for this board.)

3.1.1 MASTER OSCILLATOR AND TOP OCTAVE DIVIDER

(Refer to Upper Voicing Schematic, sheet 1 of 2.)

L1 and Q1 produce a 0 to -15 volt sine wave at approximately 500kHz. The frequency of the oscillator can be varied by adjusting the core of the coil (externally accessible). Z1 buffers and squares the waveform from the Master Oscillator and supplies it to the Top Octave Divider, Z2. Z2 is a LSI (Large Scale Integrated Circuit) divider which produces the



1 *MASTER VOLUME:* Determines the overall volume of the mixed output.

2 *LFO SPEED:* Varies the frequency of the Low Frequency Oscillator.

3 *MIX CONTROL:* Determines the balance of the string voices and the synthesizer voices.

4 *BASS VOLUME:* Determines volume for synthesizer bass voice and string bass and cello.

5 *ATTACK:* Determines attack of string section.

6 *RELEASE:* Determines the final release time of the string section (also affects synthesizer release time).

7 *BASS and CELLO:* Selects bass string pitch ranges (low note priority, lowest octave and a half only).

8 *VIOLIN and VIOLA:* Selects pitch range of upper strings.

9 *SYNTHESIZER 8', 4':* Selects the synthesizer sections's pitch range.

10 *BASS VOICE 8', 16':* Selects the bass voice pitch range and disables the synthesizer 8' and 4' voices in the bass range. If upper keys are played with bass, synthesizer will sound in bass range.

11 *STACCATO:* 8' and 16' bass have preset envelope and filter characteristics. This switch provides a shorter bass decay.

12 *CHORUS PHASER:* Routes the synthesizer output through the string section's phase shifters and reduces the phase shifter's speed. (When this switch has been depressed, the synthesizer output appears on the string output as well.)

13 *HOLLOW WAVEFORM:* Alters waveforms produced by the OMNI-2 to a hollow-like (square) sound.

14 *SINGLE TRIGGER:* Allows synthesizer to be triggered only on first key depression.

15 *ADSR ENVELOPE GENERATOR:* Determines the attack and decay sound characteristics of the synthesizer section.

16 *VCF FREQ:* Sets the initial frequency cutoff point of the Voltage Controlled Filter.

17 *RESONANCE:* Sets degree of VCF resonance ("wow" effect).

18 *ADSR into VCF:* Determines brightness of the synthesizer section.

19 *LFO into VCF:* Determines depth of tremolo.

20 *PEDAL & ACC into VCF:* Determines range of external pedal or accessory input.

21 *SUSTAIN FOOT SWITCH:* Sustains all notes when foot switch is depressed (regardless of release slider settings).

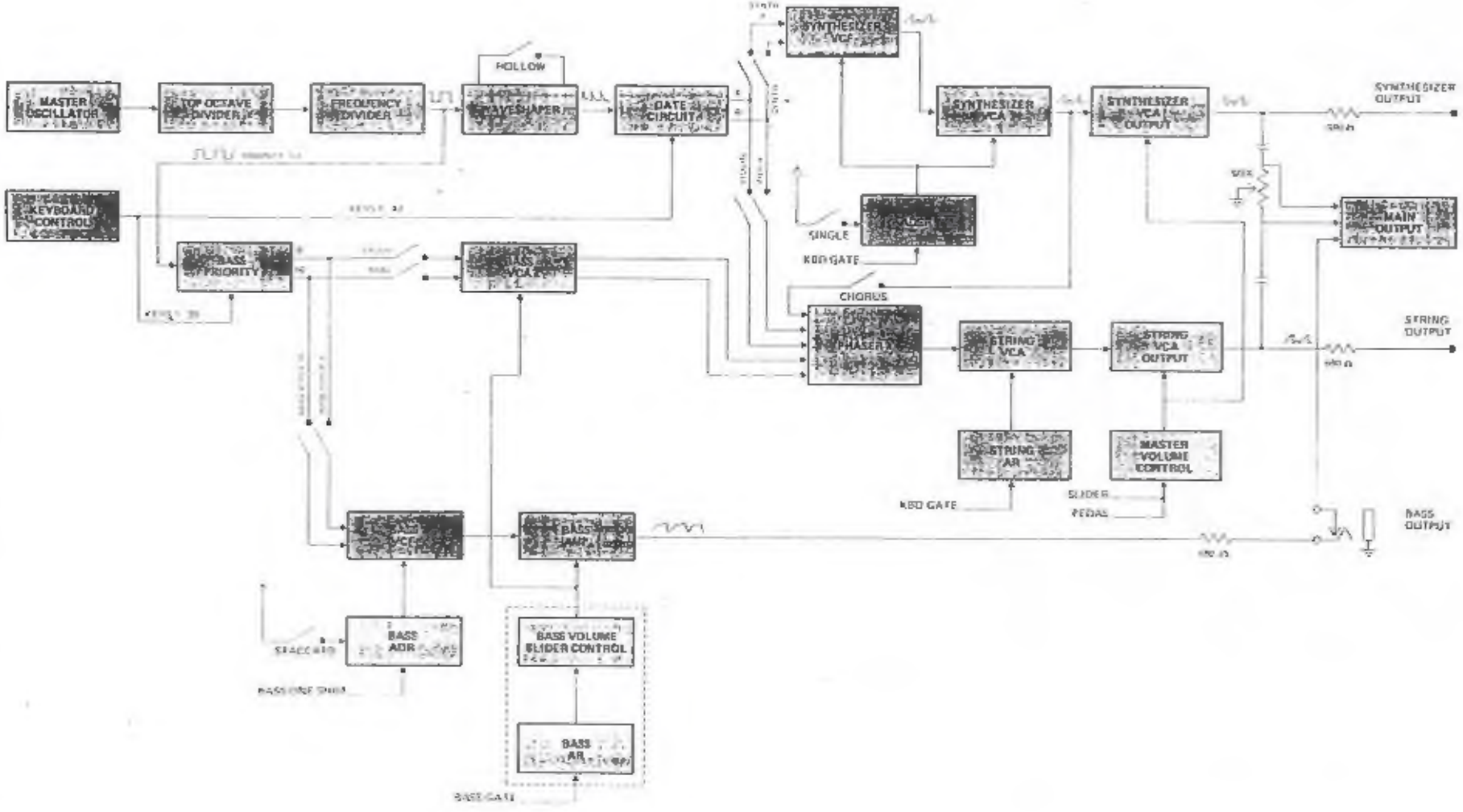
22 *FILTER PEDAL:* Used to connect a pedal to the VCF cutoff.

23 *VOLUME PEDAL:* Sets volume for all outputs except bass.

24 *UPPER & LOWER GATE OUT and TRIG OUT:* Used to interface with other synthesizers.

25 *VCF CV IN:* Connected to the VCF control input so that VCF may be controlled by external sources such as the ARP Sequencer or Sample and Hold outputs, etc., for special effects.

GMNI-2 SIMPLIFIED BLOCK DIAGRAM

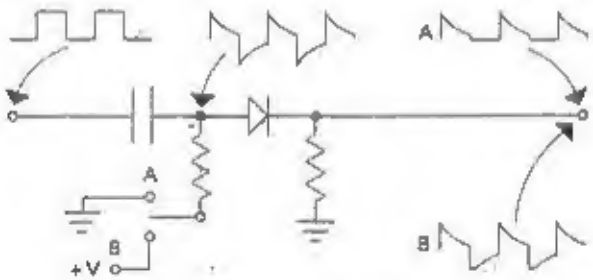


highest octave (square waves) of the instrument (C6-C7).

3.1.2 DIVIDER AND WAVE SHAPING CIRCUITS

(Refer to Upper Voicing Schematic, sheet 1 of 2.)

The square wave outputs from Z2 are supplied to the clock inputs of CD4520BE divider chips (Z3-Z7) which produce square waves for each key. The square wave outputs of the CD4520BEs are buffered by inverters Z9-Z16.



TYPICAL WAVESHAPE CIRCUIT

The square wave from inverters Z9-Z13 and from Z2 are differentiated by capacitors C17-C49 (values are selected for each frequency). CR1 through CR41 clip the negative portion of the differentiated square wave resulting in sawtooth shaped waveforms. By altering the DC bias (P6-7, Waveform Control Bus) some of the negative portion of the differentiated waveform is permitted to pass through diodes CR1-41 when the Waveform Enhancement is selected resulting in a "hollow" type sound.

3.1.3 KEYING CIRCUITS

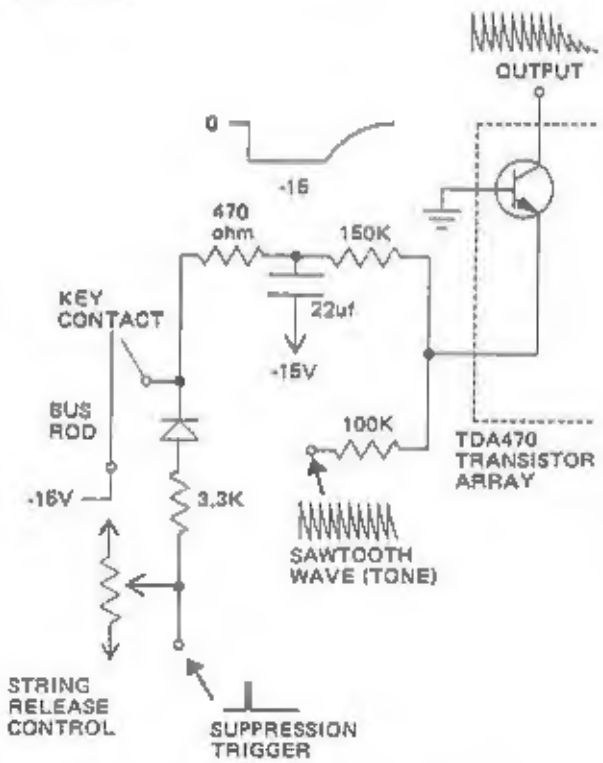
(Refer to Upper Voicing Schematic, sheet 2 of 2.)

Each key contact (P7-5, P7-4, P7-3, etc.) is connected to a 22uf electrolytic capacitor through a 470ohm resistor. The capacitor is normally charged to 0 volts (The negative side of the capacitor is at -15 volts.). When a key is depressed, the capacitor is discharged to -15 volts. The time the capacitor takes to recharge to 0 volts sets the release time of each note and can be varied by the release slider (R31) on the String Control Board. The key voltages produced for each key (indicated by letter KV) are supplied to two gate circuits; one for 8', one for 4'.

3.1.4 GATE CIRCUITS

(Refer to Upper Voicing Schematic, sheet 2 of 2.)

There are a total of ten gate transistor arrays (TDA 470) in the OMNI -2 which gate signals from the tone generator sections to the output section. Each Gate has ten transistors (on a common substrate) with common collectors and bases. The emitters serve as the inputs to the devices. Five of the arrays are used for 4' pitches and five for 8' pitches. Therefore, one key controls two gate chips at a time (4' and 8').



TYPICAL KEYING & GATING CIRCUIT

The Upper Voicing Board contains three 4' gate arrays and three 8' arrays; the remaining arrays are on the Lower Voicing Board. All of the arrays have the base pin (7) grounded. Each of the sawtooth waveforms are supplied to an emitter through a 100Kohm resistor (e.g. Tone G 4 is supplied through resistor pack Z30 pins 5 and 6 to pin 12 of Z31.). Keying voltages (denoted by KV) are supplied to the emitters also through 150Kohm resistors (e.g. KV21). As long as the keying voltage is at or near 0 volts, the transistor remains off. When a key is depressed, the keying voltage drops to -15 volts, which turns on the transistor in the array and permits the signal to pass to the collector of the array and out to the mixing circuitry (e.g. from pin 12 of Z31 to pin 14).

3.2 Lower Voicing Board

GENERAL: The Lower Voicing Board contains the Bass Low Note Priority circuitry, 4' and 8' Mixing circuitry, Gate Sensing circuitry, Suppression Trigger circuitry, 8' and 16' Bass circuitry, Keying circuits for keys 1 through 20, Gate circuits for tones C2 through

G3, and Waveshaping for tones C2 through G3.

3.2.1 WAVE SHAPING, KEYING AND GATE CIRCUITS

(Refer to Lower Voicing Schematic, sheet 1 of 3.)

The Wave Shaping, Gating and Keying circuits on this board are a continuation of the circuits on the Upper Voicing Board. See sections 3.1.2, 3.1.3 and 3.1.4 for detailed descriptions.

3.2.2 BASS LOW NOTE PRIORITY CIRCUIT

(Refer to Lower Voicing Schematic, sheet 2 of 3.)

The 8' and 16' Bass section of the OMNI-2 is single note, low note priority. The Bass Section covers the lowest octave and a half of the keyboard (Keys 1 through 20). The release time of the Bass Section is fixed, the release control on the front panel has no control over the Bass Section. Unlike the 4' and 8' polyphonic tones, the Bass Priority Circuit receives and generates only square waves.

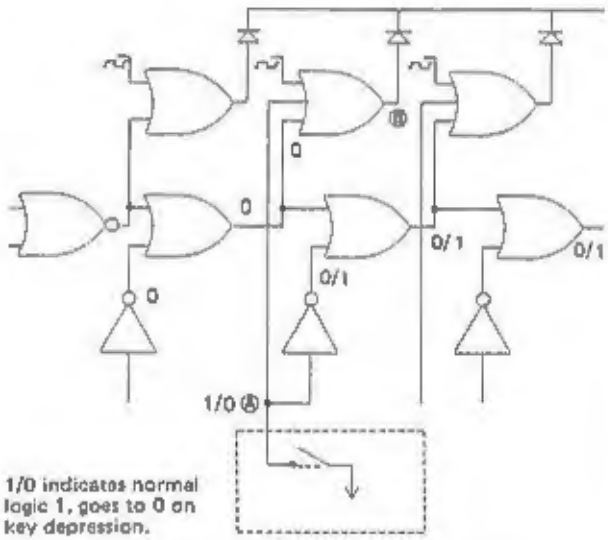
The function of the Bass Low Note Priority circuit is to route the square wave of the lowest note depressed (only) in the Bass section to the 8' and 16' Bass Wave Shaping circuits (through CR41-60) for processing. The Bass Wave Shaping circuits are monophonic; they may only accept one waveform at a time.

Square wave tones C2-G3 are routed from the Upper Voicing Board frequency dividers to one input of a three input nor gate for each key (Z33-Z39). The outputs of these nor gates are inverted square waves only when the other two inputs are a logic 0 (e.g. Z33B pin 6 is a square wave only if pin 4 and pin 3 are at logic 0.).

The "enable" input of the three input nor gates (e.g. Z33B, pin 3) will always be a logic 0 (-15 volts) provided no keys are depressed to the left of the circuit under examination.

When a key is depressed, -15 volts from the bus rod discharges a 1uf sustain capacitor through keying transistors (Q1-Q20). (e.g. Key 2, P1-12 discharges C42 through R7, Q2 and CR63 to -15 volts on key depression.) When a key is released, the voltage on the capacitor is allowed to charge back to 0 volts through a 3.3Mohm resistor (e.g. R6). This keying voltage is routed to an input of the three input nor gates (e.g. Z33B, pin 4). Thus the keying voltage permits the square wave to be transmitted from the input of the three input nor gate to the output provided that (A) the keying voltage is less than -7.5 volts and (B) the enable input is a logic 0 (indicating no lower keys are being played).

The keying voltage is also processed through a COSMOS inverter (Z45-Z47) and a nor gate (Z33-Z47) to transmit serially a logic 1 state to all keys higher than the one depressed.



BASS LOW NOTE PRIORITY CIRCUIT

The output of the three-input NOR (B) will be a square wave only when the Enable (A) input is a logic 0 (-15 volts). Also note that when this occurs, all audio signals to the right will be prevented from being processed—hence, low note priority.

NOTE: All logic gates in the Bass Low Note Priority Section are COSMOS (Complimentary Symmetry Metal Oxide Semiconductor) devices. For this particular application, they are operated between ground and -15 volts. Therefore, a logic 1 is any voltage between ground and -7.5 volts, logic 0 is any voltage between -7.5 volts and -15 volts.

The release time (decay time after the keys are released) is fixed at about one second, however, an additional charge path is provided through the 3.3K resistor and the diode to S2 for those keys previously depressed to shorten any residual release time left on that note. Q1-Q20 are off when no keys are depressed.

3.2.3 BASS KEYING VOLTAGE

(Refer to Lower Voicing Schematic, sheet 3 of 3.)

The T point of the Bass Keying Reference Generator supplies a voltage to the bass of Q1-20 of the Bass Low Note Priority Circuit which is at least three diode drops higher than the keying voltage supplied to the Lower keyboard bus rod (P1-14). The diode drops are created using CR114, Q30 and CR113.

This insures that Q1-20 will be biased ON regardless of the bus voltage which decreases as more keys are depressed.

3.2.4 GATE DETECTOR CIRCUITS

(Refer to Lower Voicing Schematic, sheet 3 of 3.)

There are two bus rods in the OMNI-2, one for the lowest 20 keys, one for the upper 29 keys. Splitting the bus rod in this manner permits a bass envelope (Bass AR) to be developed separately from the higher keys and allows independent synthesizer control.

The voltage source for the upper bus rod (P1-1) is through R130 and CR107. When an upper key is depressed, comparator Z52B switches from minus 15V to approximately 0, which in turn passes through Z4 to J11-3 via CR102 *or* directly to pins 4, 11. For example, if the Bass Enable input at J27-6 is HIGH (Bass Voice 8' or 16' has been selected), the upper gate voltage is fed through Z4 via pins 4, 11; Z4 prevents the other path from CR102. If the Bass Enable input is LOW, the path for the upper gate voltage is via CR102 to pins 2 and 9 of Z4. In this condition a lower gate voltage (0 volts when a lower key is depressed) will also appear at pins 2 and 9 as CR101 provides the lower gate voltage input. Since the upper gate voltage (logic 0 at J11-3) is the input to trigger the ADSR, when a Bass Voice Switch is selected, the ADSR will not trigger when a lower key (first 20 keys) is depressed.

NOTE: The CA339E (Z52) is an open collector output comparator. When the inverting input (-) is more negative in voltage than the noninverting (+) input, the output is open; the voltage is determined by external "pull up" resistor circuits or networks. This device is not a standard op amp; it is a specialized comparator (no feedback).

3.2.5 8' and 16' BASS WAVE SHAPING

(Refer to Lower Voicing Schematic, sheet 3 of 3.)

The single square wave from the Bass Low Note Priority Circuit (U2) is buffered through Z51A and gated through a "VCA" made up of CR105, R112 and C77. The Bass AR voltage (J11-8) is 0 volts when no keys are depressed and drops to -15 volts when a key is depressed. This voltage sets the bias of CR105 to clip the square wave on the output of Z51A. As the AR voltage drops from ground, the amplitude of the square wave increases. C77 AC couples the square wave to an emitter follower (Q21) and the 8' Bass Wave Shaping (R116, C78, R117, C79, Q22). The base and emitter of Q21 are biased the same (+7V). This means that only the differentiated rising edge of the square wave will bias Q21 on, thus clipping off the falling edge of the square wave. The sawtooth waveform on the emitter of Q21 is altered and resonated by Q22 and used for the string bass and synthesizer bass signal. The 16' Bass Wave Shaping accepts the buffered 8' square wave from Z51A and divides the frequency in half (Z49). CR106, R119 and C80 are the "VCA" for the 16' Bass circuit. Buffer and filtering are provided as with the 8' Bass (Q23 and Q24).

3.2.6. WAVEFORM CONTROL

(Refer to Lower Voicing Schematic, sheet 3 of 3.)

The Waveform Control sets the bias point of the clipping diodes in the Wave Shaping circuits for each key. When the output of Z53 is 0 volts, sawtooth waveforms are produced. When the output of Z53 is +15 volts, the "hollow" sound is produced. J11-6 is ground when the Waveform Enhancement switch is off, +15 volts when the switch is on. CR107 provides a little extra voltage to the output when the input is +15 volts since the op amp cannot supply more than about +13.5 volts by itself.

The Lower Bus Trigger Detector circuit and Lower Bus Gate Detector circuit are equivalent to the Upper Bus circuitry. CR112 is the lower bus voltage source, R150 creates the voltage difference for the lower bus trigger on key depression.

The Upper and Lower Buss Triggers (Z5A, Z52C) are combined on the base of Q27 and supplied via Q26 to the pulse drive circuit and sustain bus. The sustain bus is the common discharge path for the keying capacitors for each key. The trigger pulse rapidly discharges any keying capacitor not being played to prevent notes from running together when the release slider is at maximum.

3.2.7 BASS ONE SHOT

The Bass One Shot provides a single pulse on the first Bass key depression. It is used to develop the Bass ADR. When a bass note is selected, a positive going pulse is fed to Z51C-12, which in turn produces a positive going pulse on the output of Z51D-4. The pulse width is determined by R185, R183, and C99.

3.2.8 4' AND 8' SUM

(Refer to Lower Voicing Schematic, sheet 3 of 3.)

The outputs of the five 4' and 8' gating transistor arrays (TDA470) are summed in the 4' and 8' Sum circuits. Formant filtering is provided to voice the instrument.

The 4' Poly Sum (J11-16) and 8' Poly Sum (J11-2)

are routed to the inputs of the String and Synthesizer sections of the OMNI 2

3.3 String Control Board

GENERAL The String Control Board contains the String AR Envelope Generator AR Suppression, AR Squelch and String Voice Selection circuits. The AR Suppression forces the AR to release fully between key depressions, yielding the proper string attack times. The AR Squelch forces the release time of the AR to be the same as the release time of all the key capacitors to be tracking the audio level from the String Voice Selection.

3.3.1 STRING VOICE SELECTION

(Refer to String Control Board Schematic.)

Z1 is a COSMOS Quad Switch which selects the four pitch ranges. 4' and 8' polyphonic and 8' and 16' bass. Z3A sums the four pitch ranges and routes them to the Phaser Board. Z2 (pins 3, 4 and 5) permits the Synthesizer section to be summed with the String signals and for processing through the Phaser Board. Pins 1, 2 and 13 disable the String AR when no string voices are selected

3.3.2 STRING AR AND AR SUPRESSION

(Refer to String Control Board Schematic)

The String AR Envelope Generator produces a control voltage which controls the gain of the String VCA on the Synthesizer Control Board C15 is the integrating capacitor and is normally at 0 volts when no keys are depressed When a key is depressed, the gate signal on Z4A pin 6 changes from +15 volts to 0 volts. Comparator Z4A's output changes to -15 volts which charges C15 down toward -15 volts at a rate determined by the attack slider. When a key is released, the -15 volts is allowed to discharge through R37 38 and 39.

When a key is depressed Q3 momentarily turns on to instantly discharge C15 to 0 volts if any voltage remains from previous key depression.

3.3.3 AR SQUELCH

(Refer to String Control Board Schematic.)

Z4B monitors the audio signal from Z3A in the String Voice Selection circuit C10 integrates the output of Z4B and supplies it to Z4C The output of Z4C is low (-15V) as long as an audio signal is present which reverse biases CR11 and prevents the AR from discharging faster than the decay of the audio signal

3.3.4 ADSR BLANKING

The ADSR blanking provides a pulse to the ADSR circuit on the Synthesizer Control Board which prevents the ADSR from triggering when the foot pedal is released

Synthesizer Control Board

GENERAL The Synthesizer Control Board contains the Synthesizer Voice Selection, Low Frequency Oscillator, Synthesizer Voltage Controlled Amplifier, String Voltage Controlled Amplifier, final Output Mix and Bass AR Envelope Generator

3.4.1 LOW FREQUENCY OSCILLATOR

(Refer to Synthesizer Control Board Schematic.)

The LFO produces a triangle and a square wave output in a frequency range from about .1Hz. to 20Hz. Z4B and C11 are an integrator which charges from current passing through R45. Z4A is a hysteretic switch whose output switches from -15 volts to +15 volts when the output of Z4B reaches +5 volts This then reverses the direction of current through R45 and the rate control (R44) and thus the direction of integration at the output of Z4B. When the output of Z4B reaches -5 volts, the output of Z4A switches back to -15 volts and the cycle repeats.

3.4.2 SYNTHESIZER VOLTAGE CONTROLLED AMPLIFIER

(Refer to Synthesizer Control Board Schematic)

The Synthesizer Voltage Controlled Amplifier attenuates signals from the output of the VCF. The gain of the VCA is determined by the amount of current supplied to the differential pair Z2A, B The ADSR output is connected to the control input (pin 3, Z2) via P12 pin 10. The control rejection trimmer (R14) minimizes the effect of control voltage changes on the output of the VCA by balancing the current through Z2A and Z2B

3.4.3 STRING VOLTAGE CONTROLLED AMPLIFIER

(Refer to Synthesizer Control Board Schematic)

The string Voltage Controlled Amplifier is the same circuit as the Synthesizer VCA except that it is controlled by the String AR Envelope Generator instead of the ADSR

3.4.4 VOLUME/MIX AMPLIFIER

(Refer to Synthesizer Control Board Schematic)

The Master Volume Control (Z5A) is used to set the output level of Strings, Synthesizer and Main Output. Z5A-1 provides a 0 to 10V control voltage, depending on the position of R22, Master Volume Control Slider. The source of the negative control voltage is from a (+10V) voltage divider found on the Bass Board (at J15-4) which supplies Z5A via R37, 100K resistor. The voltage divider can be interrupted if the volume pedal (commonly called Filter Foot Pedal) is connected. The result is a variable voltage source supplied to Z5A. It should be noted that the Volume/Mix control does not affect the level of the Bass Voice Output.

R23 (Mix Control) attenuates the level of the Strings or Synthesizer before it enters the Main Output Mixer (see Bass Board schematic).

3.4.5 SYNTHESIZER VOICE SELECTION

(Refer to Synthesizer Control Board Schematic)

The pitch range push buttons, 4' and 8' Synthesizer route the audio through Z1 to the VCF input on the Synthesizer Control Board*. CR5 and CR6 disable the audio output of the first 20 notes of the polyphonic tone gates (TDA470's) when the 8' and 16' Bass voice pitch ranges are selected.

**The 8' and 16' Bass voices are routed to the Bass VCF via P15-2 and P15-3 respectively.*

3.5 Synthesizer Board

GENERAL: The Synthesizer Board contains the Voltage Controlled Filter, ADSR Envelope Generator, ADSR Gating and Gate and Trigger Output Processing circuits.

3.5.1 VOLTAGE CONTROLLED FILTER

(Refer to Synthesizer Board Schematic)

The two pitch ranges, 4' and 8' Polyphonic are summed and voiced on the audio input of the VCF (pin 1, M1). M1 is a 4075 Low Pass Voltage Controlled Filter. It has a cutoff of 24 dB/Octave and has a manually variable Q (resonance). The filter accepts negative control voltages (-1 volts/octave) on pin 4 to control the filter cutoff point. Z1B sums and inverts external voltages which control the VCF. R22, the CVR (Control Voltage Reset) trimmer prevents control voltages from affecting the audio output (pin 10). The output of the VCF is routed to the Synthesizer VCA via J12, pin 5.

3.5.2 ADSR GATING

(Refer to Synthesizer Board Schematic)

To "start" the ADSR Envelope Generator, the output of Z3A-3 must change from 0 volts to -15 volts (Logic 1 to Logic 0). Two signals must be sent to the ADSR Gating to set up this condition, the Upper Gate and Pulse Drive. The Upper Gate (J12-11) is -15 volts when no keys are depressed and goes to ground (Logic 0) when a key is selected. It is called the Upper Gate because if the 8' or 16' Bass Voice is selected, no change will appear on J12-3 when lower keys (1-20) are depressed. This means that for the above mentioned condition, the lower keys will not initiate the ADSR. When Z4B-4 goes to Logic 0, the RS flip-flop made up of Z4C and Z4D will be initiated—causing Z3A-3 to go to Logic 0 (-15 volts). This starts the ADSR cycle. Z3A-3 will remain at Logic 0 as long as a key is held.

The Pulse Drive is used to interrupt the logic level of Z3A—which will restart the ADSR. The Pulse Drive occurs every time another key is depressed (multiple triggering). But if the Single/Multiple input (J12-14) is +15 volts, the Pulse Drive input will have no effect on the condition of Z3A. Therefore, the ADSR will only be initiated on the first key depression.

3.5.3 ADSR

The ADSR Envelope Generator circuit provides a negative going DC voltage to control the VCF cutoff and the VCA.

ATTACK: When the output of Z3A changes from high to low, -15 volts is applied through CR2 and R46 to the noninverting input of follower Z2. During the attack mode, Q4 is off and R45 is disconnected from ground. Z2 directly follows the voltage on pin 3 and applies -15 volts through CR6, R52 to charge integrating capacitor C13 down.

DECAY AND SUSTAIN: Z1A is a buffer amplifier following the voltage on capacitor C13. When the output of ADSR voltage approaches -10V, Q2 begins to turn off and R35 lowers the voltage on pin 13 of Z3D. Z3C and Z3D is a bistable latch. When pin 13 falls below the threshold of the nand gate (about -7.5 volts) the output of Z3C changes from high to low applying -15 volts from pin 10 of Z3 through CR4, R38 and CR3 thus holding Q2 off. Q4 now turns on and the voltage divider consisting of R45 and R46 establishes the Sustain Level. CR6 is now reverse biased and capacitor C13 discharges through R51 and CR5 to the level at Z2 pin 3.

RELEASE: When the gate voltage is removed, Z3B goes low which turns on Q6. The remaining voltage

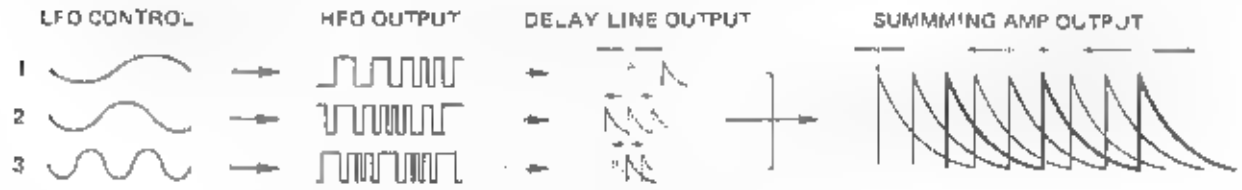
on capacitor C13 discharges through R53 R50 and Q6 to ground The output of Z1A is applied to the input of follower Z2 through R59 thereby preventing the sustain and decay charge paths from affecting the release time. Q5 and Q7 permit the release slider setting on the front panel to be overridden when the sustain footswitch is depressed Pulse Drive input is disabled by ADSR Release Control pulse which occurs whenever the footswitch is released

3.6 PHASER BOARD

GENERAL: The Phaser Board contains three identical parallel Phase Shifters each modulated by Low Frequency Oscillators The Phasers are chiefly responsible for the orchestral string effects of the OMNI-2.

Z101A, Z104B, Z101B and Z102 form a low frequency oscillator (LFO) This circuit differs from our standard LFO because Z102 (integrator) is driven direct from Z101B and Z104B, instead of Z101A A 10VPP triangle waveform at Z102 is rounded to a 1 2PP sinewave by diodes, CR101 and CR102 and fed to Z103A. Z103A is used to modulate the frequency of Z106, a high frequency square wave oscillator

Two square wave clock pulses (180 degrees out of phase) from Z106 are used to phase shift incoming audio signals entering pin 2 of Z105 (analog delay line), with outputs at pins 5 and 6. C105 adds one pole of low pass filtering to eliminate the residual high frequency clock superimposed on the output. C110 AC couples the signal into the two pole active low pass filter which further eliminates any high frequency clock signal. The outputs of the three delay line sections are mixed and amplified by Z1B and associated resistors.



3.7 BASS VOICE CIRCUIT

This circuit contains a preset Bass Voltage Controlled Filter, Envelope Generator, String and Synthesizer VCA, and the Main Output Mix Amplifier

3.7.1 BASS VCF

The Bass Voltage Controlled Filter, comprised of Z4A, C8, Z4B, and C7, form a two pole low pass filter. The Bass Waveforms (8' and 16') are summed in on J15-2 and J15-3. Z4A and B act as voltage controlled resistors, whose transconductance is controlled by the voltage at the gates. The initial conduction (or the initial cutoff frequency) is regulated by a closed loop stabilization circuit comprised of Z3 and Z4C. However, the dynamic operation of the filter cutoff frequency is controlled by the application of positive envelope control voltage at the base of R38 The Bass VCF output (typically about 1 5VPP at Z8A-7) is fed to the main output via J33. If the Bass enable line (P27-5) is low the Bass VCF signal is shunted to ground via Z5B. It should be noted that if the Bass Jack (J33) is used the Bass is disconnected from the Main Output

3.7.2 BASS ADR

Z1 (CD4007) is used as a switch for selecting certain charge and discharge paths for C1, the envelope storage capacitor For example, the One Shot (P27 1) provides a positive going pulse for every bass key depression, and is used to charge C1 via R11 (10K resistor). After the one shot, the discharge of C1 is through R10 or R10 and R9 when the Staccato switch is selected. If the Staccato switch is selected, the voltage on P27 3 will be high and the result will be a faster envelope decay on C1. The bass gate voltage (P27-2) will return from 0 to -15 volts on key release discharging the remaining voltage on C1 through R8 (47K)

3.7.3 STRING OUTPUT VCA

Audio signals entering J15-14 are from the String Section (only), and are processed through Z7C Z7D and Z8B. The output level on Z8B-7 is controlled by the Master Volume Voltage at J15 16 This Master Volume Voltage can be controlled by either the Main Volume Slider or the Volume Pedal

3.7.4 SYNTHESIZER OUTPUT VCA

Audio signals entering J15-5, from the Synthesizer Section (only), are processed through Z7A, Z7B, and Z8A. Z7E is used to provide the coordinates for the direction of current flow. The output level on Z8A 1 is controlled by the Master Volume Voltage at

J15-16 This Master Volume Vo tage can be contro led by either the Main Volume S ider or the Volume Peda

3.7 5 MAIN OUTPUT M X

Bass, Synthes zer, and String outputs are coupled to Z6B and sent to the Ma n output jacks—which are sw tchable from low level (about 200MVPP at jack) to high eve (about 1VPP at jack)

3.8 Power Supply

3 8 1 +15 VOLT SUPPLY

Z1 conta ns a voltage reference which suppl es approximate y +7 vo ts to pin 6 of Z1. Th s voltage is connected through pin 5 to the noninverting nput of an op amp. The output of the op amp is connected to an emitter fol ower, also ocated in Z1, which controls the pass trans stor (Q1). Should the output of the power supply change, the vo tage at the unc t on of R11 and R12 wi l supply the inverting input of the op amp in Z1 with the voltage difference The op amp w ll then supp y a correct on voltage to the em tter fo lower and pass transistor (Q1) and bring the power supply's vo tage to normal

3 8.2 -15 VOLT SUPPLY

The -15 volt supply derives ts regulation from the +15 volt supp y through R14. When the output of the -15 vo t supp y is at the correct vo tage, the junc t on of R14 and R15 s 0 volts Z2 is referenced to 0 volts through R2 Should the output of the minus supply increase, the voltage on pin 2 of Z2 also ncreases. Z2 then forces Q2 to supply more current, thereby lowering the output to 15 volts

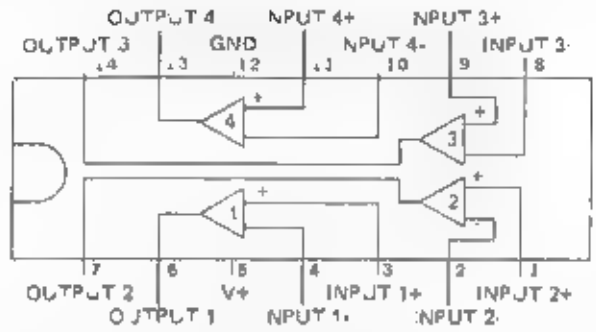
3 8.3 SHORT CIRCU T PROTECTION

R7 and the transistor in Z1 connected to pins 2 and 3 l m t the +15 supply's current to a maximum of 800 m lliamps. Q3 and R5 m t the 15 supp y's current to a maximum of 1000 mil iamps

3 9 General Information

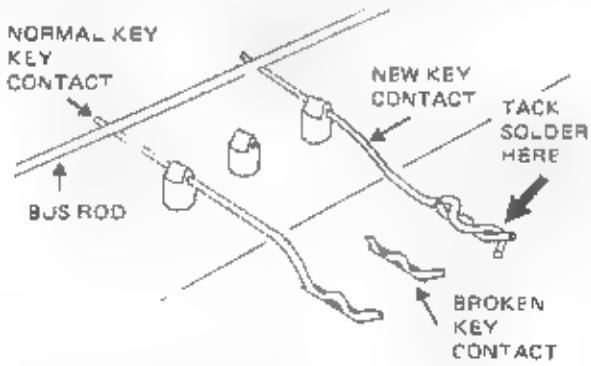
LM339 COMPARATOR

The LM339 contains four independent prec s on voltage comparators. W th an open col ector output the LM339 is compat b e with TTL and CMOS In the OMN 2, p n 12 of LM339s are connected to 15 volts. Thus the output states of the dev ce are open (voltage determined by external circu try) or 15 volts

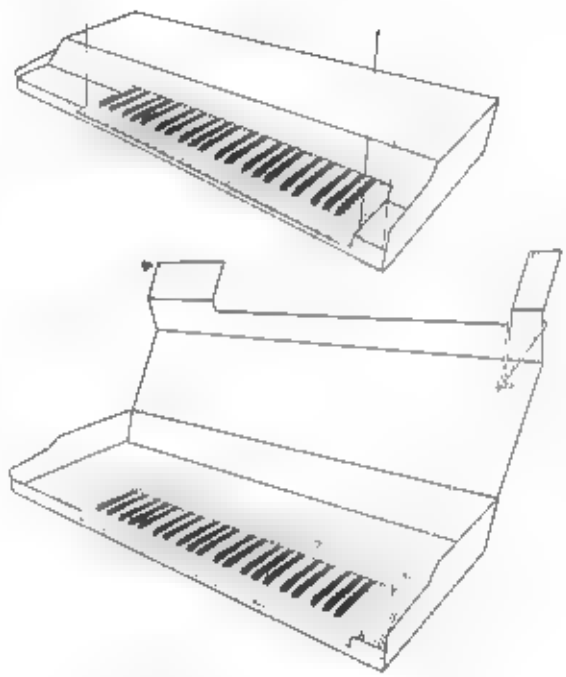


KEYBOARD CONTACT REPLACEMENT

Should t become necessary to rep ace a broken keyboard contact, it is recommended that the new contact be soldered to the old p ece instead of com plete y removing the contact (see illustration).



ASSEMB Y/DISASSEMBLY



NOTE Support the back of the un t or use a piece of wire to hold t up as shown

Power Supply Trim Procedure (NOTE: Always execute these trims first.)

REF	TRIMMER	TRIM PROCEDURE
R19	+15 VOLT SET	1. Monitor the power supply's +15 volt output with a digital voltmeter 2. Adjust R19 for exactly +15 volts.
R20	-15 VOLT SET	1. Set R5 (+15 volts) first. 2. Put the digital voltmeter's ground lead on the power supply's +15 volt output and put the meter's plus lead on the power ground output. 3. Adjust R20 for exactly +15 volts (reversed polarity).

Synthesizer Board Trim Procedure

R22	VCF CVR	1. Monitor pin 10 of filter module M1 with an oscilloscope. 2. Put the VCF FREQ slider and VCF RESONANCE slider fully DOWN 3. Put the VCF "ADSR" slider fully UP 4. Set the ADSR sliders as follows: ATTACK, DOWN, DECAY, 3/4 UP, SUSTAIN, DOWN, RELEASE, DOWN 5. Adjust R22 for minimum amplitude when keys are depressed
R16	VCF CAL	1. Monitor pin 10 of filter module M1 with an oscilloscope 2. Clip a 33Kohm resistor from pin 10 of M1 to pin 2 3. Put the VCF FREQ slider fully DOWN and the VCR RESONANCE slider fully UP, put all other sliders DOWN 4. Adjust R16 for a 16Hz sine wave.

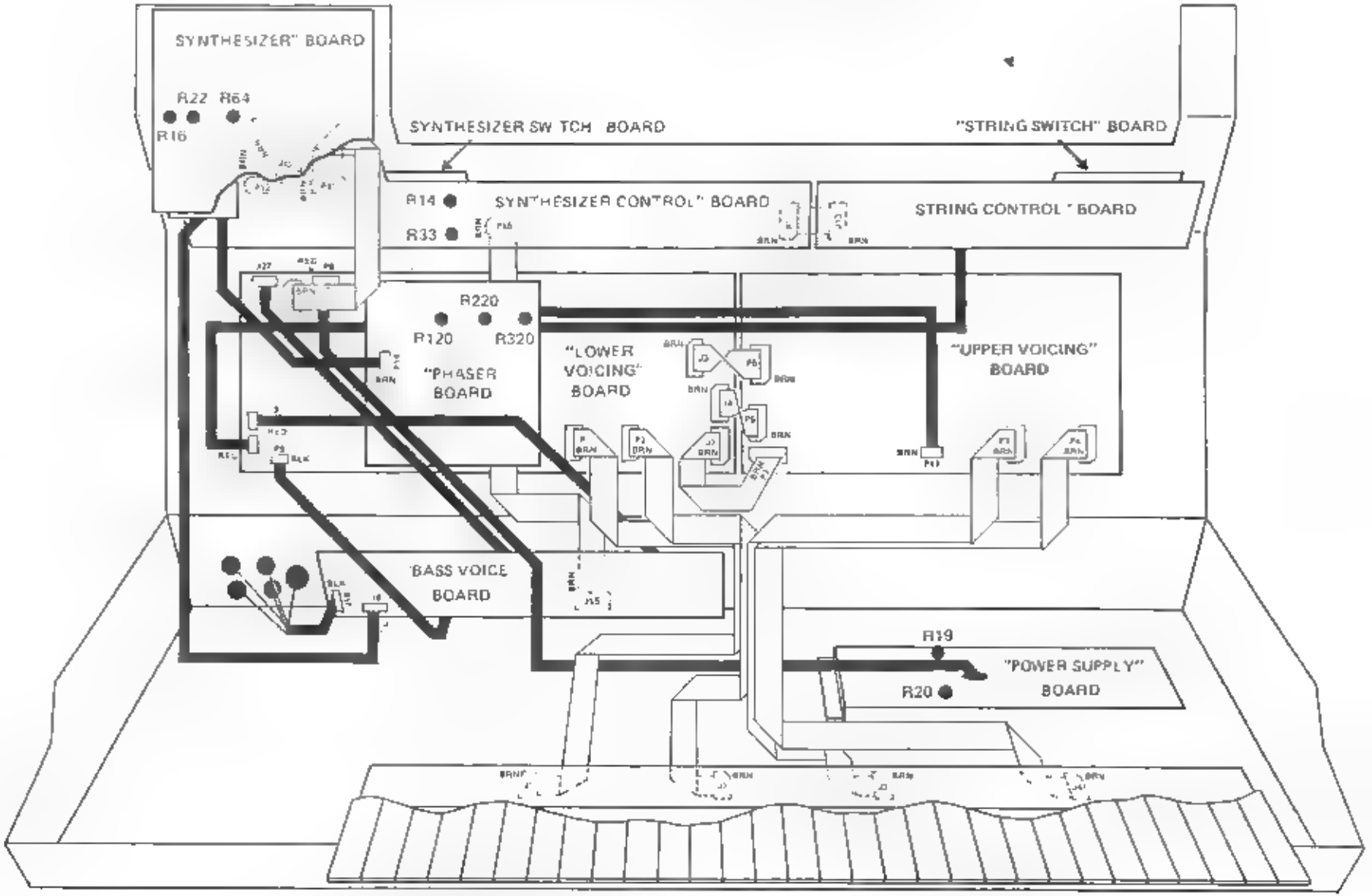
Synthesizer Control Board Trim Procedure

R14	SYNTH VCA CVR	1. Monitor the high level output of the OMNI 2 with an oscilloscope 2. Set all VOICE SELECTION switches OFF (out) 3. Put the MIX slider fully LEFT (synthesizer) 4. Put the MASTER VOLUME fully RIGHT (maximum) 5. Set ADSR sliders as follows: ATTACK, DOWN, DECAY, 3/4 UP, SUSTAIN DOWN, RELEASE, DOWN 6. Put all other sliders at minimum. 7. Adjust R14 for minimum deflection of the oscilloscope trace while repeatedly depressing keys in the highest octave

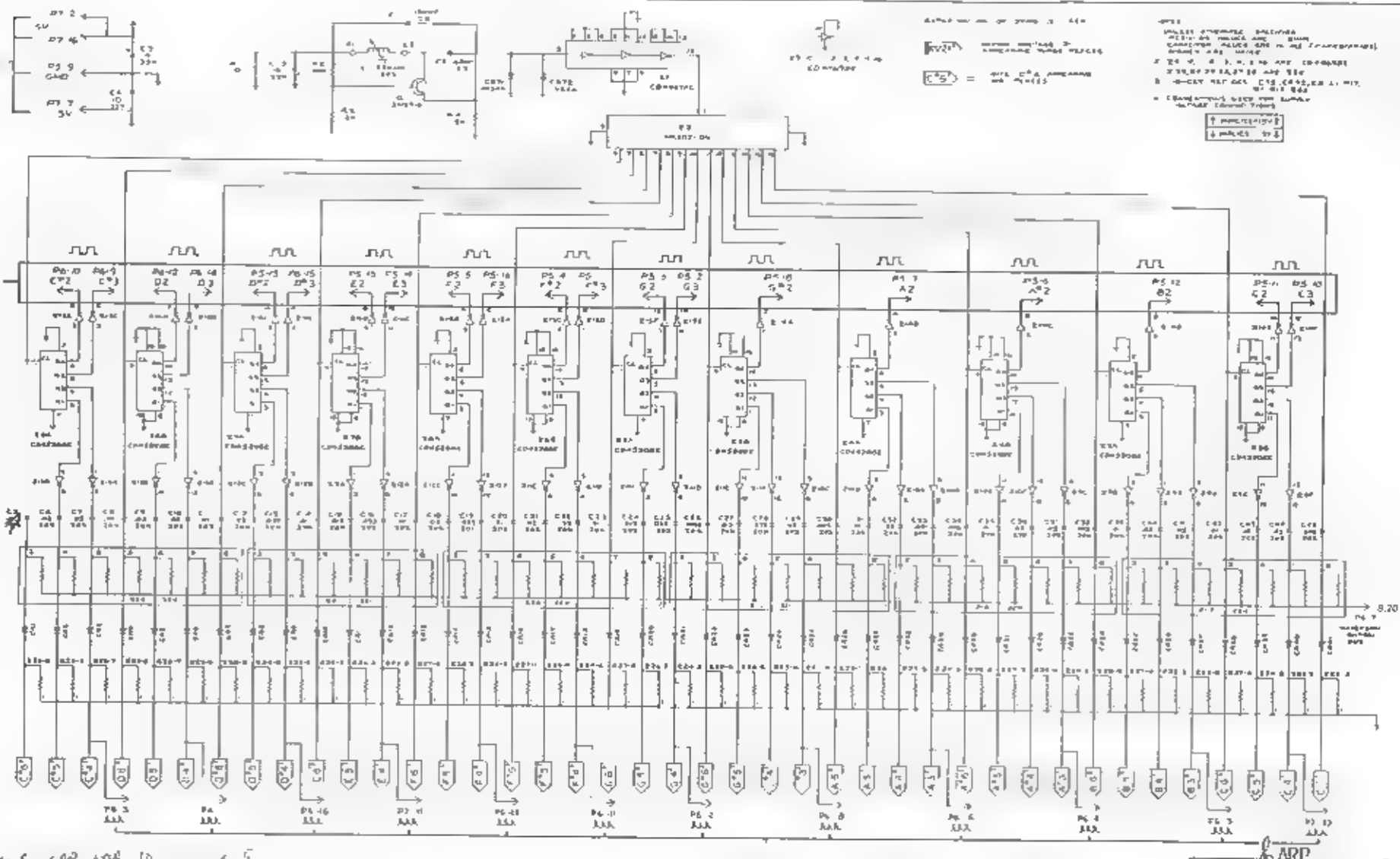
Phaser Board Trim Procedure

R120	HFO CAL 1	1. Connect ground to TP4 2. Monitor TP5 (Z106) with a frequency counter 3. Adjust R120 for a period of 13.3 µs (75kHz.)
R220	HFO CAL 2	1. Connect ground to TP9 2. Monitor TP10 (Z206) with a frequency counter 3. Adjust R220 for a period of 21.5 µs (46.5kHz.).
R320	HFO CAL 3	1. Connect ground to TP14 2. Monitor TP14 (Z308) with a frequency counter 3. Adjust R320 for a period of 12.2 µs (82kHz.)

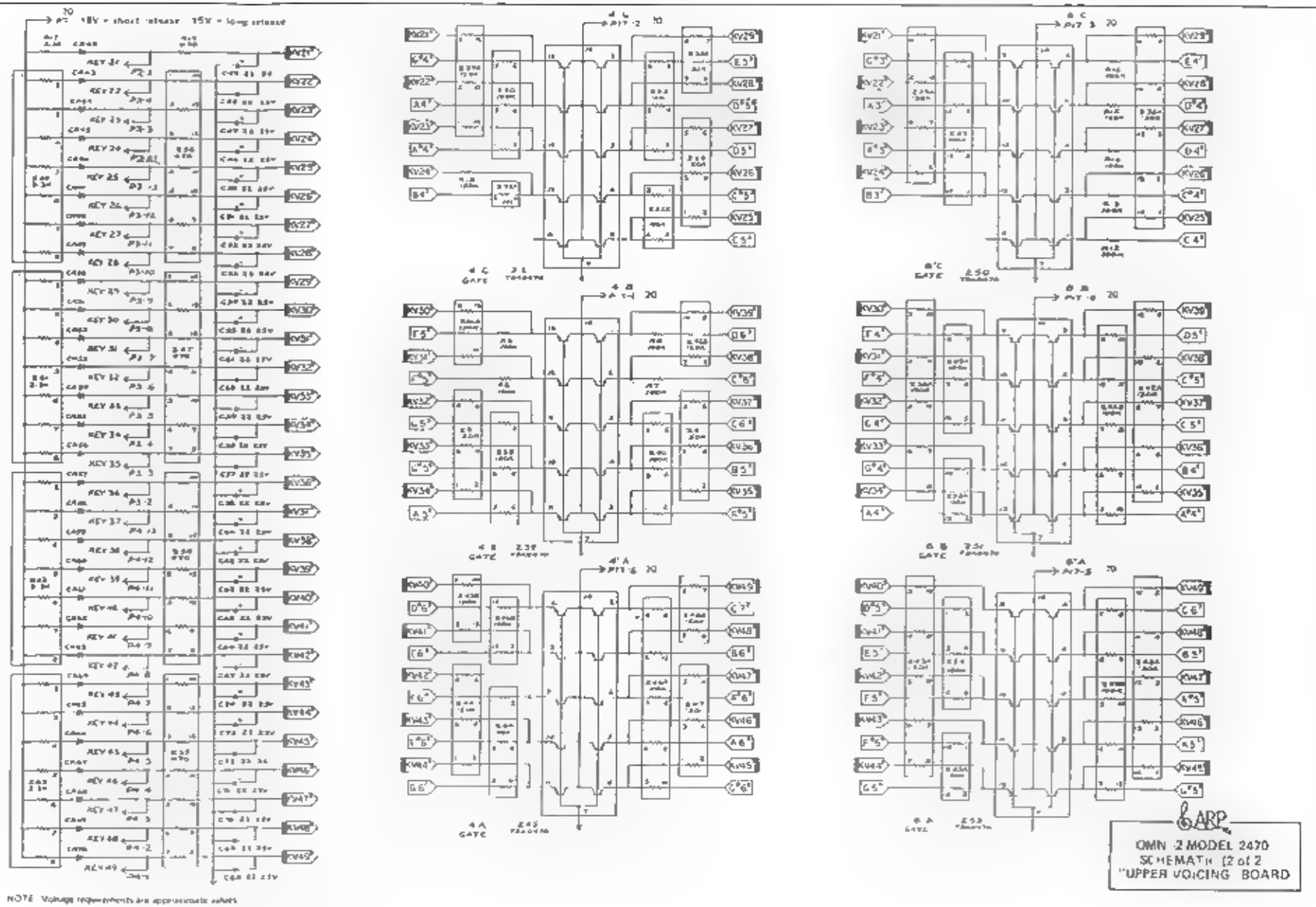
INTERCONNECTION DIAGRAM AND TRIM POT LOCATIONS



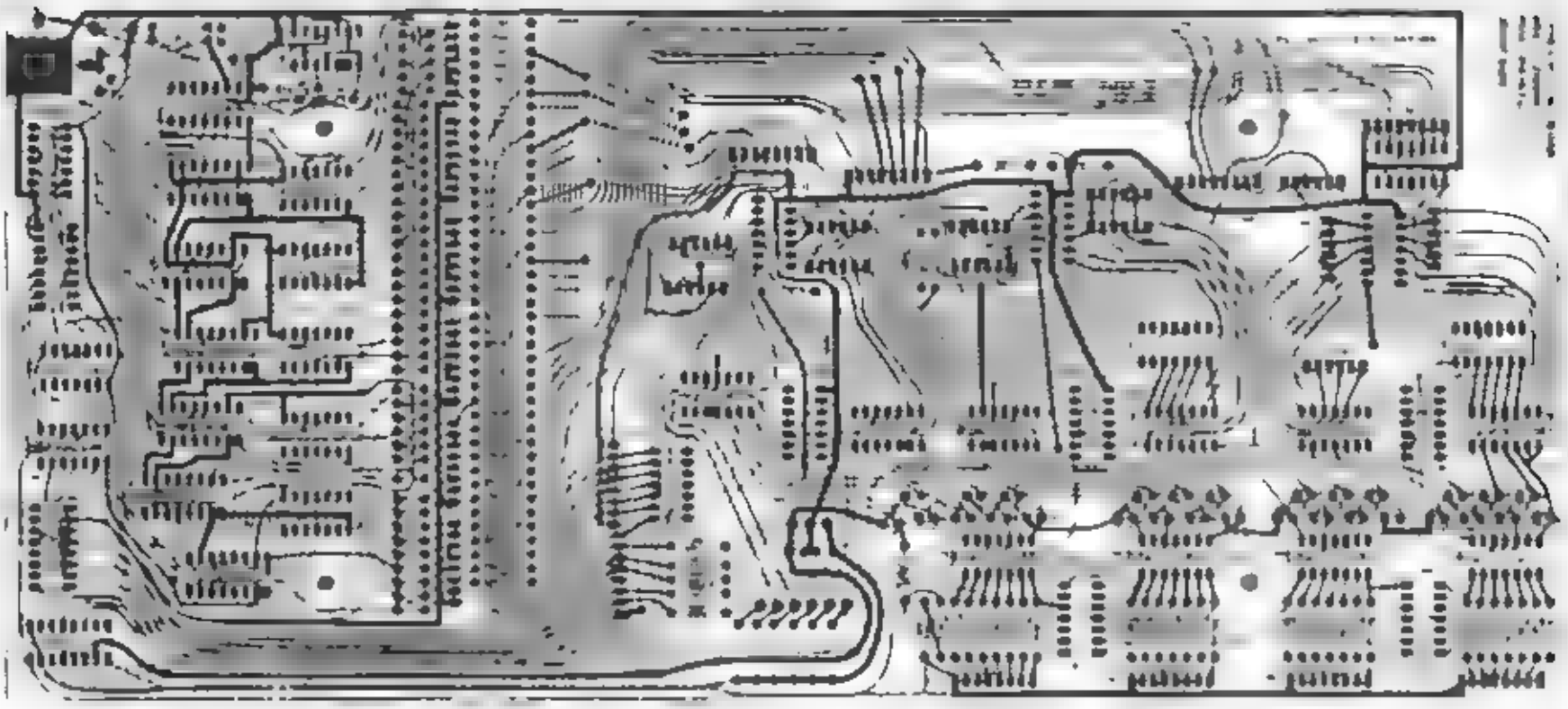
NOTE Regardless of orientation of socket pin 1 of keyboard connectors should always face the rear of the instrument.



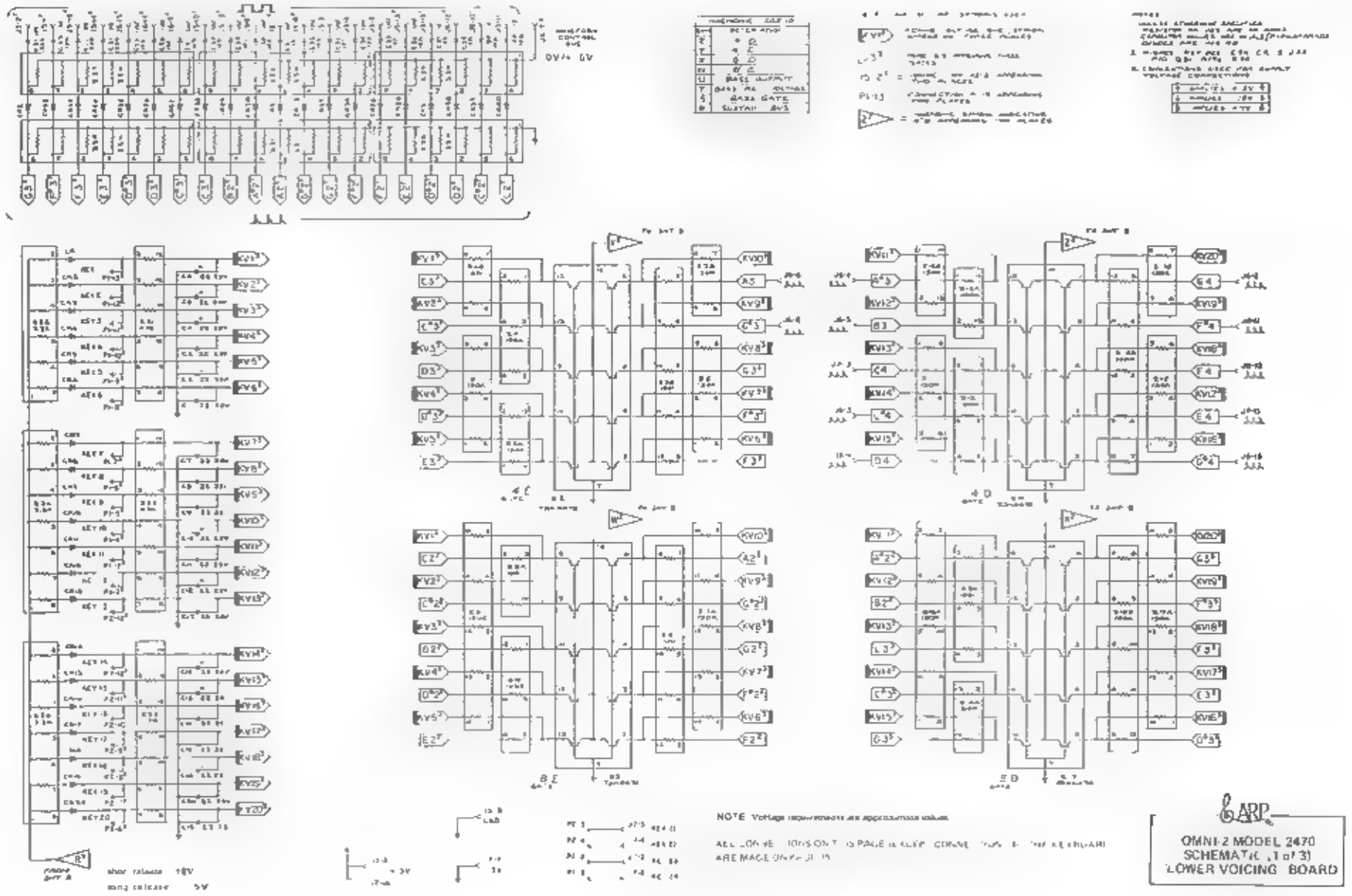
OMNI 2 MODEL 2470
SCHEMATIC [illegible] of 2
'UPPER VOICING' BOARD



NOTE: Voltage requirements are approximate values.



ASSEMBLY
UPPER VOICING BOARD



NOTE Voltage measurements are approximate values.

ALL CONNECTIONS ON THIS PAGE ARE MADE ON THE COMPONENT SIDE OF THE BOARD.
ARE MADE ON THE [illegible]

short release +8V
long release 5V

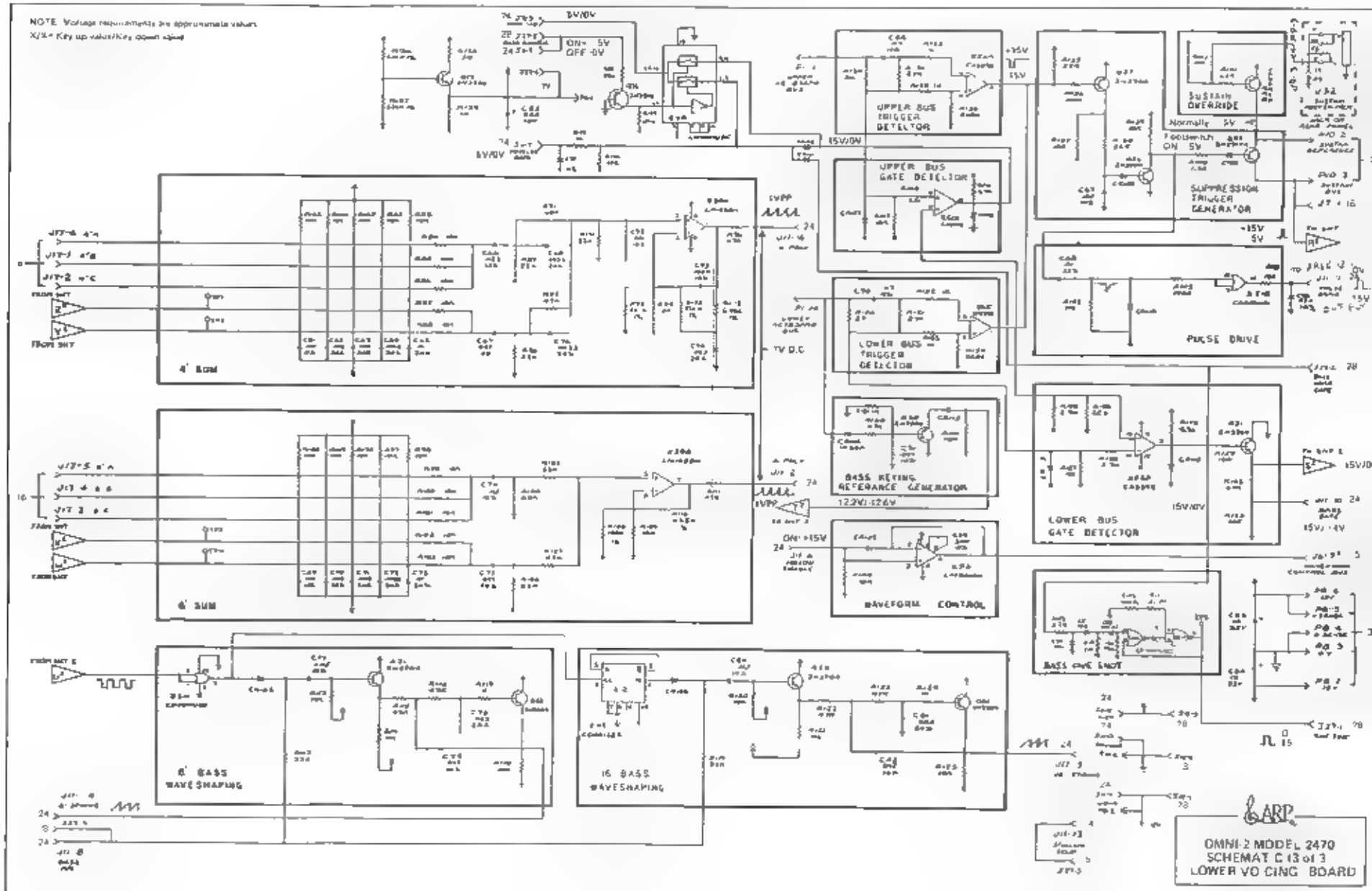
ARP

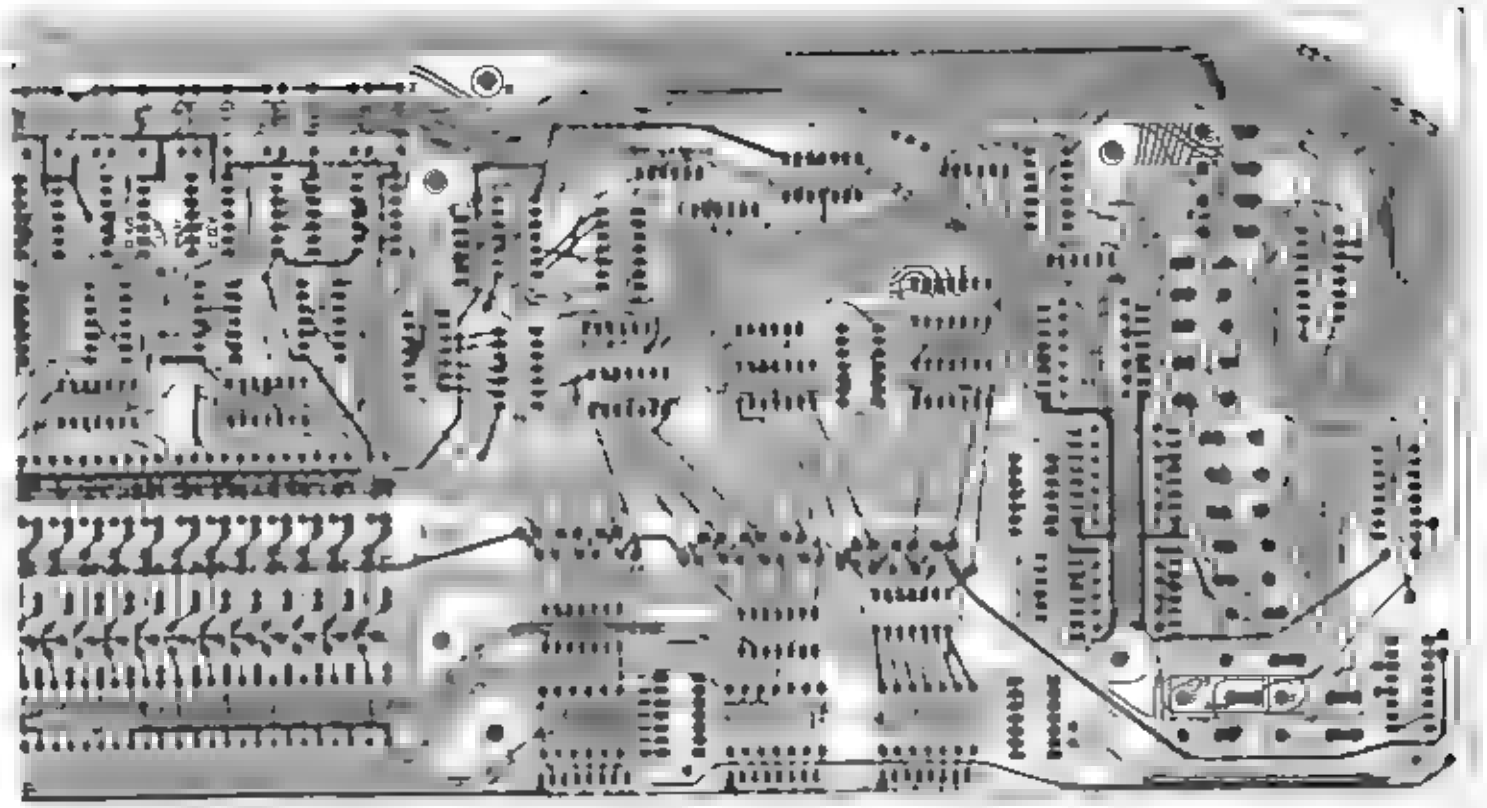
OMNI-2 MODEL 2470
SCHEMATIC (1 of 3)
LOWER VOICING BOARD

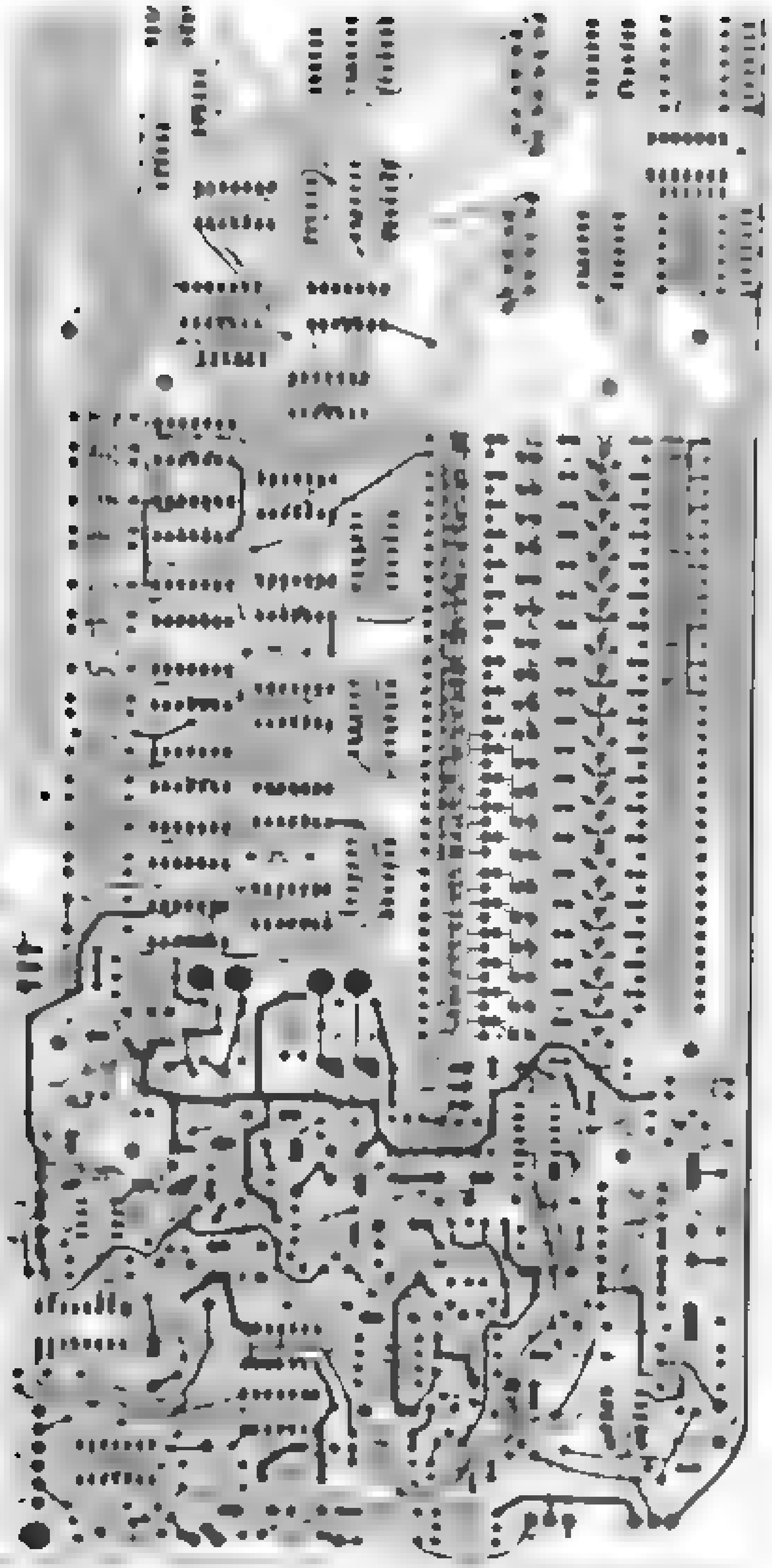
NOTE Voltage requirements are approximate values
K.U. Key up value/Key down value

ARP

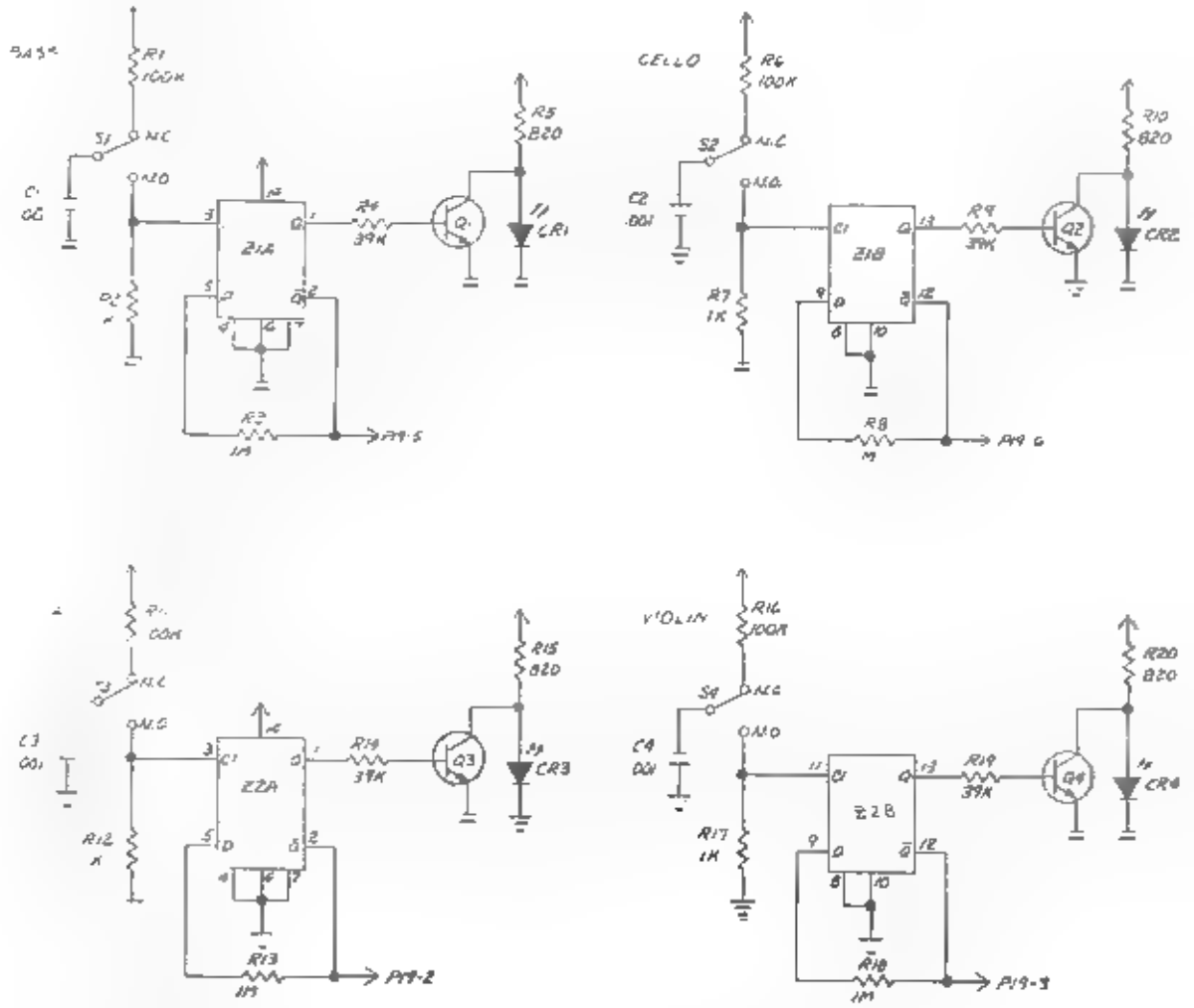
OMNI-2 MODEL 2470
SCHEMATIC (2 of 2
"LOWER VOICING BOARD


NOTE Voltage measurements are approximate values.
X/X= Key up value/Key down value
ON= 5V
OFF 0V
UPPER BUS TRIGGER DETECTOR
UPPER BUS GATE DETECTOR
LOWER BUS TRIGGER DETECTOR
BASS KEYING REFERENCE GENERATOR
WAVEFORM CONTROL
SUPPRESSION TRIGGER GENERATOR
SUPPRESSION OVERRIDE
PULSE DRIVE
LOWER BUS GATE DETECTOR
BASS ONE SHOT
4' SUM
4' SUM
8' BASS WAVESHAPING
16 BASS WAVESHAPING
ARP
OMNI-2 MODEL 2470
SCHEMATIC (3 of 3)
LOWER VOICING BOARD





ALL CONNECTIONS ON THIS PAGE ARE MADE TO THE STRING CONTROL BOARD THIS PAGE!



NOTES

1) UNLESS OTHERWISE SPECIFIED
RESISTOR VALUES ARE OHMS, ¼W, 5%
ALL TRANSISTORS ARE 2N3904
ALL IC'S ARE CD4013BE
ALL CAPACITOR VALUES ARE IN μF, 20%
P: PICOFARADS
ALL DIODES ARE FDJ360

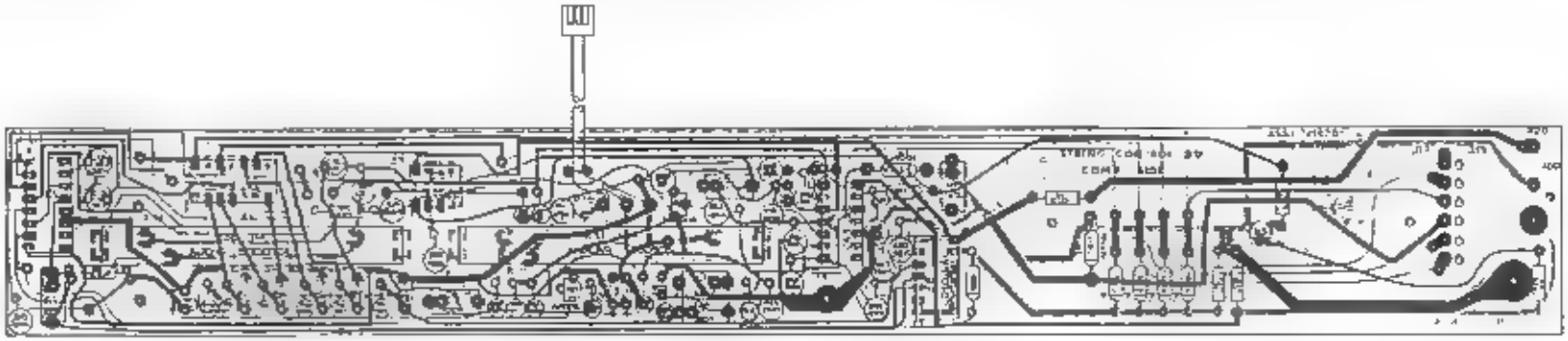
2) HIGHEST REF DES: C4, Q4, R20, S4, Z2, C#

3) CONVENTION USED FOR SUPPLY VOLTAGE CONNECTION

↑ IMPLIES +5V ↑

ARP

OMNI 2 MODEL 2470
SCHEMATIC
"STRING SWITCH" BOARD

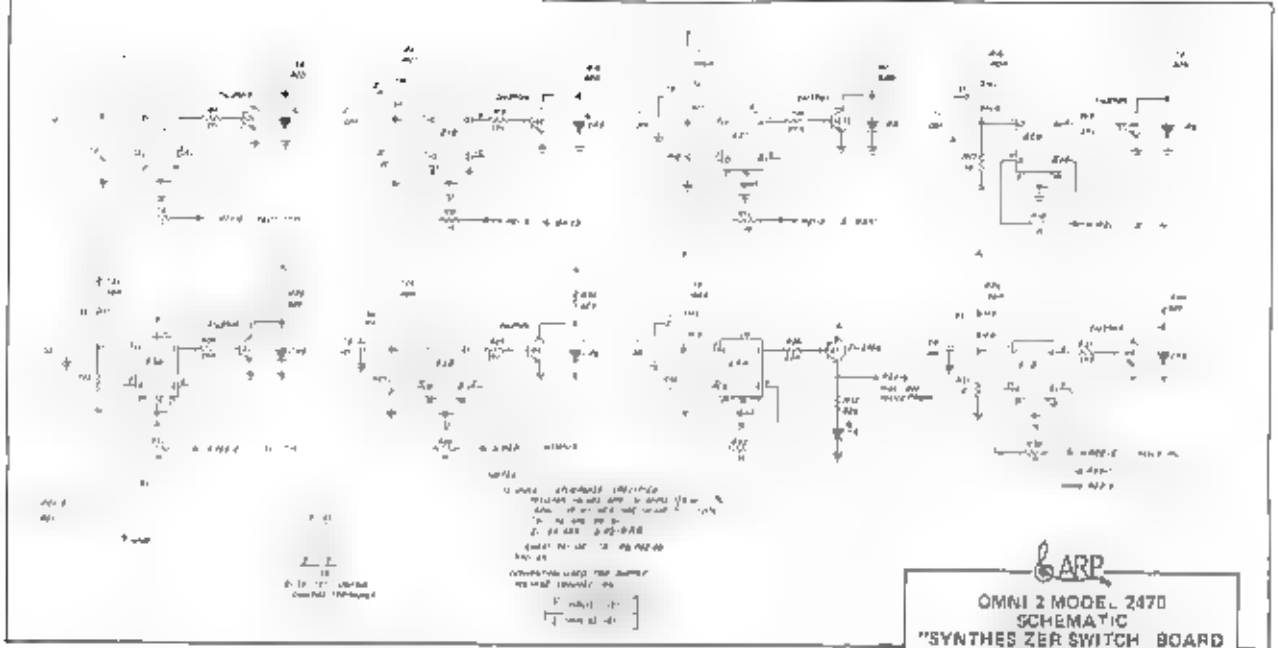


NOTES

UNLESS OTHERWISE SPECIFIED
RESISTOR VALUES ARE IN OHMS.
CAPACITOR VALUES ARE IN UF
DIODES (RES THAN) CATH ARE MARKED.

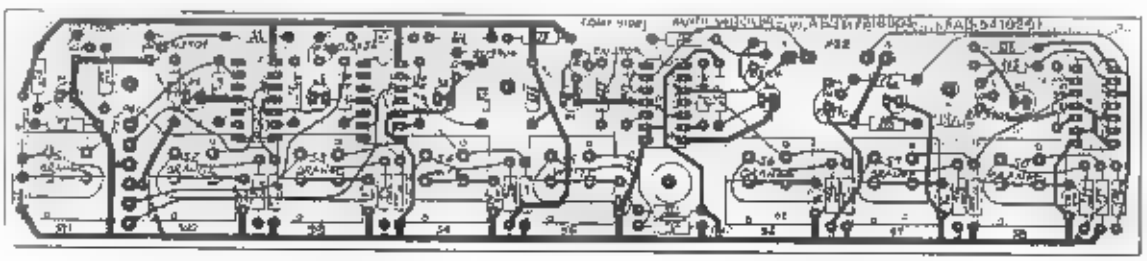
ARP

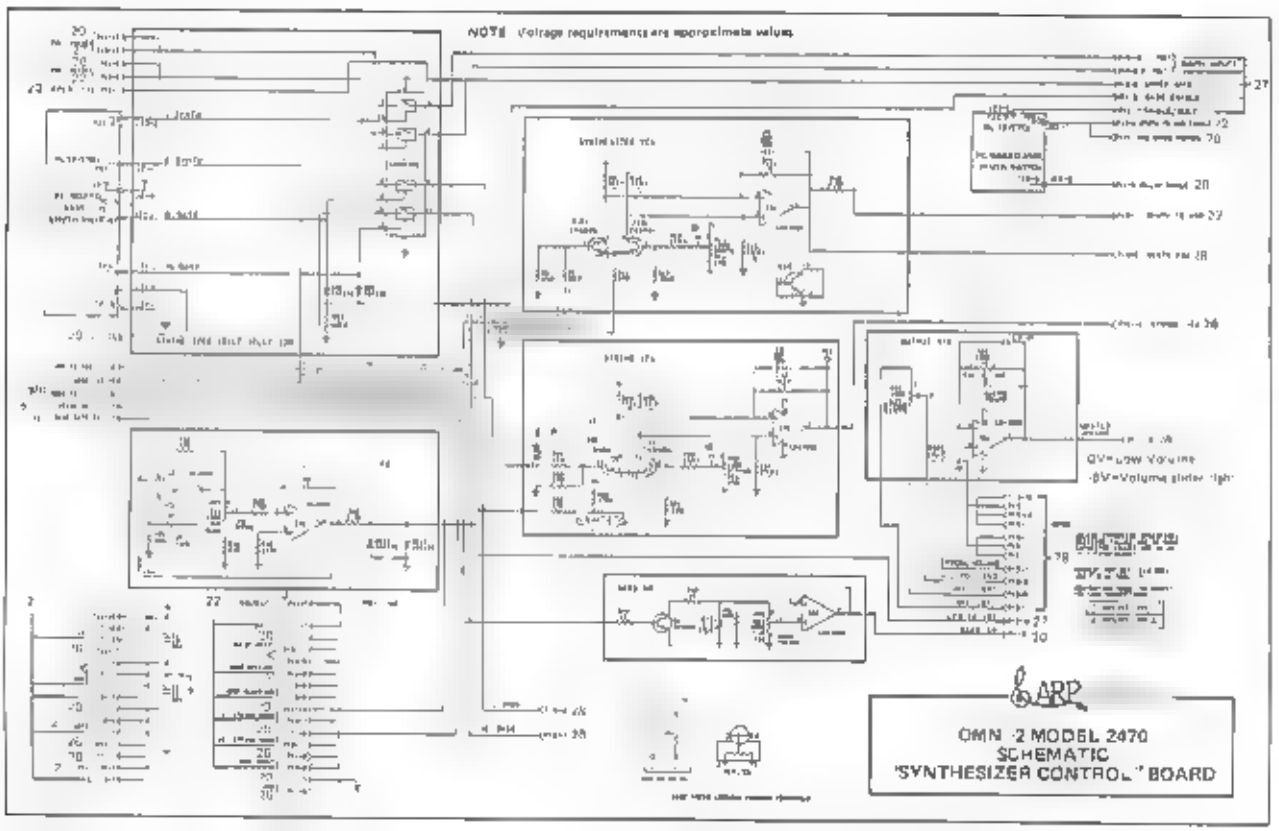
OMNI 2 MODEL 2470
ASSEMBLY
STRING CONTROL BOARD

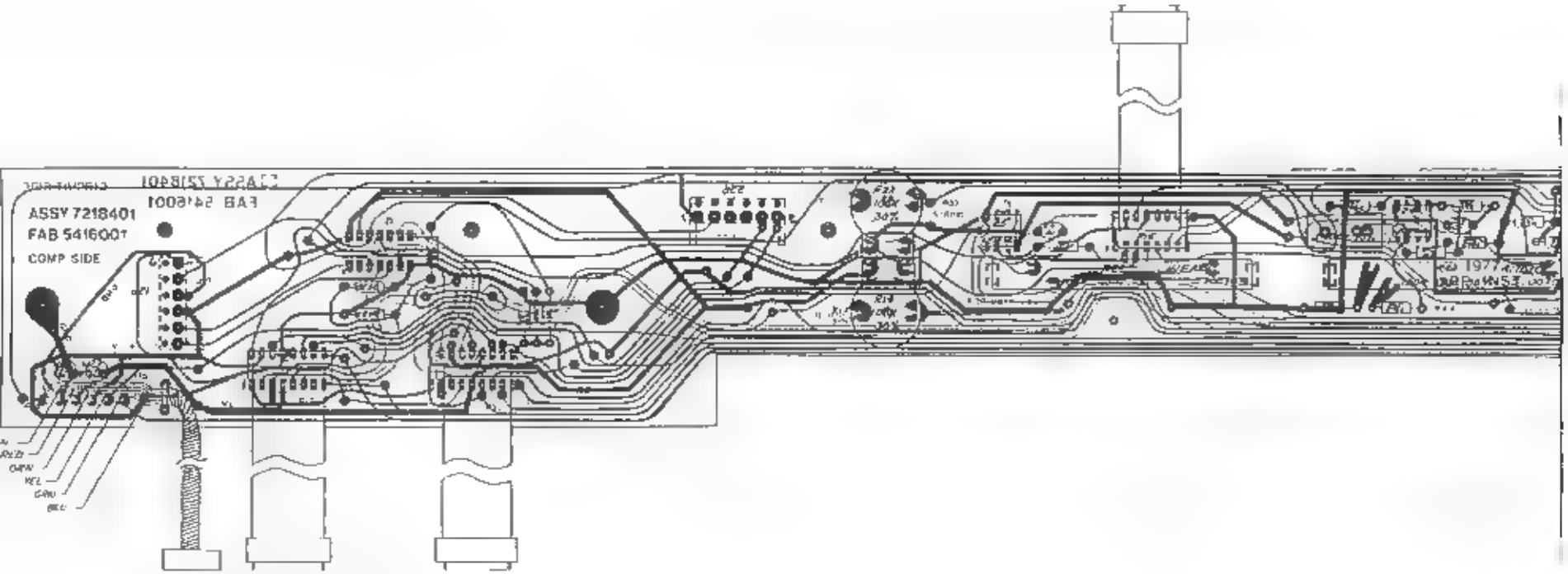


ARP

OMNI 2 MODEL 2470
SCHEMATIC
"SYNTHESIZER SWITCH BOARD
(ASSEMBLY BELOW)

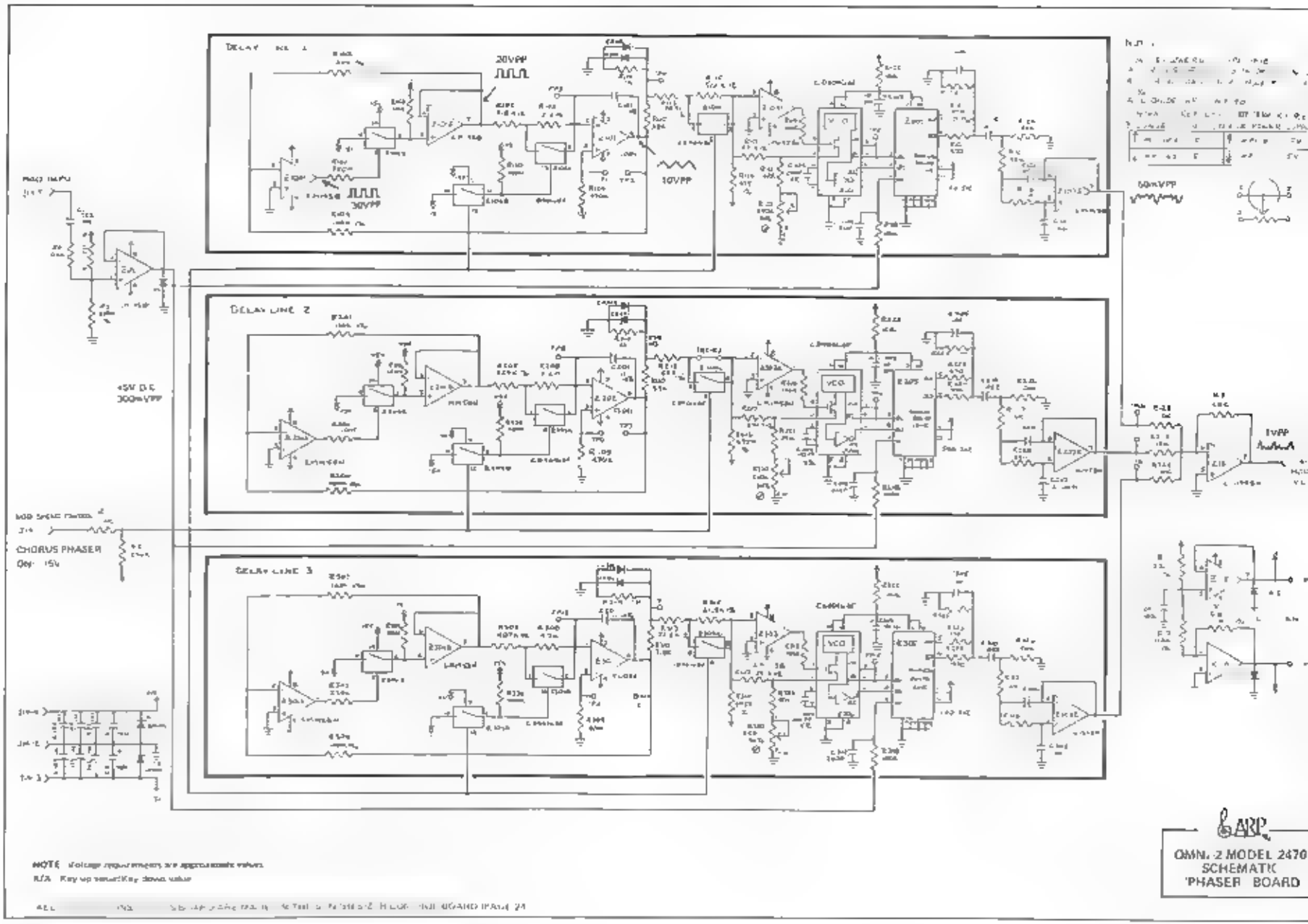






NOTES

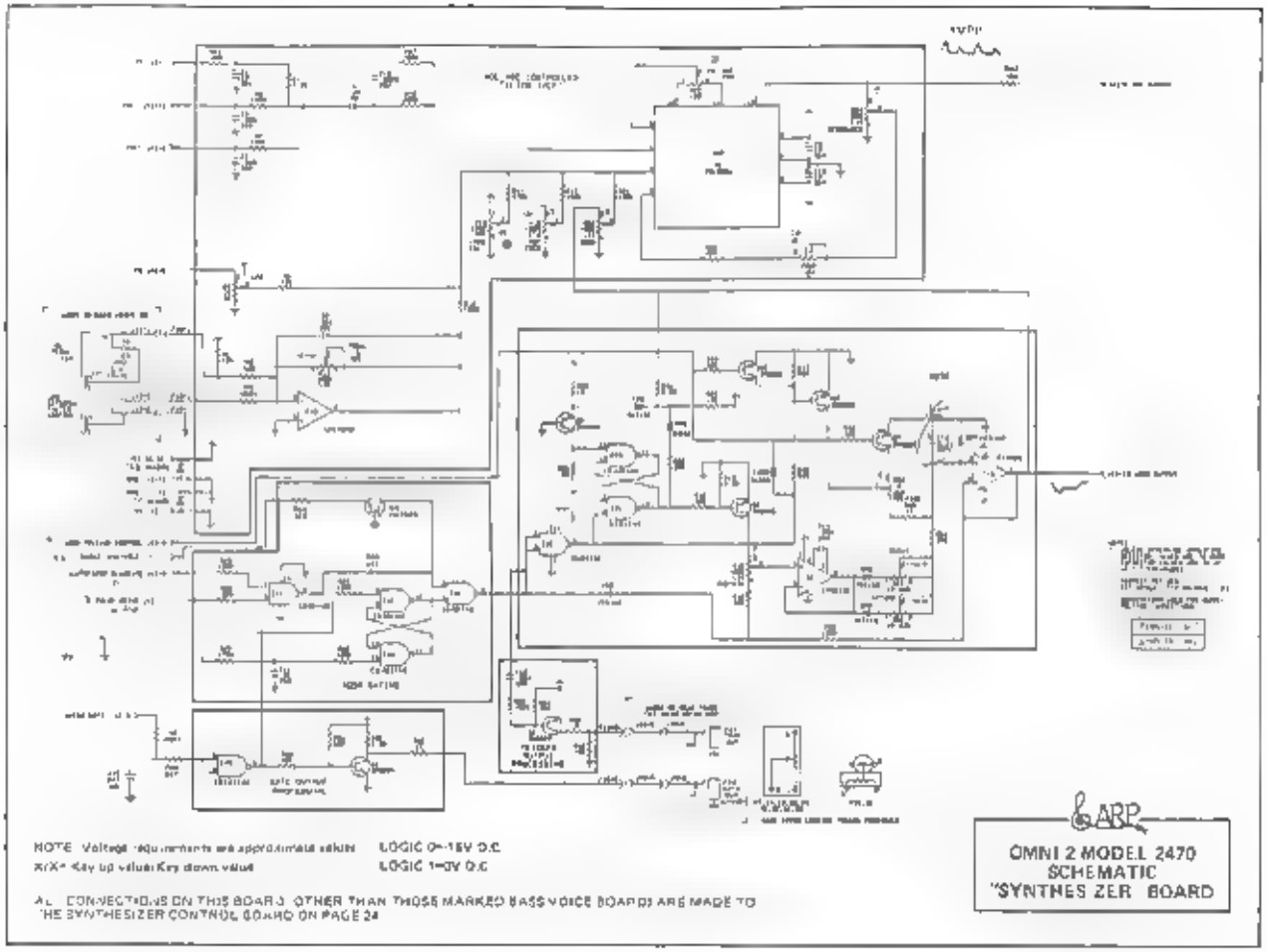
1. UNLESS OTHERWISE SPECIFIED
   RESISTOR VALUES ARE IN OHMS, 1/4W, 5%
   CAPACITOR VALUES ARE IN MFD 50V, 20%, MF POLYPHENYL
   ALL DIODES ARE 1N914



NOTE Voltage measurements are approximate values.
R/A Key up reading/Key down value

ARP

OMNI-2 MODEL 2470
SCHEMATIC
'PHASER' BOARD

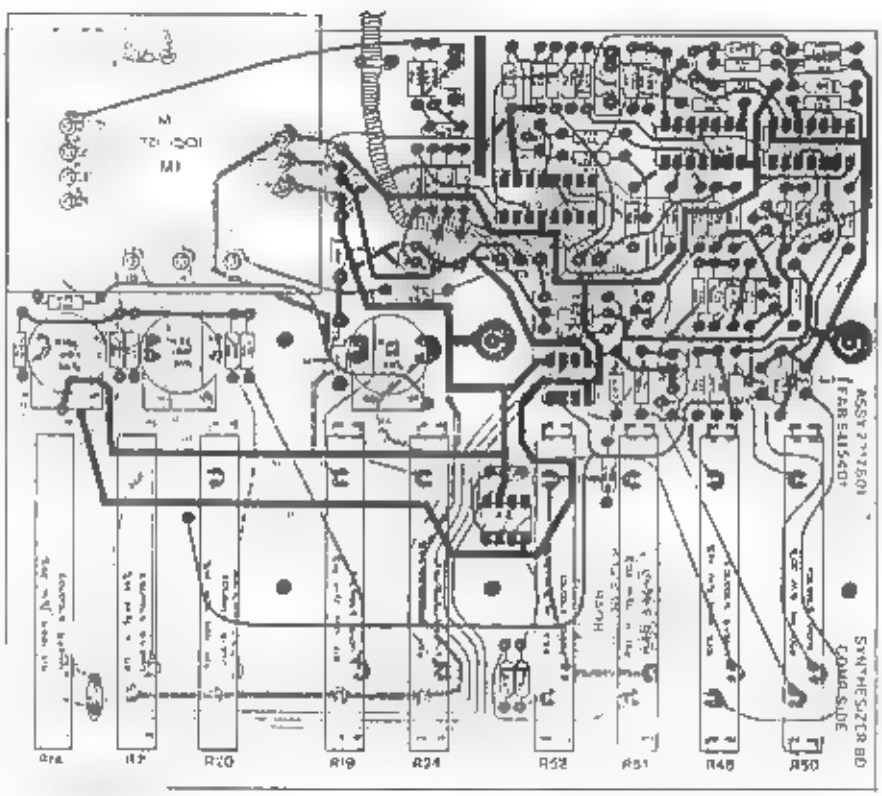


NOTE Voltage requirements are approximate values LOGIC 0=.15V D.C
X/X= Key up value/Key down value LOGIC 1=3V D.C

ALL CONNECTIONS ON THIS BOARD OTHER THAN THOSE MARKED BASS VOICE BOARD ARE MADE TO THE SYNTHESIZER CONTROL BOARD ON PAGE 24

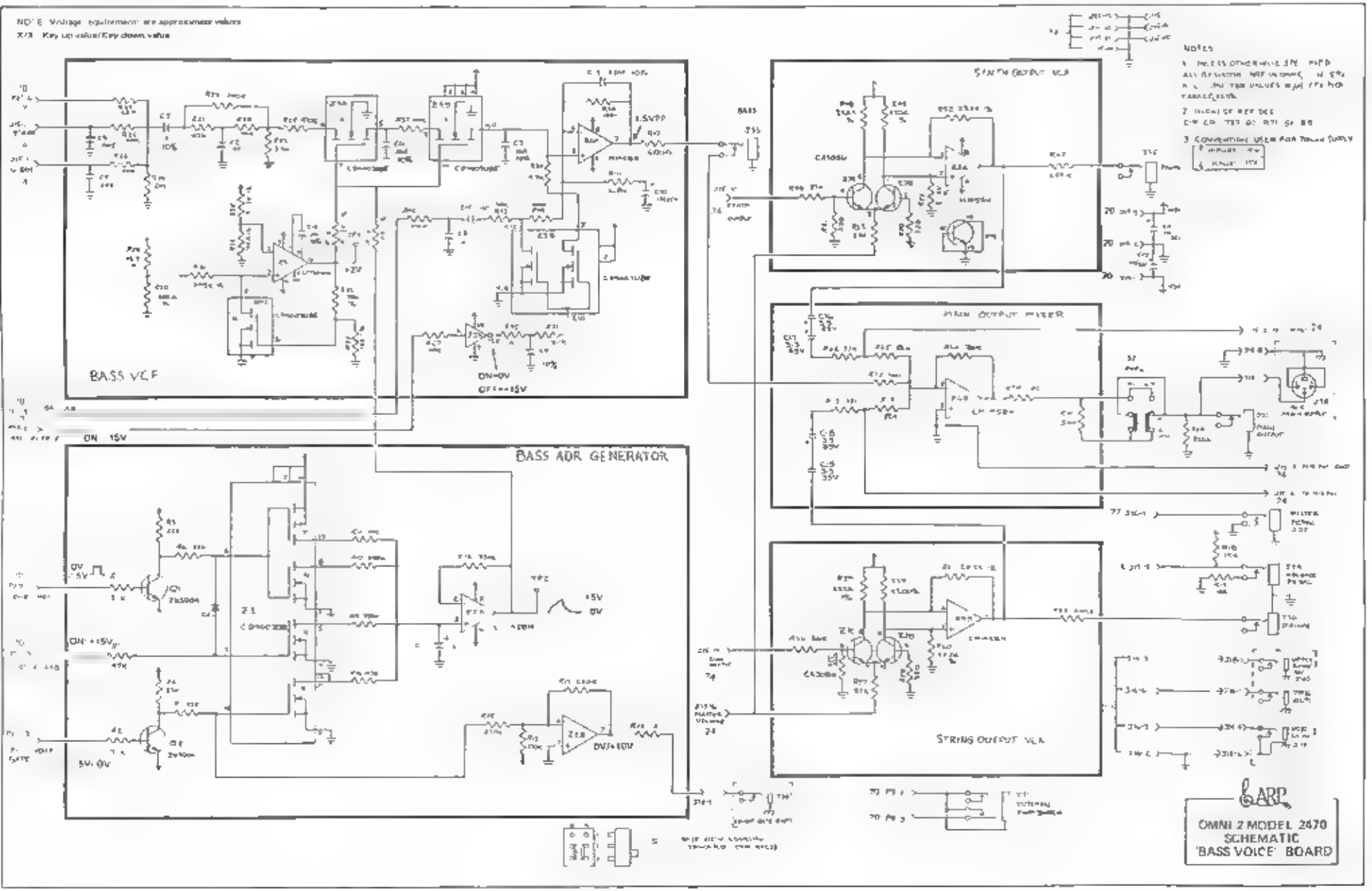
ARP

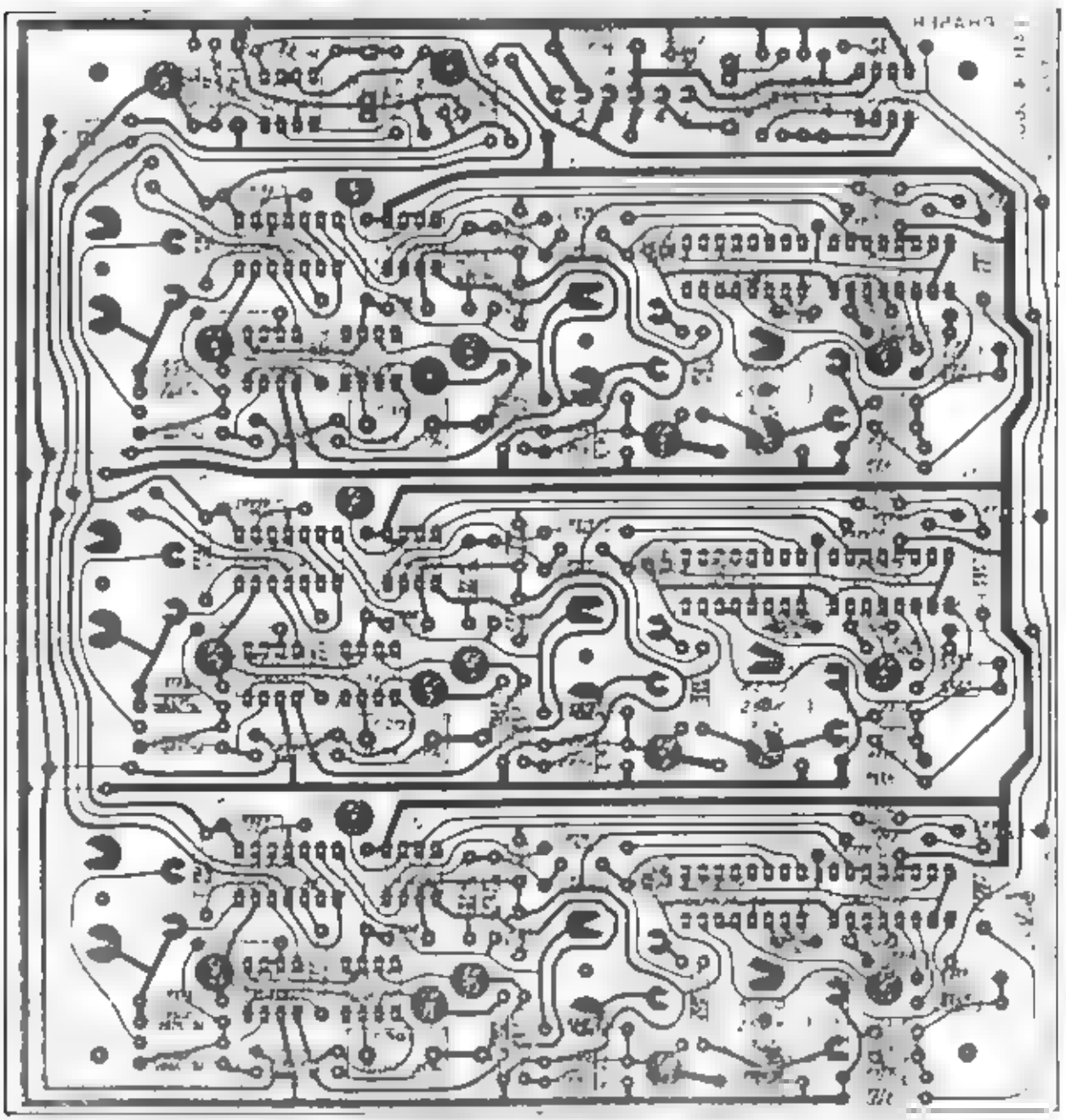
OMNI 2 MODEL 2470
SCHEMATIC
"SYNTHESIZER" BOARD



ARP

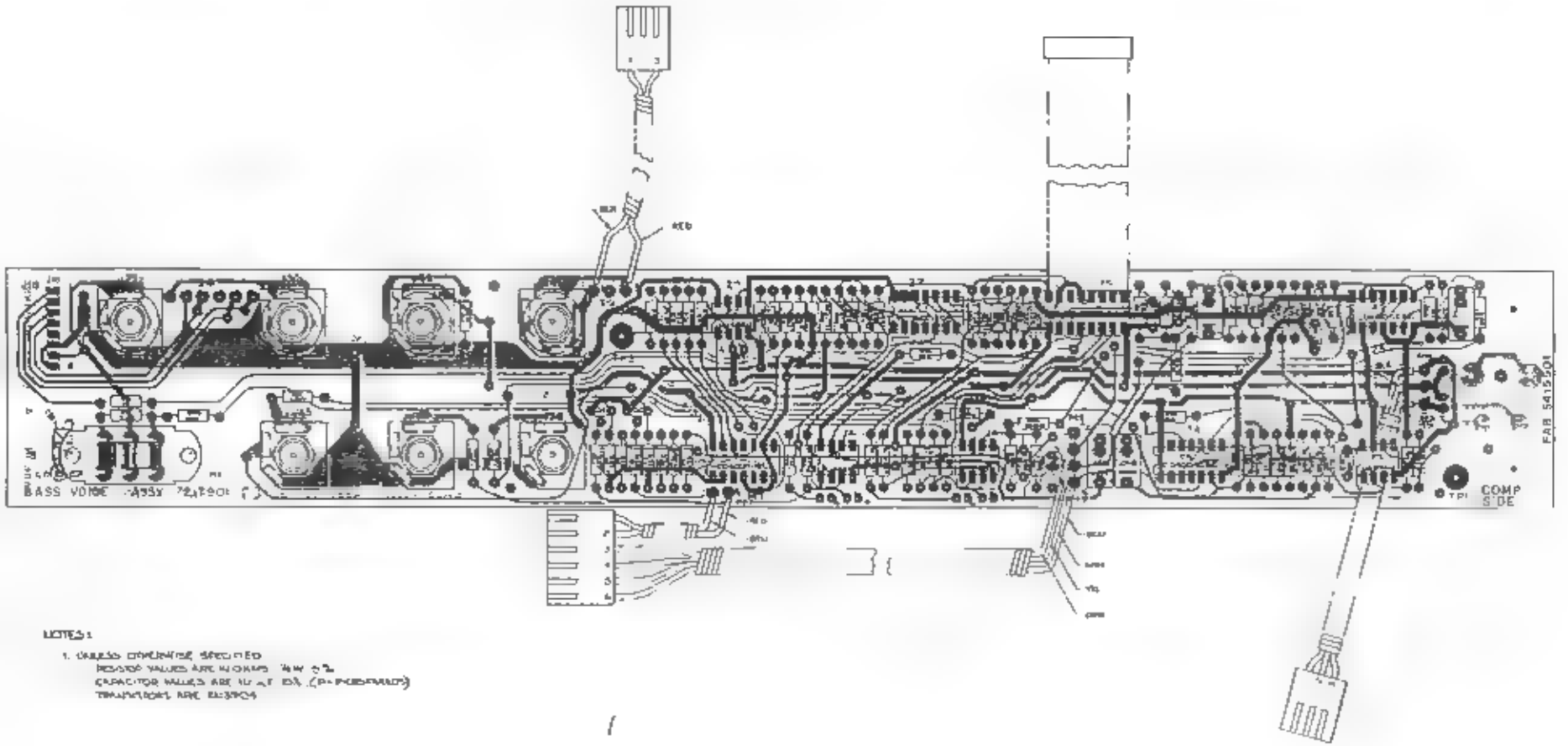
OMNI 2 MODEL 2470
ASSEMBLY
"SYNTHESIZER" BOARD


NOTE: Voltage requirements are approximate values
X/X: Key up value/Key down value
BASS VCF
BASS ADR GENERATOR
STRING OUTPUT VCA
MAIN OUTPUT MIXER
NOTES
OMNI 2 MODEL 2470
SCHEMATIC
'BASS VOICE' BOARD



ARP

OMNI 2 MODEL 2470
ASSEMBLY
"PHASER" BOARD

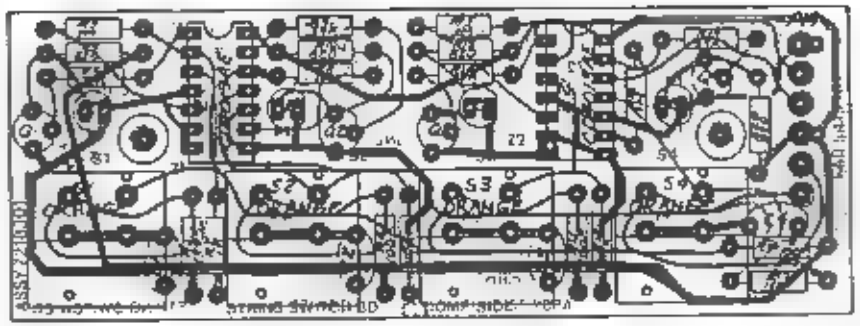


NOTES:

1. UNLESS OTHERWISE SPECIFIED
   RESISTOR VALUES ARE IN OHMS
   CAPACITOR VALUES ARE IN
   TRANSISTORS ARE

OMNI 2 MODEL 2470
ASSEMBLY
BASS BOARD

OMNI 2 MODEL 2470
SCHEMATIC
"STRING SWITCH" BOARD

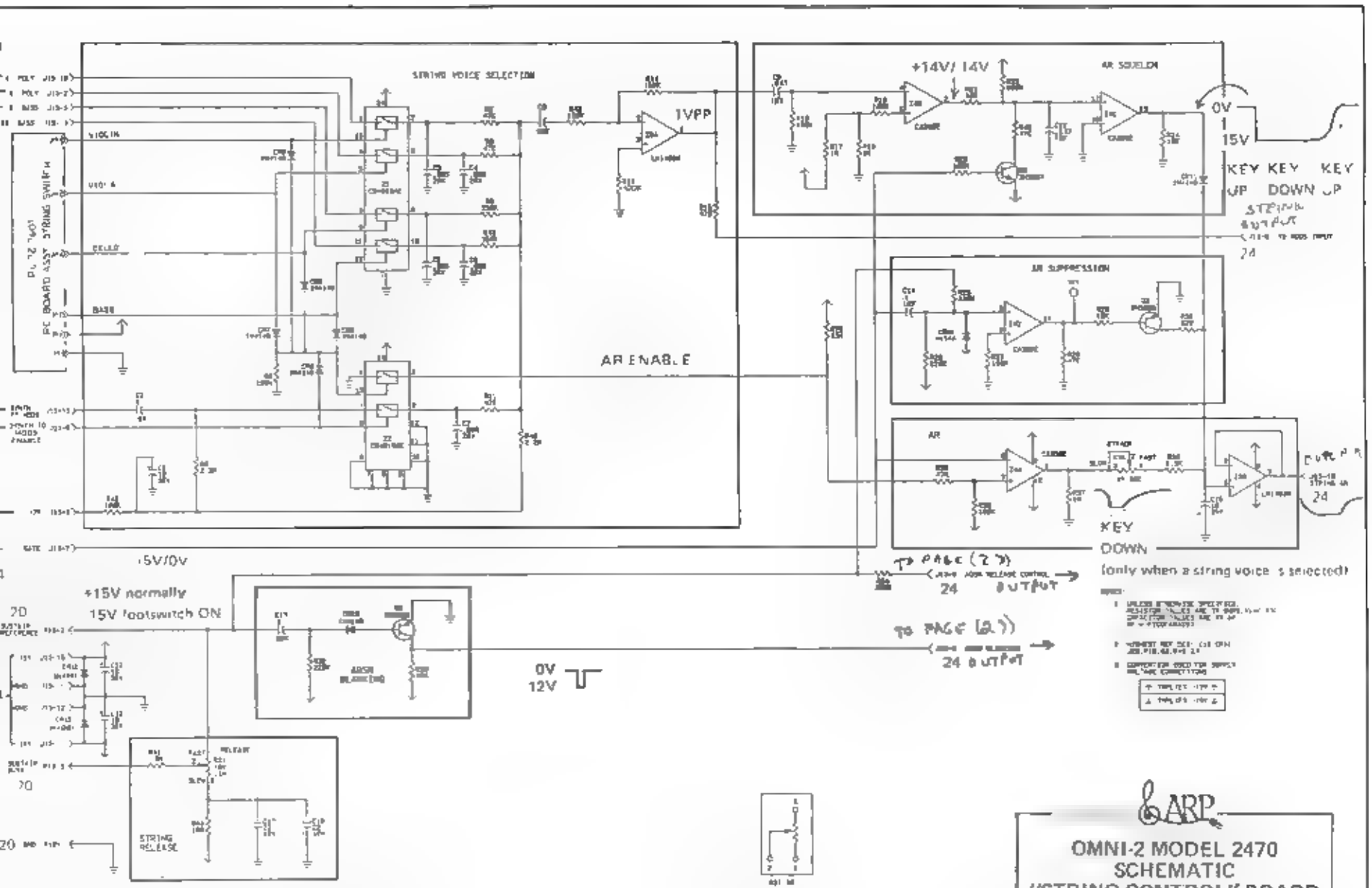


NOTES

1) UNLESS OTHERWISE SPECIFIED
RESISTOR VALUES ARE IN OHMS, ¼W, 5%
ALL CAPACITOR VALUES ARE .001μF, 50V, 20%
ALL DIODES ARE FLV360
ALL TRANSISTORS ARE 2N3904.

ARP

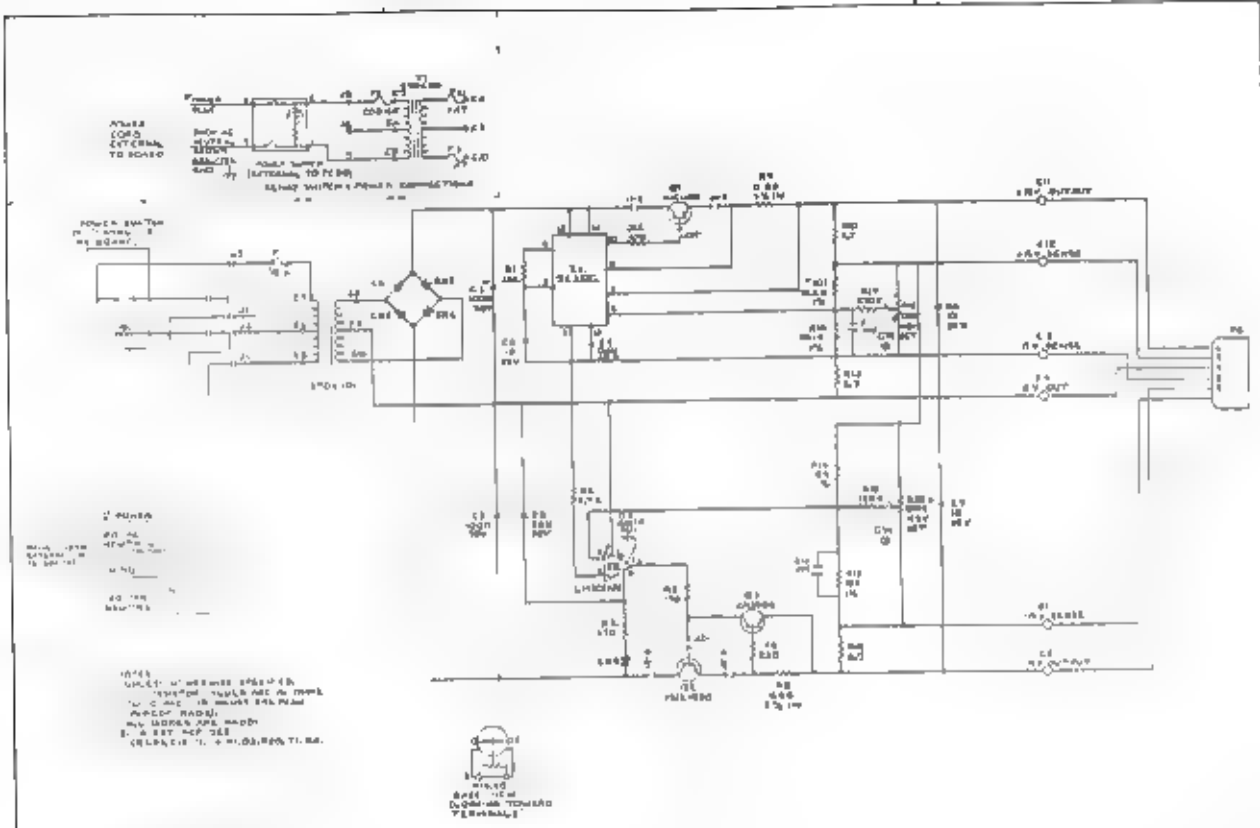
OMNI 2 MODEL 2470
ASSEMBLY
"STRING SWITCH" BOARD



NOTE Voltage requirements are approximate values
X X= Key up value Key down value

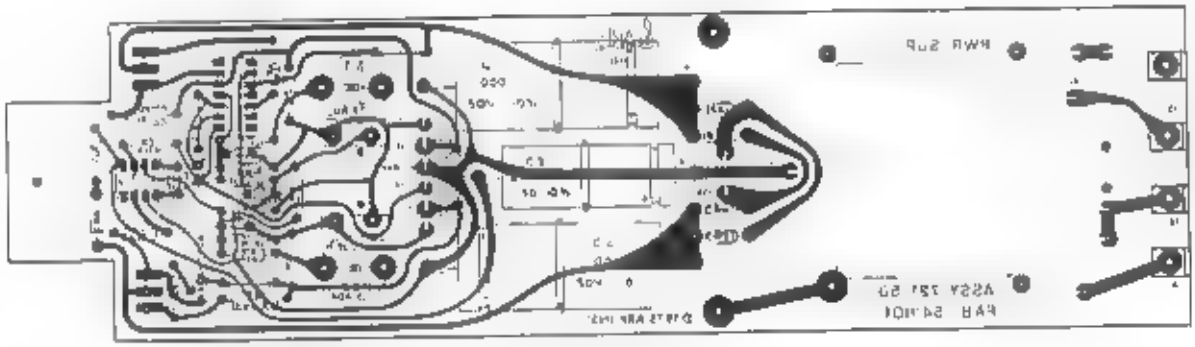
OMNI-2 MODEL 2470 SCHEMATIC "STRING CONTROL" BOARD

1

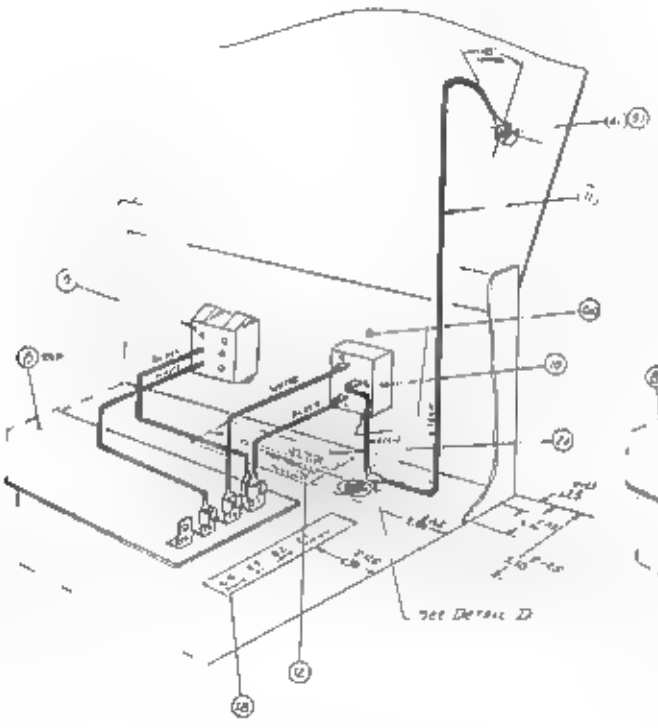


OMNI 2 MODEL 2470
SCHEMATIC
"POWER SUPPLY" BOARD

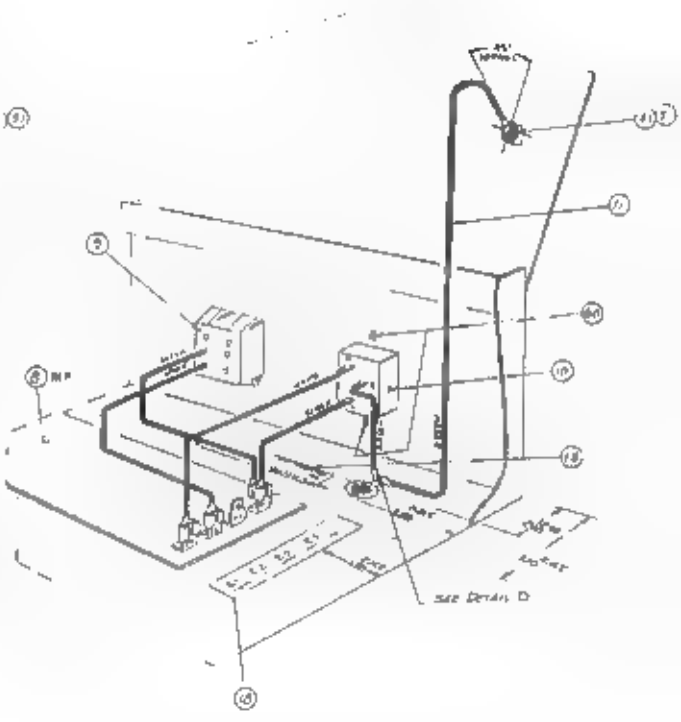
ALL CONNECTIONS ON THIS BOARD ARE MADE ON PAGE 20



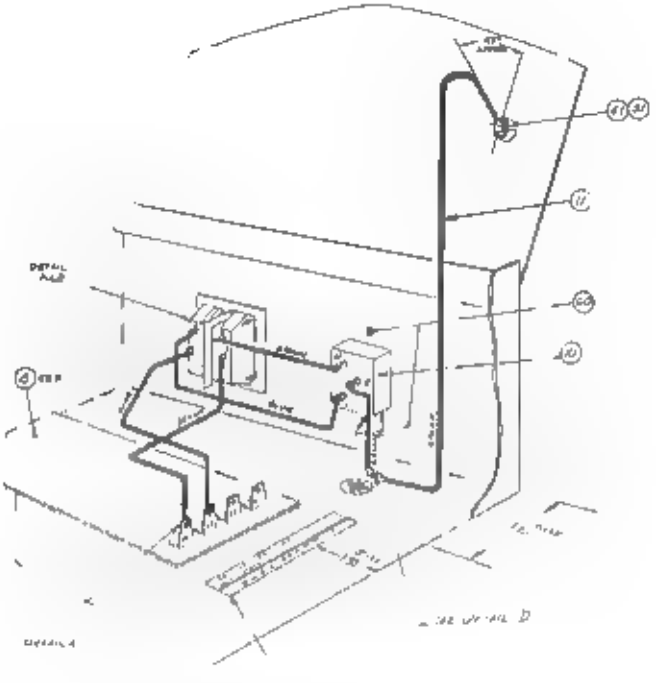
OMNI 2 MODEL 2470
ASSEMBLY
"POWER SUPPLY" BOARD



120V
CSA, LA



240V
STANDARD



240V
SEMKO

ARP

OMNI-2 MODEL 2470
WIRING DIAGRAM
"POWER SUPPLY" BOARD

UPPER VOICING BOARD

REFERENCE	ARP PART NUMBER	ARP/MFG NUMBER	DESCRIPTION
CR1-70	1200301	1N4148	DIODE, SIGNAL
CR71, 72	1200101	1N34A	DIODE, GE
Q1	1302701	2N5910	TSTR, PNP, HI SPD SW
Z1	1404201	CD4007UBE	IC, CMOS PR + INV
Z2	1405701	MK50240N	IC, TOP OCTAVE DIVIDER
Z3-8	1405201	CD4520BE	IC, DUAL BINARY UP COUNTER
Z9-16	1405801	CD4069UBE	IC, HEX INV
Z31, 38, 45, 50, 51, 53	1401201	TOA0470	IC, GATE 12 X 11 ORGAN
Z55-59	1406101	760-3-470	IC, RESNET, 14 PIN, 470 OHM
Z60-63	1406001	750-81-3.3K	IC, RESNET, 8 PIN, 3.3K
Z17-26	1406002	750-81-22K	IC, RESNET, 8 PIN, 22K
Z30, 32, 33, 38, 40, 54, 64	1405901	750-63-100K	IC, RESNET, 6 PIN, 100K
Z4, 6, 49, 52, 55	1406102	760-3-100K	IC, RESNET, 14 PIN, 100K
Z34, 37, 41, 44, 47	1405902	750-63-150K	IC, RESNET, 6 PIN, 150K, 150K
Z29, 35, 36, 42, 43, 48	1406103	760-3-150K	IC, RESNET, 14 PIN, 150K, 150K
C1	1101208	CM06FD132J03	CAP, MICA 1300PF, 100V, 5%
C2	1101207	CD15FC681J03	CAP, MICA 680PF, 100V, 5%
C4, 75	1100612	T390D106M035AS	CAP, TANT 10UF, 35V, 10%
C46-74	1100613	T392D226M025AS	CAP, TANT 22UF, 25V, 20%
L1	1500401	556-3341-24	COIL, 220UH, 20%
P3, 4	2101301	14-511-10	SOCKET, DUAL-IN-LINE, 14 PIN
P5, 6, 7	2200808	5142-004	CABLE, RIBBON, 16 X 4"

LOWER VOICING BOARD

CR114	1200101	1N34A	DIODE, GE
CR1-113, 115	1200301	1N4148	DIODE, SIGNAL
Z53	1400801	LM301AN	IC, OP AMPL
Z50	1401101	LM1458N	IC, OP AMPL, DUAL
Z52	1405401	LM339N	IC, QUAD COMP
Z2, 9, 14, 19	1401201	TOA0470	IC, GATE 12 X 11 ORGAN
Z51	1404301	CD4001UBE	IC, GATE 4 X 2I NOR
Z49	1404402	CD4013BE	IC, DUAL D FF R/S
Z48	1404201	CD4007UBE	IC, CMOS PR + INV
Z33-39	1404601	CD4025UBE	IC, GATE 3 X 3I NOR
Z45-47	1405801	CD4069UBE	IC, HEX INV
Z40-44	1405101	CD4071BE	IC, GATE 4 X 2I OR
Q1-26, 31	1302901	2N3904	TSTR, NPN, GP
Z27, 30, 32	1303001	2N3906	TSTR, PNP, GP
Z28, 29	1300401	2N2907A	TSTR, PNP, GP
Z21, 23, 25	1406101	760-3-470	IC, RESNET, 14 PIN, 470 OHM
Z22, 24, 26	1406001	750-81-3.3K	IC, RESNET, 8 PIN, 3.3K
Z27-32	1406002	750-81-22K	IC, RESNET, 8 PIN, 22K
Z4, 10, 12, 20	1405901	750-63-100K	IC, RESNET, 6 PIN, 100K
Z3, 8, 13, 18	1406102	760-3-100K	IC, RESNET, 14 PIN 100K
Z1, 5, 11, 15	1405902	750-63-150K	IC, RESNET, 6 PIN, 150K, 150K
Z6, 7, 16, 17	1406103	760-3-150K	IC, RESNET, 14 PIN, 150K, 150K
C83, 84	1100612	T390D106M035AS	CAP, TANT 10UF, 35V, 20%
C1-20	1100613	T39D226M025AS	CAP, TANT 22UF, 25V, 20%
C85	1101701	TAD250TJ10	CAP, ELECT 250UF, 10V, 50-10
J5-7, 11	2101302	16-511-10	SOCKET, DUAL-IN-LINE, 16 PIN
P1, 2	2101301	14-511-10	SOCKET, DUAL-IN-LINE, 14 PIN
J17	7518101	————	CABLE B ASSY

STRING SWITCH BOARD

REFERENCE	ARP PART NUMBER	ARP/MFG NUMBER	DESCRIPTION
Q1-4	1302901	2N3904	TSTR, NPN, GP
Z1, 2	1404402	CD4013BE	IC, DUAL D FF R/S
S1-4	1902903	DIGITAST-ST	SWITCH, PSHBT, SPDT, ORANGE

STRING CONTROL BOARD

CR5-11	1200301	1N4148	DIODE, SIGNAL
CR12, 13	1200201	1N4001	RECTIFIER, 50V, 1A
CR14	1200101	1N34A	DIODE
Q2	1302901	2N3904	TSTR, NPN, GP
Q1, 3	1303001	2N3906	TSTR, PNP, GP
Z1, 2	1404501	CD4016BE	IC, QUAD BILAT SW
Z3	1401101	LM1458N	IC, OP AMPL, DUAL
Z4	1405401	CA339E	IC, QUAD COMP
R36	5700701	5700701	POT, SLIDE, AUD 1M, 1/3W, 30%
R31	5700705	5700705	POT, SLIDE LIN 10K, 1/3W, 30%
C1, 11, 12, 15	1100512	T390D106M035AS	CAP, TANT 10UF, 35V, 20%
C17, 18	1100501	T390D226M016AS	CAP, TANT 22UF, 16V, 20%
J13	2101302	16-511-10	SOCKET, DUAL-IN-LINE, 16 PIN
P10	7518002	———	CABLE, 3 PIN, RED/BLK/SHLD
J19	2101803	09-52-3062	CONNECTOR, 6 PIN

SYNTHESIZER SWITCH BOARD

Q1-6, 8	1302901	2N3904	TSTR, NPN, GP
Q7	1303001	2N3906	TSTR, PNP, GP
Z1-4	1404402	CD4013BE	IC, DUAL D FF R/S
S1-3, 6-8	1902903	DIGITAST-ST	SWITCH, PSHBT, SPDT, ORANGE
S4, 5	1902902	DIGITAST-ST	SWITCH, PSHBT, SPDT, WHITE

SYNTHESIZER CONTROL BOARD

CR5, 6, 13, 14	1200301	1N4148	DIODE, SIGNAL
Q1	1302901	2N3904	TSTR, NPN, GP
Z2	1400501	CA3086	IC, TSTR ARRAY
Z3, 4, 5	1401101	LM1458N	IC, OP AMPL, DUAL
Z1	1404501	CD4016BE	IC, QUAD BILAT SW
R44	5700702	5700702	POT, SLIDE, AUD, 100K, 1/3W, 30%
R22, 23, 51	5700703	5700703	POT, SLIDE, LIN, 100K, 1/3W, 30%
C12	1100511	T390C335K035AS	CAP, TANT 3.3UF, 35V, 10%
C1, 2	1100512	T390D106M035AS	CAP, TANT 10UF, 35V, 20%
J21, 22	2101803	09-52-3062	CONNECTOR, 6 PIN
P15	2200806	5142-015	CABLE, RIBBON, 16 X 15"
P13	2101302	16-511-10	SOCKET, DUAL-IN-LINE, 16 PIN
P11	2200805	5142-009	CABLE, RIBBON, 16 X 9"
P12	2200806	5142-004	CABLE, RIBBON, 16 X 4"
J14	7518102	———	CABLE, 6 PIN, 12" LG.

PHASER BOARD

REFERENCE	ARP PART NUMBER	ARP/MFG NUMBER	DESCRIPTION
CR1, 2	1200201	1N4001	RECTIFIER, 50V, 1A
CR3, 4, 5, 101, 102, 201, 202, 301, 302	1200301	1N4148	DIODE, SIGNAL
Z1, 2, 101, 103, 201, 203, 301, 303	1401101	LM1458N	IC, OP AMPL, DUAL
Z104, 204, 304	1404601	CD4016BE	IC, QUAD BILAT SW
Z105, 205, 305	1408601	SAD-512	IC, ANALOG DELAY LINE
Z106, 206, 306	1406501	CD4046AE	IC, PHASE-LOCKED LOOP
R120, 220, 320	1000917	U201R254B	POT, ROT TRIM 250K, ¼W, 30%
C104, 304	1101216	ADM-15-271J	CAP, MICA 270PF, 500V, 5%
C204	1101218	ADM-15-471J	CAP, MICA 470PF, 500V, 5%
C3, 4, 103, 203,	1100612	T390D106M035AS	CAP, TANT 10UF, 35V, 20%

SYNTHESIZER BOARD

CR2, 3, 4, 5, 6, 7	1200301	1N4148	DIODE, SIGNAL
CR8, 9	1200201	1N4001	RECTIFIER, 50V 1A
CR10	1200101	1N34A	DIODE
Q1	1302901	2N3904	TSTR, NPN, GP
Q2, 3, 4, 5, 6, 7, 8	1303001	2N3906	TSTR, PNP, GP
Z2	1400801	LM301AN	IC, OP AMPL
Z1	1401101	LM1458N	IC, OP AMPL, DUAL
Z3, 4	1400501	CD4011UBE	IC, GATE 4X2I NAND
R54	1000909	U201R103B	POT, ROT TRIM 10K, ¼W, 30%
R22	1000901	U201R101B	POT, ROT TRIM 100 OHM, ¼W, 30%
R16	1000915	U201R104B	POT, ROT TRIM, 100K, ¼W, 30%
R7	5700704	5700704	POT, SLIDE, LIN, 1K, 1/3W, 30%
R14, 19, 20, 24, 45	5700703	5700703	POT, SLIDE, LIN, 100K, 1/3W, 30%
R50, 51, 52	5700701	5700701	POT, SLIDE, AUD, 1M, 1/3W, 30%
C13	1100611	T390C335K035AS	CAP, TANT 3.3UF, 35V, 10%
C1, 9, 10	1100612	T390D106M035AS	CAP, TANT 10UF, 35V, 10%
J12	2101302	16-511-10	SOCKET, DUAL-IN-LINE, 16 PIN
P16	7518702	————	CABLE ASSY, 6 PIN, 16" LG.
M1	7210501	————	PC BD, VCF 4075

BASS VOICE BOARD

CR1	1200301	1N4148	DIODE, SIGNAL
Q1, 2	1302901	2N3904	TSTR, NPN, GP
Z1, 4, 5	1404201	CD4007UBE	IC, CMOS PR + INV.
Z3	1400801	LM301AN	IC, OP AMPL
Z2, 6, 8	1401101	LM1458N	IC, OP AMPL, DUAL
Z7	1400501	CA3086	IC, TSTR ARRAY
C1	1100608	T390B105K035AS	CAP, TANT 1UF, 35V, 10%
C10-12	1100612	T390D106M035AS	CAP, TANT 10UF, 35V, 20%
C15-19	1100611	T390C335K035AS	CAP, TANT 3.3UF, 35V, 10%
J18	2104403	22-03-2081	CONN, 8 PIN WAFER
J31	2104001	113B	JACK, STEREO
J32-37	2104001	112A	JACK, HI-G, 2 COND
J15	2101302	16-511-10	SOCKET, DUAL-IN-LINE, 16 PIN
S1	1902401	01-481-0006	SWITCH, SLIDE, DPDT
P9	7518502	————	CABLE, 2 COND, 3 PIN
P18	7502805	————	CABLE, POWER
P27	7527601	————	CABLE, 6 PIN, 12" LG.

POWER SUPPLY

REFERENCE	ARP PART NUMBER	ARP/MFG NUMBER	DESCRIPTION
CR1,2,3,4,5	1200201	1N4001	RECT, 50V, 1A
Q3	1303001	2N3906	TSTR, PNP, GP
Z1	1401301	7812C	IC, VOLTAGE REGULATOR
Z2	1400601	LM301AN	IC, OP AMPL
R7,8	1000111	BW-20	RES, WW, TC, 0.68 OHM, 1W, 5%
R19,20	1000918	U201R104B	POT, ROTARY TRIM, 100K, ¼W, 30%
C8	1100609	G-0-001-G-20-0	CAP, TANT, 1UF, 35V, 20%
C5,7	1100612	G-0-010-G-20-0	CAP, TANT, 10UF, 35V, 20%
C3	1101702	TAQ250TQ50	CAP, ELECT, 250UF, 50V, +50-10%
C1,2	1101301	TGW102V050N1R3P	CAP, ELECT, 1000UF, 50V, +75-10%
Q1	1304501	MJE1100	TSTR, NPN, PWR DARL
Q2	1304301	MJE1090	TSTR, PNP, PWR DARL
T1	5704401		TRANSFORMER, POWER
F1	1700404	MDV-1/2	FUSE, PIGTAIL, SLO-BLO 1/2A 250V

MISCELLANEOUS

	5704702	5704702	DIODE REWORK GREEN .912
	5704502	5704502	DIODE REWORK RED .912
	5204102	5204102	KNOB RED
	5204103	5204103	KNOB YELLOW
	5204104	5204104	KNOB GREEN
	5204106	5204106	KNOB WHITE
	2103101	D3M	CONN RECP 3-PIN
	2101601	42A	JACK TINI
	2104502	EAC301	CONN RECP AC 3-PIN
	2106001	4.000.024.0	CONN RECP 240V SEMKO
	7500301	8000-010	POWER SWITCH ASSY
	2400101	1⅛	RUBBER FOOT
	2303703	2303703	SCREW MACH HWH 6-32 x 5/16
	2300205	2300205	SCREW MACH PH CR 6-32 x 3/8
	2303602	2303602	SCREW MACH HWH 6-32 x 5/16
	2300203	2300203	SCREW MACH PH CR 6-32 x 1/2
	2307003	2307003	HEX NUT 6 x 32
	2306104	2306104	WASHER LOCK NO. 6
	2306303	2306303	WASHER EXT TOOTH NO. 6
	2200805	5142-009	CABLE RIBBON 26 AWG 16 PIN 9 IN
	2200808	5142-004	CABLE RIBBON 26 AWG 16 PIN 4 IN
	2200809	5132-024	CABLE RIBBON 26 AWG 14 PIN 24 IN
	5204001	5204001	ENDBLOCK LEFT
	5204002	5204002	ENDBLOCK RIGHT

PARTS ORDERING

Telephone: 617/861-6000, Service Department

Replacement parts can be ordered in writing or by phone. Contact the ARP Service Department and use the ARP part number when ordering. *A five dollar minimum is required unless the order is received with cash in advance. No collect calls will be accepted.*