

**KORG**

**STRINGS SYNTHESIZER**

**DL-50**

**Service Manual**

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**KEIO ELECTRONIC LABORATORY CORPORATION  
TOKYO/JAPAN**

# 1. SPECIFICATIONS

KEYBOARD ..... ● C ~ C 49 keys

## ◀SYNTHESIZER SECTION▶

SIGNAL GENERATORS x 5 ..... ● 16', 8', 4', 2', White Noise  
VOLTAGE CONTROLLED FILTER .. ● Cut-off Frequency, Resonance, EG Depth,  
Filter Mode (Bandpass/Lowpass), KBD Follower (On/Off)  
ENVELOPE GENERATOR ..... ● Attack Time, Decay Time, Sustain Level, Release Time,  
VCA EG Mode ( , Trigger Mode (Single/Multiple



## ◀STRINGS SECTION▶

OCTAVE ..... ● OCT Balance (16' ~ 8')  
ENVELOPE GENERATOR ..... ● Attack, Release, Trigger Mode (Single/Multiple)  
EQUALIZER ..... ● Low, High

## ◀CONTROL SECTION▶

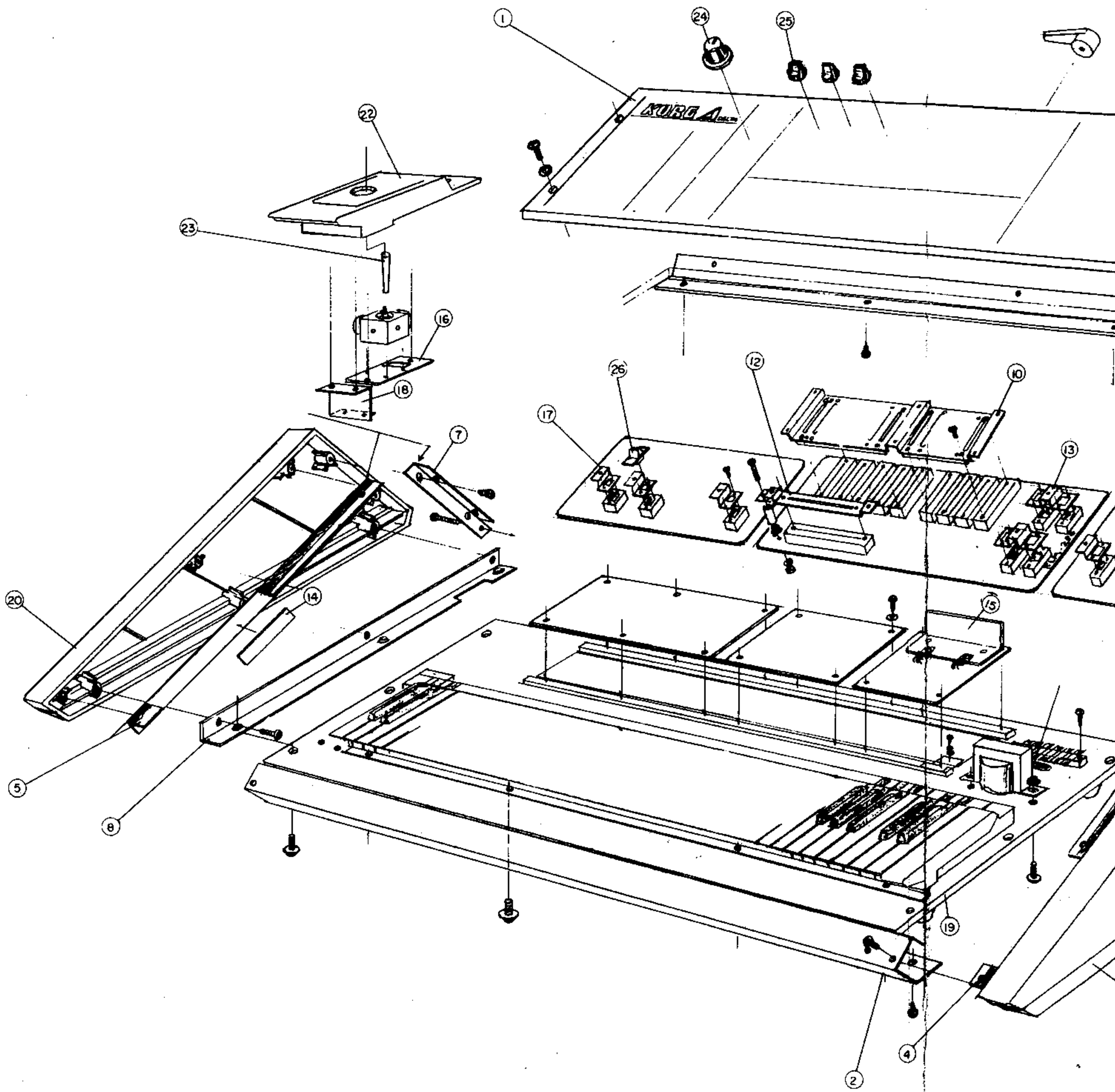
JOY STICK ..... ● Pitch Bend, Vibrato Depth/Noise Modulation Depth  
SIGNAL GENERATOR ..... ● FM Depth, On/Off  
VCF ..... ● fcM Depth, On/Off  
MODULATION GENERATOR ..... ● Vibrato Depth, Speed  
TUNE ..... ● Tune ( $\pm 100$  cents), Octave (Up/Normal)  
VOLUME ..... ● Synthesizer, Strings, Power & Volume

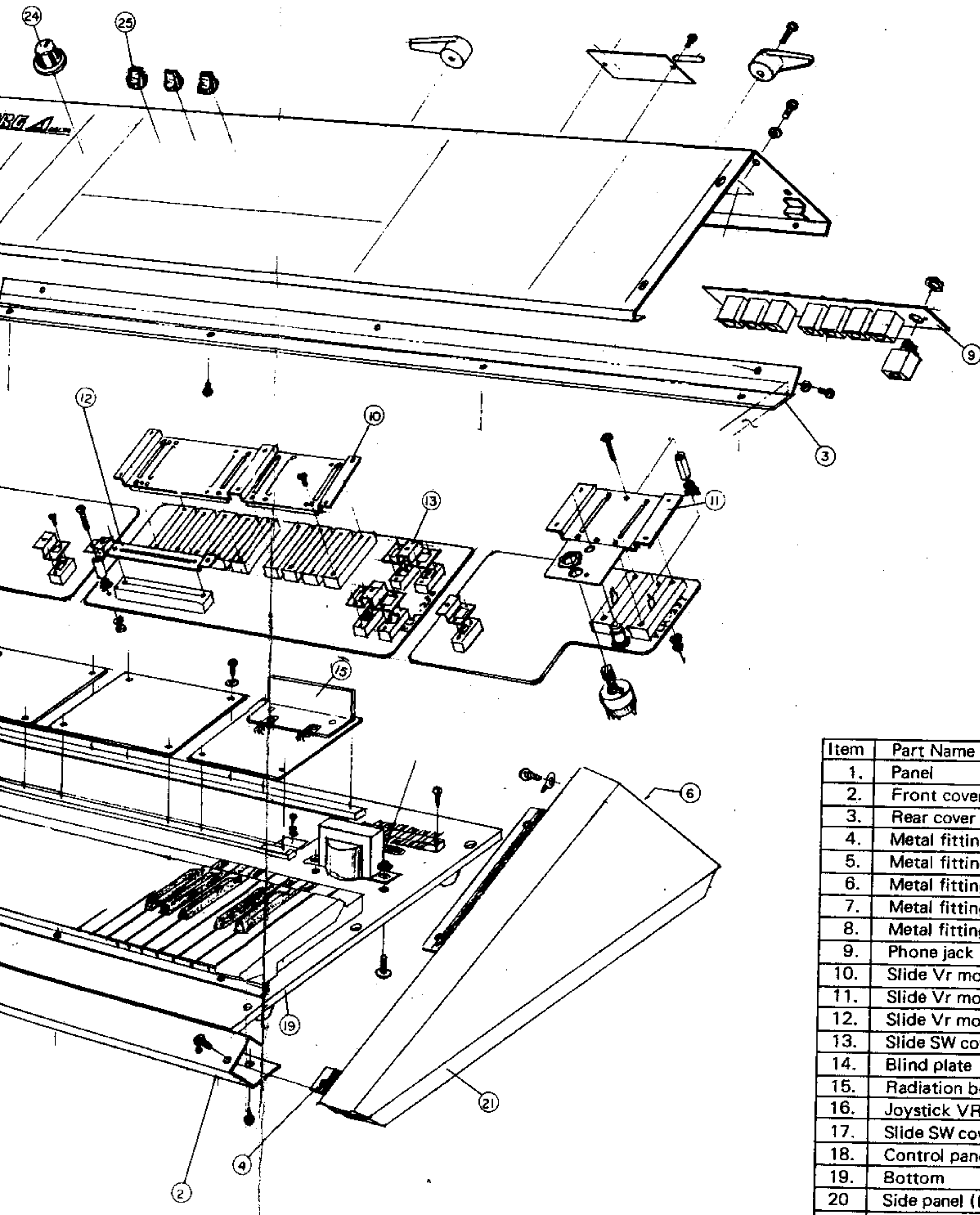
## ◀INPUTS & OUTPUTS▶

OUTPUTS ..... ● Headphones Output, Mix Outputs x 2 (High/Low), Separate  
Outputs x 2 (Synthe/Strings), Trigger Output ( )  
INPUTS ..... ● VCF fcM in (-5V ~ +5V), Trigger in ( )

DIMENSIONS ..... ● 836(W) x 153(H) x 378(D) mm  
WEIGHT ..... ● 10kg  
ACCESSORIES ..... ● Dust Cover, Connection Cord  
POWER CONSUMPTION ..... ● Voltage (Local Voltage, 50/60Hz), Wattage (15W)

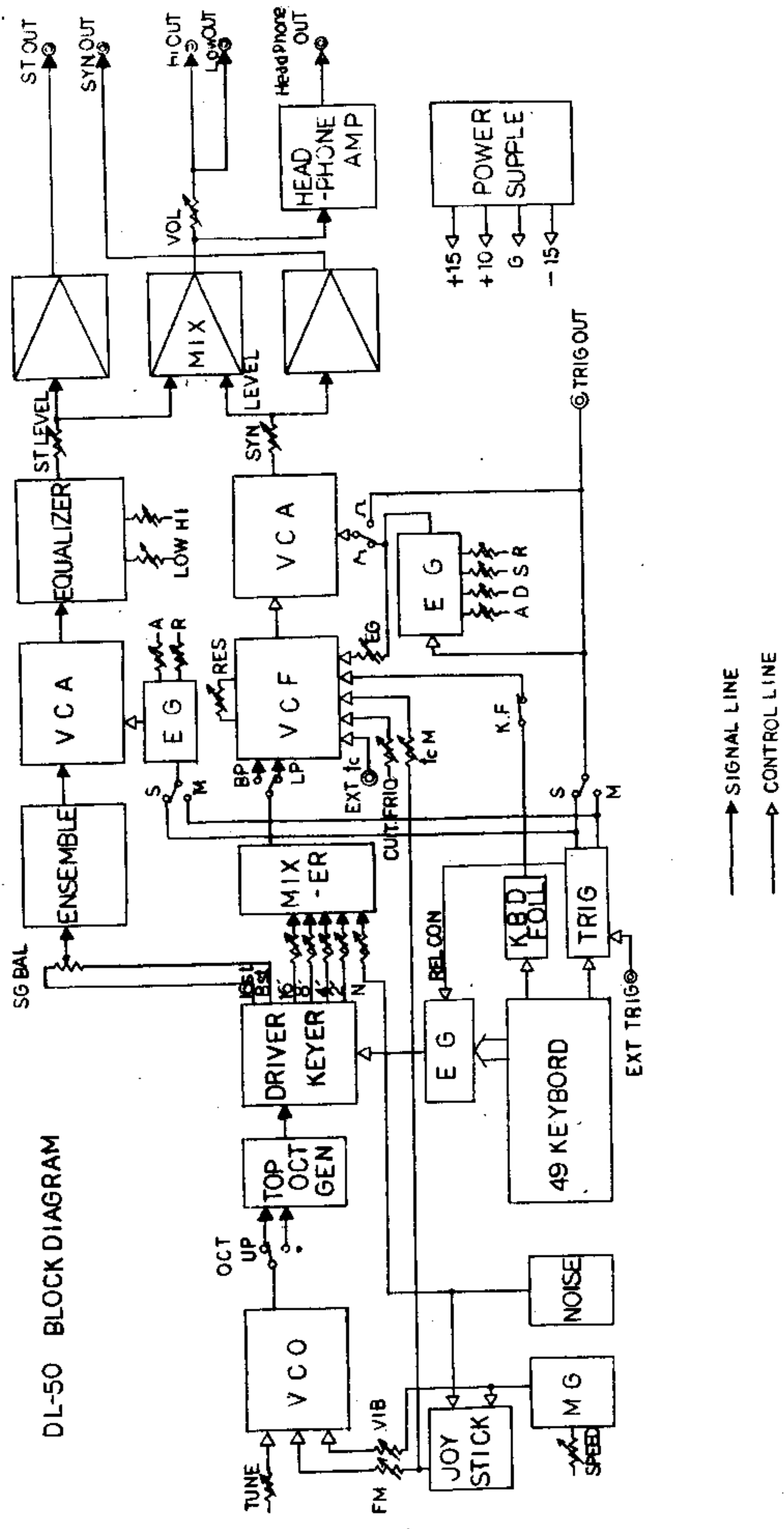
# 2. STRUCTURAL DIAGRAM



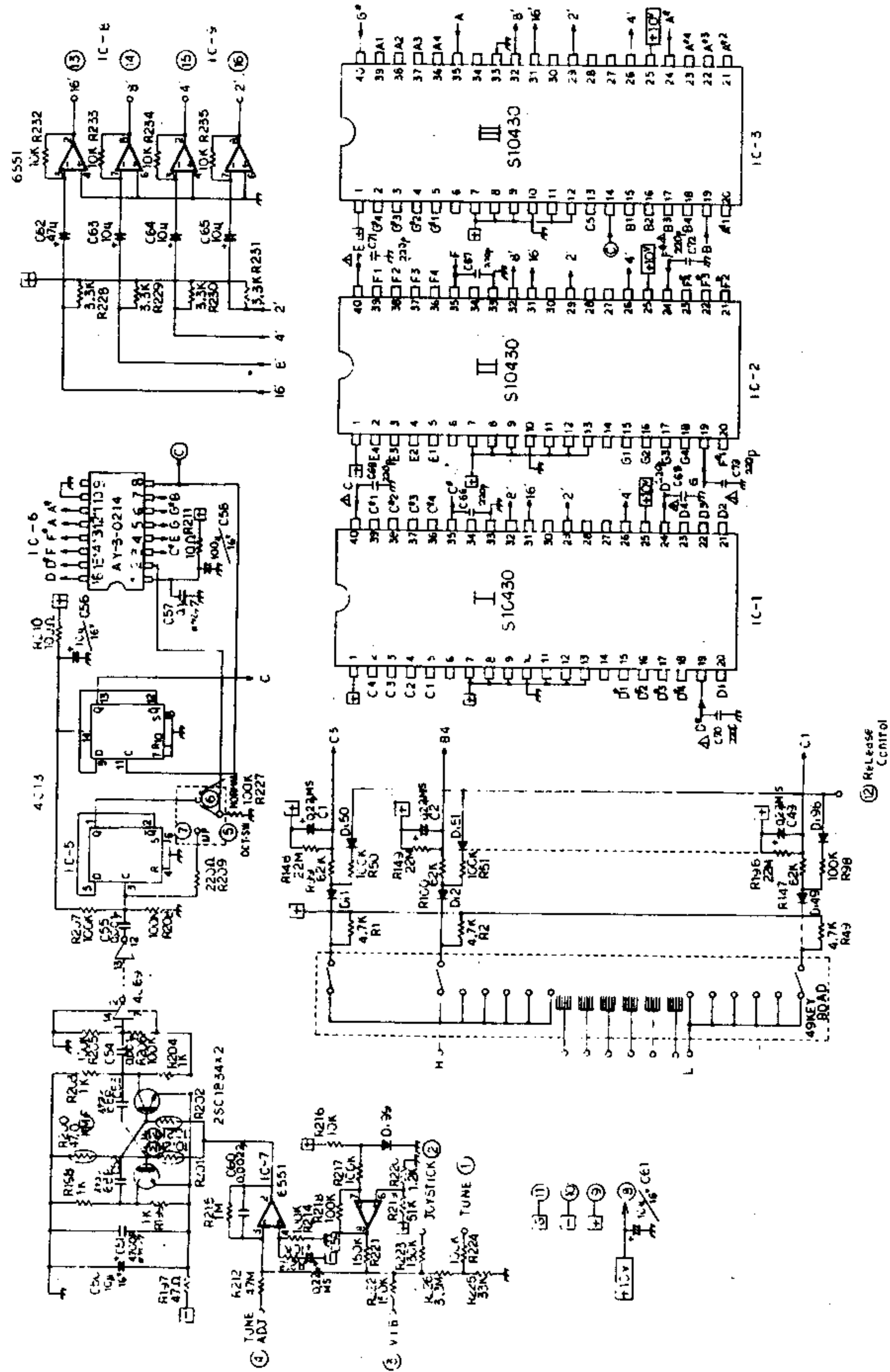


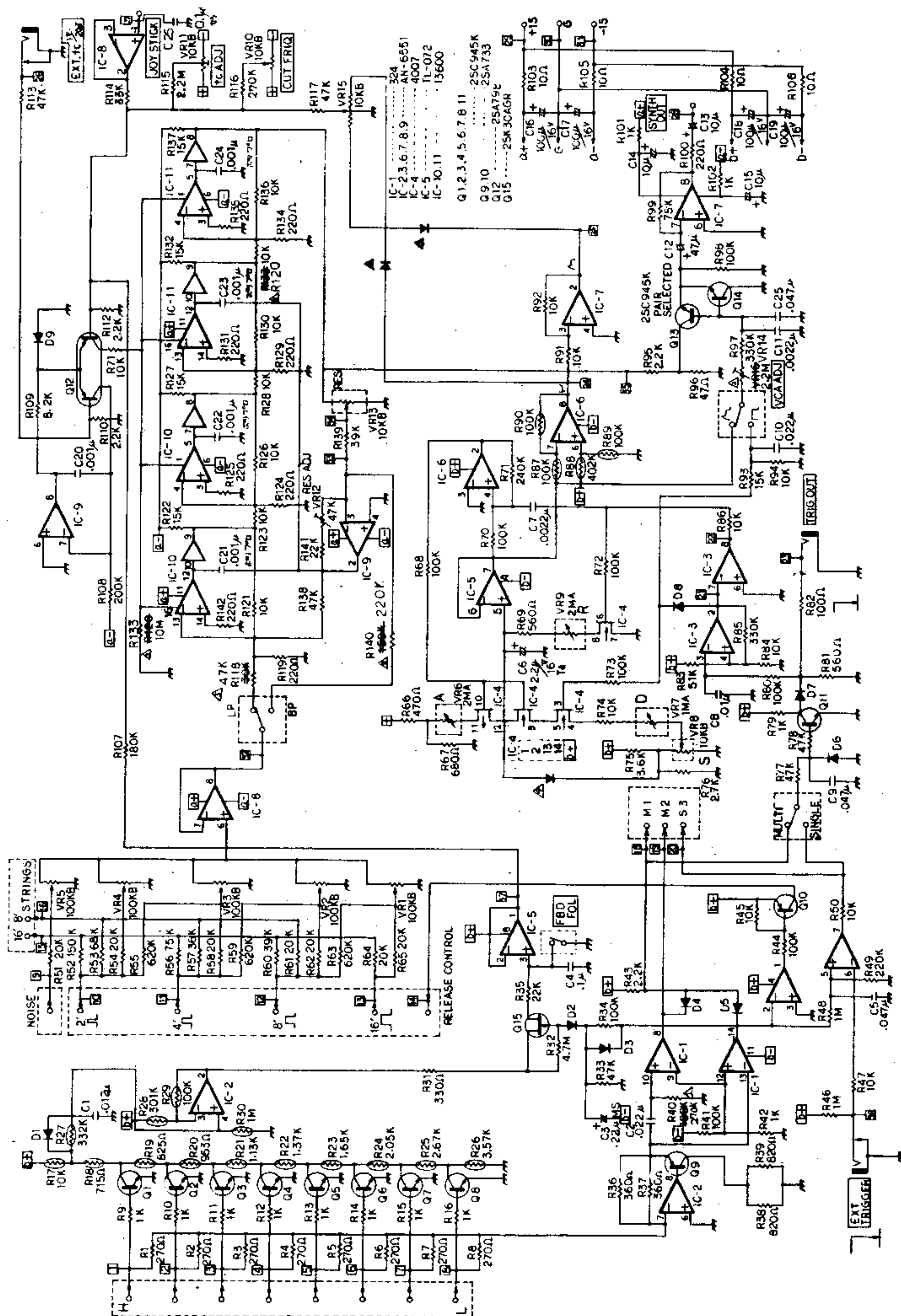
Item	Part Name	Remarks
1.	Panel	
2.	Front cover	
3.	Rear cover	
4.	Metal fitting of front panel: (A) Right	
5.	Metal fitting of front panel: (A) Left	
6.	Metal fitting of front panel: (B) Right	
7.	Metal fitting of front panel: (B) Left	
8.	Metal fitting of side panel	
9.	Phone jack mounting board	
10.	Slide Vr mounting board	
11.	Slide Vr mounting board	
12.	Slide Vr mounting board	
13.	Slide SW cover	
14.	Blind plate	
15.	Radiation board	
16.	Joystick VR mounting board	
17.	Slide SW cover	
18.	Control panel mounting board	
19.	Bottom	
20.	Side panel (Left)	
21.	Side panel (Right)	
22.	Control panel	
23.	Joystick lever knob	
24.	Rotary knob	
25.	Slide VR knob	
26.	Slide SW knob	

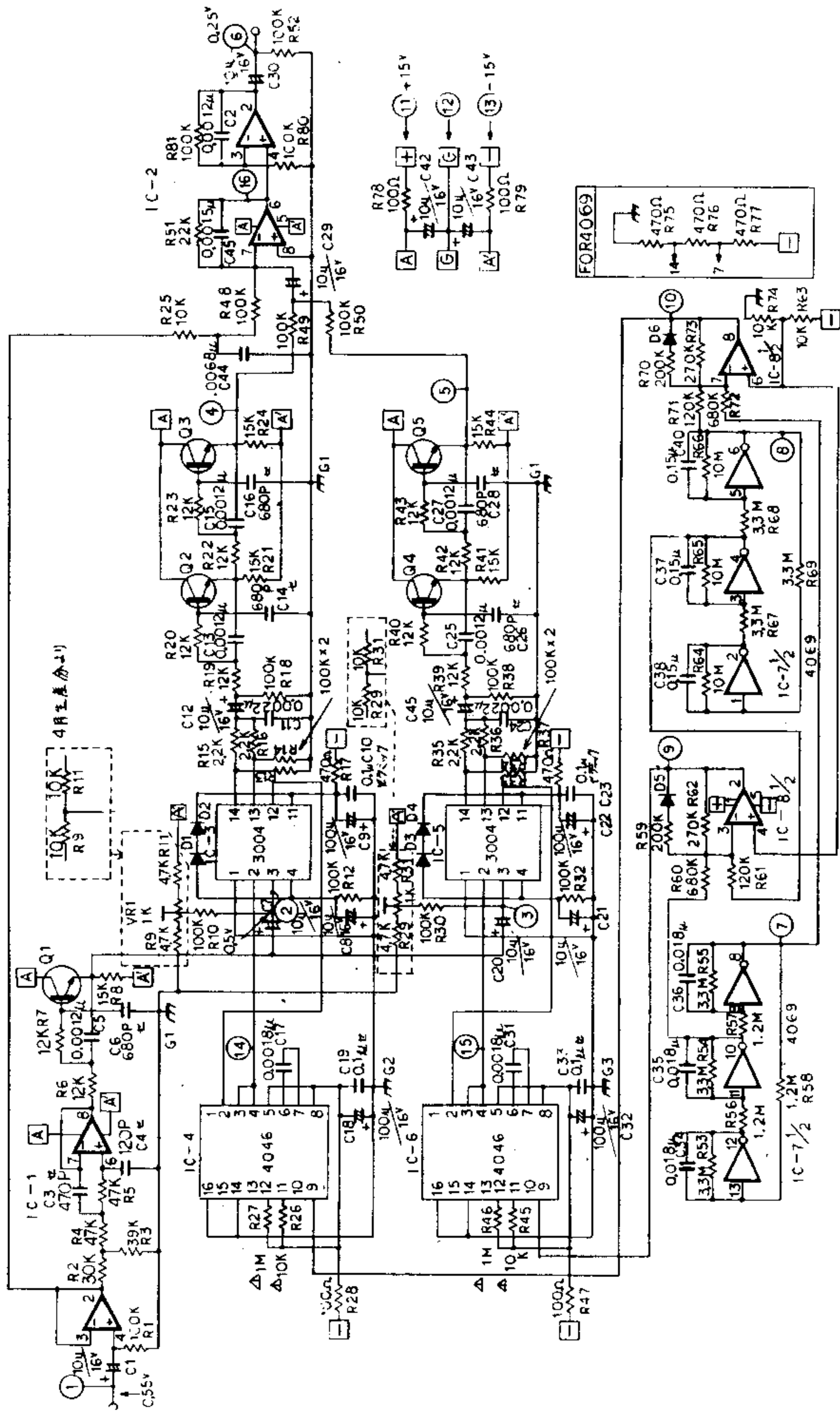
### 3. BLOCK DIAGRAM



# 4. CIRCUIT DIAGRAM



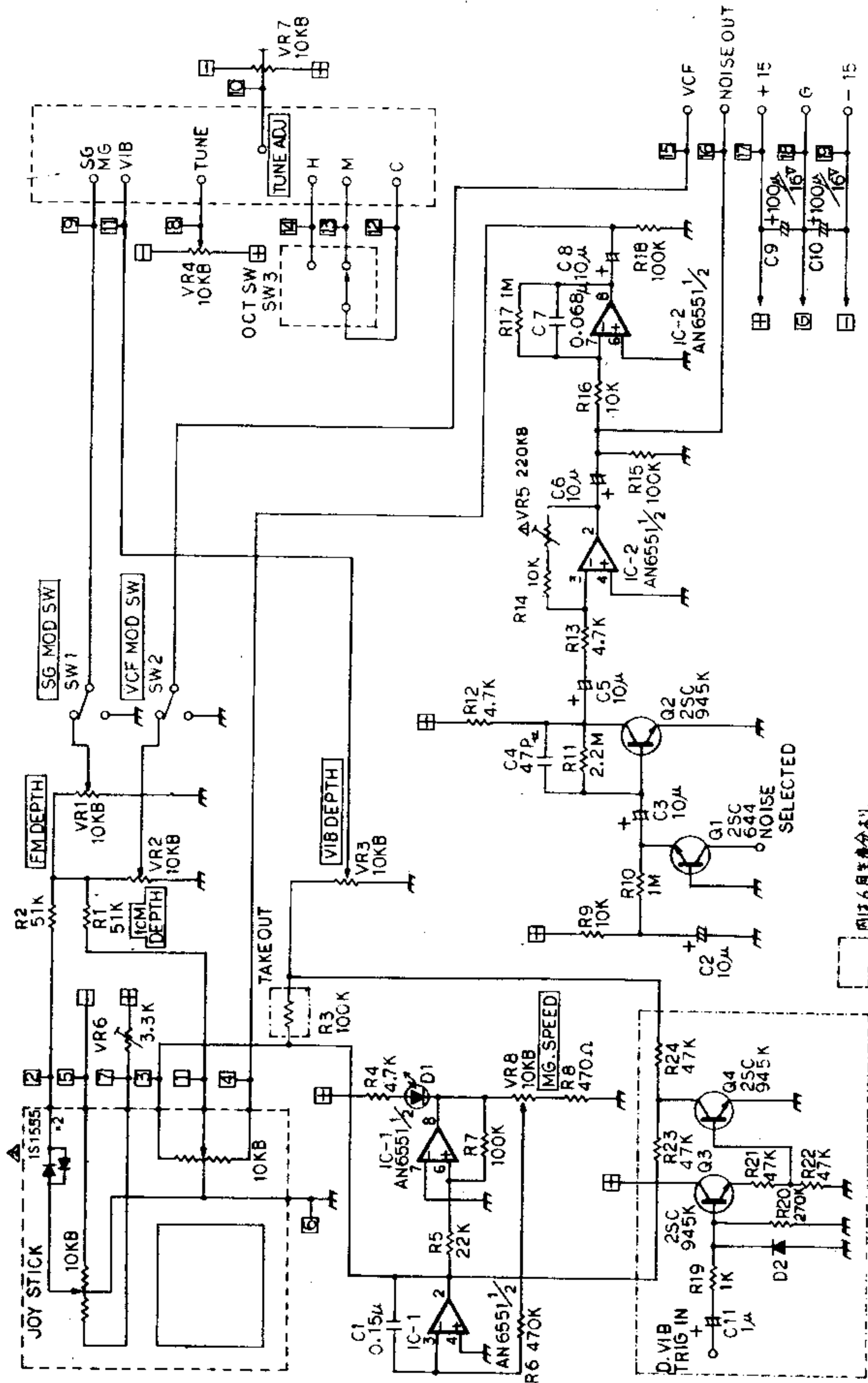




Q1~Q5 : 2SC945K

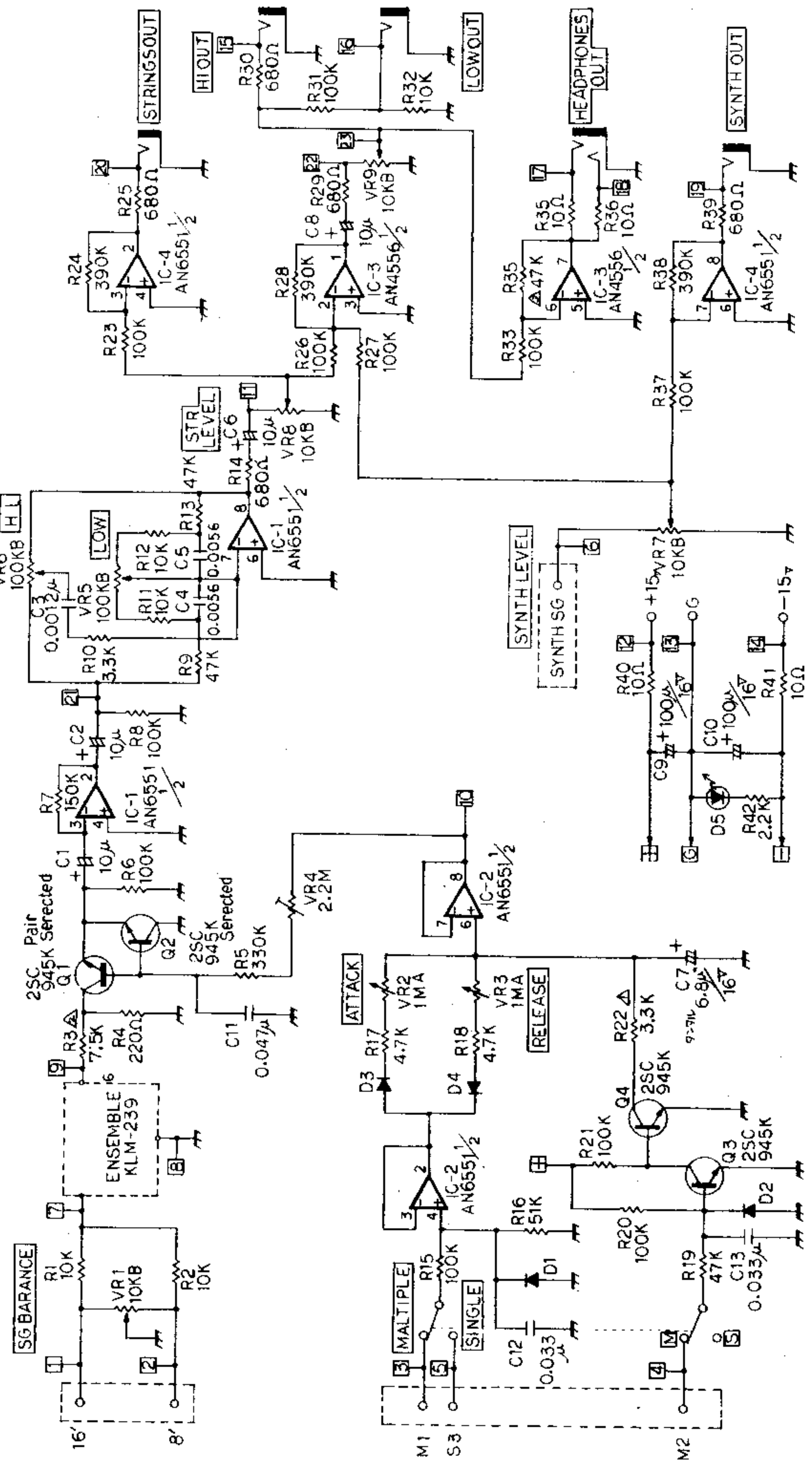


△ VR5 100KB → 220KB  
 ▲ D 15155 r.2 追加

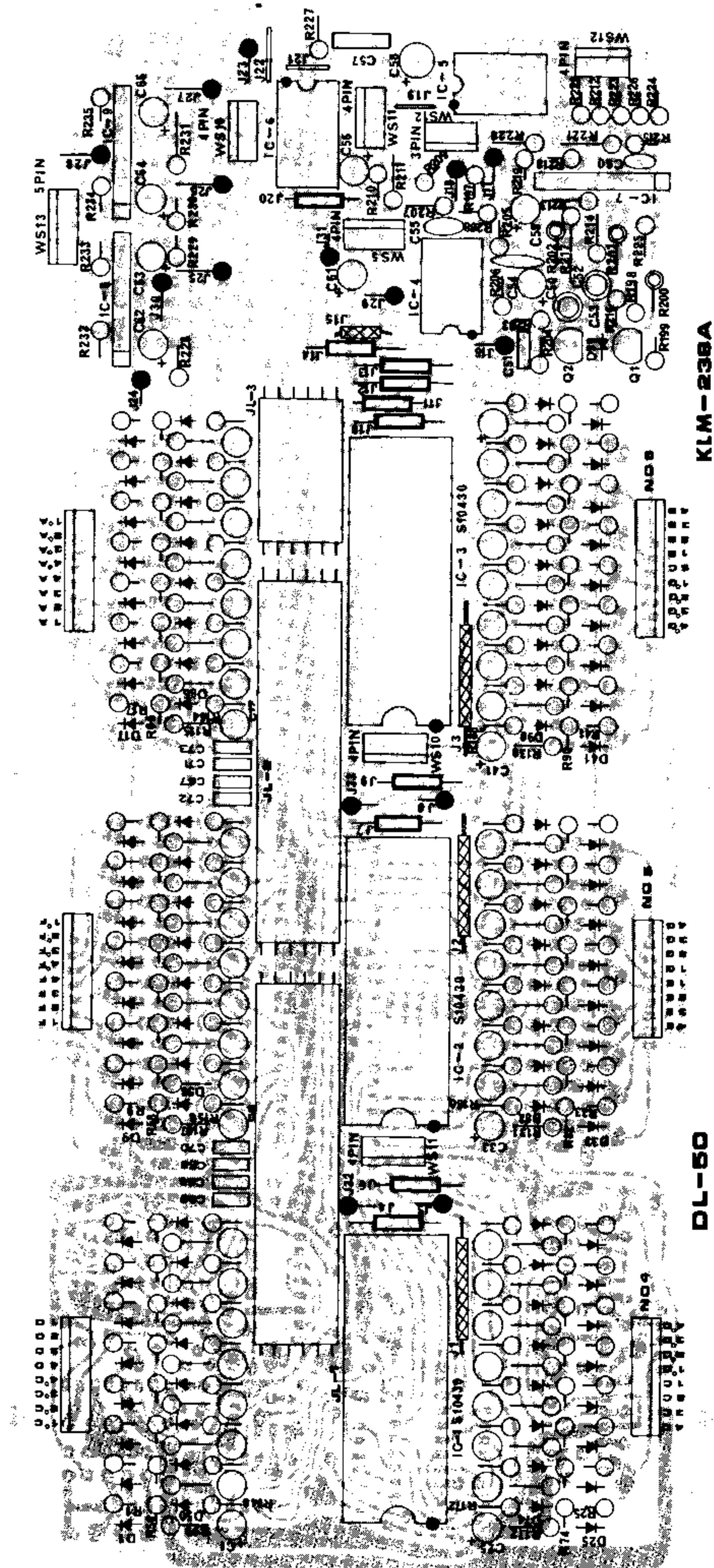




同126月号を参照せよ。

△ R22 1K → 3.3K E-3型 固定  
 △ R3 10K → 7.5K E-4型 固定  
 △ R35 100K → 47K E-3型 固定

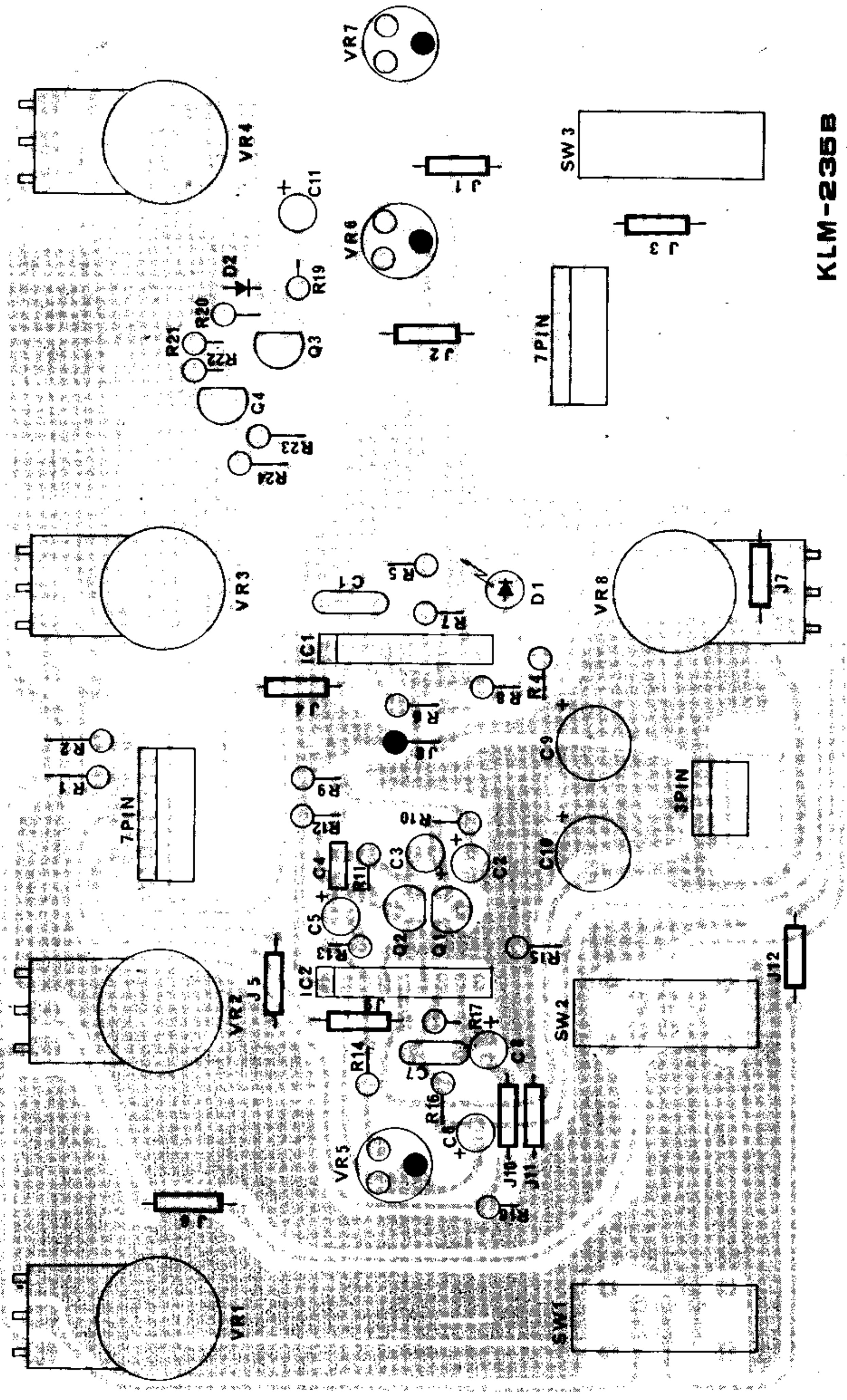


# 5. PC BOARD

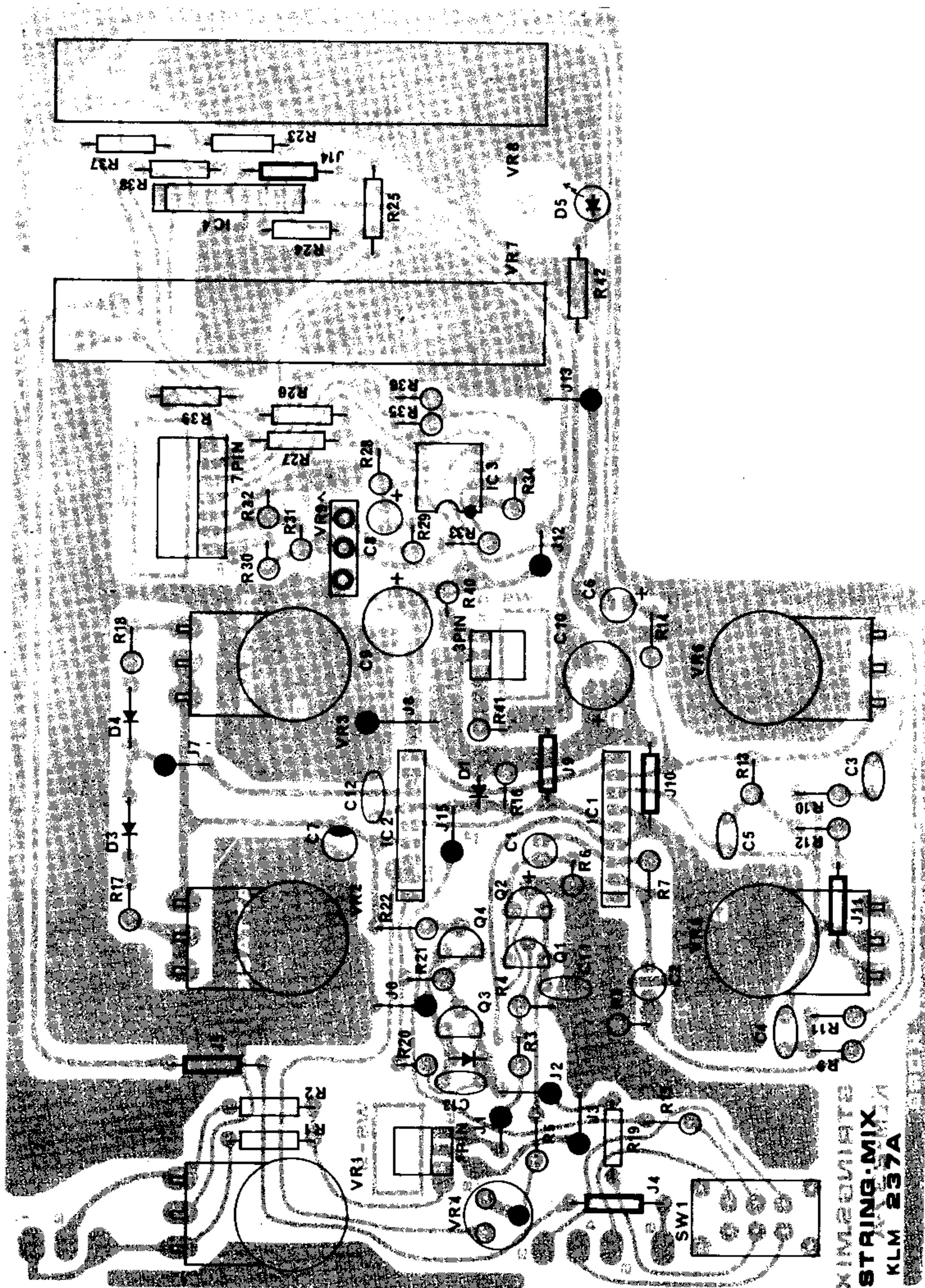


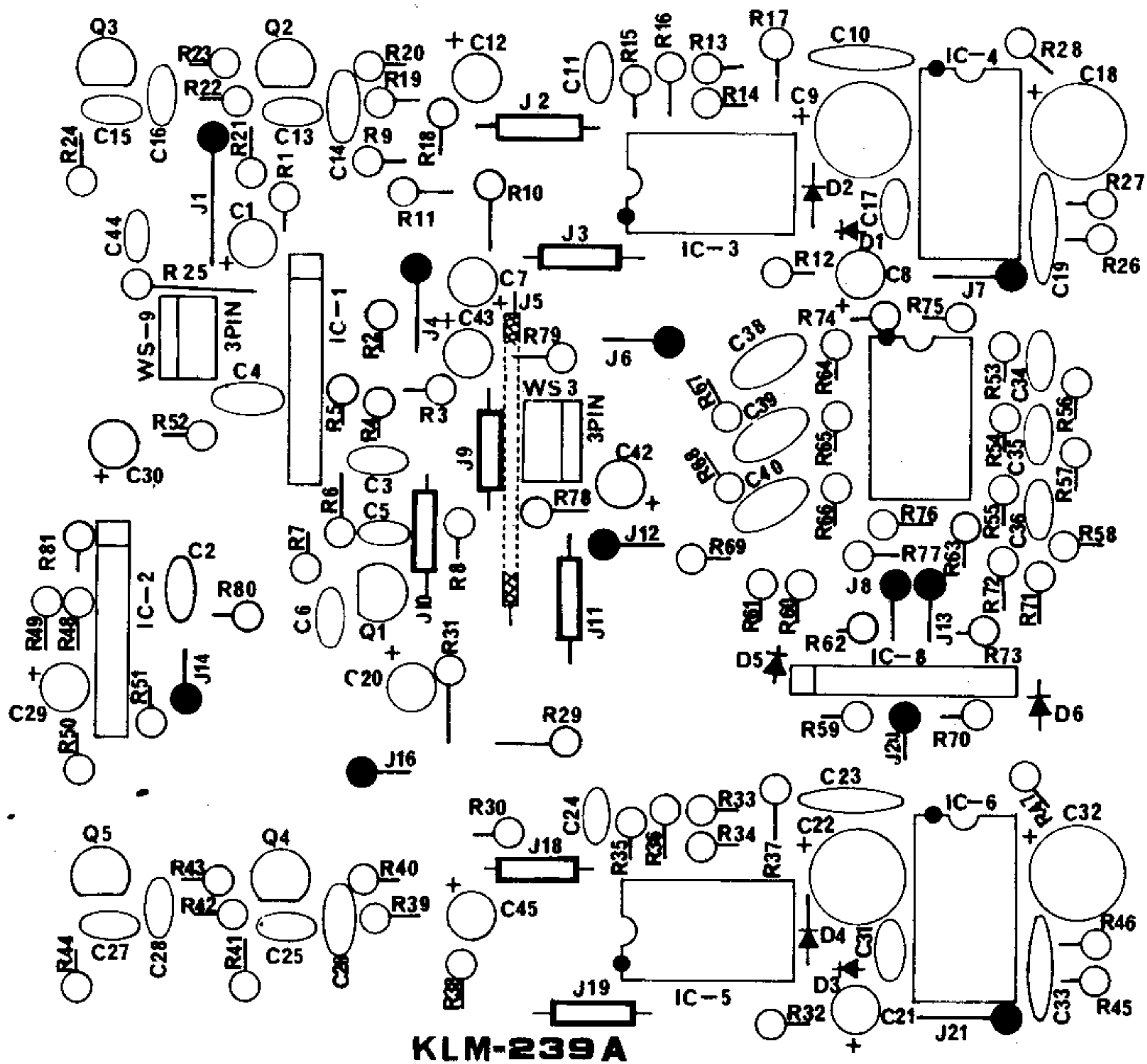
PARTS NAME	SPECIFICATIONS	Q'TY	
<b>KEYBOARD</b>			
	C-C 49 ESK-316V	1	
<b>CONNECTORS</b>			
	TRC-90	1	
	BOTTOM ENTRY  BE-3P-SHF-1	7	
		BE-5P-SHF-1	1
		BE-7P-SHF-1	3
		BE-8P-SHF-1	1
	TOP ENTRY  B-3P-SHF-1	3	
		B-4P-SHF-1	6
		B-5P-SHF-1	1
		B-8P-SHF-1	5
		B-9P-SHF-1	1
<b>PHONE JACKS</b>			
	SG-7501	5	
	SG-7617 with stopper	2	
	SG-7701	1	
<b>LUG BOARD</b>			
	L-1205	1	
<b>FUSE</b>			
	250V 0.5V	1	
<b>CONNECTORS</b>			
	WS-14	1	
	WS-1 3P	1	
	WS-2	1	
	WS-3	1	
	WS-4	1	
	WS-5 4P	1	
	WS-6 3P	1	
	WS-7 7P	1	
	WS-8	1	
	WS-9 3P-3P	1	
	WS-10 4P-4P	1	
	WS-11	1	
	WS-12	1	
	WS-13 5P-5P	1	
<b>PRINTED CIRCUIT BOARD</b>			
	KLM 183B	1	
	235A	1	
	236A	1	
	237A	1	
	238	1	
	239A	1	
<b>POWER TRANS FORMER</b>			
	KA-221 100V, 220V, 240V	1	
	KB-221 117V	1	

PARTS NAME	PANEL INSTRUCTION	STANDARD
<b>POTENTIOMETERS</b>		
	VOLUME	EVC-BQ5-P18B14
	EG. DEPTH	EVH-6LA802B14
	STRINGS Attack	EVH-5LA802A16
	STRINGS Release	EVH-5LA802A16
	STRINGS Tune. T	EVH-5LA802B15
	STRINGS Tune. B	EVH-5LA802B15
	STRINGS Oct. Bal.	EVH-5LA802B14
	RESONANCE	EVH-5LA802B14
	TUNE	EVH-5LA802B14
	VIB. DEPTH	EVH-5LA802B14
	VIB. SPEED	EVH-5LA802B14
	fcM DEPTH	EVH-5LA802B14
	FM DEPTH	EVH-5LA802B14
	JOYSTICK	E3SXC03-10KB2
<b>SLIDE VOLUME</b>		
	STRINGS	LEE-3R 10KB
	SYNTHESIZER	LEE-3R 10KB
	EG. Attack	LEE-3R 2MA
	EG. Decay	LEE-3R 1MA
	EG. Sustain	LEE-3R 10KB
	EG. Release	LEE-3R 2MA
	S.G. 16'	LEE-3R 100KB
	8'	LEE-3R 100KB
	4'	LEE-3R 100KB
	2'	LEE-3R 100KB
	White Noise	LEE-3R 100KB
	V.C.F. Cut off Freq.	LDE-3R 10KB
<b>SLIDE SW. KNOB</b>		
	TRIGGER MODE	SSB-12208
	KBD FOLLOWER	SSB-12208
	FILTER MODE	SSB-12208
	(S) TRIGGER MODE	SSB-12208
	VCA EG MODE	SSB-12208
	OCTAVE	SSB-12208
	JOYSTICK SG	SSB-12208
	JOYSTICK VCF	SSB-12208
<b>ROTARY KNOB</b>		
	ROTARY KNOB x 13	
<b>SLIDE Vr. KNOB</b>		
	SLIDE Vr. KNOB	KOC-E40039
	x 12	
<b>SLIDE SW. KNOB</b>		
	SLIDE SW. KNOB	KOC-E40026
	x 8	
<b>JOYSTICK UNIT</b>		
	JOYSTICK KNOB x 1	
<b>PHONE JACK</b>		
	PHONES OUT	SG-7701
	VCF fcM IN	SG-7617
	TRIG IN	SG-7617
	OTHERS x 5	SG-7501



KLM-235B





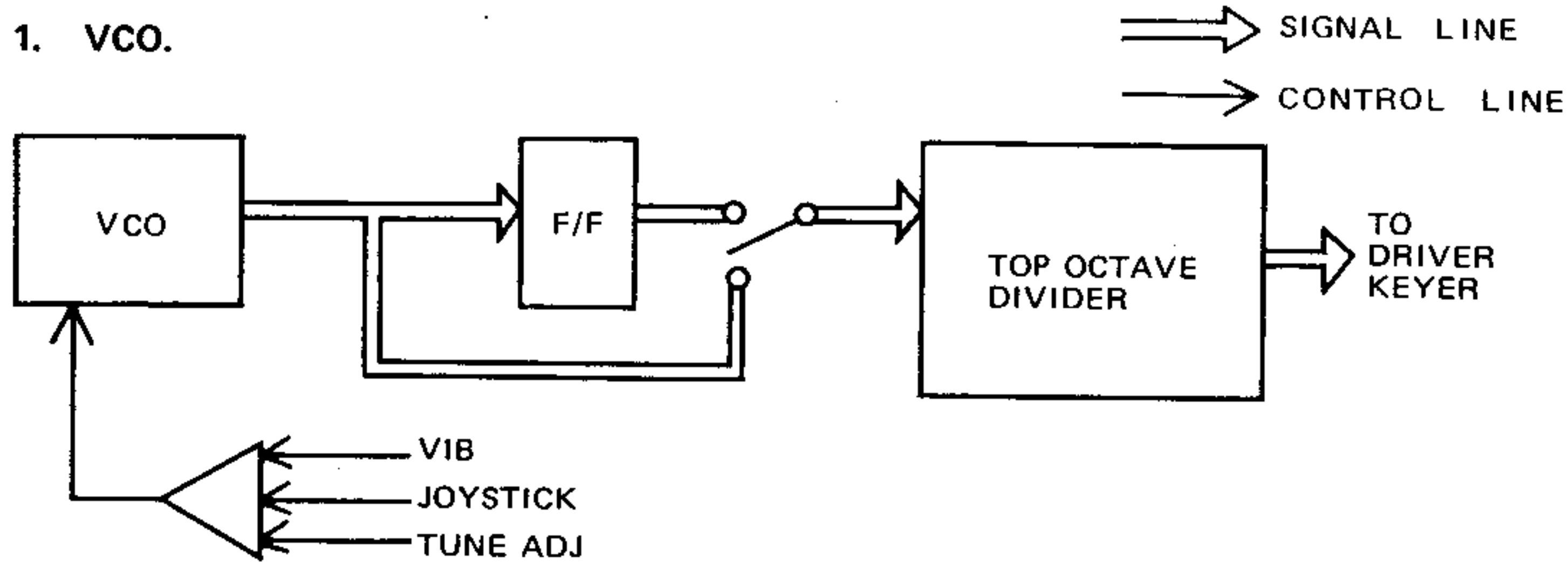
## 6. CHECK AND ADJUSTMENT

To service personnel:

As you may note in the block diagram, the DL-50 strings synthesizer does not operate on the Hz/V system.

### MAJOR CIRCUIT EXPLANATIONS

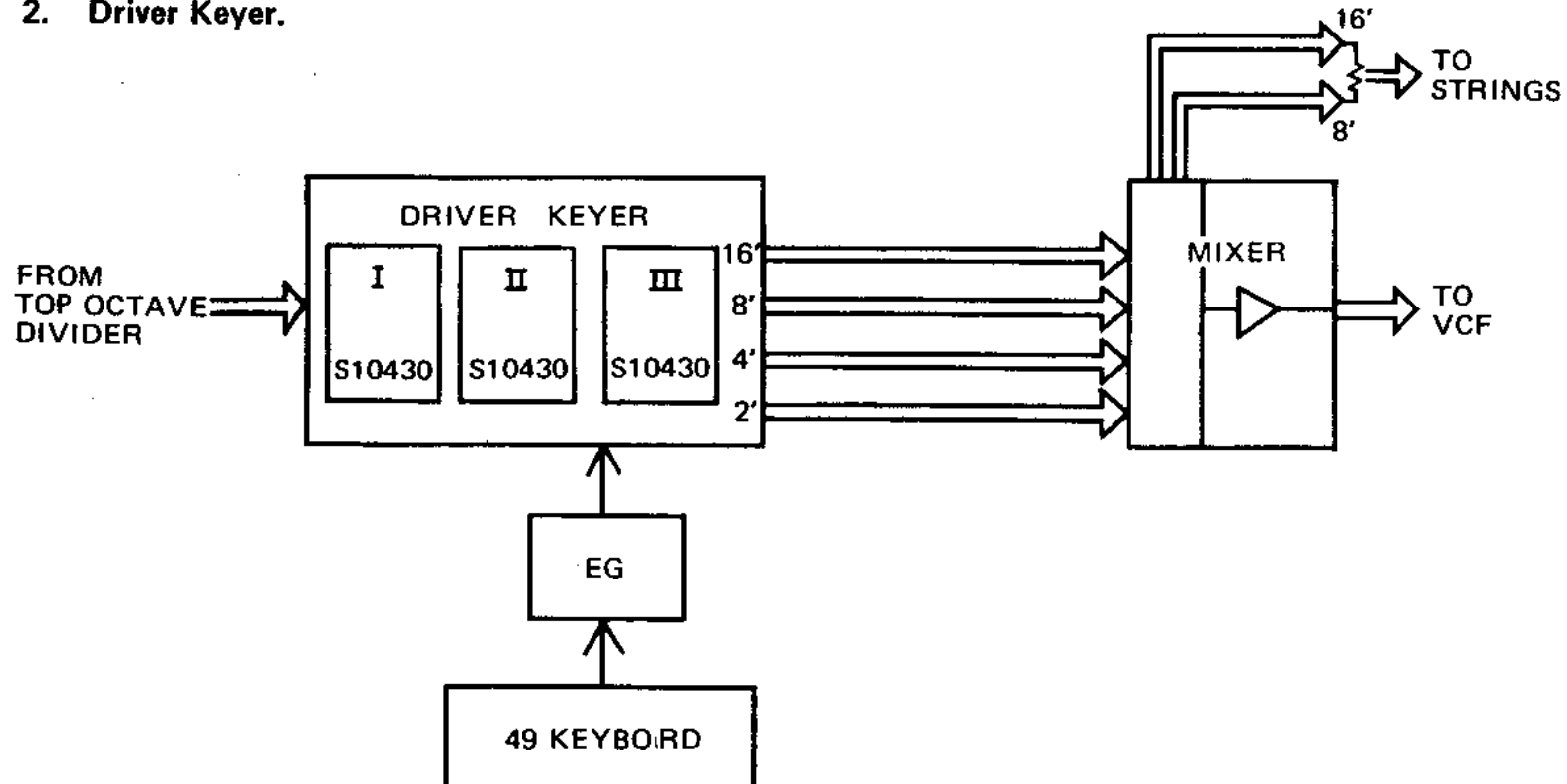
#### 1. VCO.



The VCO is not controlled in the same way as conventional Hz/V systems. Instead, oscillation is continuous and the oscillator frequency changes depending on separate control voltages from the

MG (vibrato), joy stick, and tuning sections. The VCO's clock pulse output frequency is divided by the flip-flop and drives the top octave divider (IC-AY-3-0214).

#### 2. Driver Keyer.



(The S10430 IC includes MOS gate, divider, and mixer circuit functions.)

The chromatic signal from the top octave divider output is applied to the IC-S-10430 input of the driver keyer. Each IC-S-10430 driver keyer IC provides a mixed output consisting of 4 notes in each octave. Three of these ICs, therefore, generate 48 notes. High C alone is obtained separately from the flip-flop and applied directly to

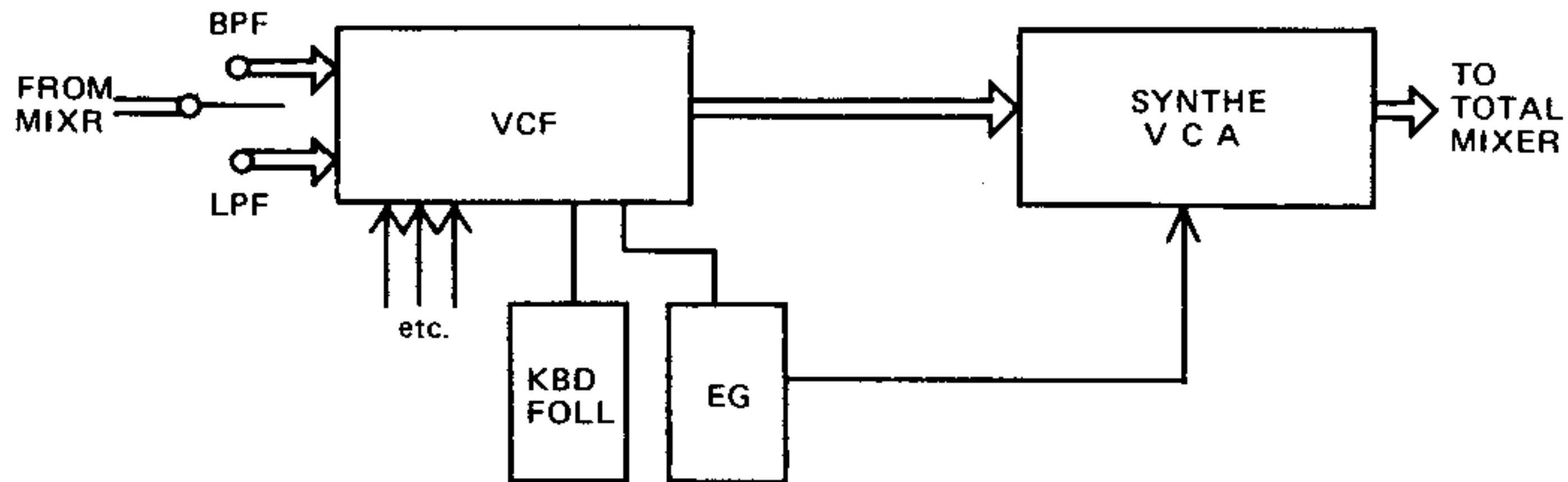
the driver keyer input.

In other words:  $4 \text{ notes} \times 4 \text{ octaves} \times 3 + 1 = 49 \text{ notes}$ .

When a key is pressed on the keyboard, an envelope signal is applied to gate the note. The mixer output provides one signal for the strings section, and another signal for the synthesizer section.



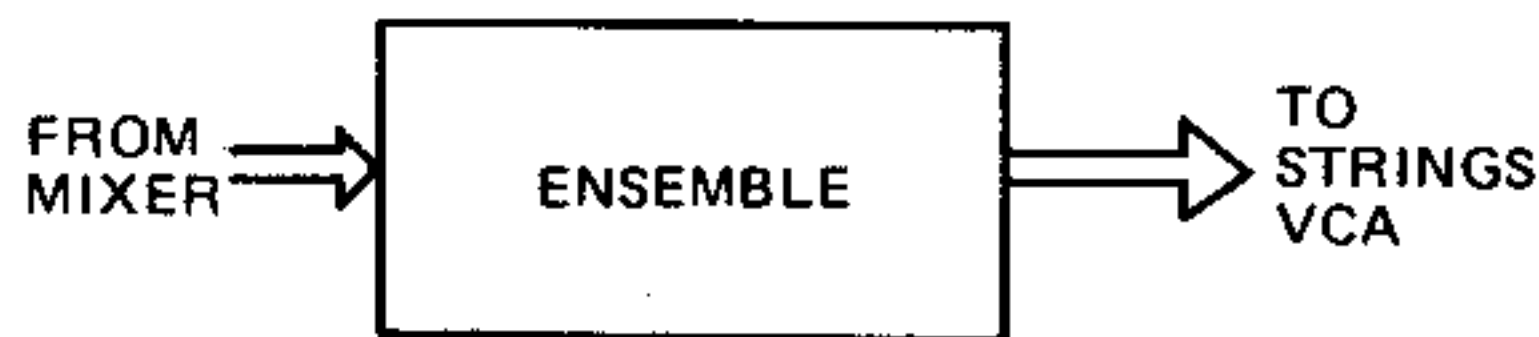
### 3. VCF, VCA.



The mixer output signal is applied through LPF or BPF inputs to the IC-13600 VCF circuit. Filter operation is determined by control signals from KBD FOLL (keyboard follower), joy stick,

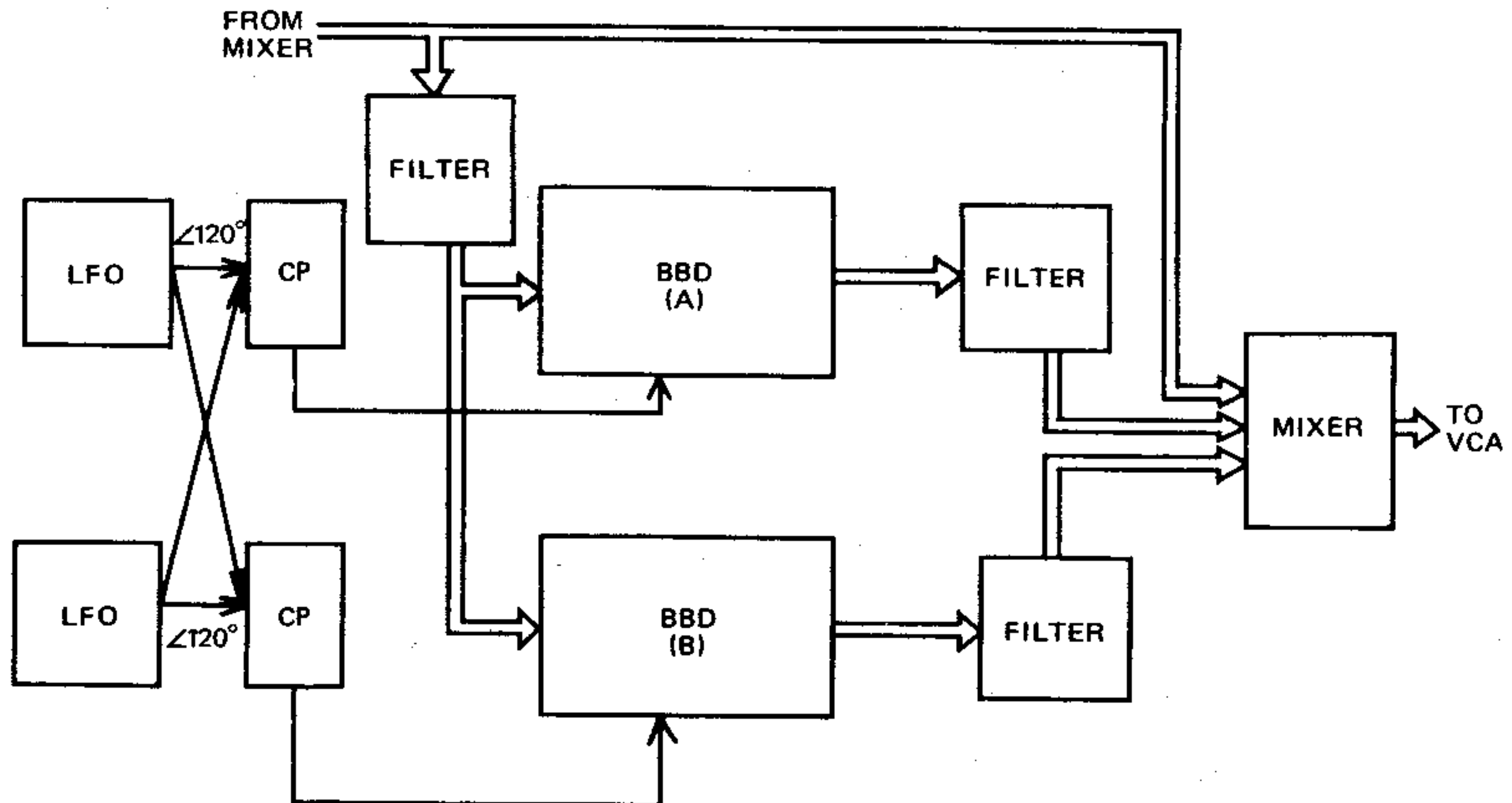
cut-off frequency EG, etc. EG control signal voltage determines VCA operation and thereby controls the audio signal input to the total mixer.

### 4. Ensemble.



The mixer output signal for the strings section is applied to two BBD ICs (IC-MN3004) to obtain

the ensemble effect. Please refer to the block diagram.



ENSEMBLE BLOCK DIAGRAM

## DL-50 Adjustment procedure

Please refer to the owner's manual for check points not covered by the adjustment procedure described here.

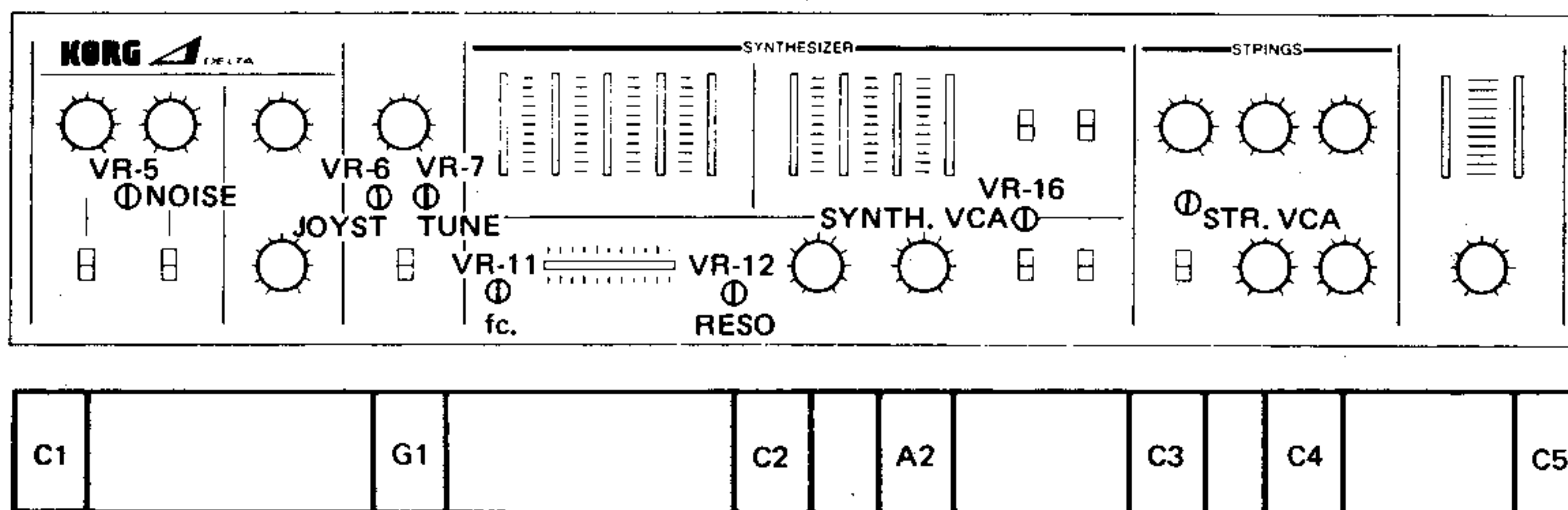
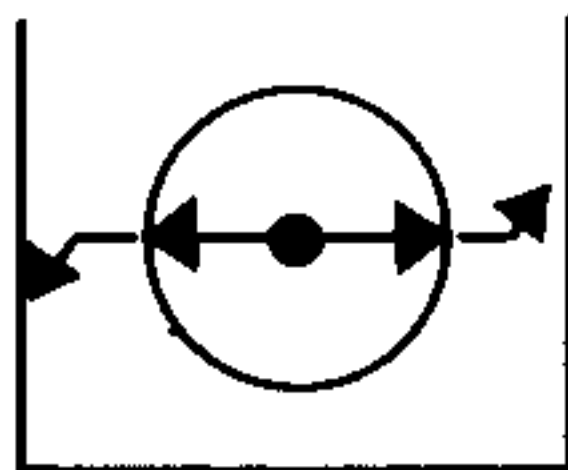
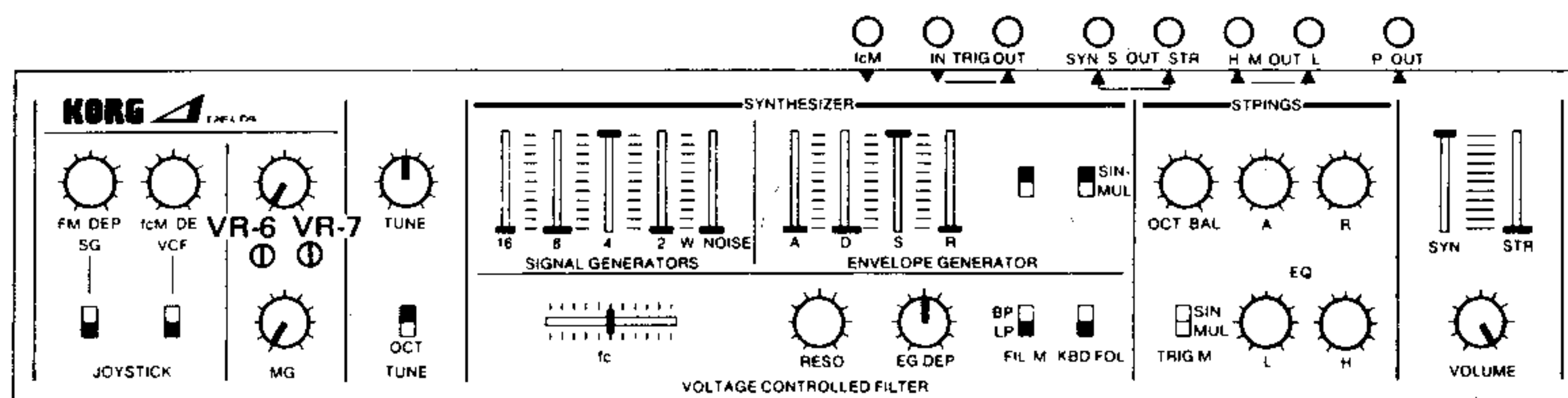


Illustration of trimmer screw and keyboard note positions.

### 1. Tune adjustment.

DL-50 MIX OUT (H) → WT-10A	WT-10A S/M → M
MIX OUT (L) → AMP	OCT → M



JOYSTICK

With controls at settings shown above, play key C3 and adjust VR7 to obtain a 0 cent reading on the WT-10A.

Next, set the release control to 2 and play C1

through C5 (in that order) while checking to see that the release time is about the same for each key.

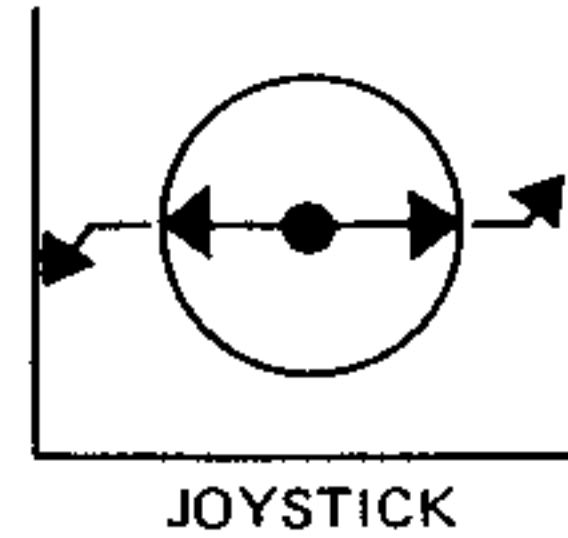
**2. Joy stick adjustment.**

| Settings | fcM SW → OFF | FM SW → ON |

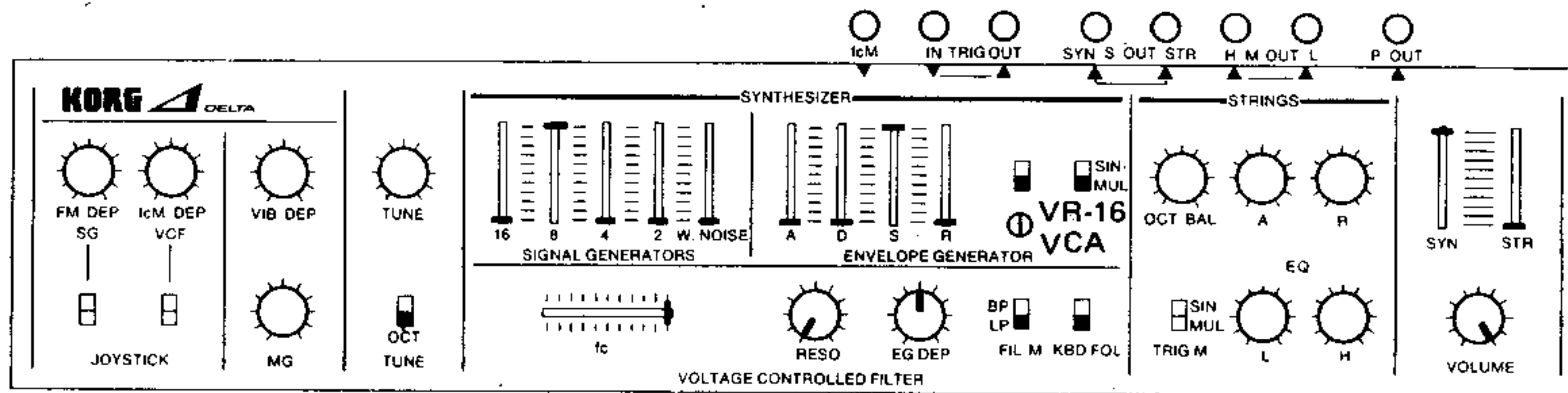
**Settings**

Play C1 and move the joy stick all the way to the right; adjust the FM depth control so the pitch rises to G1 during this procedure.

Next, play G1 and move the joy stick all the way to the left; adjust VR6 so the pitch falls to C1. (Repeat twice.)



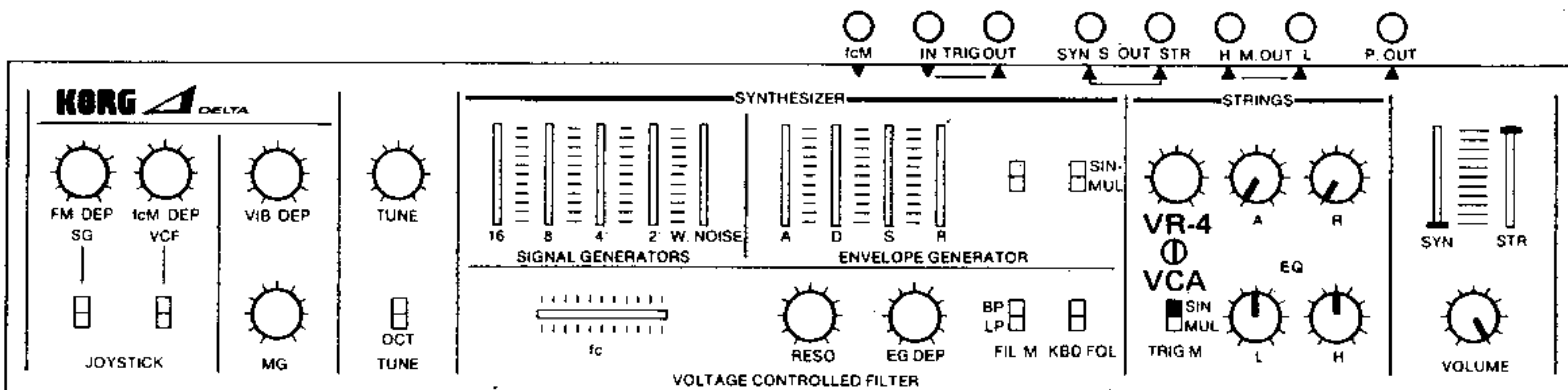
**3. Synthesizer section VCA gain adjustment.**



With the above setting, adjust VR-16 so that you obtain a 0.8Vpp reading when you play A2. Next, check to make sure there is no change in

output voltage if you turn the EQ switch (VCA EG MODE) on and off.

**4. Strings section VCA gain adjustment.**

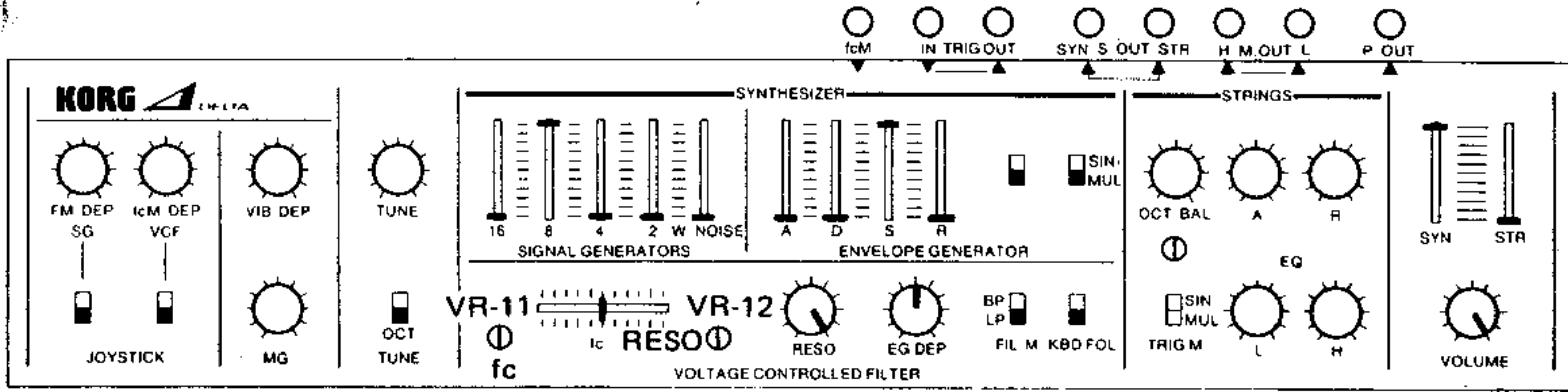


With the above setting, play C1 and check three cycles of the signal waveform. Adjust VR4 to obtain 0.8Vpp for the leading edge of the first

cycle; at the same time, check for movement in the following two cycles to confirm ensemble effect operation. Refer to illustration.

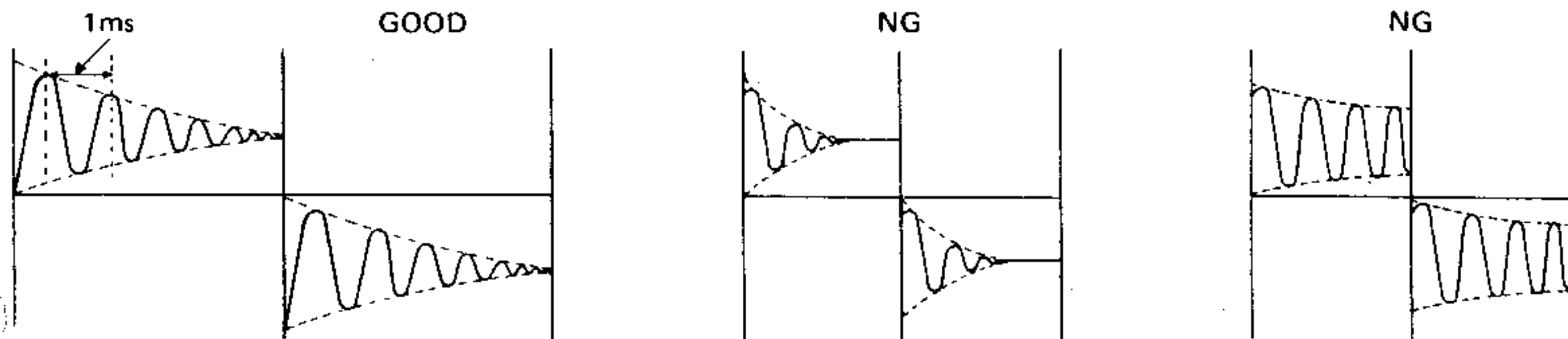


5. fc resonance adjustment.



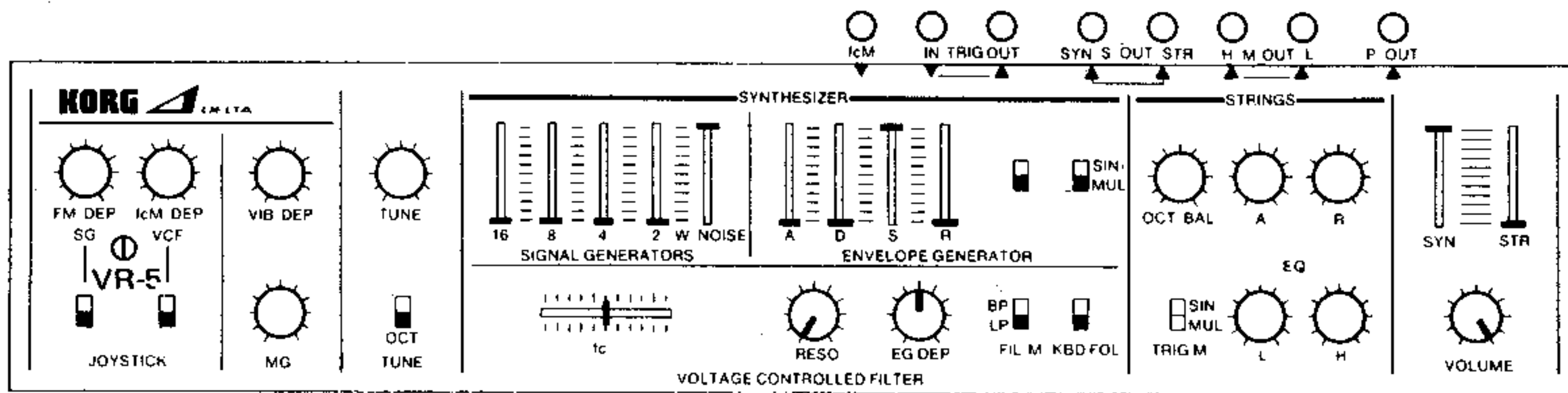
fc: With the above setting, adjust VR-11 to obtain 1ms (1kHz) on the oscilloscope.  
 Resonance: Turn VR-12 counterclockwise to

obtain an oscilloscope trace like the "good" example shown below.  
 Repeat the fc and resonance adjustments twice.



Check to confirm that the peak gets smaller and the fundamental waveform gets larger when you turn the resonance control counterclockwise.

6. Noise gain adjustment.



With the above setting, play a key and adjust VR-5 to obtain a 3Vpp noise output.

# 7. PARTS LIST

PARTS NAME	SPECIFICATIONS	Q'TY	PARTS NAME	SPECIFICATIONS	Q'TY
<b>METAL FILM RESISTORS</b>					
¼W	715Ω F	1		25V 2,200μF	1
	825	1		50V 0.22	51
	953	1	<b>POLYPROPYLENE CAPACITORS</b>		
	1.13KΩ	1		100V 0.001μF G	
	1.37	1	<b>TRANSISTORS</b>		
	1.65	1	2SA	733AK	2
	2.05	1		798F or G	1
	2.67	1	2SC	644R	1
	3.57	1		945 L K	19
	10.0	1		945 L K (selected)	2
	10.2	2		1834	2
	47.0	1	2SK	30 GR	1
	100	4	<b>DIODES</b>		
	301	1	1S	1555	126
	332	1		1885	4
	402	1		AR-2133D	2
	1MΩ	1	<b>IC</b>		
<b>MYLAR CAPACITORS</b>				AN6551	17
	0.001μF 50V K	3		LM 324 N (μpc 324 c)	1
	0.0012μ	7		TL 072	1
	0.0015	1		LM 13600	2
	0.018	2		MC 14007	1
	0.0022	5		NJM 4556D	1
	0.0056	2		MC 14013 BCP	1
	0.0068	1		AY-3-0214	1
	0.01	1		S-10430	3
	0.012	1		MN 3004	2
	0.018	3		MC 14046 BCP	2
	0.022	2		MC 14069 (μpD4069)	2
	0.033	2		(μA 7815) μpc 14315	1
	0.047	4		μA 7915 (MC 7915)	1
	0.068	1		(μA 78L08) μpc 78LD8AC3	1
	0.1	1	<b>SEMI-FIXED RESISTORS</b>		
	0.15	4	SR-19R	3.3KB	1
<b>POLYSTYRENE CAPACITORS</b>				10KB	2
	50V 68pF G	2		47KB	1
<b>CERAMIC CAPACITORS</b>				220KB	1
	50V 47pF K	1		2.2MB	2
	120	1	<b>ROTARY VARIABLE RESISTORS</b>		
	220	8		EZH-5LA 802 B14	7
	470	1		EZH-5LA 802 B15	2
	680	5		EZH-5LA 802 A16	2
	4700 MD	1		EZH-6LA 802 B14	1
	25V 0.1μF K ZFZ	8		EVC-BQ5P18B14	1
				E3-JXCO3 10KB x 2	1
<b>TANTALUM CAPACITORS</b>			<b>SLIDE VARIABLE RESISTORS</b>		
	16V 2.2μF K	1	LEE-3R	L = 45mm 2MA	5
	6.8	1		10KB	3
<b>ELECTROLYTIC CAPACITORS</b>				1MA	1
	50V 1.0μF	1		100KB	5
	16V 10	32	LDE	L-60mm 10KB	1
	47	2	<b>SLIDE SW</b>		
	100	13		SSB-12208	8
	25V 1,000	1			