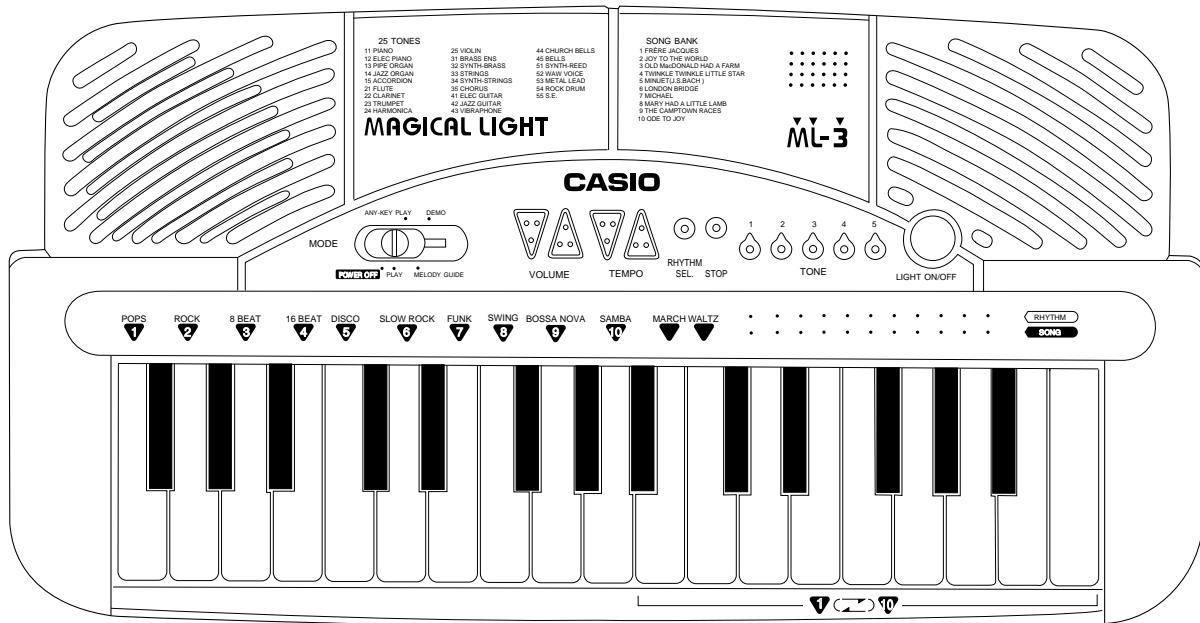


# CASIO®

# Service Manual

(without price)

## ML-3



ML-3

ELECTRONIC KEYBOARD

INDEX

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# SPECIFICATIONS

## General

Number of Keys:	32
Illuminated Keys:	White and Black keys
Polyphonic:	2-note
Preset Tones:	25
Auto-Rhythms:	12
Demonstration Tunes:	10
Lesson Functions:	3 modes; Demo, Any-Key Play, Melody Guide
Built-In Speaker:	8.0 cm dia. 1.0 W Input Rating: 1 pce.
Terminals:	Mic. Jack [Input Impedance: 20 k $\Omega$ AC Adapter Jack (DC 7.5 V)
Power Source:	DC: 5 AA size dry batteries Battery life: Approx. 4 hours (SUM-3/R6P) AC: AC adapter AD-1
Power ON Reminder*:	3 minutes after the last operation
Power Consumption:	1.5 W
Dimensions:	57 × 412 × 208 mm (HWD) (2-1/4 × 16-3/8 × 8-1/4 inches) (HWD)
Weight:	0.95 kg (2.1 lbs) excluding batteries

## Electrical

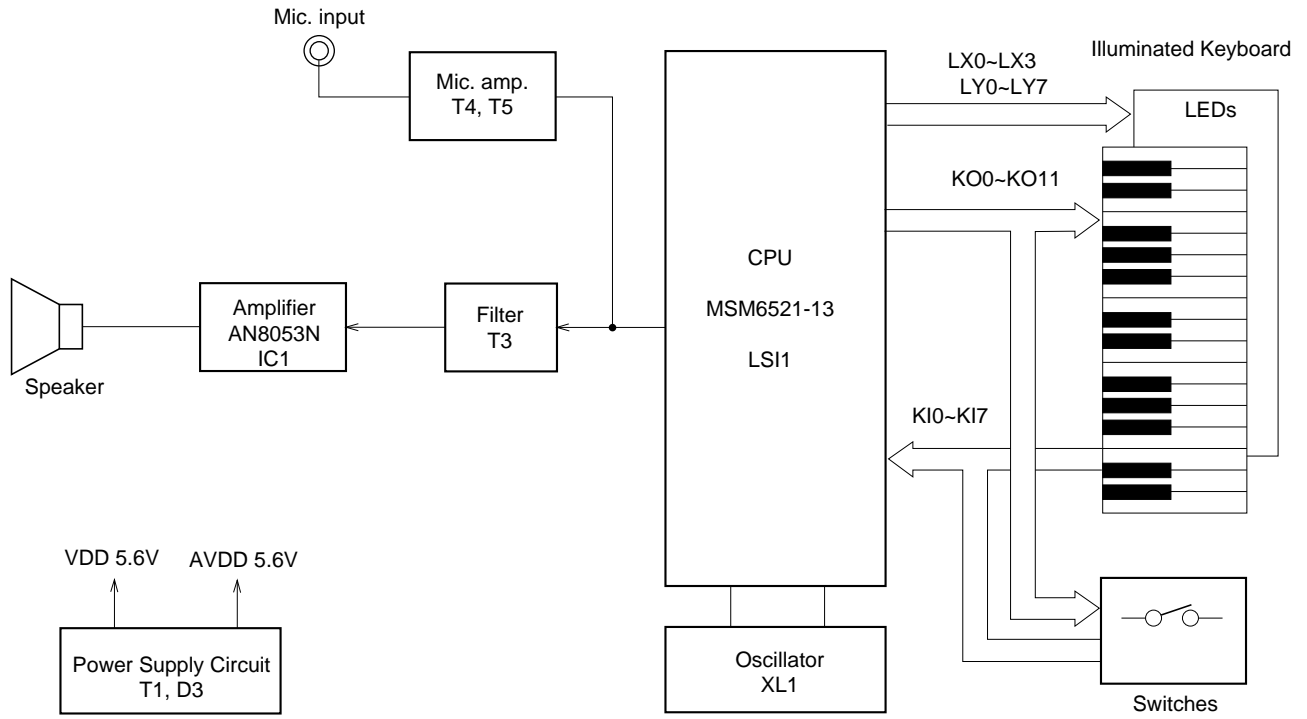
Current Drain with 7.5 V DC:	
No Sound Output	44 mA $\pm$ 20%
Maximum Volume	280 mA $\pm$ 20%
with keys B3 and C4 pressed in Flute tone	
Volume: Maximum, Rhythm: Rock,	
Tempo: Maximum, Mic. input: 29 mV	
Speaker Input Level (V <sub>rms</sub> with 4 $\Omega$ load):	740 mV $\pm$ 20%
with key C4 pressed in Flute tone	
Volume: Maximum	
Minimum Operating Voltage:	6.2 V

### \*Power ON Reminder

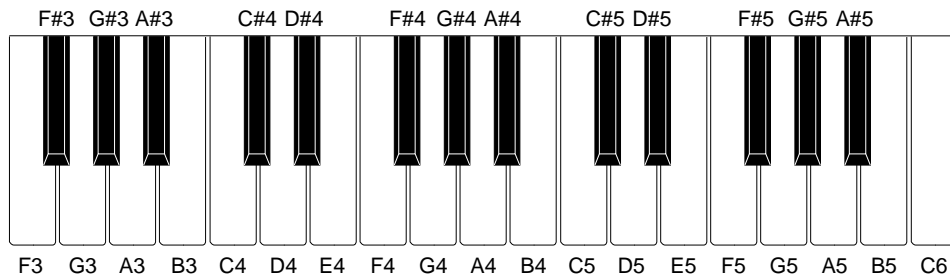
Power ON reminder is sudden audible and light signals, a short melody at maximum volume and lighting up the illuminated keyboard for a few seconds.

Power ON reminder functions three minutes after the last operation, and it repeats every three minutes until turning the switch off or restarting operations.

# BLOCK DIAGRAM



## Nomenclature of Keys



## CIRCUIT DESCRIPTION

### Key Matrix

	KI0	KI1	KI2	KI3	KI4	KI5	KI6	KI7
KO0	F3	F#3	G3	G#3	A3	A#3	B3	C4
KO1	C#4	D4	D#4	E4	F4	F#4	G4	G#4
KO2	A4	A#4	B4	C5	C#5	D5	D#5	E5
KO3	F5	F#5	G5	G#5	A5	A#5	B5	C6
KO4						Volume Down	Volume Up	Light On/Off
KO5	Tone 1					Rhythm Stop	Tempo Down	
KO6		Tone 2	Tone 3	Tone 4	Tone 5		Rhythm Select	Tempo Up
KO7				Melody Guide	Any Key Play	Demo	Play	

### Keyboard LED Matrix

	LY0	LY1	LY2	LY3	LY4	LY5	LY6	LY7
LX0	C6	F5	E5	A4	G#4	C#4	C4	F3
LX1	B5	F#5	D#5	A#4	G4	D4	B3	F#3
LX2	A#5	G5	D5	B4	F#4	D#4	A#3	G3
LX3	A5	G#5	C#5	C5	F4	E4	A3	G#3

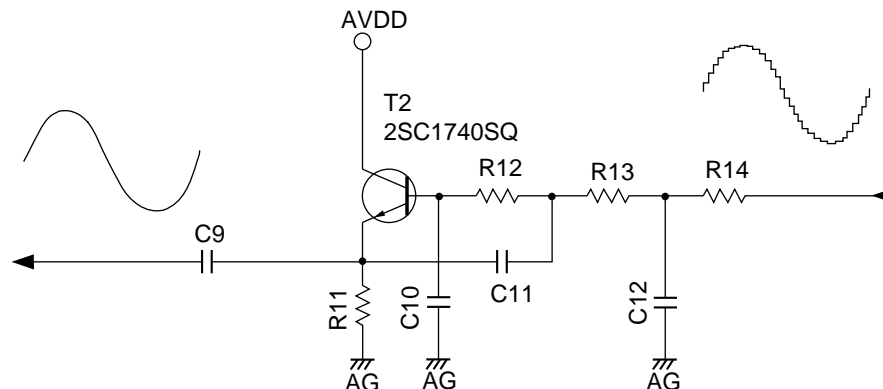
## CPU (LSI1: MSM6521-13)

Containing a sound data ROM and a DAC (Digital to Analog Converter), the CPU provides sound waveform in accordance with the pressed key and selected tone. The CPU also drives LEDs in the illuminated keyboard directly. The following table shows the pin functions of LSI1.

Pin No.	Terminal	In/Out	Function
1 ~ 7	LY1 ~ LY7	Out	Keyboard LED drive signal output
8	LVDD1	In	+5 V source for the built-in LED driver
9	LGND2	In	Ground (0 V) source for the built-in LED driver
10 ~ 13	LX0 ~ LX3	Out	Keyboard LED drive signal output
14 ~ 17	LX4 ~ LX7	Out	Not used.
18	LVDD2	In	+5 V source for the built-in LED driver
19	GND2	In	Ground (0 V) source
20, 21	COSI, COSO	In/Out	21.725 MHz clock pulse input/output
22	VDD	In	+5 V source
23	GND1	In	Ground (0 V) source
24 ~ 26	TEST1 ~ TEST3	In	Not used. Connected to ground.
27	RESET	In	Reset signal input. Power OFF: 0 V, Power ON: +5 V
28	AVDD	In	+5 V source for the built-in DAC
29	OUT	Out	Sound waveform output
30	AGND	In	Ground (0 V) source for the built-in DAC
31 ~ 38	KI0 ~ KI7	In	Input terminal for keys and switches
39 ~ 46	KO0 ~ KO7	Out	Key and switch scan signal input
47 ~ 58	—	—	Not used.
59	LGND1	In	Ground (0 V) source for the built-in LED driver
60	LY0	In	Keyboard LED drive signal output

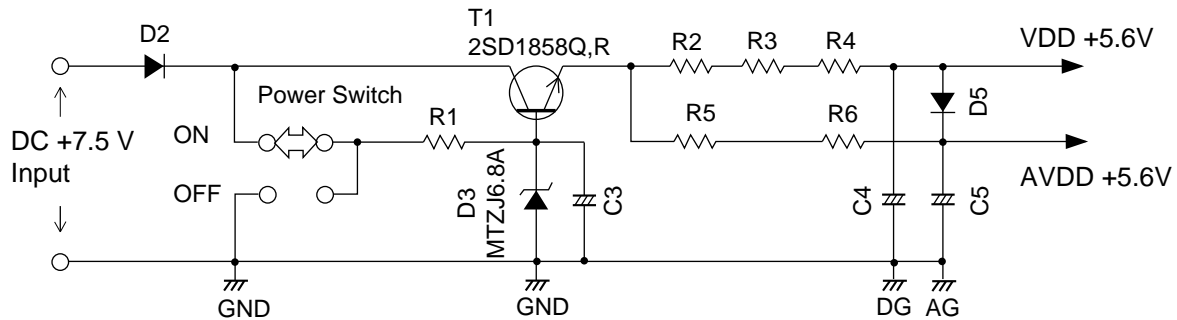
## Filter Block

Since the sound signal from the CPU is a stepped waveform, the filter block is added to smooth the waveform.



## Power Supply Circuit

The power supply circuit regulates a constant output voltage +5.6V by T1 and D4.

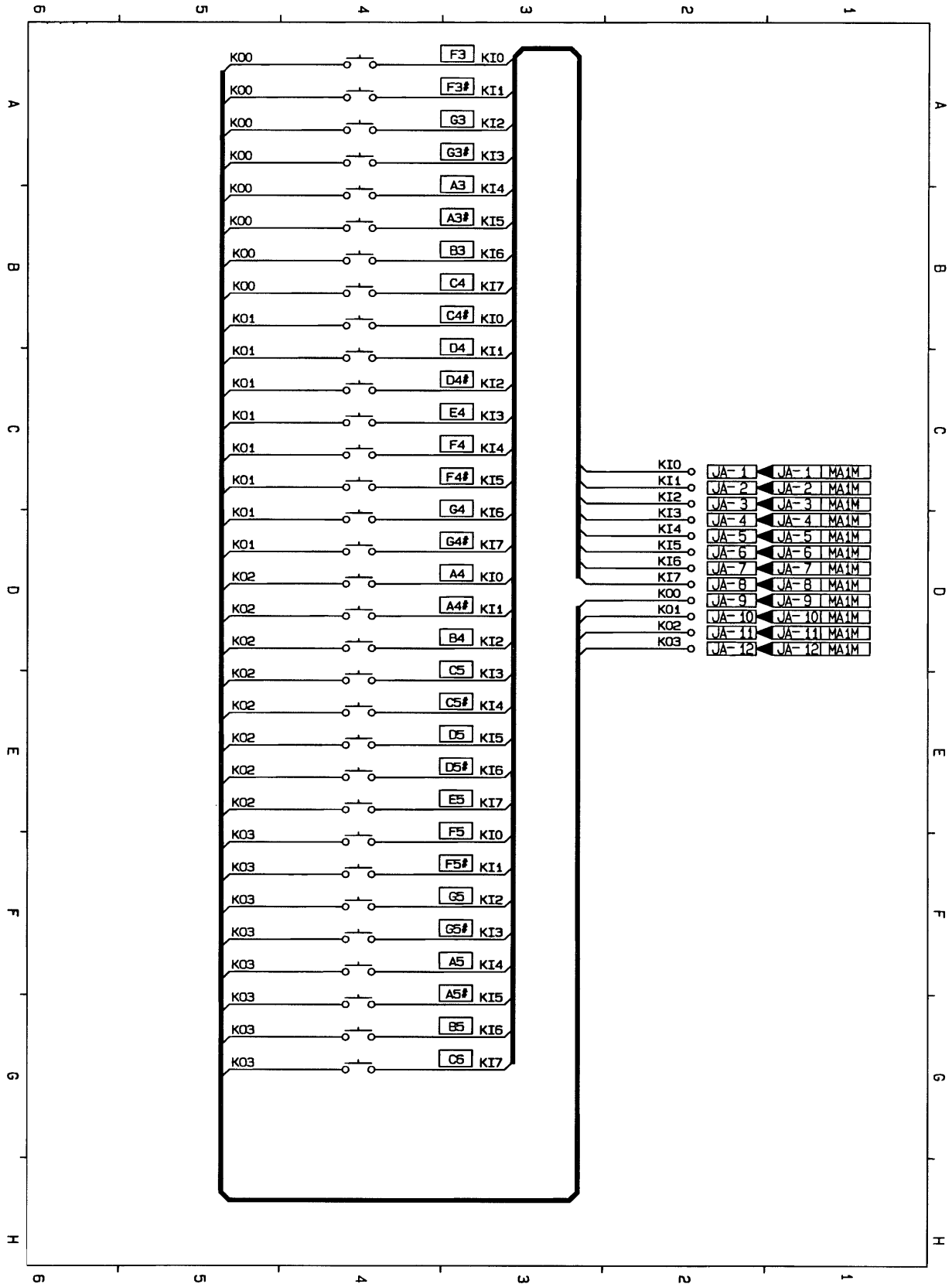


## TROUBLESHOOTING

Nature of Trouble	Faulty Block	Checkpoint
No power	Power Supply Circuit	Base of T1 should receive +6 V.
		Emitter of T1 should provide +5.6 V.
	Power switch	Switch contact.
No sound at all	Power Jack (J1)	Jack contact.
	Power Amp. (IC1: AN8053N)	Pin 16 should receive +7.5 V when the power switch is turned on.
		Voltage at pin 14 should drop at 0 V when the power switch is turned on.
		Check output signal of pin 1.
	CPU (LSI1: MSM6521-13)	Voltage at pin 27 should rise 0 V to 5.6 V when the power switch is turned on.
		Pins 39 ~ 46 should provide pulses.
Pin 29 should have a sound signal when a key is pressed.		
Oscillator (XL1)	Pins 20 and 21 of the CPU should receive an oscillation signal.	
Keyboard LEDs don't light up	Keyboard LED	
	Keyboard LED Matrix	Open circuit on LX or LY line.
A certain key or switch does not function	Key and Switch Matrix	Dust on the contact.
Certain keys or switches do not function	Key and Switch Matrix	Open circuit on KC or KI line.

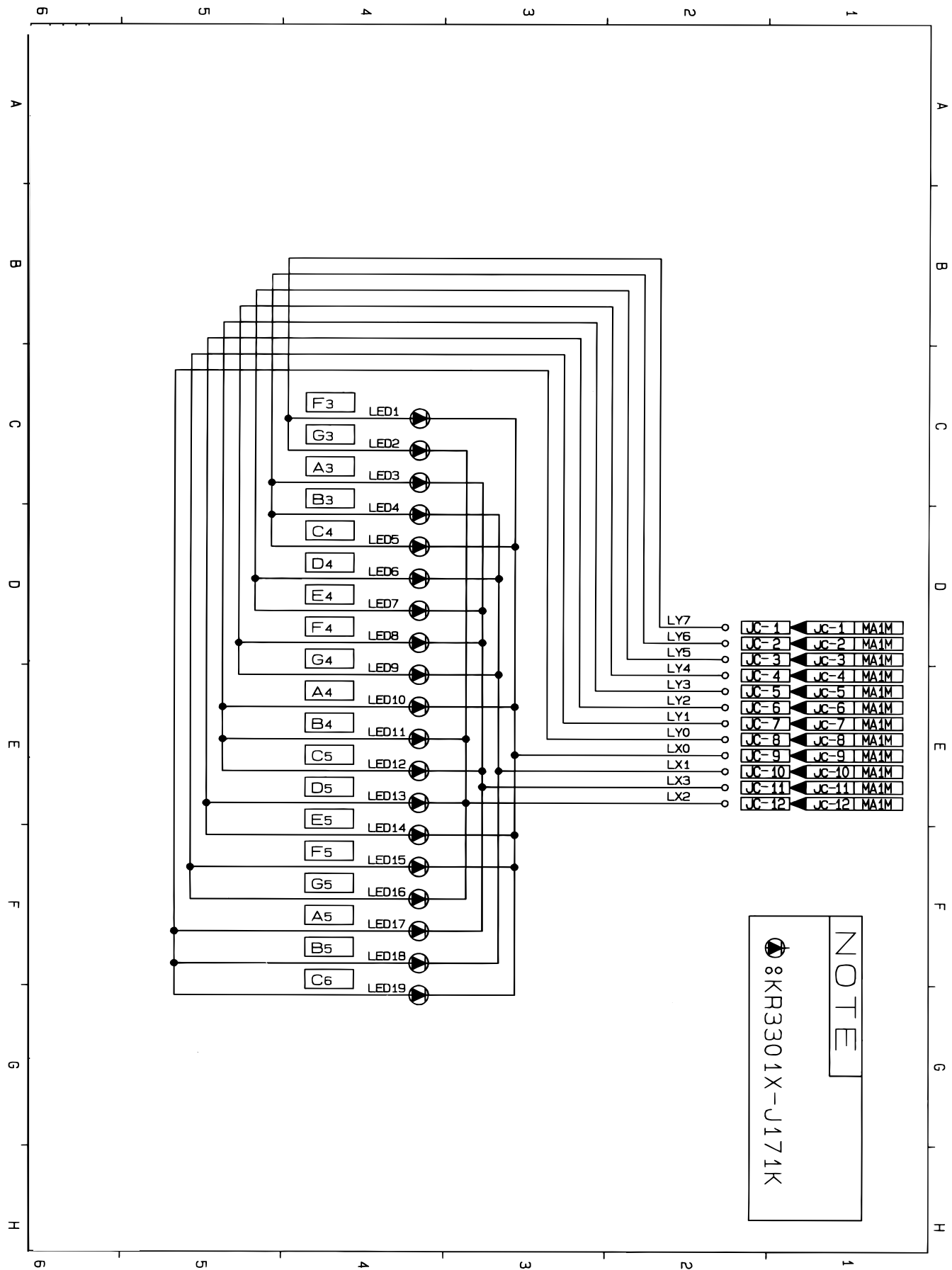
# SCHEMATIC DIAGRAMS

JCM605-KY1M

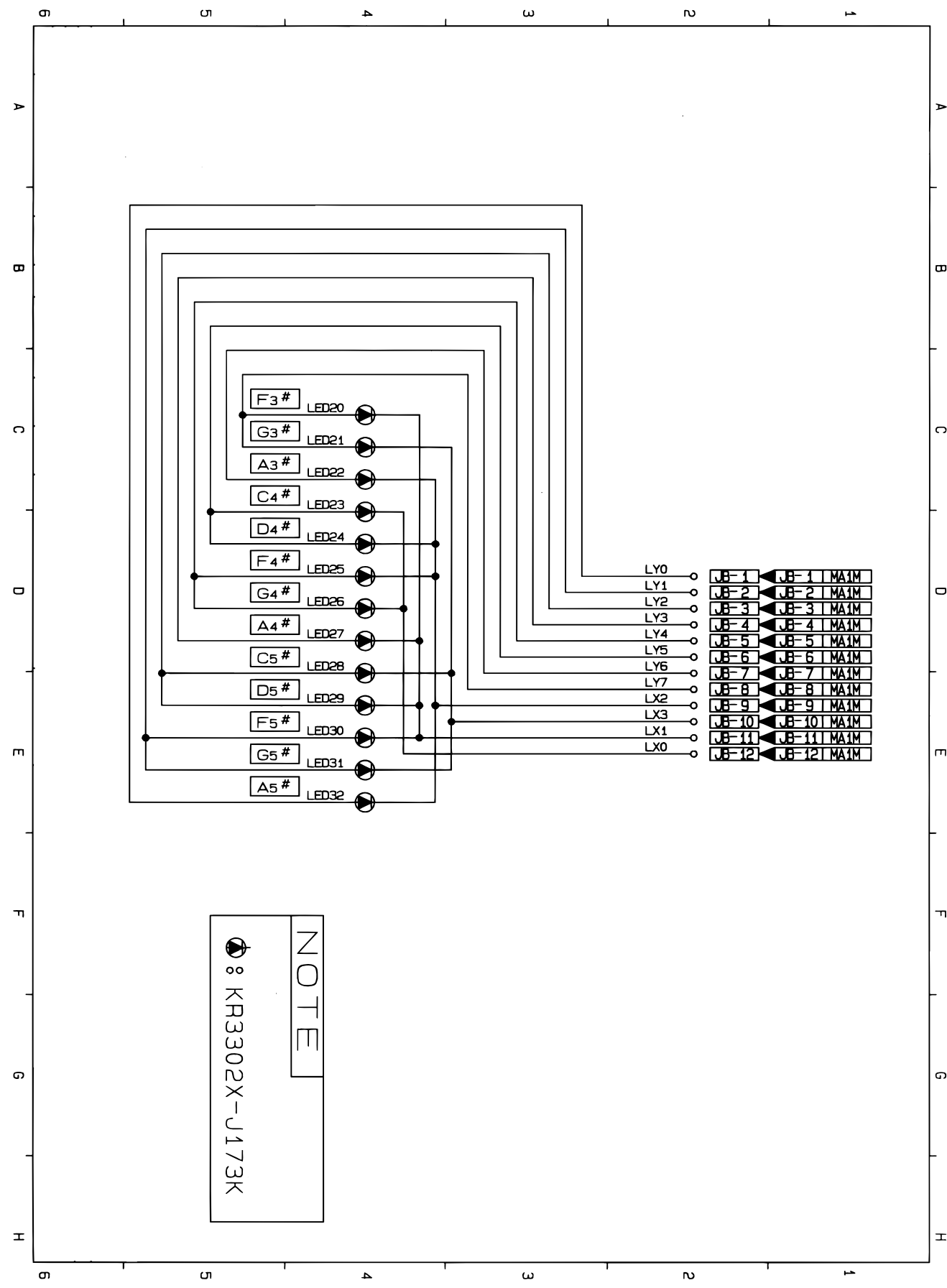




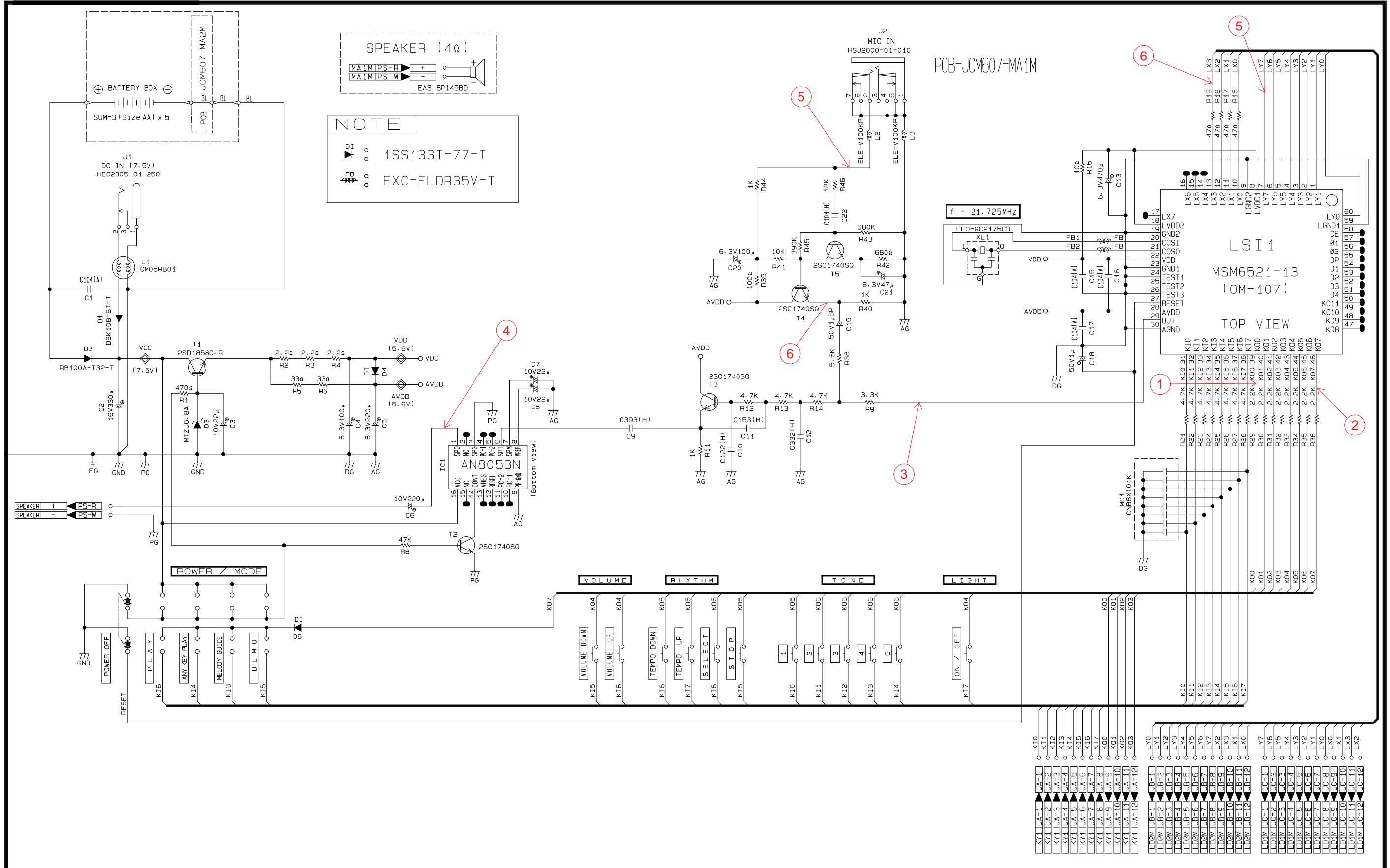
JCM605-LD1M



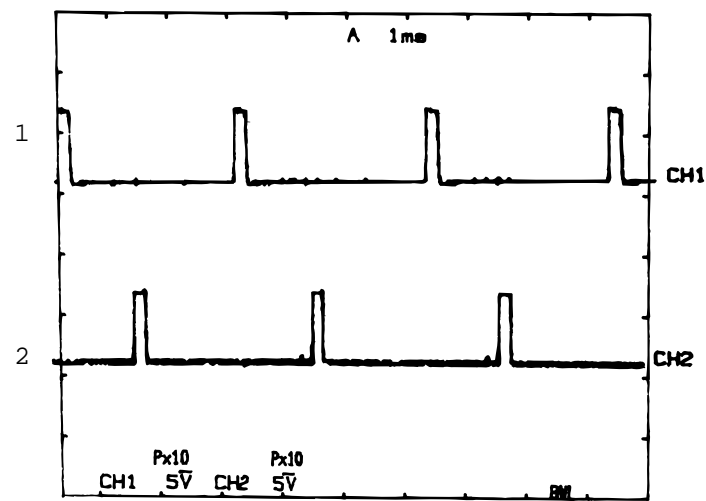
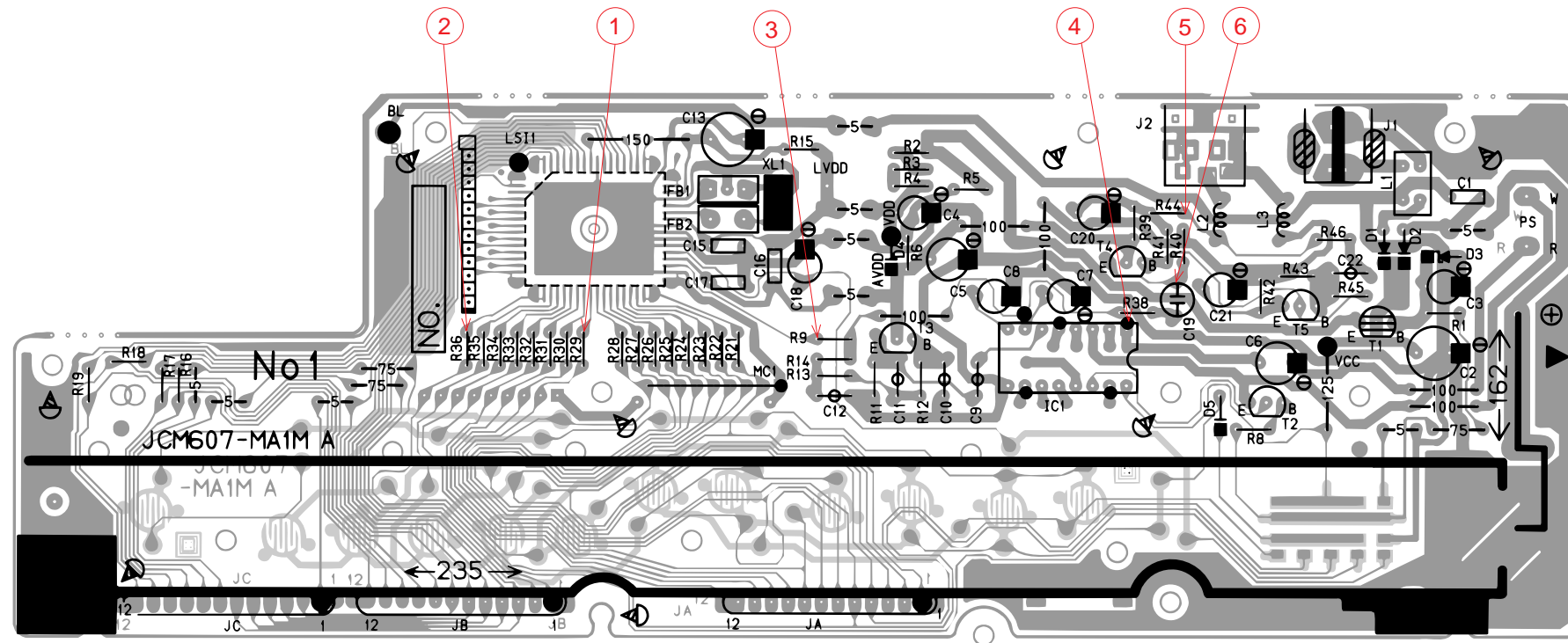
JCM605-LD2M



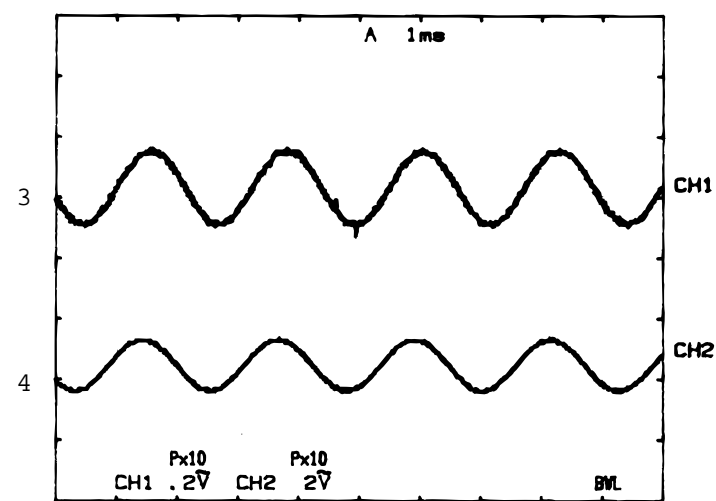
JCM607-MA1M/MA2M



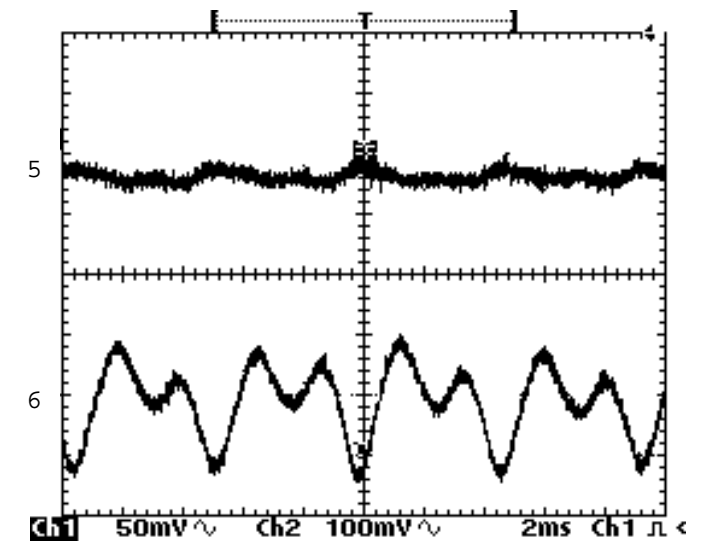
## PCB VIEW AND MAJOR WAVEFORMS



- 1 Key scan signal KO0  
MSM6521-13 pin39
- 2 Key scan signal KO7  
MSM6521-13 pin46

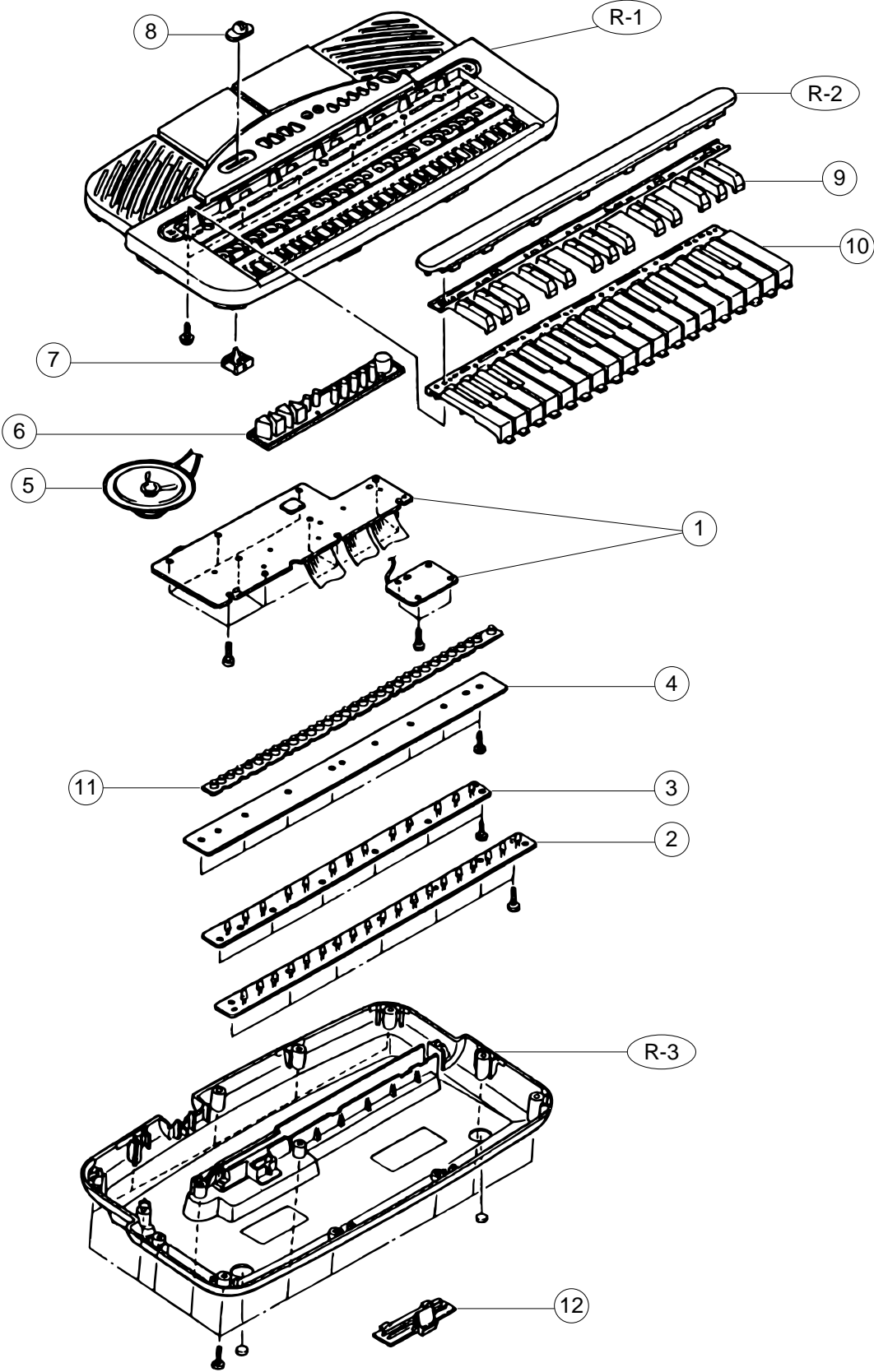


- 3 Sound signal output  
MSM6521-13 pin29
- 4 Power amp output  
AN8053N pin 1



- 5 Mic, amp. input
- 6 Mic. amp. output  
T4 Emitter

# EXPLODED VIEW



# PARTS LIST

## ML-3

Notes: This parts list does not include the cosmetic parts, which parts are marked with item No. "R-X" in the exploded view.

Contact our spare parts department if you need these parts for refurbish.

1. Prices and specifications are subject to change without prior notice.
2. As for spare parts order and supply, refer to the "GUIDEBOOK for Spare parts Supply", published separately.
3. The numbers in item column correspond to the same numbers in drawing.

Item	Code No.	Parts Name	Specification	Q	R
<b>Main PCB</b>					
1	6922 8720	Main PCB ass'y M607MA1,2M	M111832*1	1	B
LSI1	2011 8057	LSI	MSM6521-13	1	A
IC1	2114 3269	IC	AN8053N	1	A
T1	2253 0448	Transistor	2SD1858Q,R-TV6-T	1	A
T2 - T5	2220 1387	Transistor	2SC1740SQ-TP-T	4	B
D1	2390 0371	Diode	DSK10B-BT-T	1	B
D2	2390 1323	Diode	RB100A-T32-T	1	B
D3	2360 1519	Zener diode	MTZJ6.8A-T77-T	1	A
D4/5	2390 1344	Diode	1SS133T-77-T	2	B
XL1	2590 0742	Ceramic oscillator	EFO-GC2175C3	1	B
J1	3501 3731	Power jack	HEC2305-01-250	1	A
J2	3501 4382	Jack	HSJ2000-01-010	1	B
<b>LED PCBs</b>					
2	6922 6890	LED PCB ass'y M605-LM1M	M211795*1	1	C
	2370 1043	LED	KR3301X-J171K	19	B
3	6922 6900	LED PCB ass'y M605-LM2M	M211796*1	1	C
	2370 1050	LED	KR3302X-J173K	13	B
<b>Mechanical Parts</b>					
4	4317 5081	Blank PCB JCM605-KY1	M211780A-1	1	C
5	3831 0378	Speaker	EAS-8P149BD	1	B
6	6922 8850	Rubber button	M211778-2	1	B
7	6909 5890	Slide contact	CSB-12D	1	B
8	6922 6930	Slide knob	M311280-4	1	B
9	6906 7203	Black key set, LNM32	M110553C-3	1	A
10	6922 6760	White key set, LNM32	M117817-1	1	A
11	6917 1080	Key contact rubber	M310878-1	1	A
12	6906 7311	Battery cover	M312197A*2	1	B
<b>Accessories</b>					
	6922 8890	Mic. holder	M312227-1	1	B
	6922 8881	Mic. holder base	M312242A*1	1	B
	6923 2300	Microphone	4110-072-0-01	1	B
	6925 4630	Console sheet	M240480A-2	1	B

Notes: Q – Used quantity  
R – Rank

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