CASIO®

Service Manual

(with price)

ML-2

ML-2

ELECTRONIC KEYBOARD

INDEX

CONTENTS

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:	Output Jack [Output Impedance: 100 Ω, Output Voltage: 1.6 V (rms)], AC Adapter Jack (DC 7.5 V)
Power Source:	DC: 5 AA size dry batteries Battery life: Approx. 5 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 x 415 x 208 mm (HWD) (2-1/4 x 16-3/8 x 8-1/4 inches) (HWD)
Weight:	1.05 kg (2.3 lbs) including batteries

Electrical

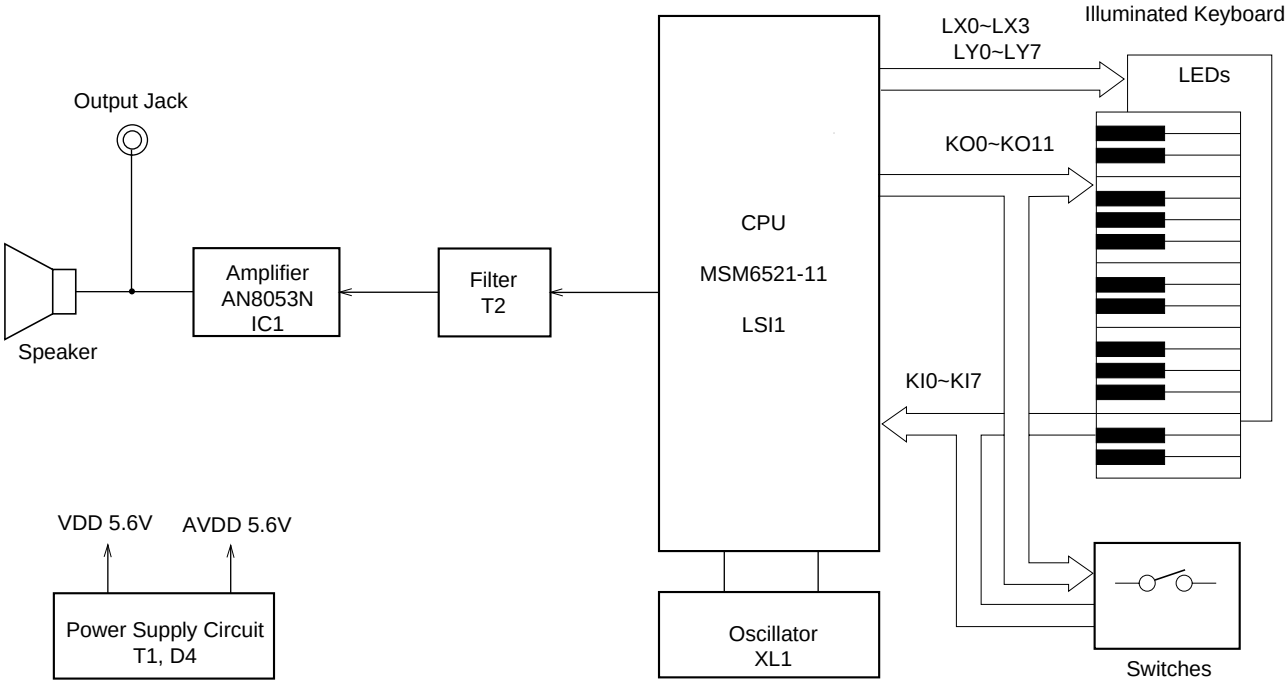
Current Drain with 7.5 V DC:	
No Sound Output	44 mA ± 20%
Maximum Volume with keys B3 and C4 pressed in Flute tone Volume: Maximum, Rhythm: Rock, Tempo: Maximum	175 mA ± 20%
Speaker Input Level (Vrms with 4 Ω load): with key C4 pressed in Flute tone Volume: Maximum	750 mV ± 20%
Output Level (Vrms with 47 kΩ load): with key C4 pressed in Flute tone Volume: Maximum	800 mV ± 20%
Minimum Operating Voltage:	6.2 V

*Power ON Reminder

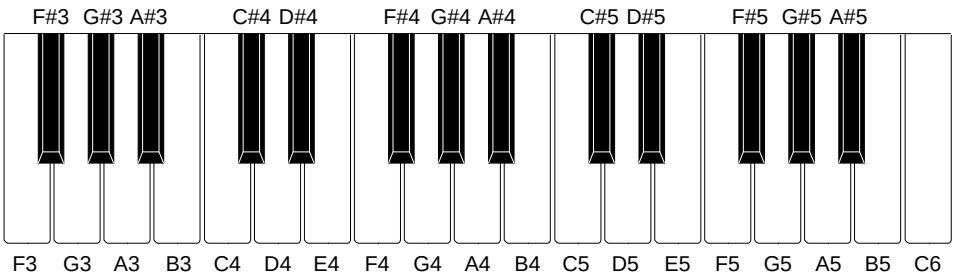
Power ON reminder is sudden audible and light signals, a short melody at maximum volume and lighting up the illuminated keyboard for a few seconds.

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

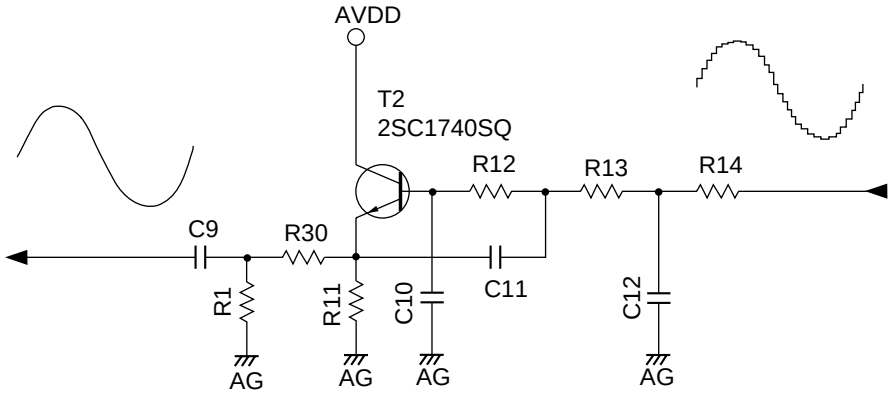
CPU (LSI1: MSM6521-11)

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	+5V source for the built-in LED driver
9	LGND2	In	Ground (0V) 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	+5V source for the built-in LED driver
19	GND2	In	Ground (0V) source
20, 21	COSI, COSO	In/Out	21.725 MHz clock pulse input/output
22	VDD	In	+5V source
23	GND1	In	Ground (0V) source
24 ~ 26	TEST1 ~ TEST3	In	Not used. Connected to ground.
27	RESET	In	Reset signal input. Power OFF: 0V, Power ON: +5V
28	AVDD	In	+5V source for the built-in DAC
29	OUT	Out	Sound waveform output
30	AGND	In	Ground (0V) 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 (0V) source for the built-in LED driver
60	LY0	In	Keyboard LED drive signal output

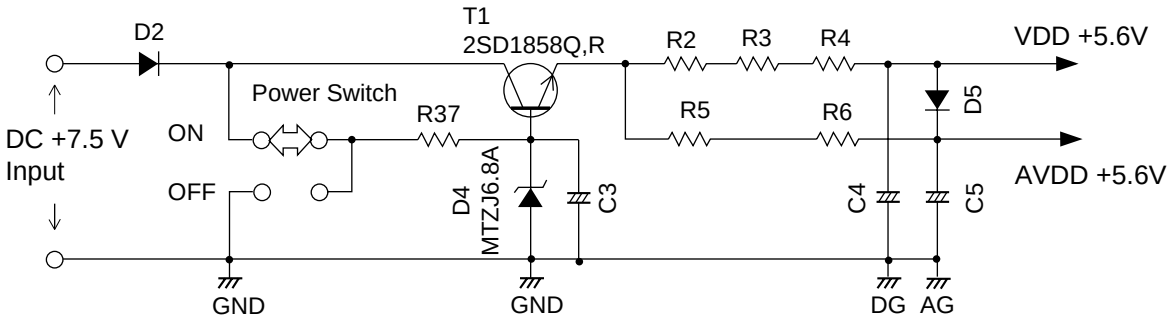
Filter Block

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.

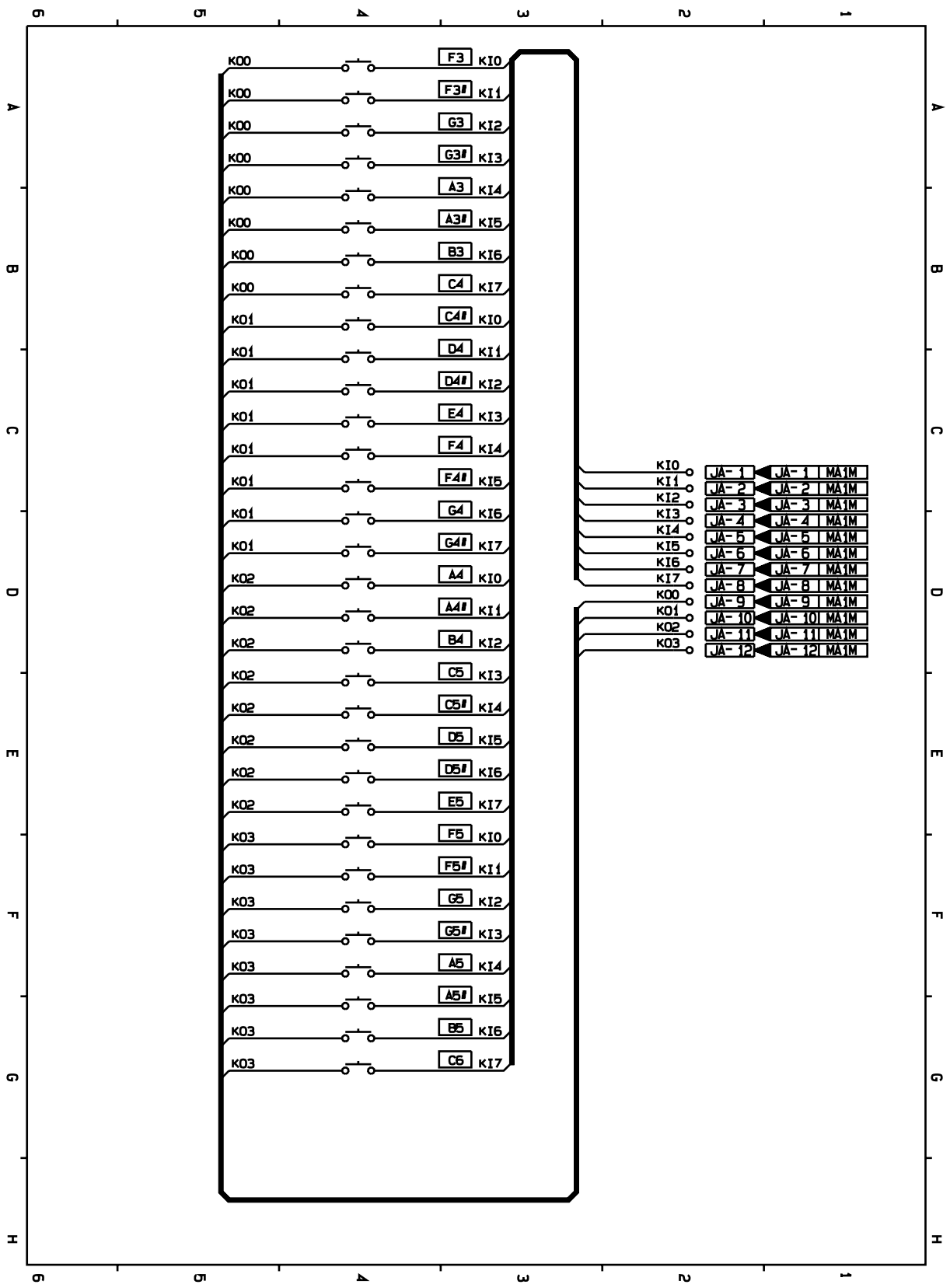


TROUBLESHOOTING

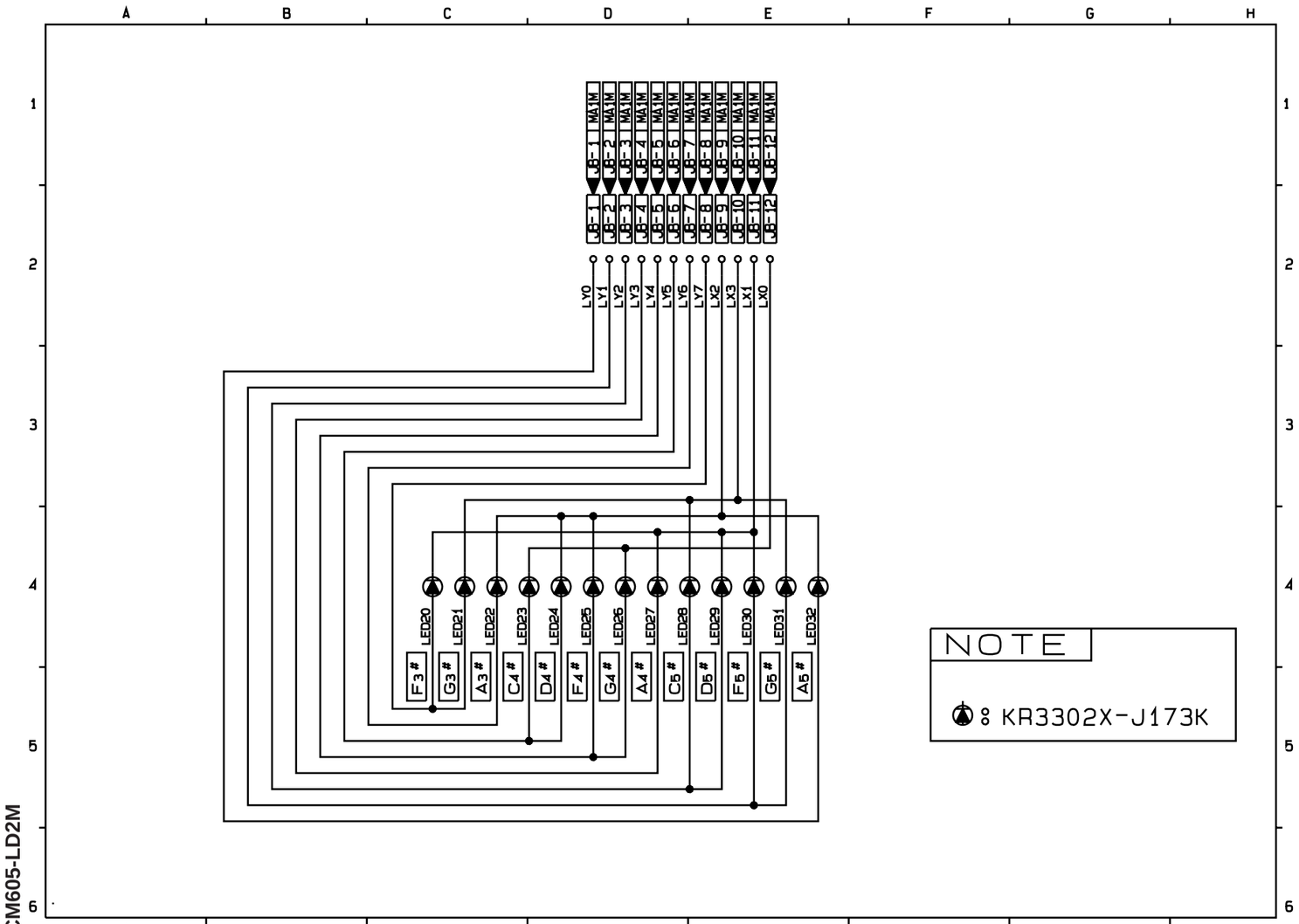
Nature of Trouble	Faulty Block	Checkpoint
No power	Power Supply Circuit	Base of T1 should receive +6 V.
		Emitter of T1 should provide +5.6 V.
	Power switch	Switch contact.
	Power Jack (J1)	Jack contact.
No sound at all	Power Amp. (IC1: AN8053N)	Pin 16 should receive +7.5 V when the power switch is turned on.
		Voltage at pin 14 should drop at 0V when the power switch is turned on.
		Check output signal of pin 1.
	CPU (LSI1: MSM6521-11)	Voltage at pin 27 should rise 0V to 5.6V 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 ocsillation signal.
Keyboard LEDs don't light up	Keyboard LED	
	Keyboard LED Matrix	Open circuir 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

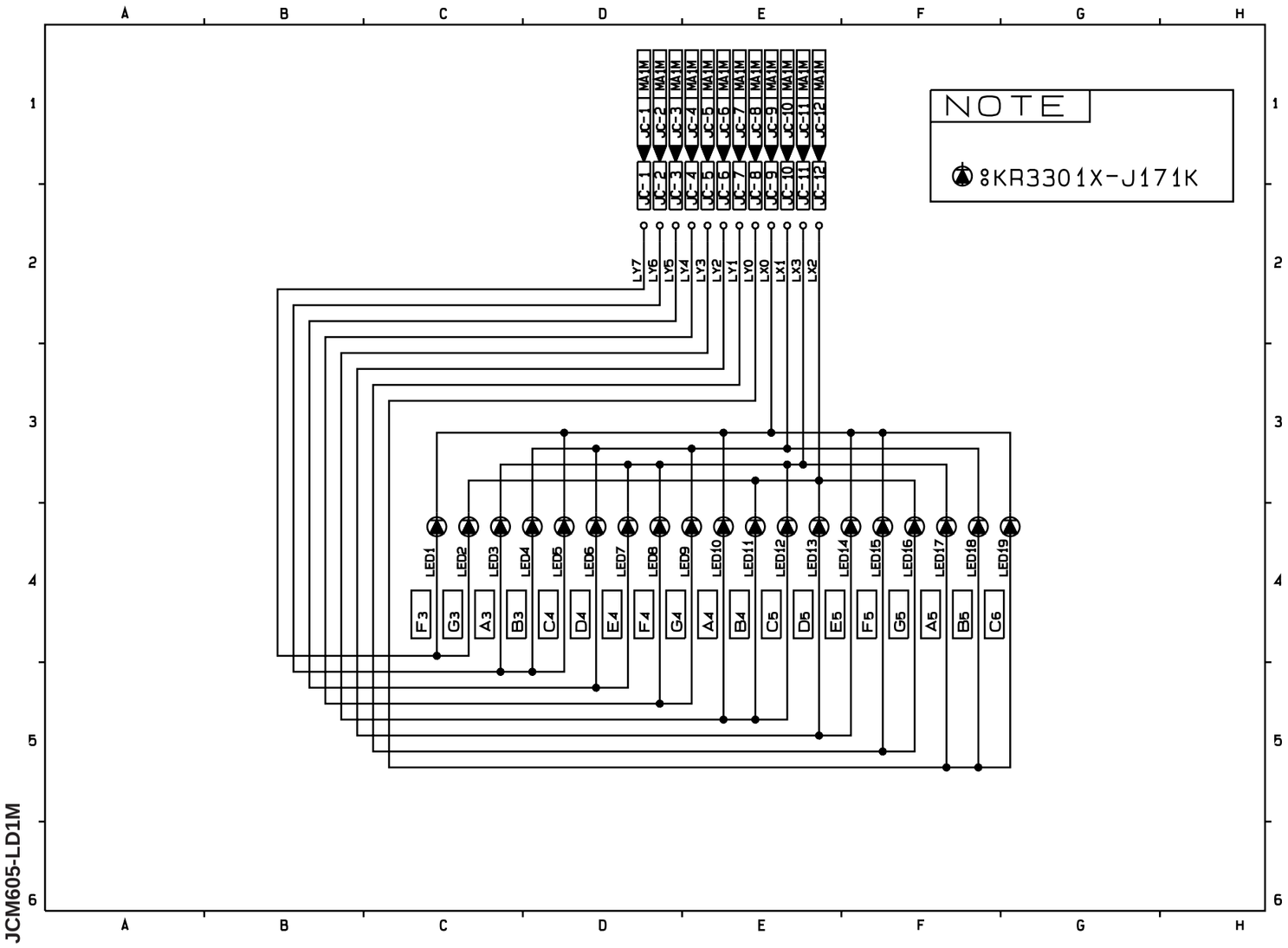
JCM605-KY1M

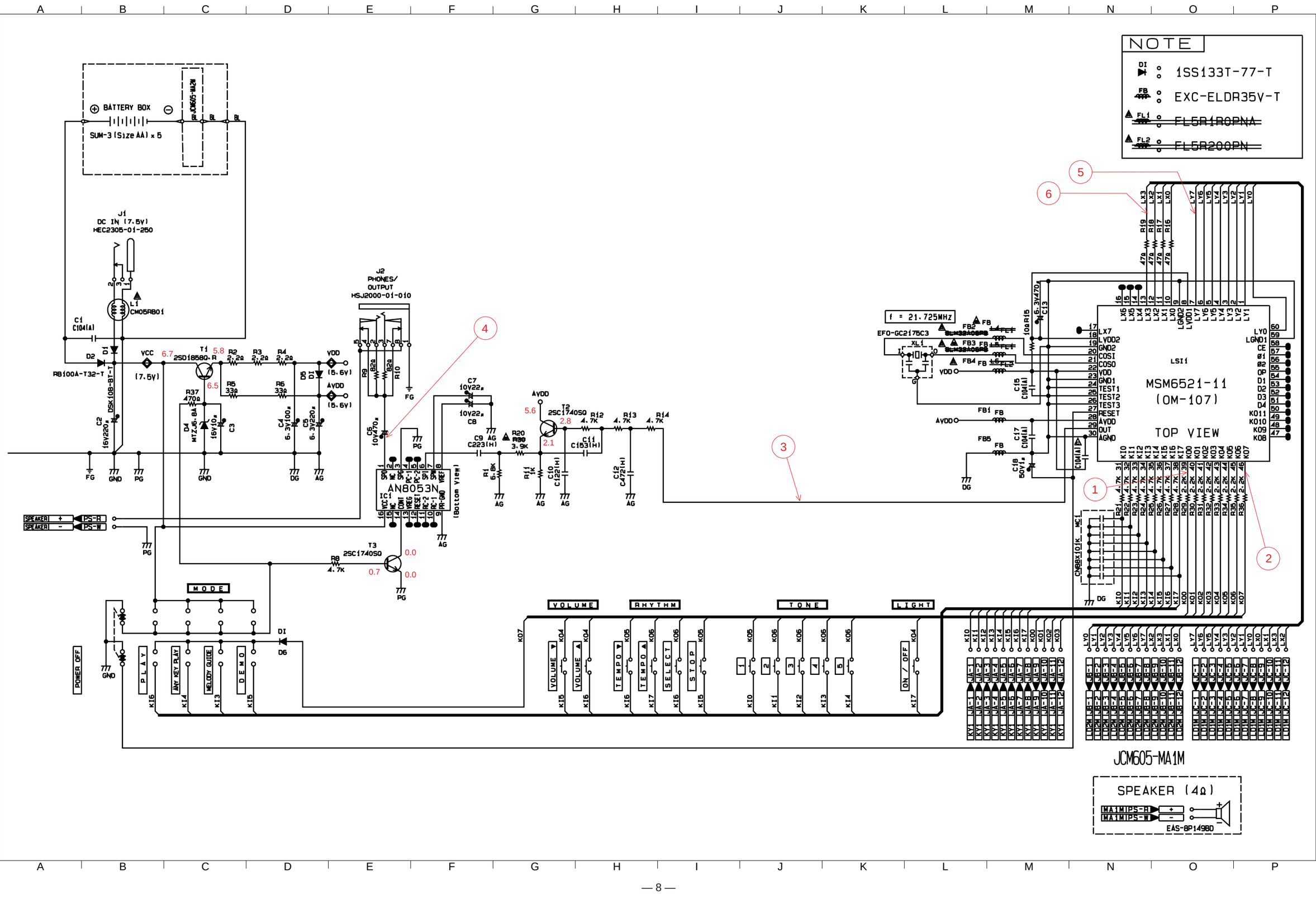


JCM605-LD2M

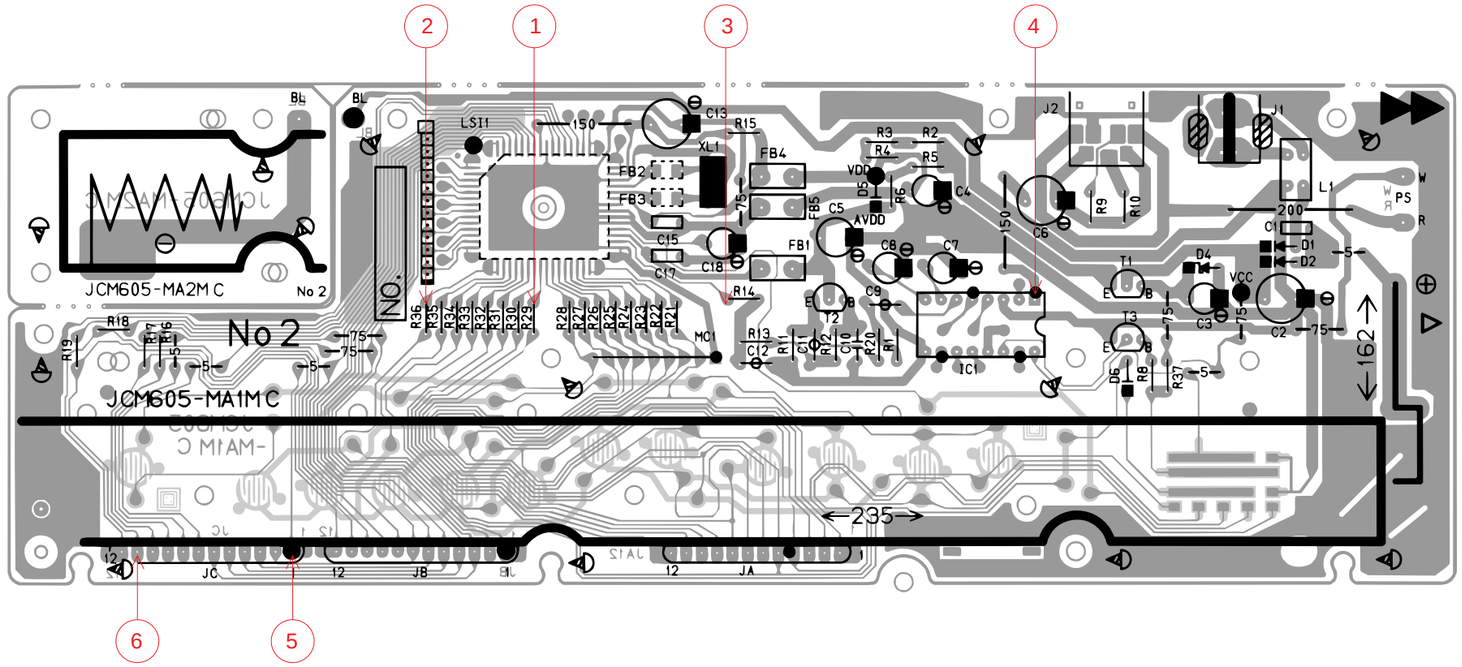


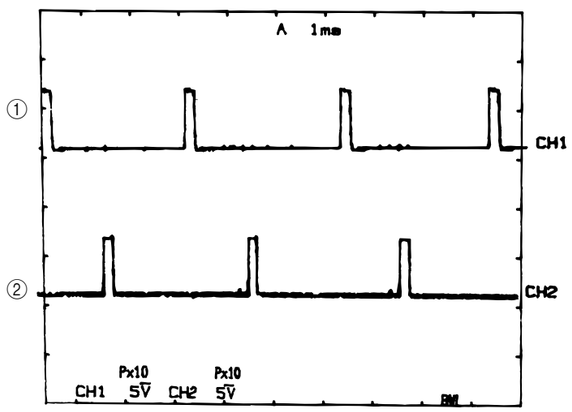
JCM605-LD1M




NOTE
DI 1SS133T-77-T
FB EXC-ELDR35V-T
FL1 FL5R1R0PNA
FL2 FL5R200PN
BATTERY BOX
SUM-3 (Size AA) x 5
J1
DC IN (7.5V)
HEC2305-01-250
L1
CM05RB01
C1
C104(A)
RB100A-T32-T
DSK108-81-T
VCC
(7.5V)
T1
2SD1858O-R
R1 2.2Ω
R2 2.2Ω
R3 2.2Ω
R4 2.2Ω
R5 33Ω
R6 33Ω
R37 470Ω
D4 MTZJ6.8A
C2 16V220μ
C3 16V10μ
C4 6.3V100μ
C5 6.3V220μ
VDD (5.6V)
AVDD (5.6V)
J2
PHONES/
OUTPUT
HSJ2000-01-010
R9 82Ω
R10 82Ω
FG
C7 10V22μ
C8 10V22μ
C5 10V470μ
PG
GND
DG
AG
SPEAKER + PS-R
SPEAKER - PS-W
IC1
AN8053N
(Bottom View)
T2
2SC1740SQ
R12 4.7K
R13 4.7K
R14 4.7K
R20 R30 3.9K
C9 AG C223(H)
C11 C153(H)
R11 1K
C10 C122(H)
R4 6.8K
C12 C472(H)
T3
2SC1740SQ
R8 4.7K
MODE
POWER OFF
PLAY
ANY KEY PLAY
MELODY GUIDE
DEMO
DI
D6
VOLUME
RHYTHM
TONE
LIGHT
f = 21.725MHz
EFO-GC2175C3
XL1
C15 C104(A)
C13 6.3V470μ
10Ω R15
FB2 FB3 FB4 FB5 FB1 FB
C17 C104(A)
C18 B0V1μ
C104(A)
LSI1
MSM6521-11
(OM-107)
TOP VIEW
R19 R18 R17 R16 47Ω
CN88x10JK_MCL
R21 R22 R23 R24 R25 R26 R27 R28 4.7K
R29 R30 R31 R32 R33 R34 R35 R36 2.2K
1
2
3
4
5
6
5.6
6.7
5.8
6.5
2.8
2.1
0.0
0.7
0.0
JCM605-MA1M
SPEAKER (4Ω)
MA1MIPS-R
MA1MIPS-W
EAS-8P149B0

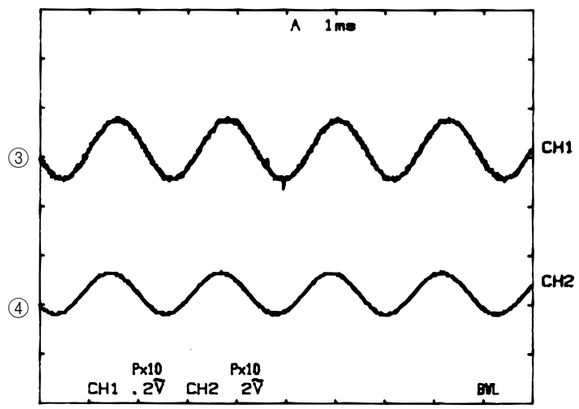
PCB VIEW AND MAJOR WAVEFORMS





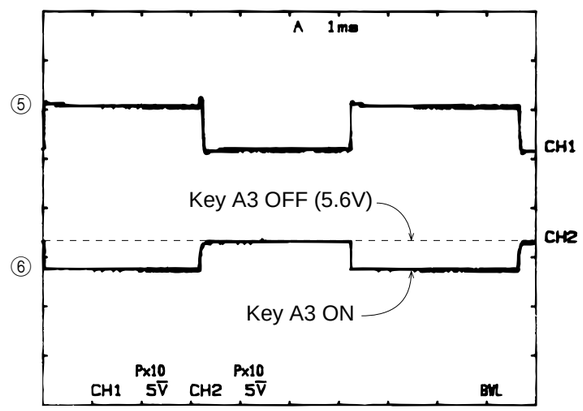
① Key scan signal KO0
MSM6521-11 pin39

② Key scan signal KO7
MSM6521-11 pin46



③ Sound signal output
MSM6521-11 pin29

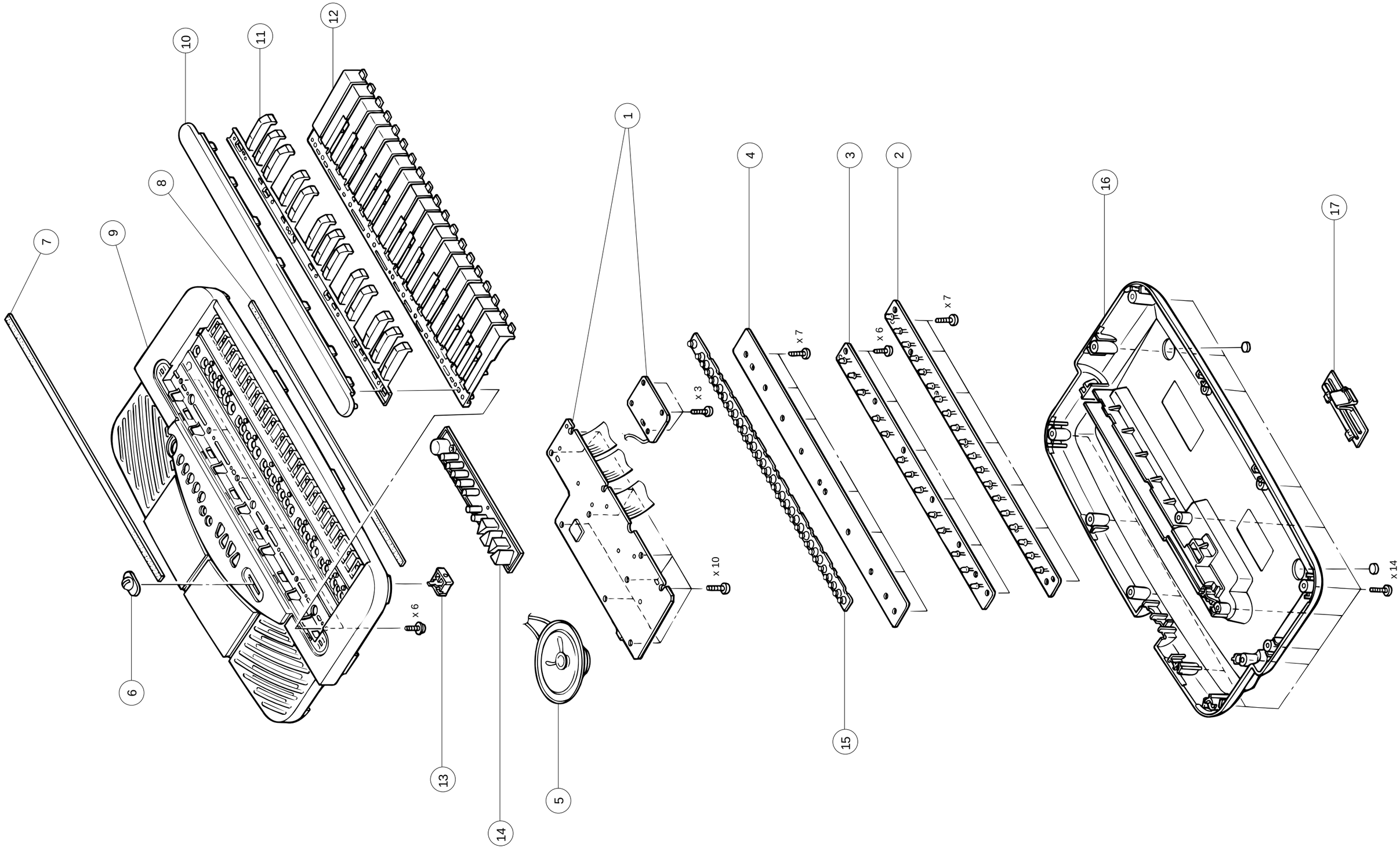
④ Power amp output
AN8053N pin 1



⑤ LED drive signal LY7
JC connector pin1

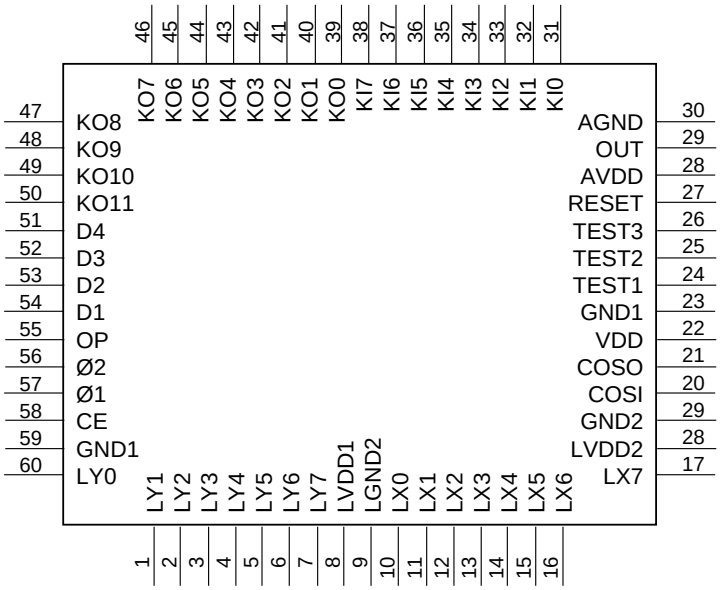
⑥ LED drive signal LX3
JC connector pin11

EXPLODED VIEW

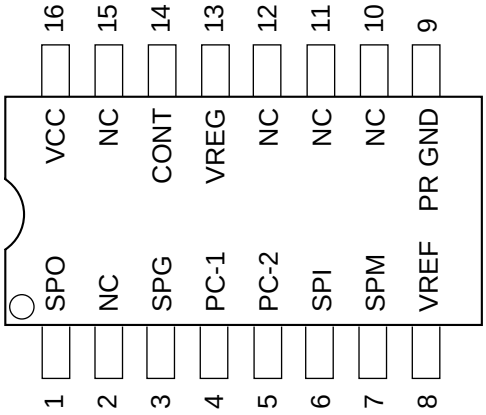


IC LEAD IDENTIFICATION

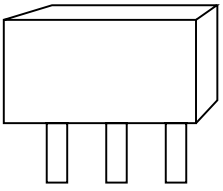
LSI1: MSM6521-11



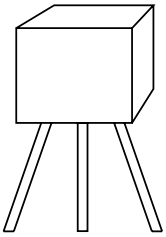
IC1: AN8053N



T1: 2SD1858Q, R



T2, T3: 2SC1740SQ



PARTS LIST

ML-2

Notes:

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 seperately.
3. The numbers in item column correspond to the same numbers in drawing.

N	Item	Code No.	Parts Name	Specification	Q	M	FOB Japan N.R.Yen Unit Price	R	*
		Main PCB Ass'y							
N	LSI1	2011 7497	LSI	MSM6521-11	1	1	780	A	H
	IC1	2114 3269	IC	AN8053N	1	1	120	A	B
	T1	2253 0448	Transistor	2SD1858Q,R-TV6-T	1	1	24	A	A
	T2/3	2220 1387	Transistor	2SC1740SQ-TP-T	2	10	13	B	A
	D1	2390 0371	Diode	DSK10B-BT-T	1	10	11	B	A
	D2	2390 1323	Diode	RB100A-T32-T	1	10	29	B	A
	D4	2360 1519	Zener diode	MTZJ6.8A-T77-T	1	10	8	A	A
	D5/6	2390 1344	Diode	1SS133T-77-T	2	10	3	C	A
	XL1	2590 0742	Ceramic oscillator	EFO-GC2175C3	1	1	64	B	B
	R1	2606 1491	Carbon film resistor	R-20-6.8K-J-T23-T	1	20	2	C	A
	R2~4	2606 1722	Carbon film resistor	R-20-2.2-J-T23-T	3	20	2	C	A
	R5/6	2606 1477	Carbon film resistor	R-20-33-J-T23-T	2	20	2	C	A
	R9/10	2606 1232	Carbon film resistor	R-20-82-J-T23-T	2	20	2	C	A
	R11	2606 1141	Carbon film resistor	R-20-1K-J-T23-T	1	20	2	C	A
	R12~14, 21~28	2606 1253	Carbon film resistor	R-20-4.7K-J-T23-T	12	20	2	C	A
	R15	2606 1162	Carbon film resistor	R-20-10-J-T23-T	1	20	2	C	A
	R16~19	2606 1708	Carbon film resistor	R-20-47-J-T23-T	4	20	2	C	A
	R20	2606 1365	Carbon film resistor	R-20-3.9K-J-T23-T	1	20	2	C	A
	R29~36	2606 1288	Carbon film resistor	R-20-2.2K-J-T23-T	8	20	2	C	A
	R37	2606 1309	Carbon film resistor	R-20-470-J-T23-T	1	20	2	C	A
	C2	2807 0985	Electrolytic capacitor	16RE2-220-T2-T	1	10	30	C	A
	C3	2805 3142	Electrolytic capacitor	16RE2-10-T2-T	1	10	14	C	A
	C4	2807 1091	Electrolytic capacitor	6.3RE2-100-T2-T	1	10	18	C	A
	C5	2805 3061	Electrolytic capacitor	6.3RE2-220-T2-T	1	10	26	C	A
	C6	2807 0926	Electrolytic capacitor	10RE2-470-T2-T	1	10	36	C	A
	C7/8	2805 3134	Electrolytic capacitor	10RE2-22-T2-T	2	10	14	C	A
	C9	2813 1932	Semiconductive capacitor	RT-B50TKYR223K-T	1	20	5	C	A
N	C10	2813 2947	Semiconductive capacitor	RT-C40TKYR122K-T	1	20	4	C	A
	C11	2813 3094	Semiconductive capacitor	RT-C50TKYR153K-T	1	20	4	C	A
	C12	2813 1729	Semiconductive capacitor	RT-C40TKYR472K-T	1	20	4	C	A
	C13	2807 1040	Electrolytic capacitor	6.3RE2-470-T2-T	1	10	27	C	A
	C15,17	2813 3283	Ceramic capacitor	UP050F104Z-A-B	3	20	8	C	A
	C18	2807 1023	Electrolytic capacitor	50RE2-1-T2-T	1	10	15	C	A
	MC1	2845 0168	Module capacitor	CNB8X101K	1	1	58	C	B
	FB1~5	3035 0266	Ferrite beads	BL02RN2-R62T4-T	5	10	13	C	A
	J1	3501 3731	DC jack	HEC2305-01-250	1	1	30	B	A
	J2	3501 4382	Jack	HSJ2000-01-010	1	1	56	C	B
N	JA	3719 4319	Ribbon cable M605A	DF5H12085-5000M	1	1	30	C	A
N	JB	3719 4326	Ribbon cable M605B	DF5H12095-5000M	1	1	27	C	A
N	JC	3719 4333	Ribbon cable M605C	DF5H12115-5000M	1	1	31	C	A
	L1	3841 1057	Common mode coil	CM05RB01	1	1	63	C	B
N		4317 5032	Blank PCB JCM605-MA1M	M211783B-1	1	1	160	C	B
N		4317 5042	Blank PCB JCM605-MA2M	M211783B-2	1	1	16	C	A
N	1	6921 8160	PCB ass'y M605-MA1,2M	M111821*1	1	1	1740	B	P
		6922 1750	Battery spring (+) 522A	M412225-1	1	20	7	B	A
		6922 1760	Battery spring (-) 522B	M412226-1	1	20	10	B	A
		LED PCB ass'y							
N	2	6922 6890	PCB ass'y M605-LD1M	M211795*1	1	1	880	C	J
N		4317 5010	Blank PCB JCM605-LD1M	M211781-1	1	1	54	C	B
N		2370 1043	LED	KR3301X-J171K	19	10	38	B	A
N	3	6922 6900	PCB ass'y M605-LD2M	M211796*1	1	1	650	C	G
N		4317 5020	Blank PCB JCM605-LD2M	M211782-1	1	1	45	C	A
N		2370 1050	LED	KR3302X-J173K	13	10	38	B	A

Notes: N – New parts
M – Minimum order/supply quantity
R – Rank

N	Item	Code No.	Parts Name	Specification	Q	M	FOB Japan N.R.Yen Unit Price	R	*
		Mechanical Parts							
N	4	4317 5081	Blank PCB JCM605-KY1	M211780A-1	1	1	88	C	B
	5	3831 0378	Speaker	EAS-8P149BD	1	1	160	B	B
	6	6922 6930	Slide knob 521	M311280-4	1	5	19	B	A
N	6	6922 7670	Slide knob 521	M311280-5	1	5	19	B	A
N	7	6922 6821	L-LIMIT-LNM32	M412337A-1	1	1	36	C	A
N	8	6922 6810	U-LIMIT-LNM32	M412336-1	1	1	28	C	A
N	9	6922 6791	Upper case (Black)	M211786A*2	1	1	440	C	D
N	9	6922 6741	Upper case (Light gray)	M211786A*1	1	1	440	C	D
N	10	6922 6780	KY-PANEL-605	M211772-1	1	1	150	C	B
N	11	6906 7203	Black key set LNM32	M110553C-3	1	1	70	A	B
N	12	6922 6760	White key set LNM32	M117817-1	1	1	160	A	B
	13	6909 5890	Slide contact12D	CSB-12D	1	5	35	B	A
N	14	6922 6770	Rubber button 605	M211778-1	1	1	170	B	B
	15	6917 1080	Key contact rubber NM32	M310878-1	1	1	87	B	B
N	16	6922 6720	Lower case sub ass'y	M211789*1	1	1	280	C	C
N	17	6906 7193	Battery cover sub ass'y	M311200C*15	1	10	32	B	A
N		6922 6910	Rating label	M312199-2	1	10	8	C	A
		0009 5573	Screw	2.6x10	14	50	2	C	A
		0009 5574	Screw, washer head	2.6x6	6	50	2	C	A
		0009 2682	Screw	2.6x8	34	50	2	C	A

Notes: N – New parts
M – Minimum order/supply quantity
R – Rank

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MA0700941A