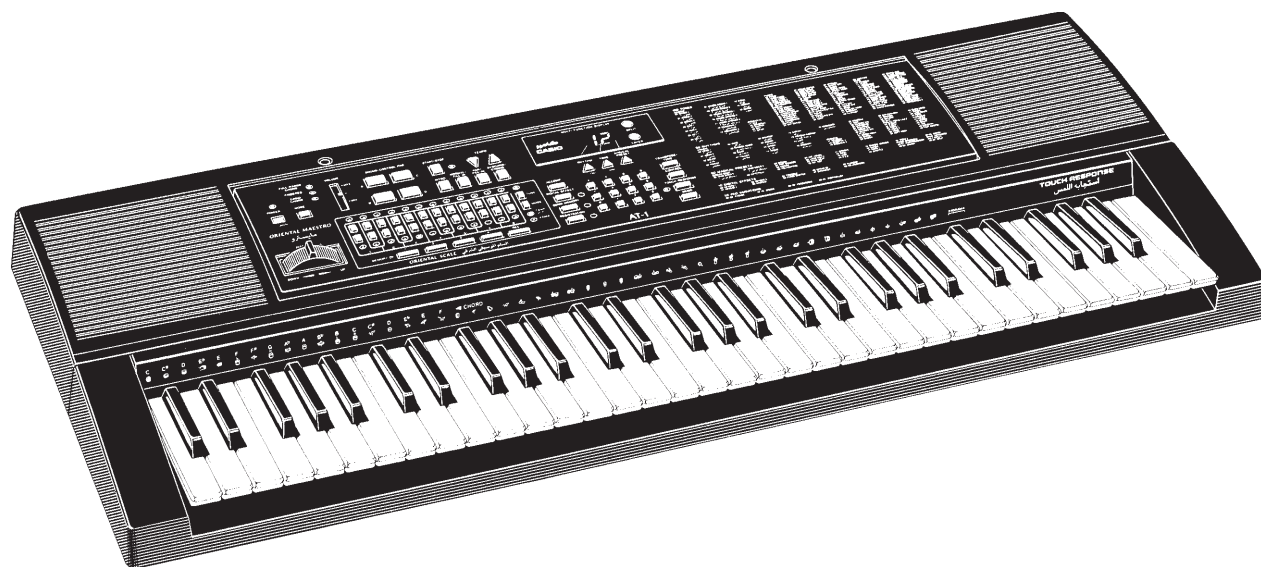


CASIO®

Service Manual

(without price)

AT-1



ELECTRONIC KEYBOARD

CONTENTS

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SPECIFICATIONS

General

Number of Keys:	61
Polyphonic:	32-note
Preset Tones:	100
Keyboard Controls:	Tone Expander: Layer, Split Touch Response: On/Off Touch Sensitivity: Light/Middle/Heavy
Key Transpose:	Range from F# to F by a semitone increment
Oriental Scale Control:	Tune: On/Off, Mode: Cent/ <i>Koma</i> Tuning Rang: Quarter tone (± 99 cents) and <i>koma</i> (± 5 <i>komas</i>)
Scale Memories:	4
Auto-Rhythms:	50 Tempo Control: 40 to 255
Auto-Accompaniment:	CASIO Chord/Fingered/Full-Range Chord Controller: Variation, Fill-In, Intro/Ending
Magical Presets:	50; BREAK BEAT 20 FREE SESSION 24 KEY SPLIT 6
Digital Effects:	10; Reverb-1, Reverb-2, Reverb-3, Chorus, Tremolo, Phase Shifter, Organ SP, Enhancer, Flanger, EQ Loudness
Sound/Control Pads:	4
Pad Variations:	32; Phrases: 10, Drums: 10, Percussion: 10, Controllers: 2
Song Memory:	1; System: Real-time recording Memory Capacity: Approx. 700 notes
Pitch Bender:	Bend Range; 2 semitones/3 semitones
Registration Memories:	6
Registration Items:	Tone Number, Rhythm Number, Tempo, Accompaniment Mode, Accompaniment Volume, Effects, Layer On/Off, Split On/Off, Chord On/Off, Accompaniment Scale On/Off, Pad Variation, Assignable Jack, Auto-Accompaniment Controller, MIDI (Channel On/Off, GM On/Off, Local Control On/Off, Bend Range)
Tuning Control:	440Hz \pm 50 cents
Terminals:	Headphone Jack [Output Impedance: 150 Ω , Output Voltage: 5.2 V(rms) MAX], Assignable Jack, MIDI Jacks (IN, OUT), AC Adaptor Jack (9 V)
Built-In Speakers:	12 cm dia. 2.5 W Input Rating: 2 pcs.
Power Source:	2-way AC or DC source AC: AC adaptor AD-5 DC: 6 D size dry batteries Battery life: Approx. 5 hours by manganese batteries R20P(SUM-1)
Auto Power Off:	Approximately 6 minutes after the last operation
Power Consumption:	7.7 W
Dimensions (HWD):	129 x 942 x 367 mm 5-1/16 x 37-1/16 x 14-7/16 inches
Weight:	5.3 kg (11.7 lbs) excluding batteries
Standard Accessory:	Music stand, Dust cover

Electrical

Current Drain with 9 V DC:

No Sound Output

260 mA \pm 20%

Maximum Volume

930 mA \pm 20%

with key C3 pressed in Synth-Bass tone and effect No. E-9

Split: On, Layer: On, Oriental scale: On/Cent

Song memory: Play, Volume; maximum, Touch: maximum

Line Output Level (Vrms with 47 K Ω load each channel):

with key F2 pressed in FSynth-Bass tone

2480 mV \pm 20%

Phone Output Level (Vrms with 8 Ω load each channel):

with key C3 pressed in FSynth-Bass tone

97 mV \pm 20%

Speaker Input Level:

with key C3 pressed in FSynth-Bass tone

2240 mV \pm 20%

Minimum Operating Voltage:

6.3 V

REPLACING THE DSP (HG51B155FD)

Note: To increase productivity, the DSP HG51B155FD is stucked on the main PCB with a double-side adhesive tape, then its leads are soldered.

Remove the DSP according to the following procedures.

1. Prepare isopropyl alcohol and a flat IC desoldering machine (Spot Heater HS-600).
2. Apply plenty of the alcohol to the adhesive tape from the reverse side of the main PCB. (Fig.1)
There is a hole on the PCB just under the LSI, and the adhesive tape can be seen through the hole.
3. Leave it more than one minute so that the alcohol weaken adhesive power fully.
4. Using a proper size of nozzle, apply heat to leads of the LSI with the desoldering machine.
5. Grasp the LSI with tweezers, and using gentle force vibrate the tweezers to feel melting solder. (Fig.2)
6. Remove the LSI after melting solder at every leads wholly.

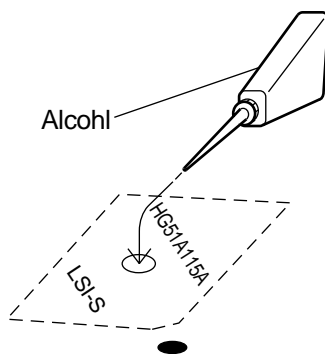


Fig.1

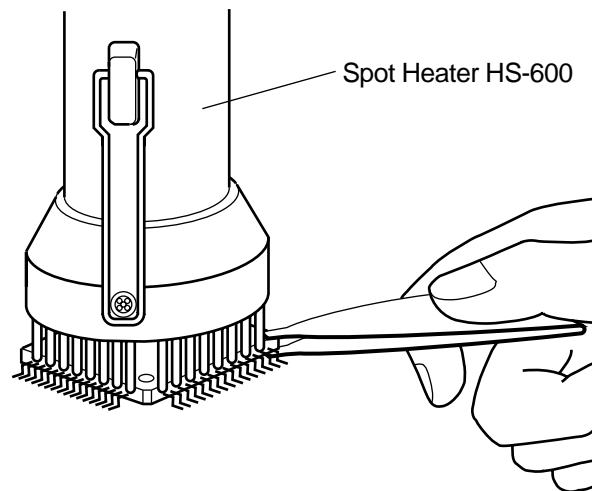
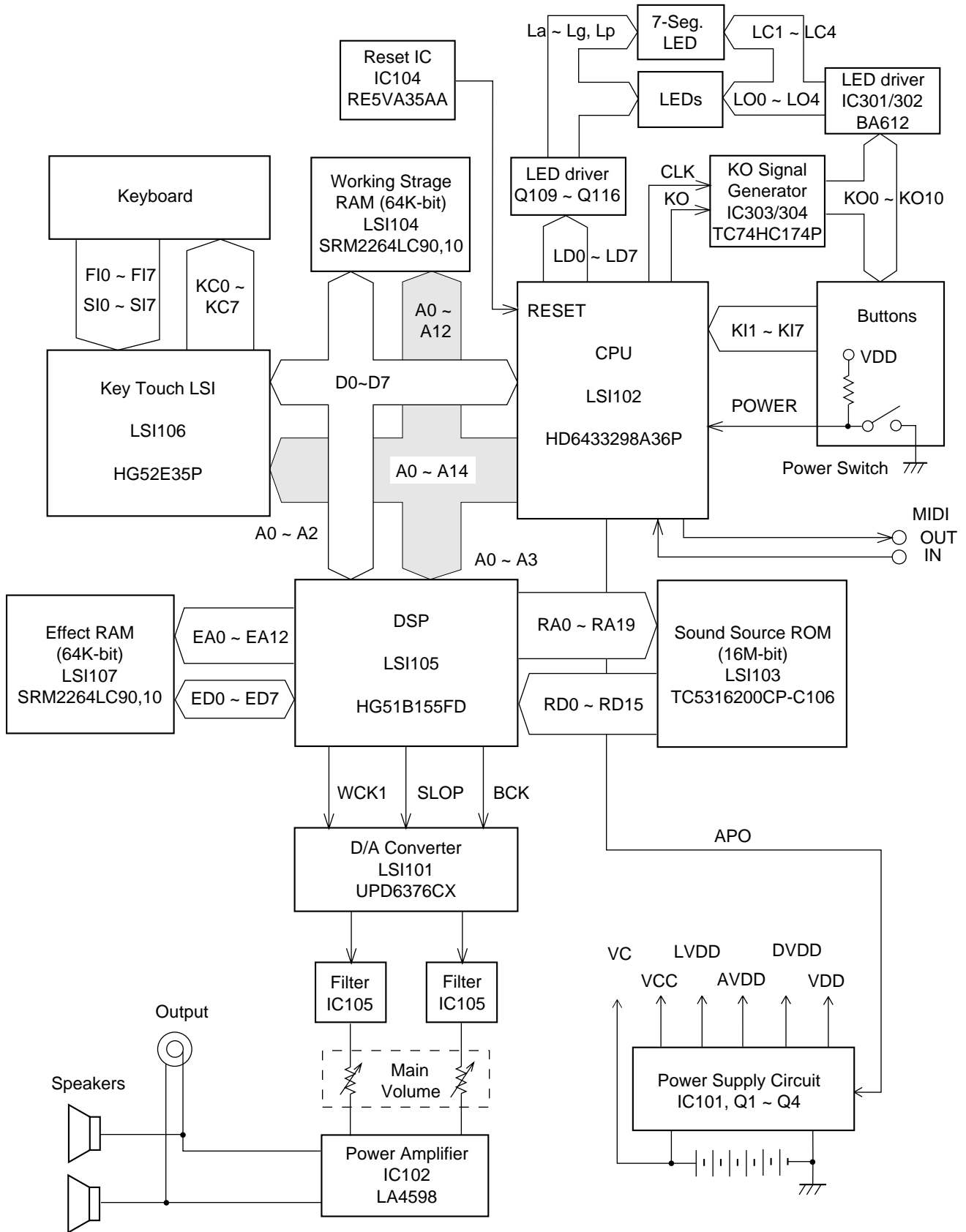


Fig.2

BLOCK DIAGRAM

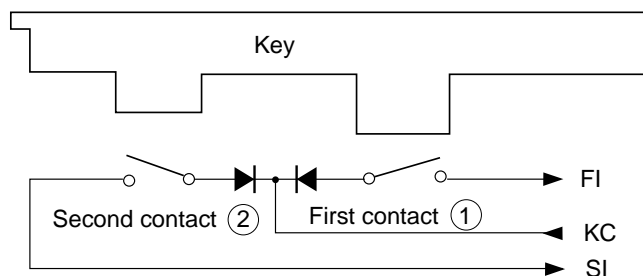


CIRCUIT DESCRIPTION

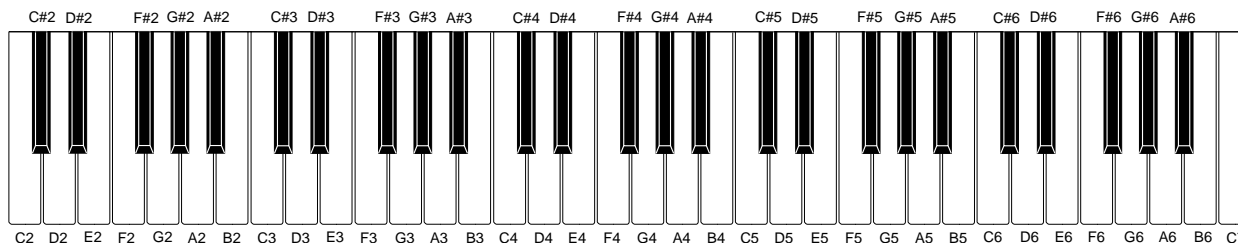
Key Matrix

	KC0	KC1	KC2	KC3	KC4	KC5	KC6	KC7
F10	C2 ①	C#2 ①	D2 ①	D#2 ①	E2 ①	F2 ①	F#2 ①	G2 ①
S10	C2 ②	C#2 ②	D2 ②	D#2 ②	E2 ②	F2 ②	F#2 ②	G2 ②
F11	G#2 ①	A2 ①	A#2 ①	B2 ①	C3 ①	C#3 ①	D3 ①	D#3 ①
S11	G#2 ②	A2 ②	A#2 ②	B2 ②	C3 ②	C#3 ②	D3 ②	D#3 ②
F12	E3 ①	F3 ①	F#3 ①	G3 ①	G#3 ①	A3 ①	A#3 ①	B3 ①
S12	E3 ②	F3 ②	F#3 ②	G3 ②	G#3 ②	A3 ②	A#3 ②	B3 ②
F13	C4 ①	C#4 ①	D4 ①	D#4 ①	E4 ①	F4 ①	F#4 ①	G4 ①
S13	C4 ②	C#4 ②	D4 ②	D#4 ②	E4 ②	F4 ②	F#4 ②	G4 ②
F14	C4 ①	C#4 ①	D4 ①	D#4 ①	E4 ①	F4 ①	F#4 ①	G4 ①
S14	C4 ②	C#4 ②	D4 ②	D#4 ②	E4 ②	F4 ②	F#4 ②	G4 ②
F15	E5 ①	F5 ①	F#5 ①	G5 ①	G#5 ①	A5 ①	A#5 ①	B5 ①
S15	E5 ②	F5 ②	F#5 ②	G5 ②	G#5 ②	A5 ②	A#5 ②	B5 ②
F16	C6 ①	C#6 ①	D6 ①	D#6 ①	E6 ①	F6 ①	F#6 ①	G6 ①
S16	C6 ②	C#6 ②	D6 ②	D#6 ②	E6 ②	F6 ②	F#6 ②	G6 ②
F17	G#6 ①	A6 ①	A#6 ①	B6 ①	C7 ①			
S17	G#6 ②	A6 ②	A#6 ②	B6 ②	C7 ②			

Note: Each key has two contacts, the first contact ① and second contact ② .



Nomenclature of Keys



Button Matrix

	KI1	KI2	KI3	KI4	KI5	KI6	KI7
KO0		Registration	Song Memory	3	2	1	0
KO1	Transpose/Tune	Control	Touch Response	Demo	Layer	Split	
KO2	Magical Preset	Tone	Rhythm	9	8	7	+
KO3		Digital Effect	Accomp	6	5	4	-
KO4			G# down	A down	A# down	B down	G down
KO5	ScaleMode	ScaleTune	B up	A# up	A up	G# up	G up
KO6	Tempo Down	Tempo Up	Synchro/Ending	Variation/Fill-In	Normal/Fill-In	Intro	Start/Stop
KO7	C up	C# up	D up	D# up	E up	F up	F# up
KO8	C down	C# down	D down	D# down	E down	F down	F# down
KO9	Mode	Pad B	Pad D	Pad A	Pad C		
KO10	Scale Memory 1	Scale Memory 2	Rec	Scale Memory 3	Scale Memory 4		

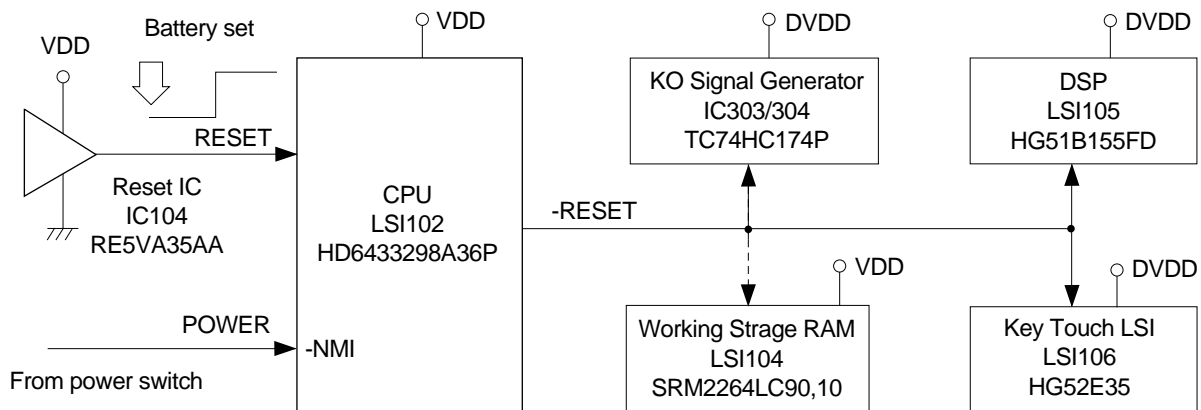
Reset Circuit

Initial reset

When batteries are set or an AC adapter is connected, the reset IC provides a low pulse to the CPU. The CPU then initializes its internal circuit and clears the working strage RAM.

Power ON reset

When the power switch is pressed, the CPU receives a low pulse of POWER signal. The CPU provides APO signal to the power supply circuit, then provides RESET signal to the DSP, the key touch LSI and the KO signal generators.



CPU (HD6433298A36P)

The 16-bit CPU contains a 32k-bit ROM, a 1k-bit RAM, seven 8-bit I/O ports, an A/D convertor and serial interfaces. The CPU accesses the working storage RAM, the DSP and the key touch LSI. The CPU also controls buttons, button input, LEDs and MIDI input/output.

The following table shows the pin functions of the CPU.

Pin No.	Terminal	In/Out	Function
1	P40	Out	KO signal data output
2	P41	Out	Clock for KO signal data
3	P42	Out	APO (Auto Power Off) signal output. ON: High OFF: Low
4	P43	Out	Read enable signal output
5	P44	Out	Write enable signal output
6	P45		Not used
7	P46	Out	10 MHz clock output
8	P47	In	Wait signal input. Connected to +5 V.
9	TXD	Out	MIDI signal output
10	RXD	In	MIDI signal input
11	P52	Out	Reset signal output
12	-RESET	In	Reset signal input
13	-NMI	In	Power ON signal input
14	VCC	In	+5 V source
15	-STBY	In	Standby signal input. Connected to +5 V.
16	VSS	In	Ground (0 V) source
17, 18	XTAL,EXTAL	In	20 MHz clock input
19, 20	MD1, MD0	In	Mode selection input.(Internal ROM mode --- MD1: High MD0: Low)
21	AVSS	In	Ground (0 V) source for the built-in DAC
22	AN0	In	Analog input. Connected to ground.
23 ~ 29	P71 ~ P77	In	Terminal for button input signal
30	AVCC	In	+5 V source for the built-in DAC
31 ~ 38	P60 ~ P67	Out	LED segment signal output
39	VCC	In	+5 V source
40	P27		Not used
41 ~ 56	P26 ~ P10	Out	Address bus
48	VSS	In	Ground (0 V) source
57 ~ 64	P30 ~ P37	In/Out	Data bus

Digital Signal Processor (HG51B155FD)

Upon receipt of note numbers and their velocities, the DSP reads sound and velocity data from the sound source ROM in accordance with the selected tone; the DSP can read rhythm data simultaneously when a rhythm pattern is selected. Then it provides 16-bit serial signals containing data of the melody, chord, bass, and percussion to the DAC. The DSP also adds the selected effect to the sound data using a 64k-bit RAM.

The following table shows the pin functions of the DSP.

Pin No.	Terminal	In/Out	Function
1 ~ 8	CD0 ~ CD7	In/Out	Data bus
9, 10			Not used
11	GND7	In	Ground (0 V) source
12	CK16	Out	16.384 MHz clock output
13	VCC6	In	+5 V source
14	CK0	In	Clock input. Connected to terminal CK16.
15	TCKB		Not used
16	VCC1	In	+5 V source
17	GND1	In	Ground (0 V) source
18, 19	XT0, XT1	In/Out	16.384 MHz clock input/output. Connected to a crystal oscillator.
20	SGL	In	System control terminal. Single chip system: Open
21	CCSB	In	Chip select signal input
22 ~ 25	CA0 ~ CA3	In	Address bus
26	CE0	In	Not used. Connected to ground.
27	CWRB	In	Write enable signal
28	CRDB	In	Read enable signal
29 ~ 32			Not used
33	RESB	In	Reset signal input
34	TESB	In	Not used. Connected to +5 V.
35 ~ 39			Not used
40 ~ 49 52 ~ 57	RD0 ~ RD15	In	Address bus for the sound source ROM
50	VCC2		+5 V source
51	GND2		Ground (0 V) source
58	RA23	Out	Not used
59	RA22	Out	Chip select signal for the sound source ROM
60, 61	RA20, RA21	Out	Not used
62 ~ 73 75 ~ 82	RA0 ~ RA19	Out	Address bus for the sound source ROM
74	GND5	In	Ground (0 V) source
83	WOK2	Out	Word clock output. Not used.
84	VCC3	In	+5 V source
85	GND3	In	Ground (0 V) source
86	WOK1	Out	Word clock for the DAC
87	SOLM	Out	Serial data output. Not used.
88	SOLP	Out	Serial sound data output for the DAC
89	BOK	Out	Bit clock output for the DAC
90 ~ 92			Not used
93	VCC5	In	+5 V source
94	EA14	Out	Not used
95, 97 99 ~ 105 107, 109 110, 112	EA0 ~ EA12	Out	Address bus for the effect RAM

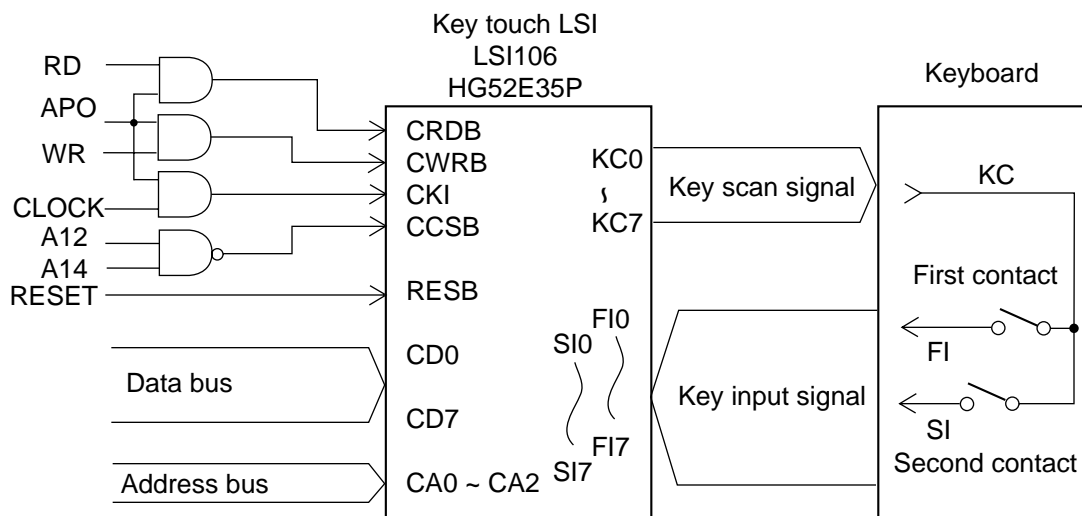
DAC (UPD6376CX)

UPD6376CX is a two-channel 16-bit Digital to Analog Converter consisting of resistor string, output amplifier and zero offset circuit.

Pin No.	Terminal	In/Out	Function
1	SEL	In	Mode selection terminal. Connected to ground.
2	D.GND	In	Ground (0 V) source for internal digital circuit
3	NC		Not used
4	DVDD	In	+5 V source for internal digital circuit
5	A.GND	In	Ground (0 V) source for internal analog circuit
6	R.OUT	Out	Right channel sound waveform output
7	A.VDD	In	+5 V source for internal analog circuit
8	A.VDD	In	+5 V source for internal analog circuit
9	R.REF	In	Reference voltage terminal. Connected to a capacitor.
10	L.REF	In	Reference voltage terminal. Connected to a capacitor.
11	L.OUT	Out	Left channel sound waveform output
12	A.GND	In	Ground (0 V) source for internal analog circuit
13	LRCK	In	Word clock (L/R separation signal) input.
14	LRSEL	In	Not used. Connected to ground.
15	SI	In	Sound data input
16	CLK	In	Bit clock input

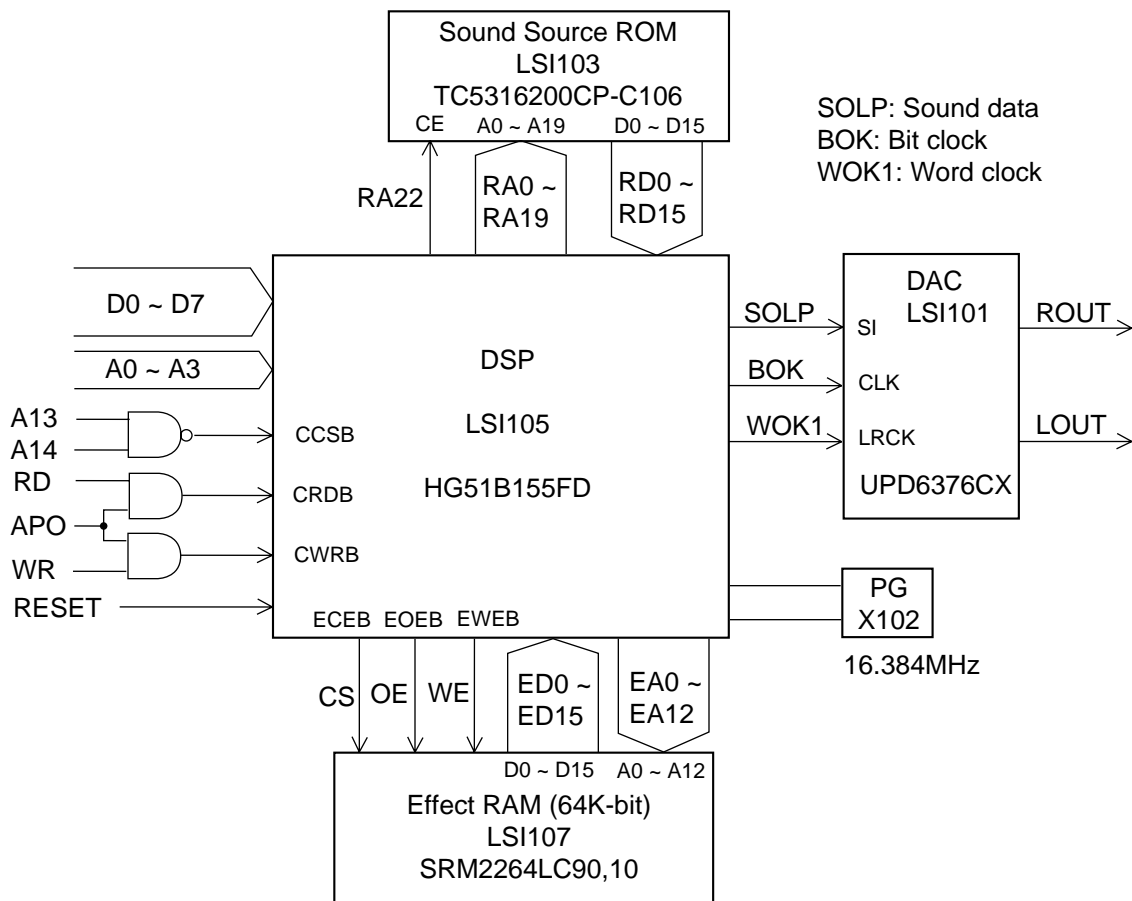
Key Touch LSI (HG52E35P)

By counting the time between first-key input signal FI and second-key SI from the keyboard unit, the key touch LSI detects key velocity of 256-step. Then the LSI sends the CPU the note number and its velocity data.



Pin No.	Terminal	In/Out	Function
96	EWEB	Out	Write enable signal output for the effect RAM
98	EA13	Out	Not used
106	EOEB	Out	Read enable signal output for the effect RAM
108	VCC7	In	+5 V source
111	ECEB	Out	Chip select signal output for the effect RAM
113 ~ 117			Not used
118	VCC4	In	+5 V source
119	GND4	In	Ground (0 V) source
120 ~ 122			Not used
123 ~ 130	ED0 ~ ED7	In/Out	Data bus for the effect RAM
131	GND5	In	Ground (0 V) source
132 ~ 134			Not used. Connected to ground.
135, 136			Not used

Block diagram of DSP and DAC circuit

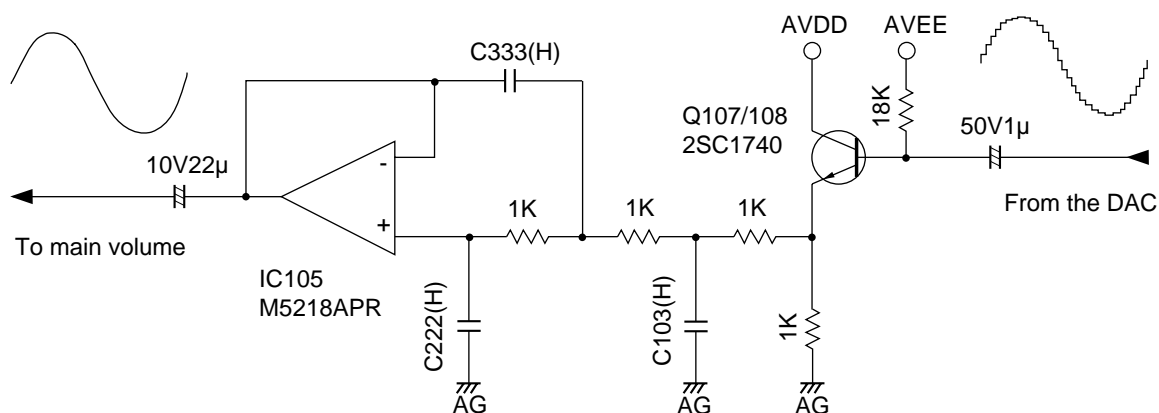


The following table shows the pin functions of the key touch LSI.

Pin No.	Terminal	In/Out	Function
1	REQB	Out	Interrupt request. Not used.
2, 3, 60 ~ 63	FI8 ~ FI10 SI8 ~ SI10	In	Key input signal. Connected to +5 V.
4	VCC	In	+5 V source
5	CRDB	In	Read enable signal
6	CWRB	In	Write enable signal
7	CCBB	In	Chip select signal
8, 9, 11	T, STBY, W	In	Not used. Connected to +5 V.
10	RESB	In	Reset signal
12	CKI	In	10 MHz clock input
13, 14	TMD, TST	In	Not used. Connected to ground.
15	CKO	Out	Not used
16	GND	In	Ground (0 V) source
17	XIN	In	Not used. Connected to ground.
18	XOUT	Out	Not used
19	TRES	In	Not used. Connected to ground.
20 ~ 23, 25 ~ 28	CD0 ~ CD7	In/Out	Data bus
24	GND	In	Ground (0 V) source
29 ~ 31	CR0 ~ CR2	In	Address bus
32	VCC	In	+5 V source
33 ~ 39, 41 ~ 43 53 ~ 55, 57 ~ 59	FI0 ~ FI7, SI0 ~ SI7	In	Key input signal
40	VCC	In	+5 V source
44 ~ 47, 49 ~ 52	KC0 ~ KC7	Out	Key scan signal
48, 56	GND	In	Ground (0 V) source
64	VCC	In	+5 V source

Filter Block

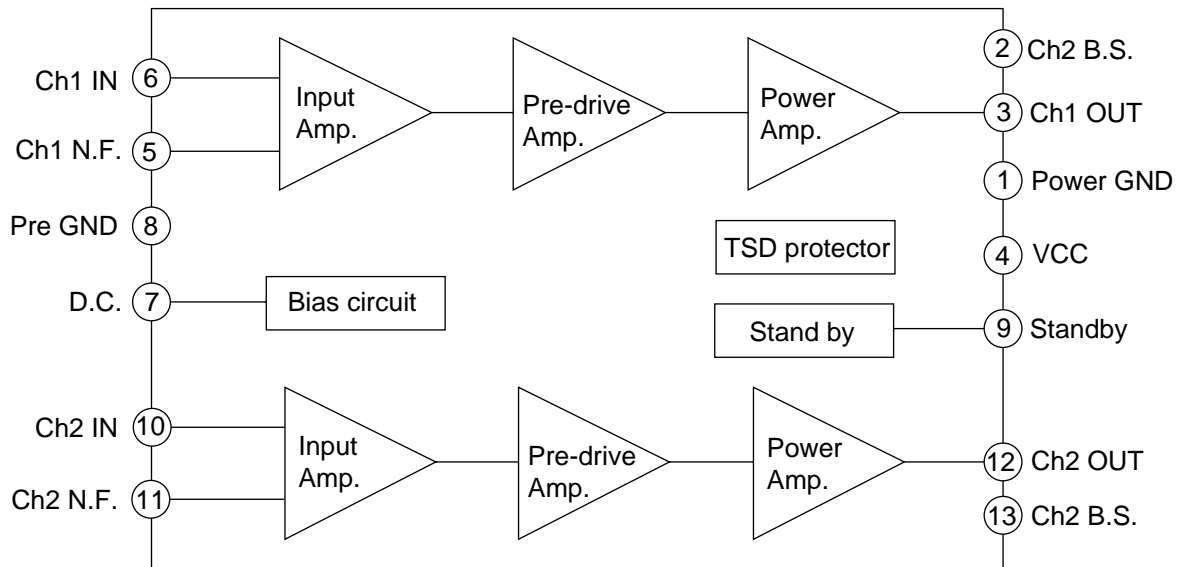
Since the sound signals from the DAC are stepped waveforms, the filter block is added to smooth the waveforms.



Power Amplifier (LA4598)

The power amplifier is a two-channel amplifier with standby switch. The following figure shows the internal diagram of the amplifier.

Internal Diagram of LA4598

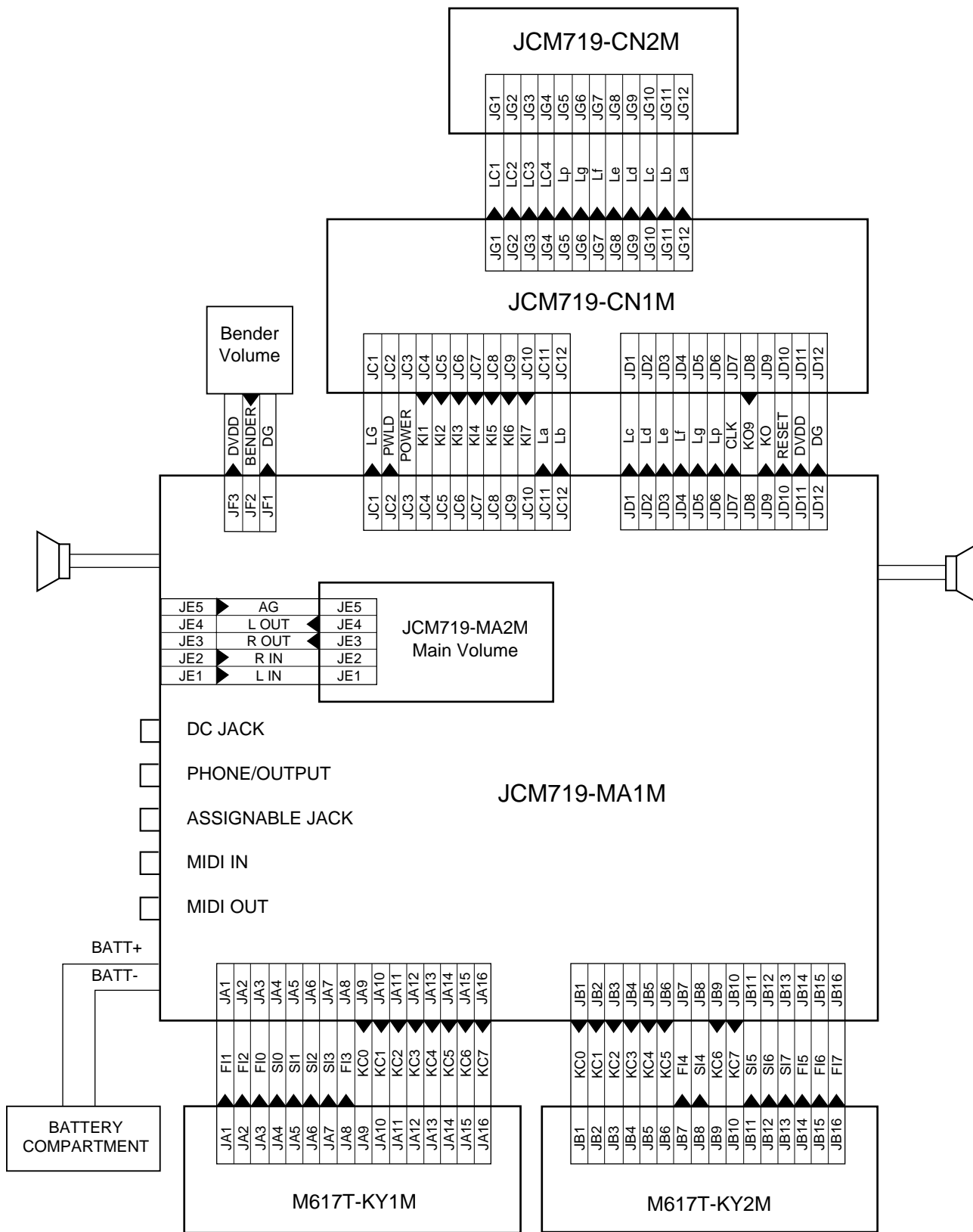


Power Supply Circuit

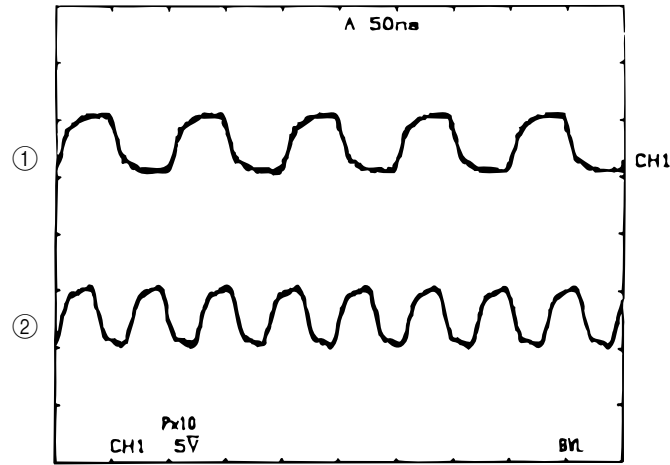
The power supply circuit generates six voltages as shown in the following table. VDD voltage is always generated. The others are controlled by APO signal output from the CPU.

Name	Voltage	For operation of
VDD	+5 V	CPU, Reset IC, Working strage RAM
DVDD	+5 V	DSP, Key controller, Sound source ROM, Effect RAM, DAC, KO signal generator
AVDD	+5 V	DAC Filter
LVDD	+4.5 V	LED Driver
VCC	+9 V	Pilot lamp
VC	+9 V	Power amplifier

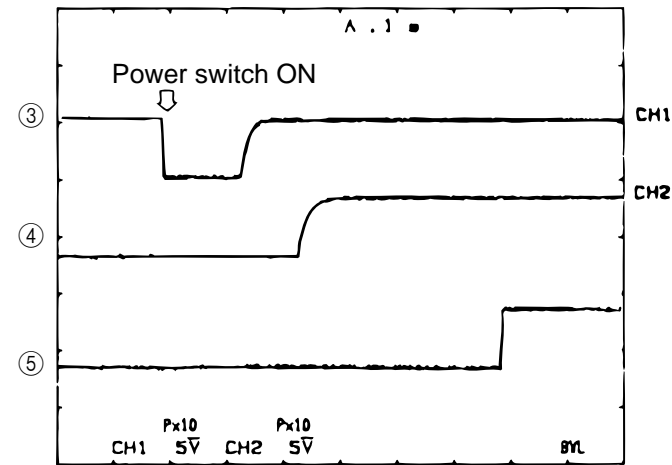
WIRING DIAGRAM



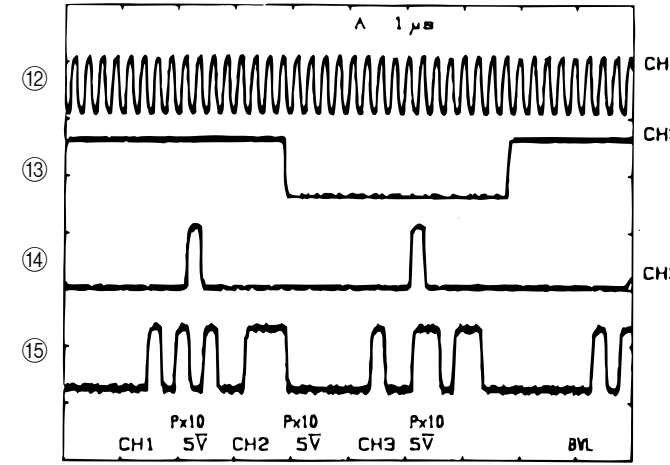
MAJOR WAVEFORMS



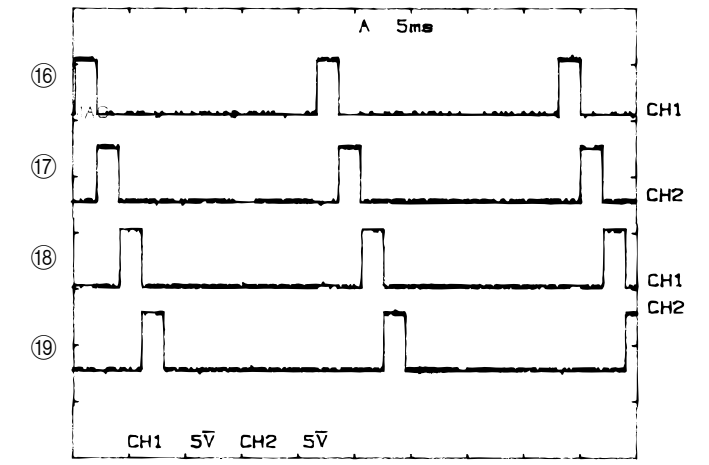
- ① Main clock pulse
HD6433298A36P pin 7
- ② DSP clock pulse
HG51B155FD pin 12



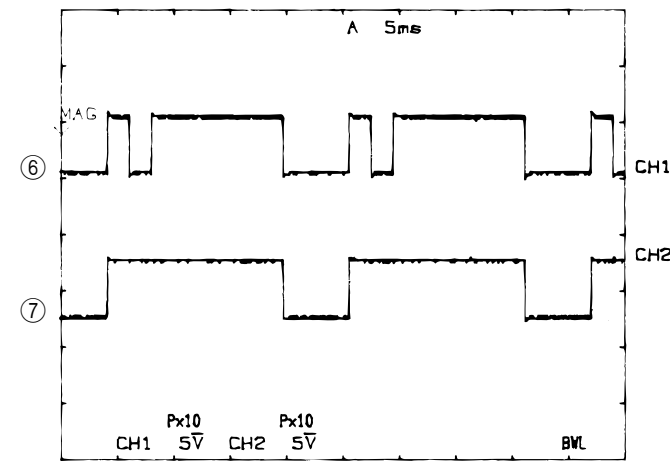
- ③ POWER signal
HD6433298A36P pin 13
- ④ APO signal
HD6433298A36P pin 3
- ⑤ RESET signal
HD6433298A36P pin 11



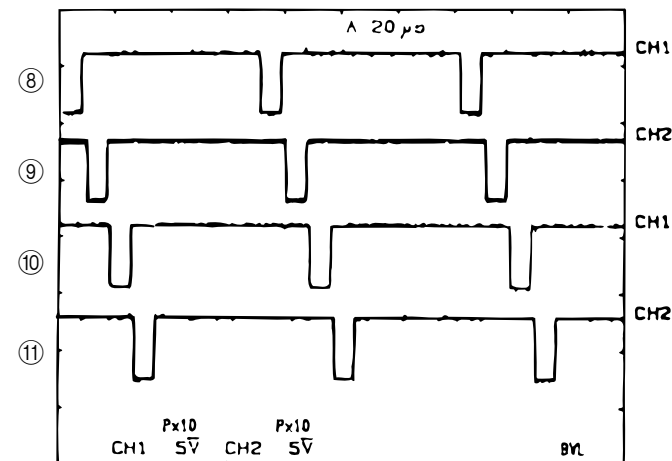
- ⑫ Bit clock BOK
UPD6376CX pin 16
- ⑬ L/R clock WOK1
UPD6376CX pin 13
- ⑭ Sound data SOLP (Note OFF)
- ⑮ Sound data SOLP (Note ON)
UPD6376CX pin 15



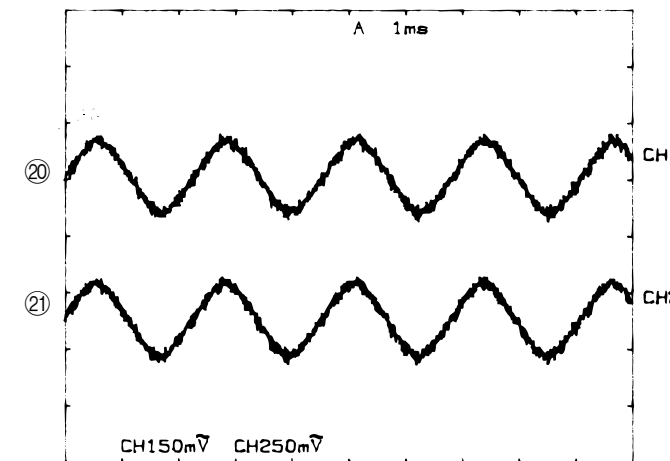
- ⑯ Button scan signal KO0
IC304: TC74HC174AP pin 2
- ⑰ Button scan signal KO1
IC304: TC74HC174AP pin 5
- ⑱ Button scan signal KO2
IC304: TC74HC174AP pin 7
- ⑲ Button scan signal KO3
IC304: TC74HC174AP pin 15



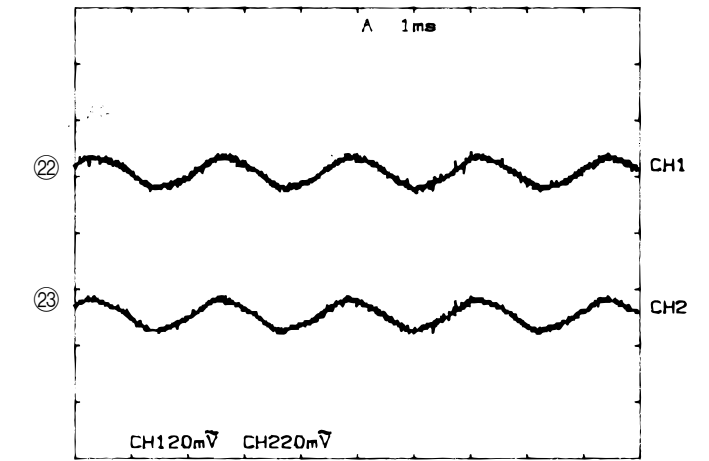
- ⑥ LED segment signal LD0
HD6433298A36P pin 31
 - ⑦ LED segment signal LD3
HD6433298A36P pin 34
- Display: "0.0"



- ⑧ Key scan signal KC0
HG52E35P pin 44
- ⑨ Key scan signal KC1
HG52E35P pin 45
- ⑩ Key scan signal KC2
HG52E35P pin 46
- ⑪ Key scan signal KC3
HG52E35P pin 47

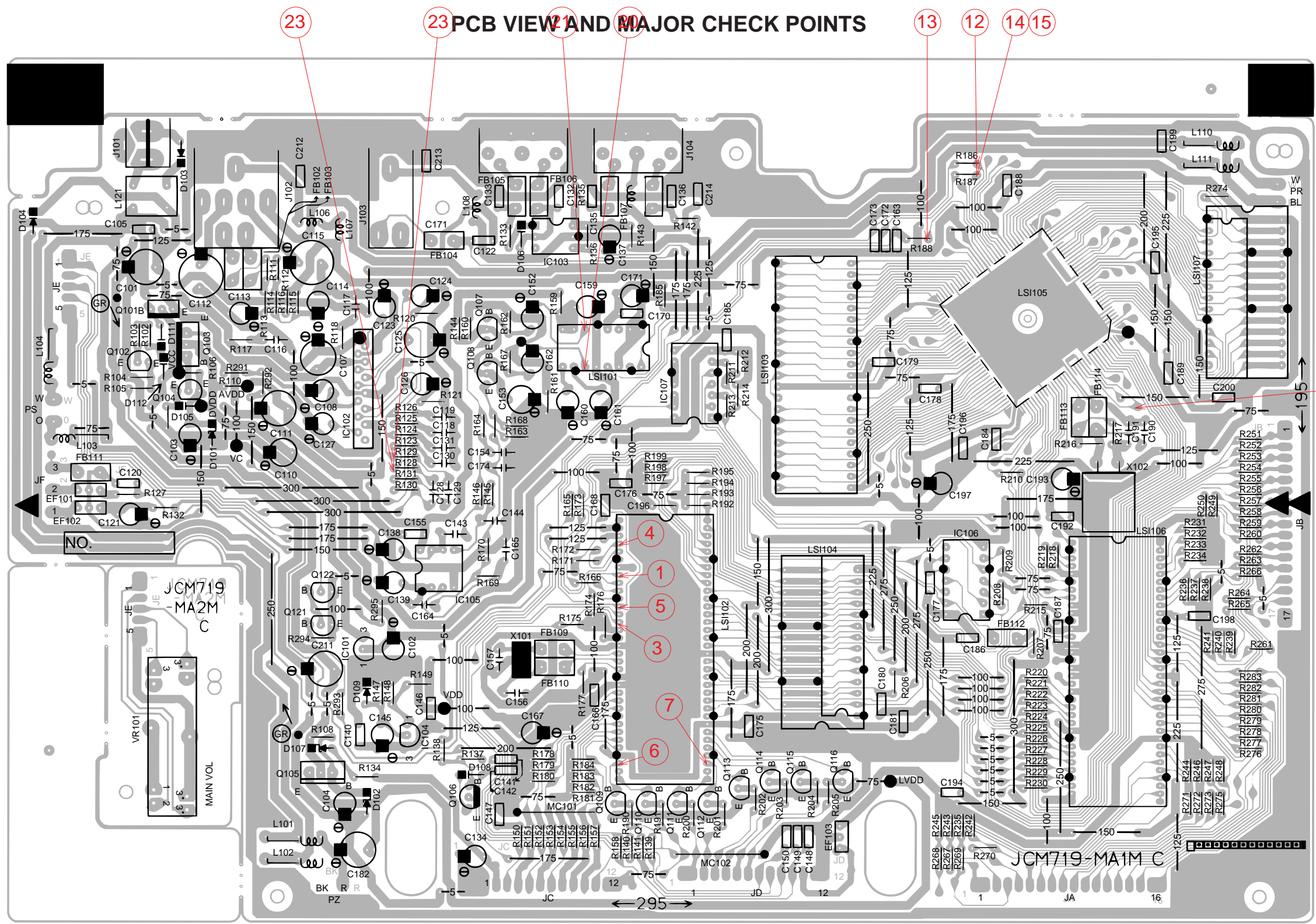


- ⑳ DAC output
UPD6376CX pin 11
 - ㉑ DAC output
UPD6376CX pin 6
- Tone: No. 78
Key: A4
Touch response: OFF
Digital effect: OFF
Volume: Maximum



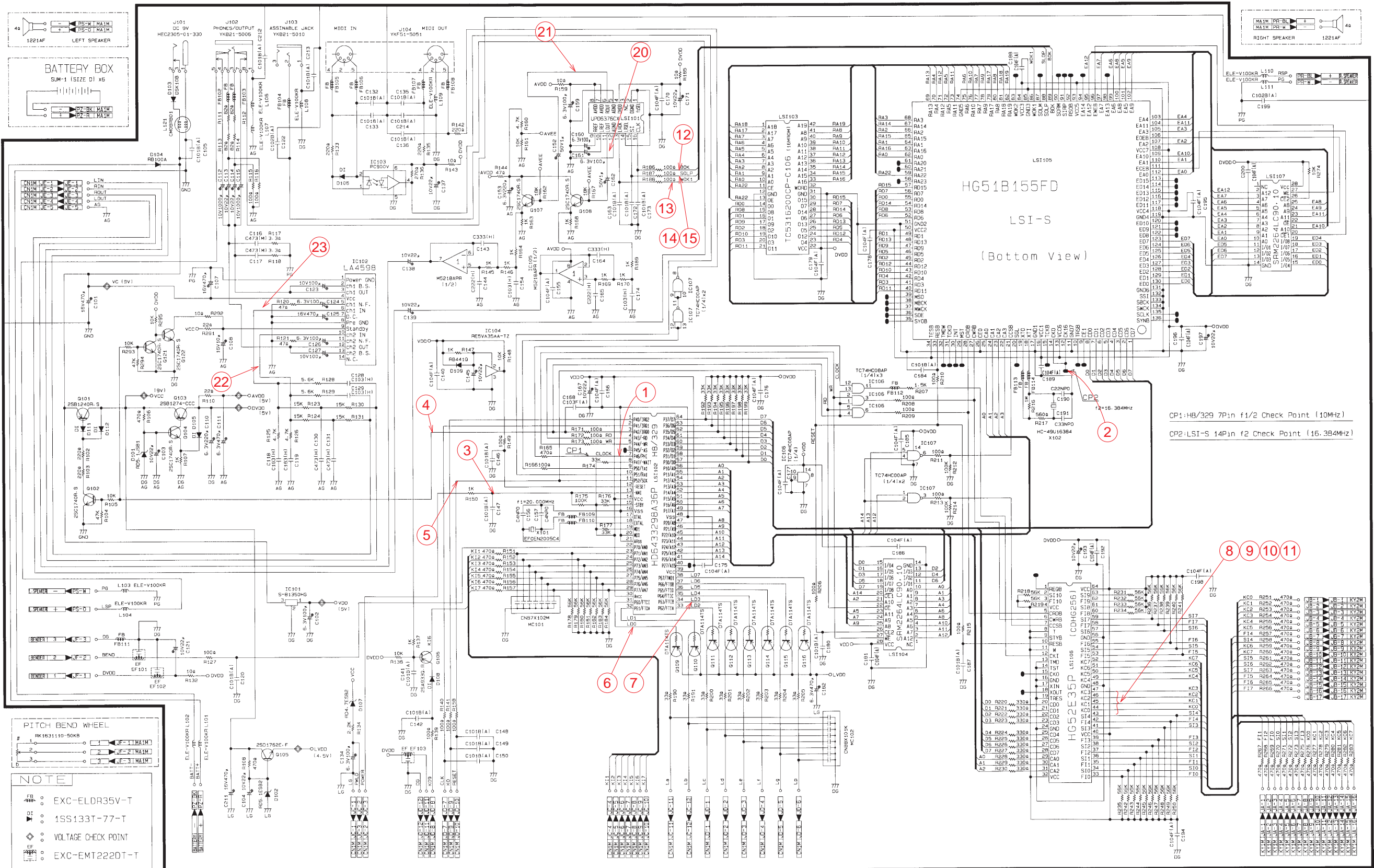
- ㉒ Power amp. input
LA4598 pin 10
- ㉓ Power amp. input
LA4598 pin 6

PCB VIEW AND MAJOR CHECK POINTS



PCB JCM719-MA1M

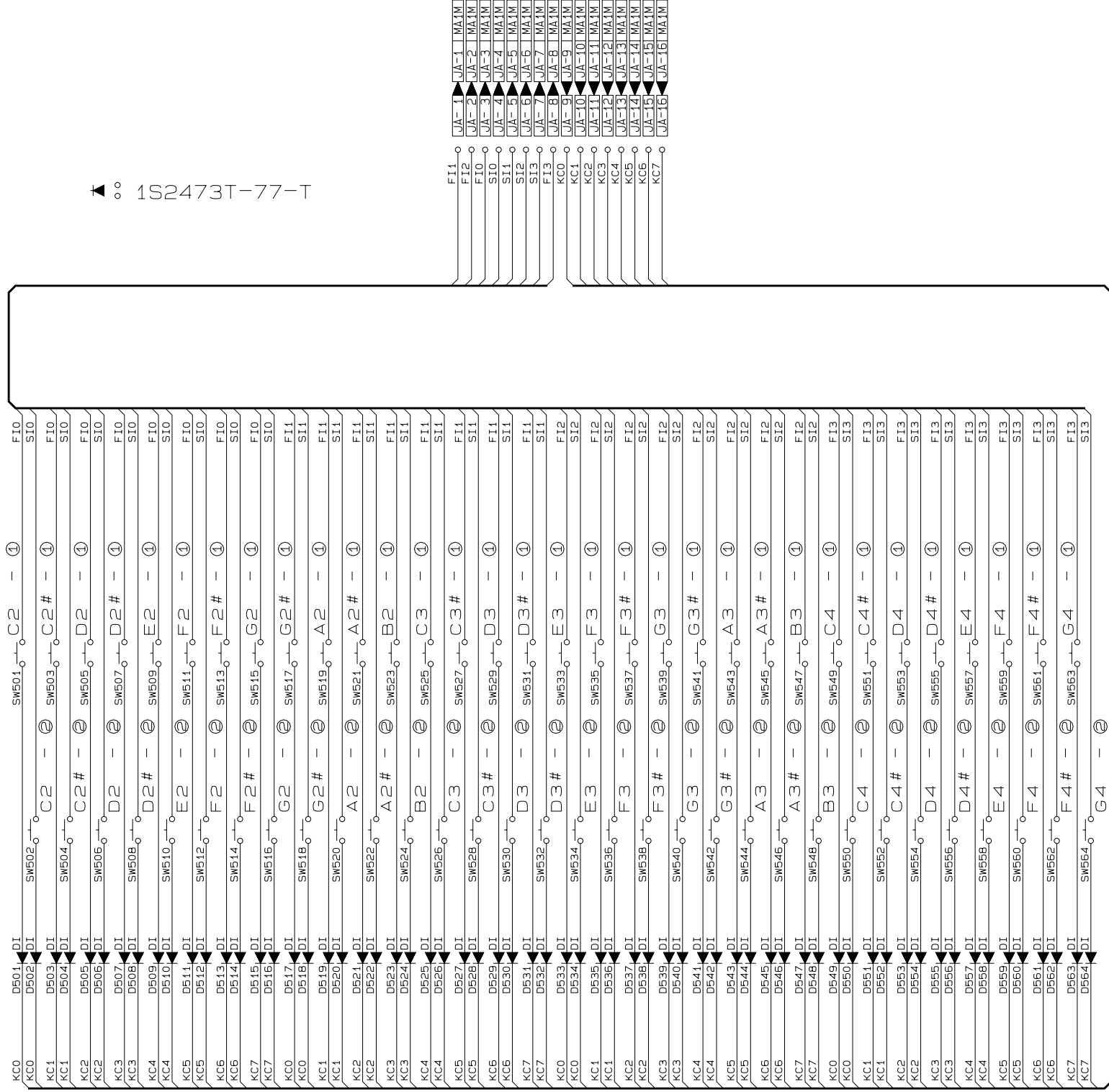
SCHMATIC DIAGRAMS



PCBs JCM617T-KY1M, KY2M

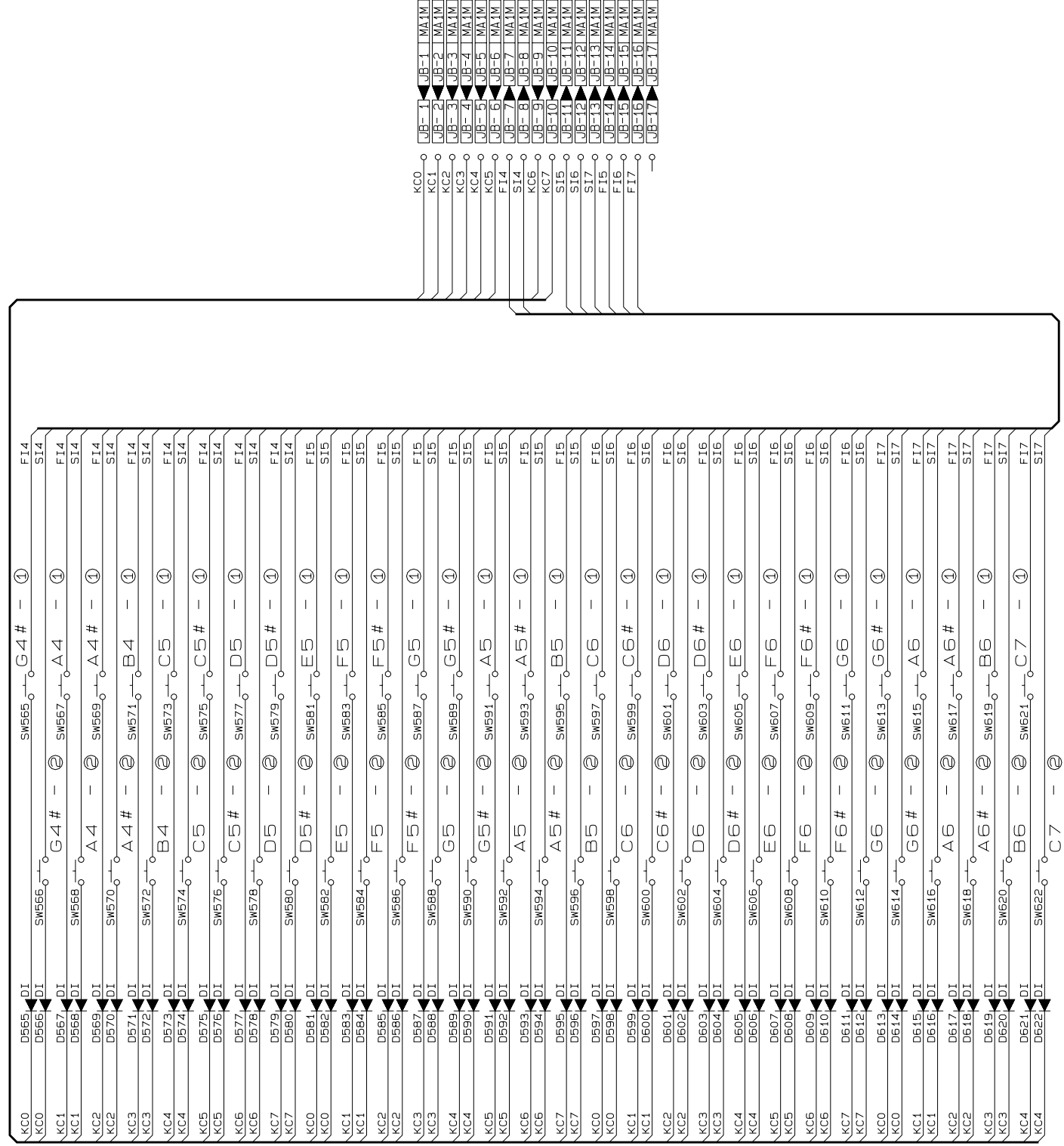
JCM617T-KY1M

▲ ◎ 1S2473T-77-T



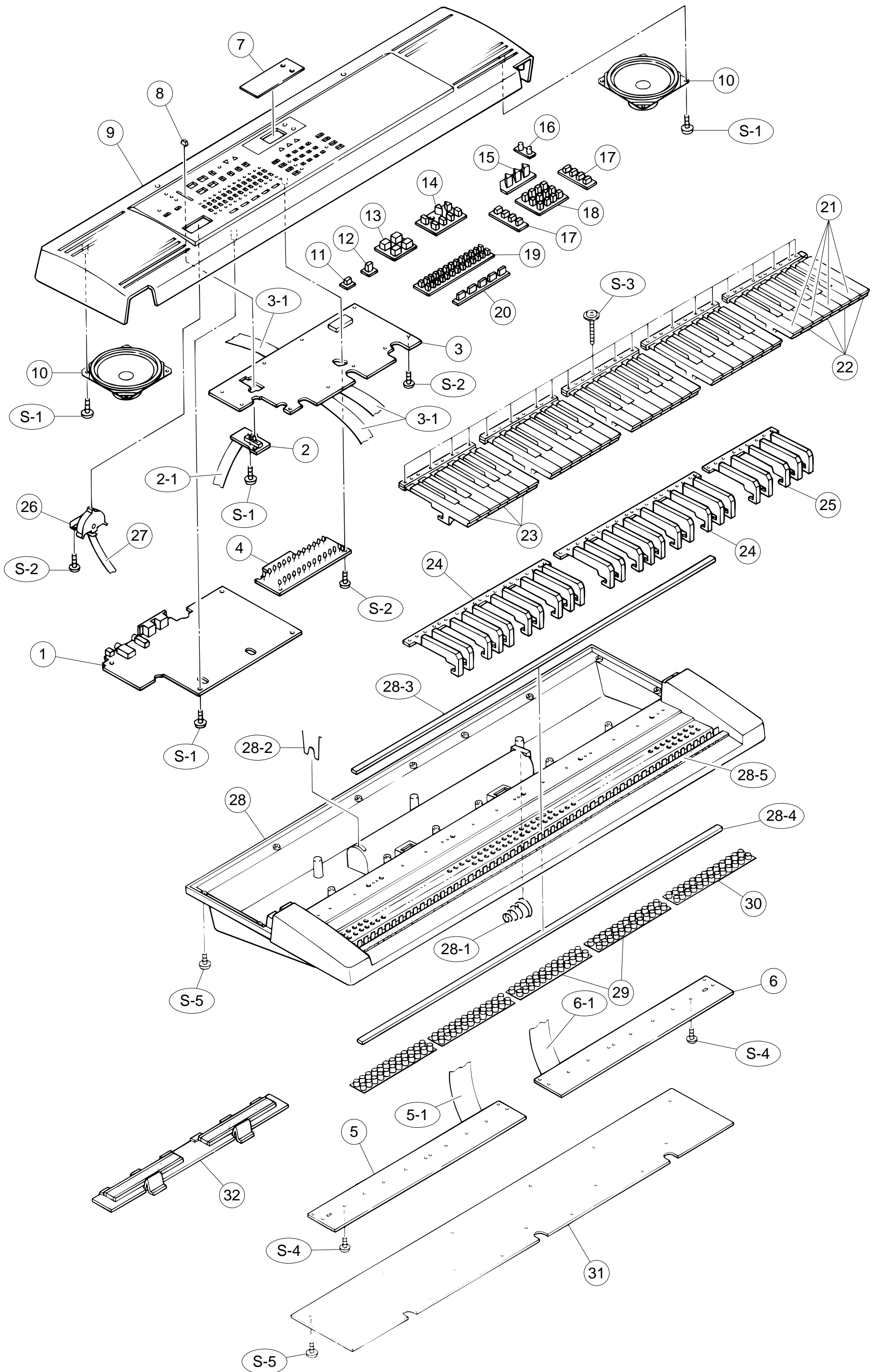
- C2
- C2#
- D2
- D2#
- E2
- F2
- F2#
- G2
- G2#
- A2
- A2#
- B2
- C3
- C3#
- D3
- D3#
- E3
- F3
- F3#
- G3
- G3#
- A3
- A3#
- B3
- C4
- C4#
- D4
- D4#
- E4
- F4
- F4#
- G4

JCM617T-KY2M



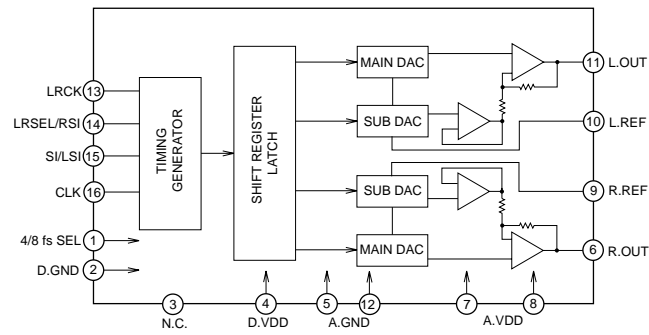
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- A4
- A4#
- B4
- C5
- C5#
- D5
- D5#
- E5
- F5
- F5#
- G5
- G5#
- A5
- A5#
- B5
- C6
- C6#
- D6
- D6#
- E6
- F6
- F6#
- G6
- G6#
- A6
- A6#
- B6
- C7

EXPLODED VIEW

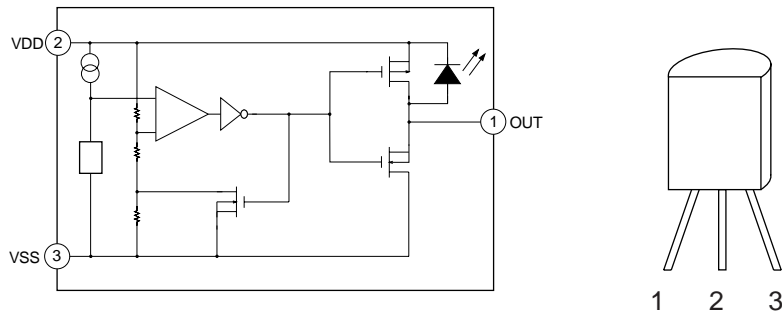


IC LEAD IDENTIFICATION AND INTERNAL DIAGRAM

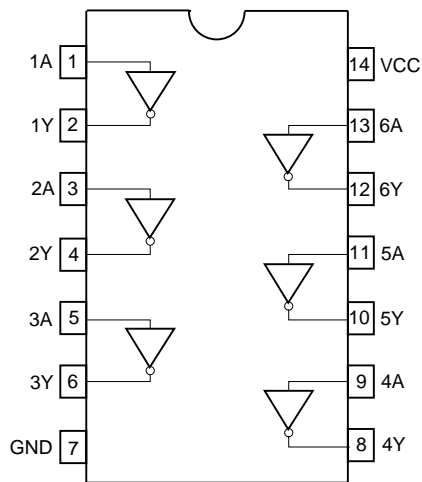
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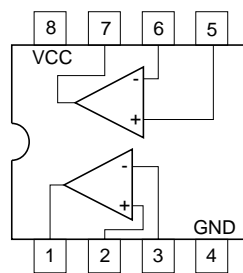
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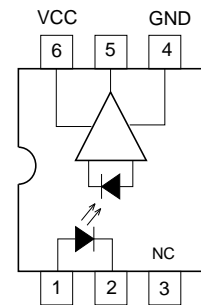
TC74HC04AP



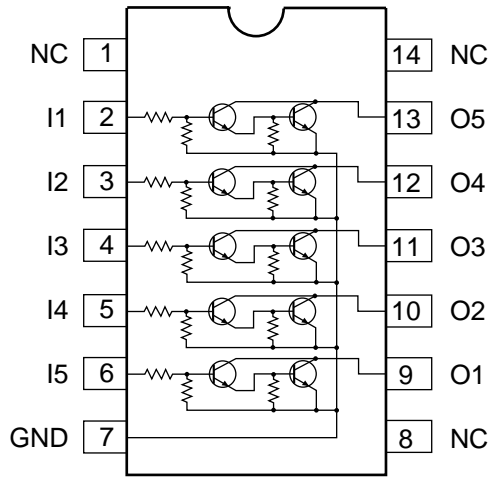
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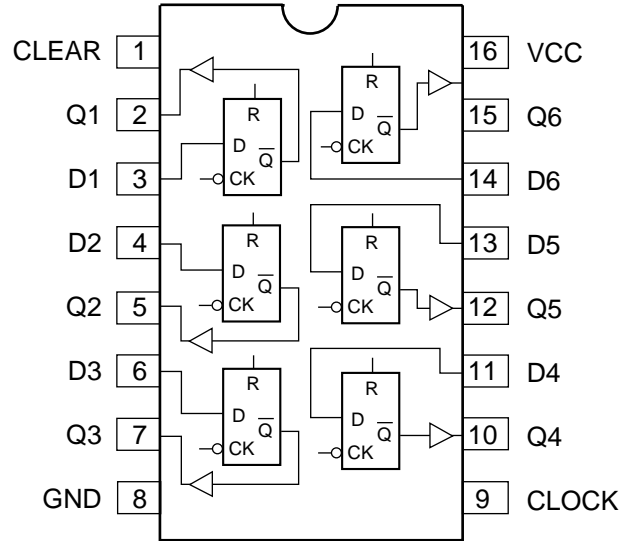
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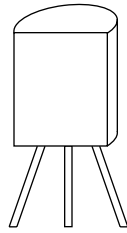
BA612



TC74HC174AP

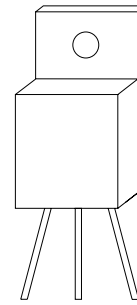


S-81350HG



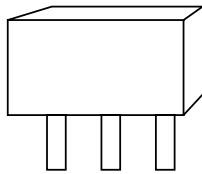
1 2 3

2SB1274



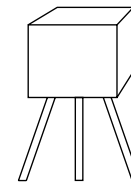
B C E

2SB1240Q,R



E C B

**2SC1740SQ
2SA933SQ
DTA114TS**



E C B

PARTS LIST

AT-1

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

N	Item	Code No.	Parts Name	Specification	Q	FOB Japan N.R.Yen Unit Price	R
Main PCB JCM719-MA1M							
N	1	6923 4040	PCB ass'y JCM719-MA1M	M140127*1	1		B
	LSI01	2011 3325	LSI	UPD6376CX	1		A
N	LSI02	2012 0021	LSI	HD6433298A36P	1		A
N	LSI03	2012 0035	LSI	TC5316200CP-C106	1		A
	LSI05	2011 7434	LSI	HG51B155FD	1		A
	LSI06	2011 5194	LSI	HG52E35P	1		A
N	LSI07	2012 0028	LSI	SRM2264LC90,10	2		A
	IC101	2105 2114	IC, Regulator	S-81350HG	1		A
	IC102	2114 2891	IC	LA4598	1		A
	IC103	2114 1421	IC, Photocoupler	PC900V	1		A
N	IC104	2105 3941	IC	RE5VA35AA-TZ	1		A
	IC105	2114 1799	IC	M5218APR	1		A
	IC106	2105 2912	IC	HD74HC08P	1		A
	IC107	2105 3136	IC	HD74HC00P	1		A
	Q101	2251 0665	Transistor	2SB1240R.S-TV6-T	1		A
	Q102, Q104, Q107/108, Q121/122	2252 0896	Transistor	2SC1740S-R,S-TP-T	6		A
	Q103	2251 0651	Transistor	2SB1274-CCC	1		A
	Q105	2253 0455	Transistor	2SD1762E,F	1		A
	Q106	2250 0574	Transistor	2SA933SQ,R-TP-T	1		A
	Q109~116	2259 1883	Digital transistor	DTA114TS-TP-T	8		A
	D101	2360 2233	Zener diode	RD5.1JSB1-T1-T	1		A
	D102	2360 0098	Zener diode	RD5.1ESB2-T1-T	1		A
	D103	2390 0371	Diode	DSK10B-BT-T	1		B
	D104	2390 1316	Diode	SB10-04A3-BT-T	1		B
	D105/106, D108, D111/112	2390 1344	Diode	1SS133T-77-T	5		B
	D107	2310 7996	Zener diode	RD4.7ESB2-T1-T	1		A
	D109	2390 1995	Diode	RB441Q-T77-T	1		B
	X101	2590 1526	Ceramic oscillator	EFO-EN2005C4	1		B
	X102	2590 1519	Crystal oscillator	HC-49U16384	1		B
	MC101	2819 5552	Module Capacitor	CNB7X102M	1		C
	MC102	2845 0168	Module Capacitor	CNB8X101K	1		C
	FB102~114	2845 3220	Ferrite beads	EXC-ELDR35V-T	13		C
	EF101~103	3025 0826	EMI filter	EXC-EMT222DT-T	3		C
	J101	3501 7049	DC jack	HEC2305-01-330	1		A
	J102	3612 0665	Phone jack	YKB21-5006	1		B
	J103	3612 0789	Jack	YKB21-5010	1		B
	J104	3501 4816	DIN jack	YKF51-5051	1		B
	L101~104, L106~111	3841 0539	Inductor	ELE-V100KR-T	10		C
N	L121	3841 1456	Coil	CM08RB01	1		C
N		4317 5522	Blank PCB JCM719-MA1M	M140129B-1	1		
Volume PCB JCM719-MA2M							
	2	6923 4050	PCB ass'y M719-MA2M	M440151*1	1		B
	VR101	2765 1575	Slide volume	EWA-MJOS10B23	1		A
	2-1	3719 2562	Ribbon cable M296D	DF5H05130-MM	1		C
N		4317 5532	Blank PCB JCM719-MA2M	M140129B-2	1		C
Console PCB JCM719-CN1M							
N	3	6923 4060	PCB ass'y M719-CN1M	M140128*1	1		B
	IC303/304	2105 3045	IC	HD74HC174P	2		A

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

N	Item	Code No.	Parts Name	Specification	Q	FOB Japan N.R.Yen Unit Price	R
N	IC301/302	2114 3318	IC	BA612	2		A
	LED301~309, LED311	2370 0343	LED	LN28RPX-(TT)	9		C
	LED309/310	2370 0959	LED	LN882RPX-(TT)	2		C
	LED312	2370 1141	LED	SL-9352-60	1		C
	D301~368	2390 1344	Diode	1SS133T-77-T	68		C
	3-1	3719 4235	Ribbon cable M711C	DF5H12120-MM	3		C
N		4317 5540	Blank PCB JCM719-CN1M	M140130-1	1		C
LED PCB JCM719-CN2M							
N	4	6923 4070	PCB ass'y M719-CN2M	M340168*1	1		B
N		2370 1148	LED	LN28RPH(V)-(TA9)	27		C
N		4317 5550	Blank PCB JCM719-CN2M	M140130-2	1		C
Keyboard PCBs							
N	5	6923 6940	PCB ass'y M617T-KY1M	M140211*1	1		B
		2301 0101	Diode	1S2473-T-77-T	64		C
N	5-1	3719 4557	Ribbon cable	DF5H16200-MM	1		C
N		4317 5560	Blank PCB M617T-KY1M	M140200-1	1		C
N	6	6923 6950	PCB ass'y M617T-KY2M	M140212*1	1		B
		2301 0101	Diode	1S2473-T-77-T	58		C
N	6-1	3719 4564	Ribbon cable	DF5H17200-MM	1		C
N		4317 5570	Blank PCB M617T-KY2M	M140201-1	1		C
Bender							
		2765 1141	Volume	RK1631110-50KB	1		C
Mechanical Parts							
N	7	6923 4250	Display plate 719	M340042-1	1		C
	8	6921 5040	Slide knob	M311860-1	1		B
N	9	6923 4290	Panel 719	M140037-1	1		C
	10	3831 0357	Speaker	1221AF	2		B
	11	6922 3830	Rubber button 711A	M312122-1	1		B
	12	6922 3840	Rubber button 711B	M312123-1	1		B
N	13	6923 4300	Rubber button 711C	M312124-2	1		B
N	14	6923 4310	Rubber button 711F	M211727-2	1		B
N	15	6923 4320	Rubber button 711E	M312126-2	1		B
	16	6922 2680	Rubber button 710D	M312082-2	1		B
	17	6922 3870	Rubber button 711D	M312125-1	2		B
	18	6922 2660	Rubber button 710C	M312088-1	1		B
N	19	6923 4350	Rubber button 719A	M340038-1	1		B
N	20	6923 4360	Rubber button 719B	M340039-1	1		B
	21	6922 2840	White key set CEGB	M111723-1	5		A
	22	6922 2860	White key set DFAS	M111725-1	1		A
	23	6922 2850	White key set DFA	M111724-1	4		A
	24	6922 2740	Black key set 10P	M111726-1	2		A
	25	6922 2750	Black key set 5P	M111726-2	1		A
N	26	6923 4410	Bender knob	M340169-1	1		C
		6911 5241	Bender chassis A	M31487A-1	1		C
		6911 5250	Bender chassis B	M41946-1	1		C
		6911 5260	Bender spring	M41949-1	1		C
N	27	3719 4536	Ribbon cable M719F	DF5H03095-35353535	1		C
N	28	6922 3925	Upper case sub ass'y	M111732E*2	1		C
	28-1	6902 6140	Battery spring 90	M41226-1	1		B
	28-2	6903 2150	Battery spring B	M41330-1	1		B
	28-3	6922 2810	Lower key stopper 710	M412287-1	1		C
	28-4	6922 2820	Upper key stopper 710	M412286-1	1		C
	28-5	6922 4480	Key damper 710	M412324-1	1		C

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

N	Item	Code No.	Parts Name	Specification	Q	FOB Japan	
						N.R.Yen	R Unit Price
	29	6922 2761	Key contact rubber LT-CB	M211704A-1	4		A
	30	6922 2771	Key contact rubber LT-CS	M211705A-1	1		A
	31	6922 2631	Bottom plate 710	M211706A-1	1		C
N	32	6918 1636	Battery cover	M311164F*1	1		B
N		6923 4280	Rating plate	M312163-2	1		C
Accessory							
		6920 8680	Dust cover 590	M311784-1	1		B
		6920 8691	Music stand 590	M311760A-1	1		B

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

Description of Capacitors

A general description of capacitors is shown in the following table.
The description consists of Type, Value, Rated Voltage and Tolerance.
When you need a capacitor, please find a substitution in your country by yourselves referring to the description.

Ref. No of Capacitor	Description
C101, C107, C125, C211	Electrolytic, 16 V, 470 μ F, +/-20%
C110, C153	Electrolytic, 6.3 V, 220 μ F, +/-20%
C103, C104, C113, C114, C121, C137~C139, C145, C167, C171, C193, C197	Electrolytic, 10 V, 22 μ F, +/-20%
C108	Electrolytic, 16 V, 10 μ F, +/-20%
C152, C162	Electrolytic, 50 V, 1 μ F, +/-20%
C111, C182	Electrolytic, 6.3 V, 470 μ F, +/-20%
C102, C124, C126, C134, C159~C161	Electrolytic, 6.3 V, 100 μ F, +/-20%
C123, C127	Electrolytic, 10 V, 100 μ F, +/-20%
C144, C165	Semiconductive, 16 V, 2200 pF, +/-10%
C147, C164	Semiconductive, 16 V, 0.033 μ F, +/-10%
C130, C131	Semiconductive, 16 V, 0.047 μ F, +/-10%
C128, C129, C154, C174	Semiconductive, 16 V, 0.01 μ F, +/-10%
C118, C119	Semiconductive, 16 V, 0.018 μ F, +/-10%
C140, C155, C166, C170, C175~C179, C181, C185, C186, C188, C189, C192, C194~C196, C198, C200	Ceramic, 50 V, 0.1 μ F, +80/-20%
C105, C120, C132, C133, C135, C136, C141, C142, C146~C150, C163, C172, C173, C180, C184, C187, C212~C214	Ceramic, 50 V, 100 pF, +/-10%
C122, C199	Ceramic, 50 V, 1000 pF, +/-10%
C168	Ceramic, 50 V, 0.01 μ F, +/-20%
C191	Semiconductive, 16 V, 33 pF, +/-10%
C156, C157	Semiconductive, 16 V, 4 pF, +/-0.5 pF
C190	Semiconductive, 16 V, 22 pF, +/-10%
C116, C117	Mylar, 50 V, 0.047 μ F, +/-10%
C112, C115	Electrolytic, 10 V, 1000 μ F, +/-20%

Description of Resistors

A general description of resistors is shown in the following table.

The description consists of Type, Value, Rated Wattage and Tolerance.

When you need a resistor, please find a substitution in your country by yourselves referring to the description.

Note:

All resistors are carbon film, 1/5 watt, +/-5% otherwise specified.

Ref. No of Resistor	Description
R107, R137, R145~R147, R150, R163, R164, R168~R170, R189	1 K Ω
R102, R103, R133, R135, R142	220 Ω
R220~R230	330 Ω
R132, R143, R159, R185, R292	10 Ω
R115, R116, R127, R139~R141, R149, R158, R166, R171~R173, R186~R188, R206, R208~R211, R213, R215	100 Ω
R175, R212, R214	100 K Ω
R105, R138, R148, R161, R274, R293, R295	10 K Ω
R110, R291	22 Ω
R117, R118	3.3 Ω
R111~R114	82 Ω
R125, R126, R160	4.7 K Ω
R207	1.5 K Ω
R134	2.2 K Ω
R136	270 Ω
R106, R108, R151~R157, R165, R251~R273, R275~R283	470 Ω
R104, R294	47 K Ω
R178~R184, R218, R219, R231~R250	56 K Ω
R216	1 M Ω
R174, R176, R177, R192~R199	33 K Ω
R123, R124, R130, R131	15 K Ω
R128, R129	5.6 K Ω
R217	560 Ω
R162, R167	18 K Ω
R190, R191, R200~R205	33 Ω
R120, R121, R144	47 Ω

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