CASIO®

ServiceManual

(with price)

CTK-750
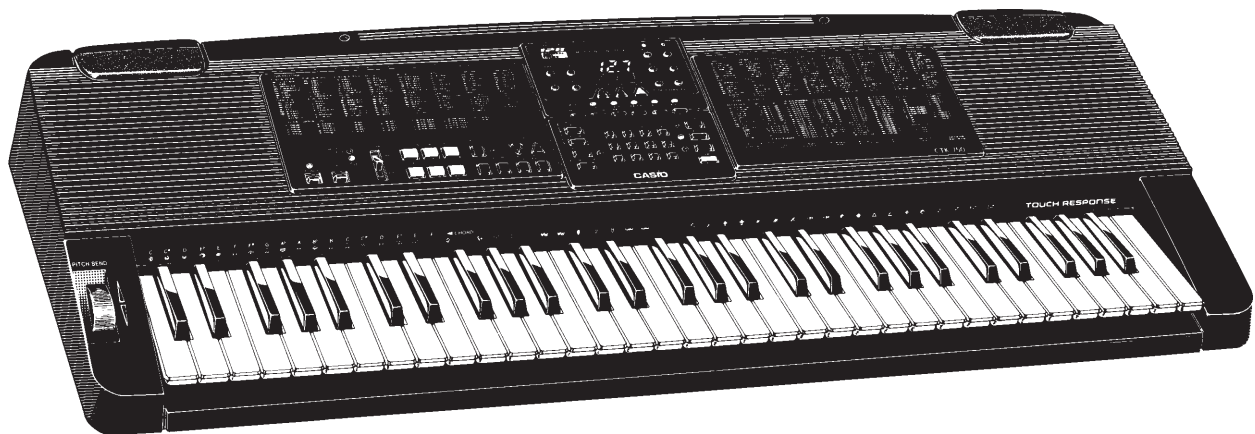
CTK-750

ELECTRONIC KEYBOARD

CONTENTS

SPECIFICATIONS

General

Number of Keys:	61
Polyphonic:	32-note
Preset Tones:	128
	Tone Expander: Layer, Split
Keyboard Controls:	Touch Response: On/Off
	Touch Sensitivity: Light/Middle/Heavy
Key Transpose:	Range from F# to F by a half-note increment
Auto-Rhythms:	128
	Tempo Control: 40 to 255
Auto-Accompaniment:	CASIO Chord/Fingered/Full-Range Chord
	Controller: Variation, Fill-In, Intro/Ending

Magical Preset Variations:

128;	BREAK BEAT	16	MELODYCOMP	8
	SHADOW DRUM	4	FREE SESSION	32
	TONE STACK	40	KEY SPLIT	12
	HYPERACTIVE	16		

Digital Effects:	16; Reverb-1, Reverb-2, Reverb-3, Chorus, Tremplp, Phase Shifter, Organ SP, Enhancer, Flanger, EQ Loudness, Delay-1, Delay-2, Analog Delay, Tap Delay, Chorus Reverb, Tremolo Reverb
Sound/Control Pads:	6
Pad Variations:	32; Phrases: 10, Drums: 10, SE/Percussion: 10, Controller: 2
Song Memories:	2; Tracks: 6
	System: Real-time recording
	Memory Capacity: Approx. 5,800 notes
Registration Memories:	10
Registration Items:	Tone Number, Rhythm Number, Tempo, Accompaniment Mode, Accompaniment Volume, Effects, Layer On/Off, Split On/Off, Pad Variation, Assignable Jack, Auto-Accompaniment On/Off, Auto-Accompaniment Controller, MIDI (Channel On/Off, GM On/Off, Local Control On/Off, Bend Range)
Tuning Control:	440Hz $\pm$ 100 cents
Terminals:	Headphone Jack [Output Impedance: 100 Ω, Output Voltage: 1.7 V(rms) MAX], Assignable Jack, MIDI Jacks (IN, OUT), AC Adaptor Jack (12V)
Built-In Speakers:	12 cm dia. 1.1W Input Rating: 2 pcs.
Power Source:	2-way AC or DC source
	AC: AC adaptor AD-12
	DC: 6 D size dry batteries
	Battery life: Approx. 5 hours by manganese batteries R20P(SUM-1)
	Approx. 5 hours by alkaline batteries LR20(AM1)
Auto Power Off:	Approximately 6 minutes after the last operation
Power Consumption:	18 W
Dimentions:	141 x 968 x 411 mm (HWD)
	(5-11/16 x 38-1/16 x 16-5/16 inches) (HWD)
Weight:	7.0 kg (15.5 lbs) excluding batteries
Standard Accessory:	Music stand

Electrical

Current Drain with 12V DC:
   No Sound Output   390 mA ± 20%
   Maximum Volume   1700 mA ± 20%
      with white keys D2 to D3 pressed in Synth-Bass-2 tone
      and in Latin Fusion rhythm at initial setup tempo
      Volume; maximum, Touch: maximum
Line Output Level (Vrms with 47 KΩ load each cannel):
      with key D4 pressed in FSynth-Bass-2 tone on L-ch   850 mV ± 20%
      with key G4 pressed in FSynth-Bass-2 tone on R-ch   800 mV ± 20%
Phone Output Level (Vrms with 8 Ω load each channel):
      with key D4 pressed in FSynth-Bass-2 tone on L-ch   280 mV ± 20%
      with key G4 pressed in FSynth-Bass-2 tone on R-ch   260 mV ± 20%
Speaker Input Level:
      with key D4 pressed in FSynth-Bass-2 tone on L-ch   5200 mV ± 20%
      with key G4 pressed in FSynth-Bass-2 tone on R-ch   5600 mV ± 20%
Minimum Operating Voltage: 5.5 V

REPLACING THE DSP (HG51A115A01FD)

Note: To increase productivity ,the DSP HG51A115A01FD is sticked 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)
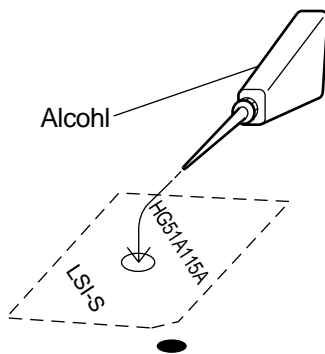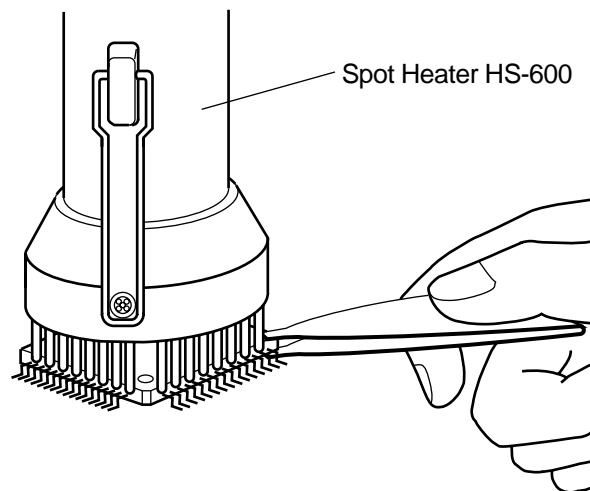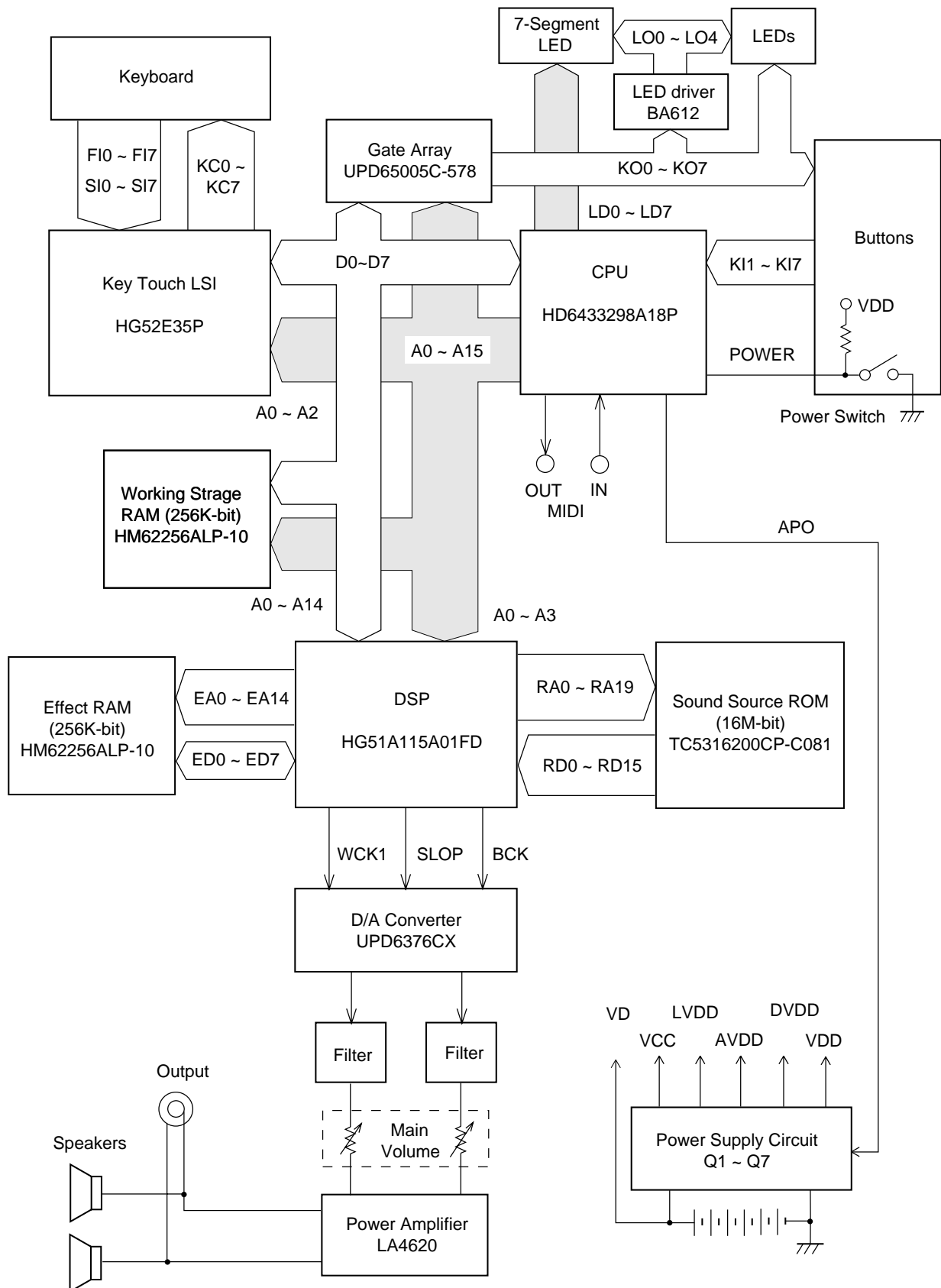6. Remove the LSI after meltingsolder at every leads wholly.

Alcohl

HG51A115A

LSI-S

Spot Heater HS-600

Fig.1   Fig.2

BLOCK DIAGRAM

Keyboard

7-Segment LED

LO0 ~ LO4

LEDs

LED driver
BA612

FI0 ~ FI7
SI0 ~ SI7

KC0 ~
KC7

Gate Array
UPD65005C-578

KO0 ~ KO7

LD0 ~ LD7

Buttons

D0~D7

CPU

HD6433298A18P

KI1 ~ KI7

VDD

Key Touch LSI

HG52E35P

A0 ~ A15

POWER

Power Switch

A0 ~ A2

OUT   IN
MIDI

APO

Working Strage
RAM (256K-bit)
HM62256ALP-10

A0 ~ A14

A0 ~ A3

Effect RAM
(256K-bit)
HM62256ALP-10

EA0 ~ EA14

DSP

HG51A115A01FD

RA0 ~ RA19

Sound Source ROM
(16M-bit)
TC5316200CP-C081

ED0 ~ ED7

RD0 ~ RD15

WCK1   SLOP   BCK

D/A Converter
UPD6376CX

VD   LVDD   DVDD

VCC   AVDD   VDD

Output

Filter   Filter

Speakers

Main
Volume

Power Supply Circuit
Q1 ~ Q7

Power Amplifier
LA4620

— 3 —

CIRCUIT DESCRIPTION

Key Matrix

	KC0	KC1	KC2	KC3	KC4	KC5	KC6	KC7
FI0	C2 ①	C#2 ①	D2 ①	D#2 ①	E2 ①	F2 ①	F#2 ①	G2 ①
SI0	C2 ②	C#2 ②	D2 ②	D#2 ②	E2 ②	F2 ②	F#2 ②	G2 ②
FI1	G#2 ①	A2 ①	A#2 ①	B2 ①	C3 ①	C#3 ①	D3 ①	D#3 ①
SI1	G#2 ②	A2 ②	A#2 ②	B2 ②	C3 ②	C#3 ②	D3 ②	D#3 ②
FI2	E3 ①	F3 ①	F#3 ①	G3 ①	G#3 ①	A3 ①	A#3 ①	B3 ①
SI2	E3 ②	F3 ②	F#3 ②	G3 ②	G#3 ②	A3 ②	A#3 ②	B3 ②
FI3	C4 ①	C#4 ①	D4 ①	D#4 ①	E4 ①	F4 ①	F#4 ①	G4 ①
SI3	C4 ②	C#4 ②	D4 ②	D#4 ②	E4 ②	F4 ②	F#4 ②	G4 ②
FI4	G#4 ①	A4 ①	A#4 ①	B4 ①	C5 ①	C#5 ①	D5 ①	D#5 ①
SI4	G#4 ②	A4 ②	A#4 ②	B4 ②	C5 ②	C#5 ②	D5 ②	D#5 ②
FI5	E5 ①	F5 ①	F#5 ①	G5 ①	G#5 ①	A5 ①	A#5 ①	B5 ①
SI5	E5 ②	F5 ②	F#5 ②	G5 ②	G#5 ②	A5 ②	A#5 ②	B5 ②
FI6	C6 ①	C#6 ①	D6 ①	D#6 ①	E6 ①	F6 ①	F#6 ①	G6 ①
SI6	C6 ②	C#6 ②	D6 ②	D#6 ②	E6 ②	F6 ②	F#6 ②	G6 ②
FI7	G#6 ①	A6 ①	A#6 ①	B6 ①	C7 ①			
SI7	G#6 ②	A6 ②	A#6 ②	B6 ②	C7 ②			

Note: Each key has two contacts, the first conatct ① and second contact ② .
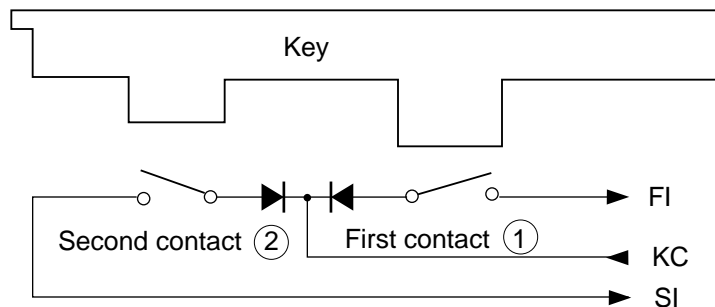
Nomenclature of Keys
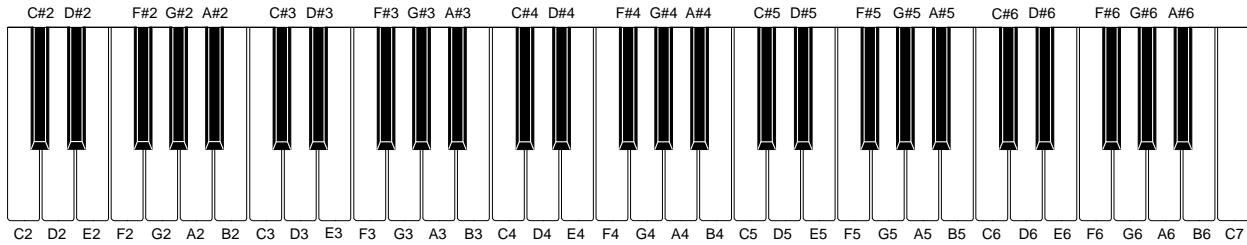
Button Matrix

	KI1	KI2	KI3	KI4	KI5	KI6	KI7
KO0	Split	Layer	Upper 1	Lower 1	Lower 2	Upper 2	
KO1	Transpose	Tune	MIDI	Jack	Rhythm	Tone	Play Style
KO2			Track 4 Chord 1	Track 5 Chord 2	Track 6 Chord 3	Track 2 Rhythm	Track 3 Bass
KO3	3	6	9	Demo	Touch Responce	Digital Effect	Resistration
KO4	2	5	8	Track 1	1	4	7
KO5	Accomp. Volume	Song Memory	Accomp.	Track	0	-	+
KO6	Synchro/ Ending	Variation /Fill-In	Normal/ Fill-In	Intro	F	D	B
KO7	Mode	A	C	E	Start/ Stop	Tempo Down	Tempo Up

Reset Circuit
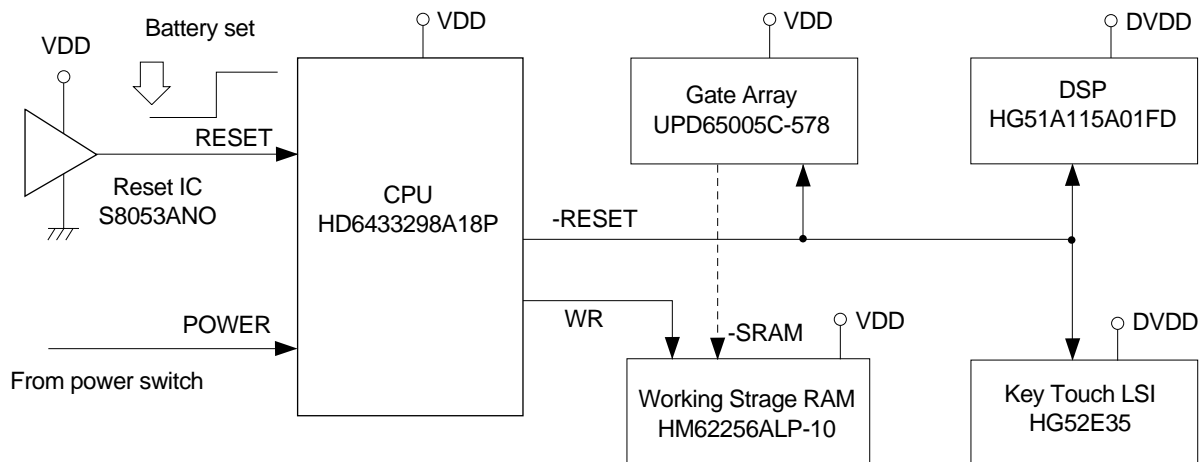
Initial reset

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 data in the working strage RAM.

Power ON reset

When the power switch is pressed, the CPU receives a low pulse of POWER signal. The CPU first raises APO signal to +5V to generat DVDD voltage, then raises RESET signal to +5V. During this period the gate array, the DSP and the key touch LSI initializes their internal circuit.

CPU (HD6433298A18P)

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 to the working strage RAM, the DSP and the key touch LSI. The CPU also controls buttons, LEDs, bender input and MIDI input/output.

| 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	10MHz clock output
8	P47	In	Wait signal input. Connected to +5V.
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	+5V source
15	-STBY	In	Standby signal input. Connected to +5V.
16	VSS	In	Ground (0V) source
17	XTAL	In	20MHz clock input
18	EXTAL	In	20MHz clock input
19, 20	MD1, MD0	In	Mode selection input. (Internal ROM mode --- MD1: Hight, MD0: Low)
21	AVSS	In	Ground (0V) source for internal DAC
22	AN0	In	Analog input. Connected to the bender volume.
23 ~ 29	P71 ~ P77	In	Button input signal input
30	AVCC	In	+5V source for internal DAC
31 ~ 38	P60 ~ P67	Out	LED segment signal output
39	VCC	In	+5V source
40 ~ 56	P27 ~ P10	Out	Address bus
48	VSS	In	Ground (0V) source
57 ~ 64	P30 ~ P37	Ijn/Out	Data bus

Gate Array (UPD65005C-578)

Functions of the gate array are;
(1) To decode chip select signals for the working strage RAM, the DSP and the key touch LSI.
(2) To hold the following signals on "Low" during power off.
    Read/write enable signals for the DSP and the key touch LSI
    10MHz clock for the key touch LSI
(3) To generate button scan / LED drive signals.
The following table shows the pin functions of the gate array.

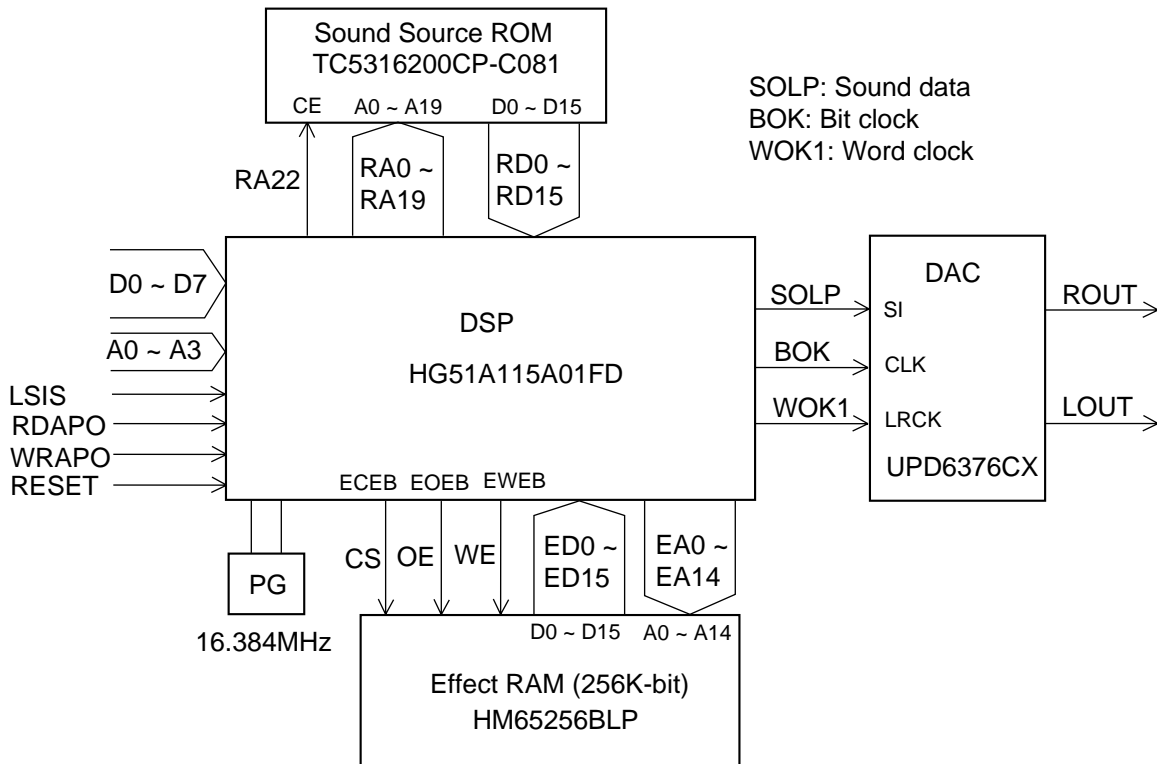| Pin No.	Terminal	In/Out	Function
1	-RESET	In	Reset signal input
2	-RDAPO	Out	Read enable signal output
3	-WRAPO	Out	Write enable signal output
4	-LSIS	Out	Chip select signal for the DSP
5	-HG	Out	Chip select signal for the key touch LSI
6	PHAPO	Out	10MHz clock for the key touch LSI
7	-SRAM	Out	Chip select signal for the working strage RAM
8 ~ 9	KO8 ~ KO9		Not used.
10 ~ 17	KO7 ~ KO0	Out	Button scan / LED drive signal output
18 ~ 20			Not used.
21	GND	In	Ground (0V) source
22	PHA	In	10MHz clock input
23	-WR	In	Write enable signal input
24	-RD	In	Read enable signal input
25	-APO	In	APO (Auto Power Off) signal input
26	KOC	In	KO signal data input
27	KOD	In	Clock for KO signal data
28 ~ 39	A15 ~ A4	In	Address bus
40, 41	D0, D1	In	Data bus
42	VDD	In	+5V source
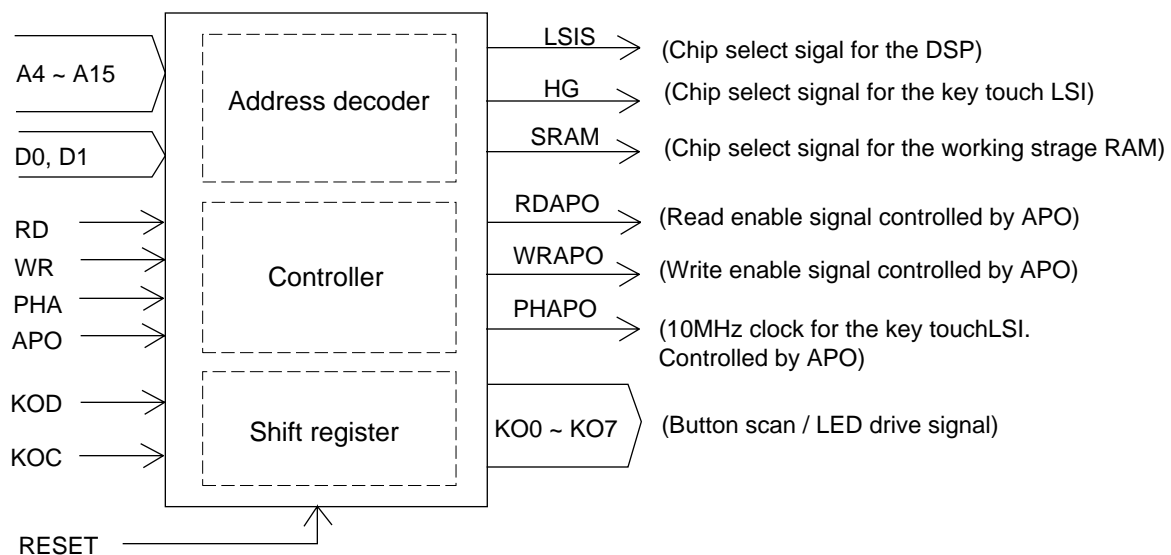
Digital Signal Processor (HG51A115A01FD)

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 rythm 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 256k-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 (0V) source
12	CK16	Out	16.384MHz clock output
13	VCC6	In	+5V source
14	CK0	In	Clock input. Connected to terminal CK16.
15	TCKB		Not used.
16	VCC1	In	+5V source
17	GND1	In	Ground (0V) source
18, 19	XT0, XT1	In/Out	16.384MHz 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	Addess 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 +5V.
35 ~ 39			Not used.
40 ~ 49 52 ~ 57	RD0 ~ RD15	In	Data bus for the sound source ROM
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	Data bus for the sound source ROM
74	GND5	In	Ground (0V) source
83	WOK2	Out	Word clock output. Not used.
84	VCC3	In	+5V source
85	GND3	In	Ground (0V) source
86	WOK1	Out	Word clock for the DAC
87	SOLM	Out	Serial data output. Not used.
88	SOLP	Out	Serial data output for the DAC
89	BOK	Out	Bit clock output for the DAC
90 ~ 92			Not used.

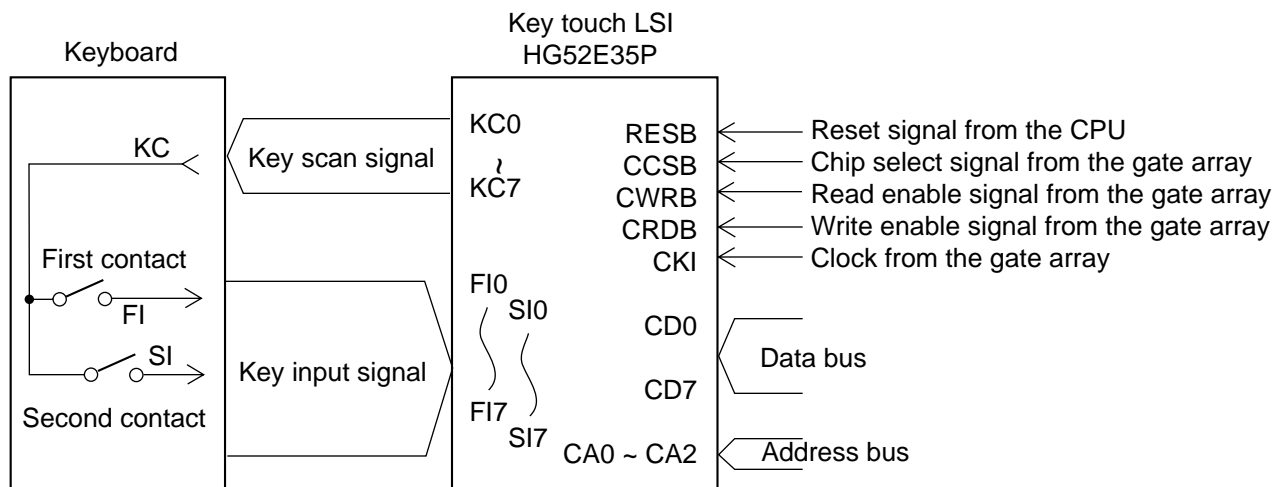| Pin No.	Terminal	In/Out	Function
93	VCC5	In	+5V source
94, 95 97 ~ 105 107,109 110, 112	EA0 ~ EA14	Out	Address bus for the effect RAM
96	EWEB	Out	Write enable signal output for the effect RAM
106	EOEB	Out	Read enable signal output for the effect RAM
108	VCC7	In	+5V source
111	ECEB	Out	Chip select signal output for the effect RAM
113 ~ 117			Not used.
118	VCC4	In	+5V source
119	GND4	In	Ground (0V) source
120 ~ 122			Not sued.
123 ~ 130	ED0 ~ ED7	In/Out	Data bus for the effect RAM
131	GND5	In	Ground (0V) source
132 ~ 134			Not used. Connected to ground.
135, 136			Not used.

Block diagram of DSP and DAC circuit

DAC (UPD6376CX)

UPD6376CX is a two-channel 16-bit Digital to Analog Convertor 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 (0V) source for internal digital circuit
3	NC		Not used.
4	DVDD	In	+5V source for internal digital circuit
5	A.GND	In	Ground (0V) source for internal analog circuit
6	R.OUT	Out	Sound waveform output
7	A.VDD	In	+5V source for internal analog circuit
8	A.VDD	In	+5V 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 (0V) 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.

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	FI10, SI10	In	Key input signal
4	VCC	In	+5V source
5	CRDB	In	Read enable signal
6	CWRB	In	Write enable signal
7	CCBB	In	Chip select signal
8, 9	T, STBY	In	Not used. Connected to +5V.
10	RESB	In	Reset signal
11	W	In	Not used. Connected to +5V.
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 (0V) 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 (0V) source
29 ~ 31	CR0 ~ CR2	In	Address bus
32	VCC	In	+5V source
33 ~ 39, 41 ~ 43 53 ~ 55, 57 ~ 63	FI0 ~ FI9, SI0 ~ SI9	In	Key input signal
40	VCC	In	+5V source
44 ~ 47, 49 ~ 52	KC0 ~ KC7	Out	Key scan signal
48, 56	GND	In	Ground (0V) source
64	VCC	In	+5V source

Filter Block

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

— 11 —
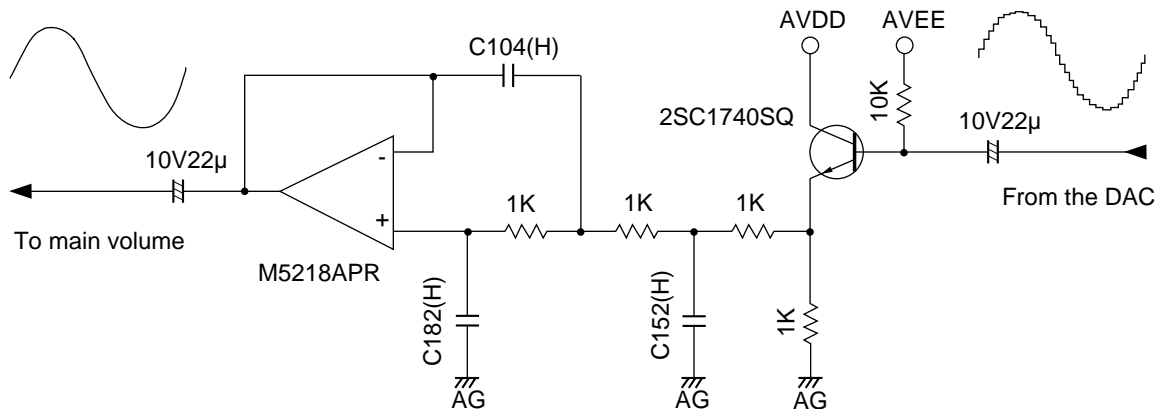
Power Amplifier (LA4620)

The power amplifier is a two-channel balanced amplifier with standby switch. The following figure shows the internal diagram of the amplifier.
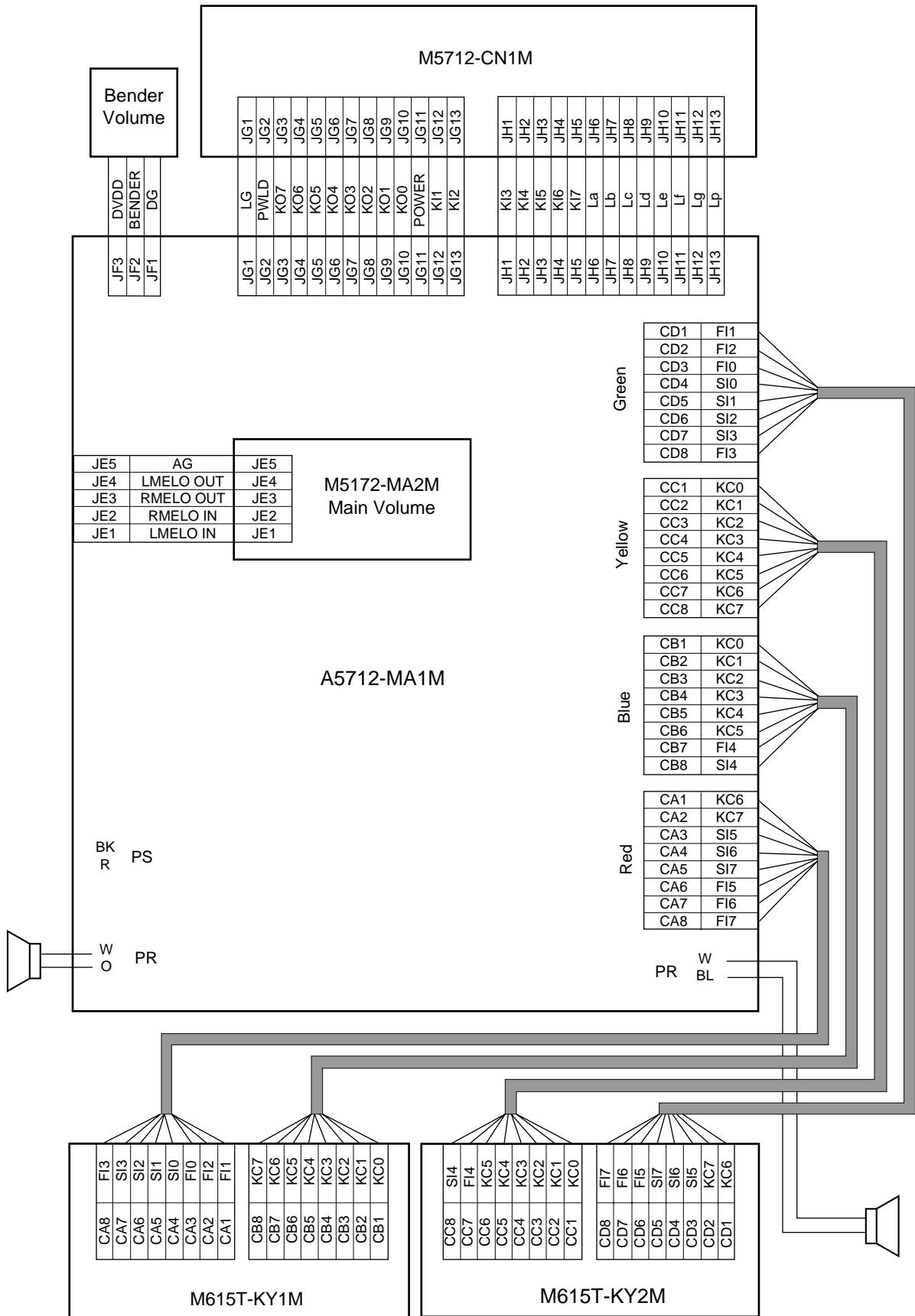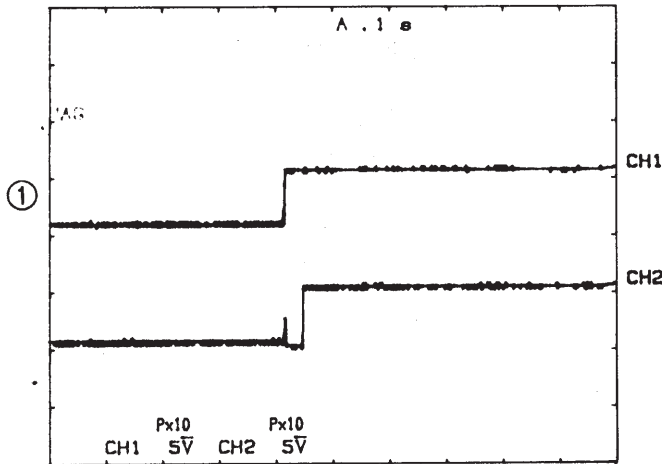
Internal Diagram of LA4620
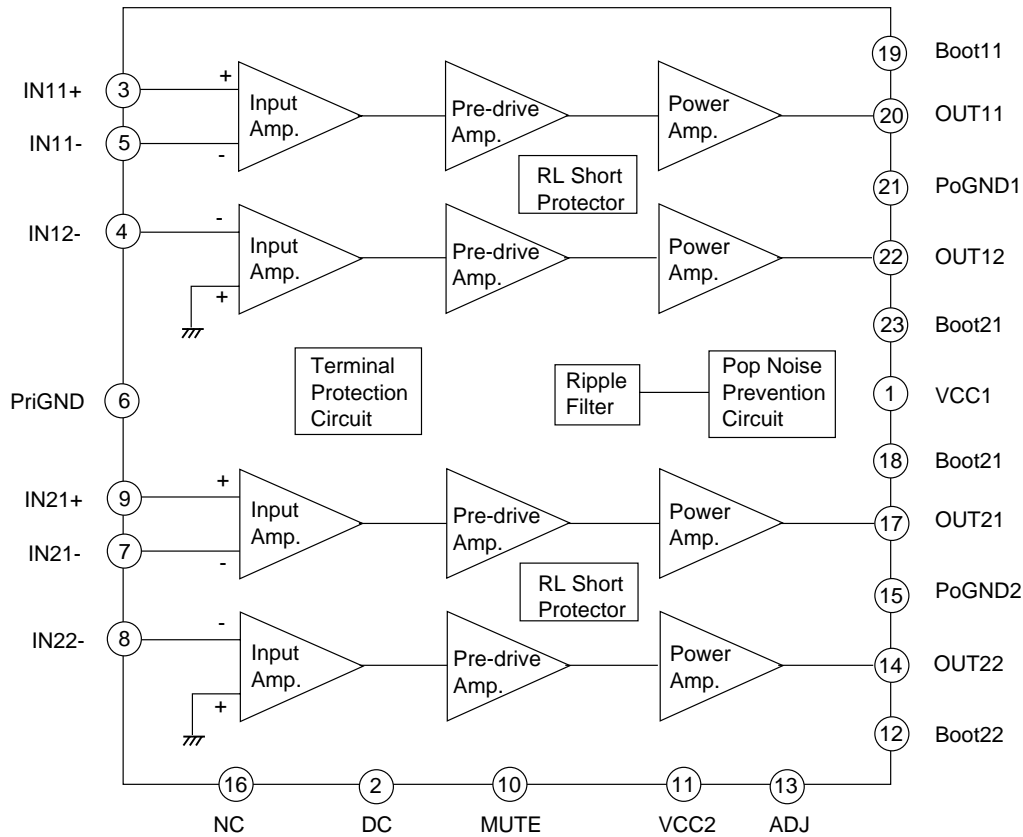
Power Supply Circuit

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 from the CPU.

Name	Voltage	For operation of
VDD	+5.1V	CPU, Reset IC, Gate array, Working strage RAM
DVDD	+5.3V	DSP, Key touch LSI, Sound source ROM, Effect RAM, DAC
AVDD	+5.2V	DAC, Filter
LVDD	+5.2V	LED driver
VCC	+12V	Pilot lamp
VD	+12V	Power amplifier

WIRING DIAGRAM

M5712-CN1M

Bender Volume

JG1 JG2 JG3 JG4 JG5 JG6 JG7 JG8 JG9 JG10 JG11 JG12 JG13 JH1 JH2 JH3 JH4 JH5 JH6 JH7 JH8 JH9 JH10 JH11 JH12 JH13

DVDD BENDER DG

LG PWLD KO7 KO6 KO5 KO4 KO3 KO2 KO1 KO0 POWER KI1 KI2 KI3 KI4 KI5 KI6 KI7 La Lb Lc Ld Le Lf Lg Lp

JF3 JF2 JF1

JG1 JG2 JG3 JG4 JG5 JG6 JG7 JG8 JG9 JG10 JG11 JG12 JG13 JH1 JH2 JH3 JH4 JH5 JH6 JH7 JH8 JH9 JH10 JH11 JH12 JH13

A5712-MA1M

M5172-MA2M Main Volume

JE5	AG	JE5
JE4	LMELO OUT	JE4
JE3	RMELO OUT	JE3
JE2	RMELO IN	JE2
JE1	LMELO IN	JE1

Green

CD1	FI1
CD2	FI2
CD3	FI0
CD4	SI0
CD5	SI1
CD6	SI2
CD7	SI3
CD8	FI3

Yellow

CC1	KC0
CC2	KC1
CC3	KC2
CC4	KC3
CC5	KC4
CC6	KC5
CC7	KC6
CC8	KC7

Blue

CB1	KC0
CB2	KC1
CB3	KC2
CB4	KC3
CB5	KC4
CB6	KC5
CB7	FI4
CB8	SI4

Red

CA1	KC6
CA2	KC7
CA3	SI5
CA4	SI6
CA5	SI7
CA6	FI5
CA7	FI6
CA8	FI7

BK R PS

W O PR

PR W BL

M615T-KY1M

CA8 CA7 CA6 CA5 CA4 CA3 CA2 CA1
FI3 SI3 SI2 SI1 SI0 FI0 FI2 FI1

CB8 CB7 CB6 CB5 CB4 CB3 CB2 CB1
KC7 KC6 KC5 KC4 KC3 KC2 KC1 KC0

M615T-KY2M

CC8 CC7 CC6 CC5 CC4 CC3 CC2 CC1
SI4 FI4 KC5 KC4 KC3 KC2 KC1 KC0
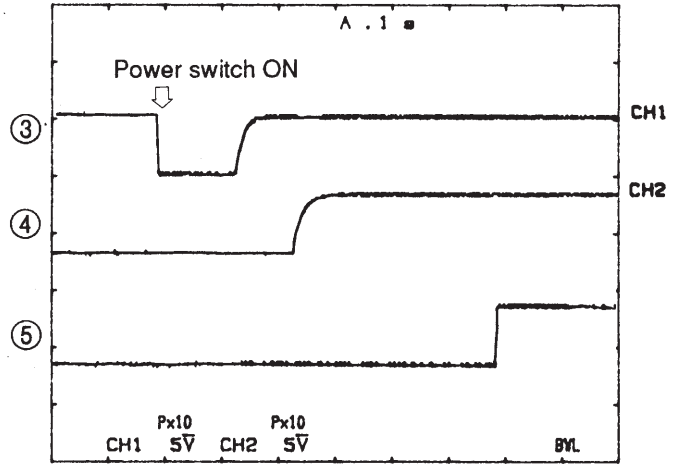
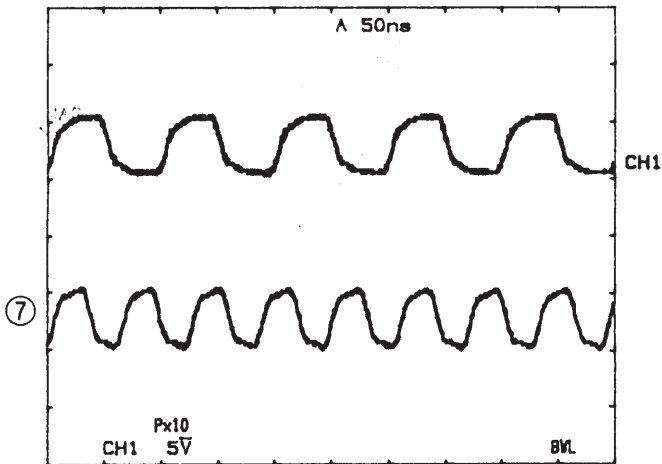CD8 CD7 CD6 CD5 CD4 CD3 CD2 CD1
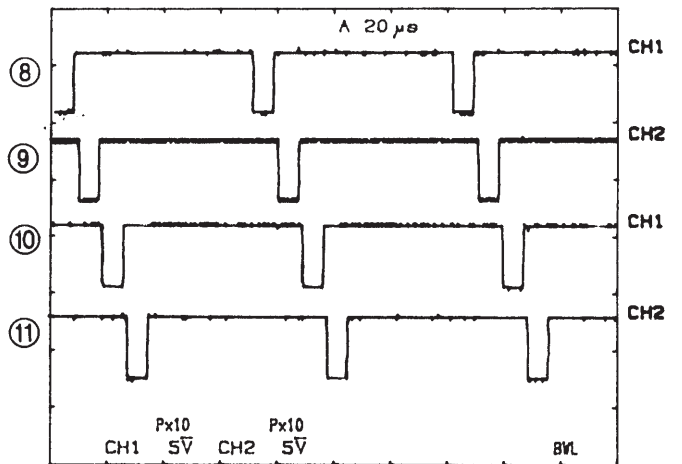FI7 FI6 FI5 SI7 SI6 SI5 KC7 KC6

MAJOR WAVEFORMS

① VDD voltage
Q7 emitter

② Initial reset signal
S8053ANO pin 1

③ POWER signal
HD6433298A18P pin 13

④ APO signal
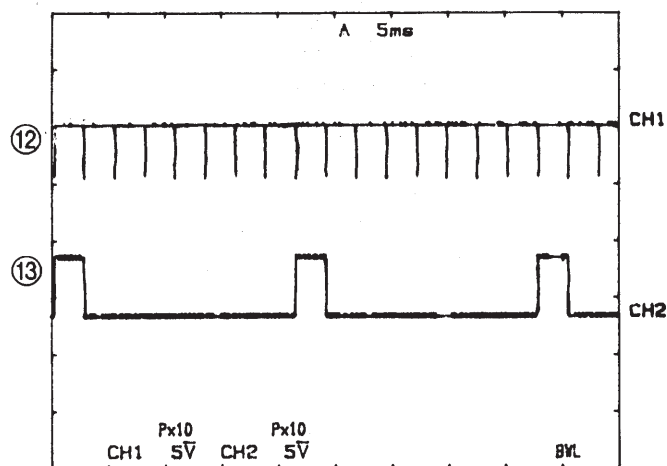HD6433298A18P pin 3

⑤ RESET signal
HD6433298A18P pin 11

⑥ Main clock pulse
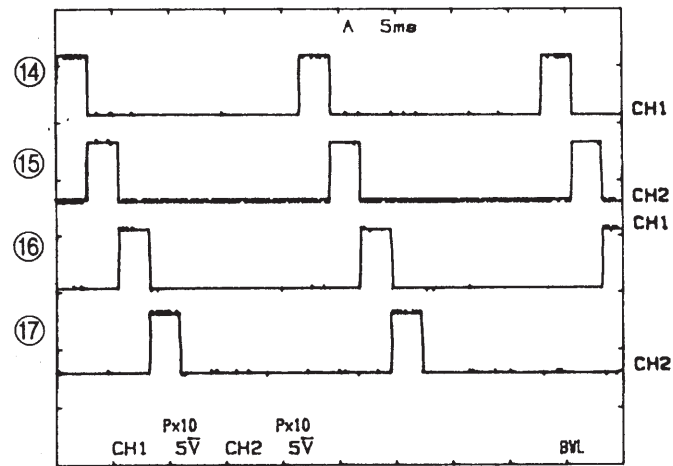HD6433298A18P pin 7

⑦ DSP clock pulse
HG51A115A01FD pin 12

⑧ Key scan signal KC0
HG52E35P pin 44

⑨ Key scan signal KC1
HG52E35P pin 45

⑩ Key scan signal KC2
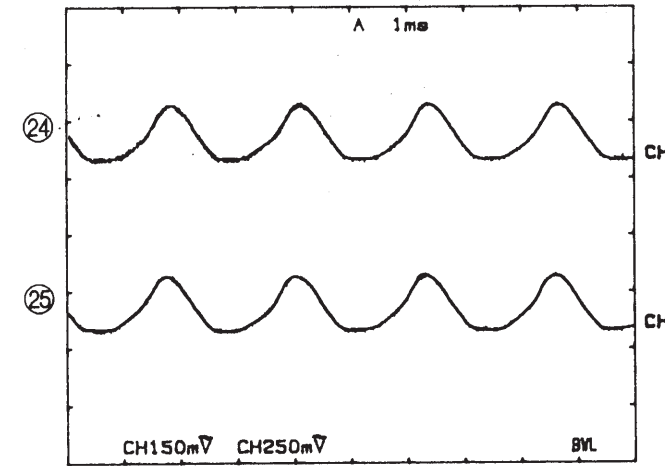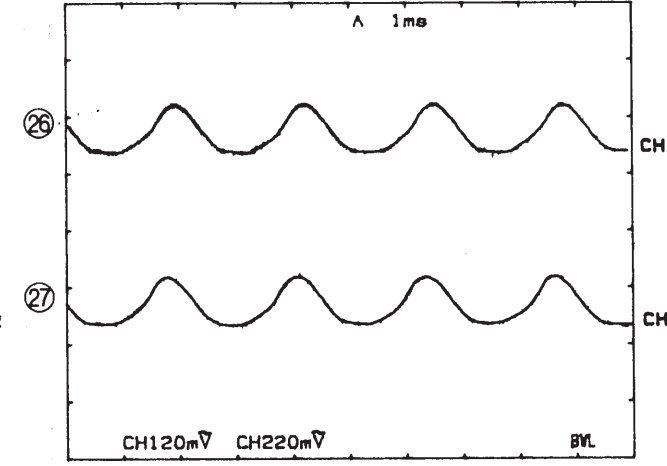HG52E35P pin 46

⑪ Key scan signal KC3
HG52E35P pin 47

⑫ KOC signal
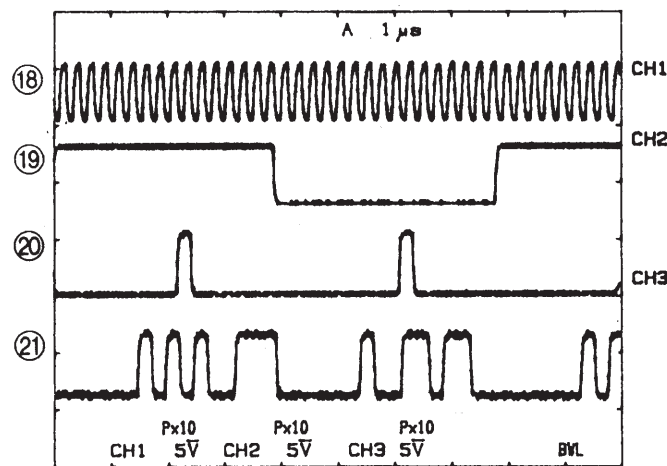UPD65005C-578 pin 26

⑬ KOD signal
UPD65005C-578 pin 27

⑭ Button scan / LED drive signal KO0
UPD65005C-578 pin 17

⑮ Button scan / LED drive signal KO1
UPD65005C-578 pin 16

⑯ Button scan / LED drive signal KO2
UPD65005C-578 pin 15

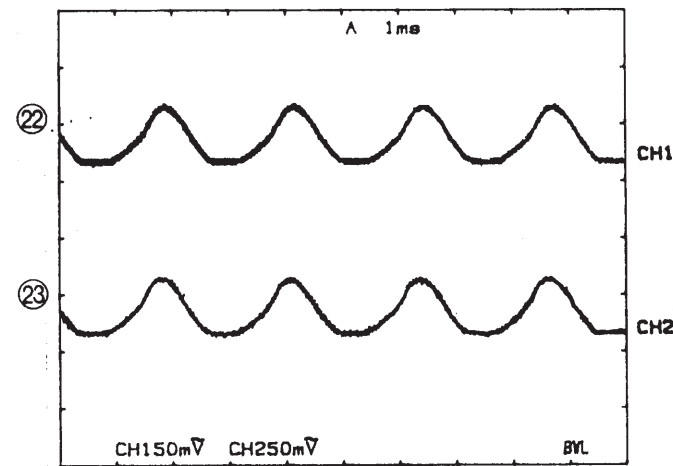⑰ Button scan / LED drive signal KO3
UPD65005C-578 pin 14

⑱ Bit clock BOK
UPD6376CX pin 16

⑲ L/R clock WOK1
UPD6376CX pin 13

⑳ Sound data SOLP (Note OFF)

㉑ Sound data SOLP (Note ON)
UPD6376CX pin 15

㉒ DAC output
UPD6376CX pin 11

㉓ DAC output
UPD6376CX pin 6
   Tone : Flute (No. 078)
   Key : A4

㉔ Filter output
M5218APR pin 1

㉕ Filter output
M5218APR pin 7

㉖ Power amp. input
LA4620 pin 9

㉗ Power amp. input
LA4620 pin 3
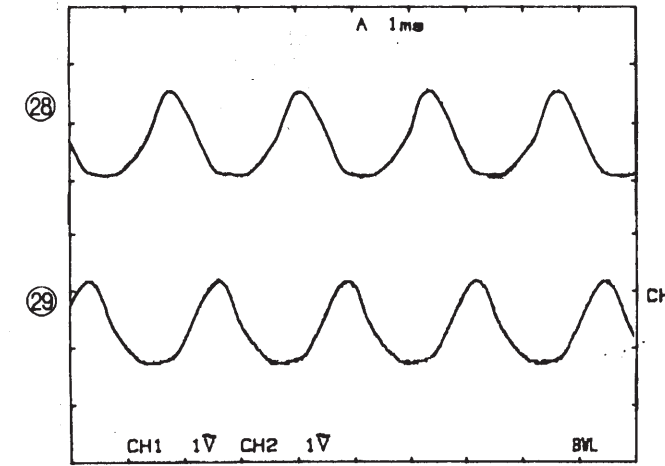
㉘ Power amp. output OUT11 (L-ch)
LA4620 pin 20

㉙ Power amp. output OUT12 (L-ch)
LA4620 pin 22

Tone : Flute (No. 078)
Key : A4
Touch response : OFF
Digital effect : OFF
Volume : Max

PCB VIEW and MAJOR CHECK POINTS
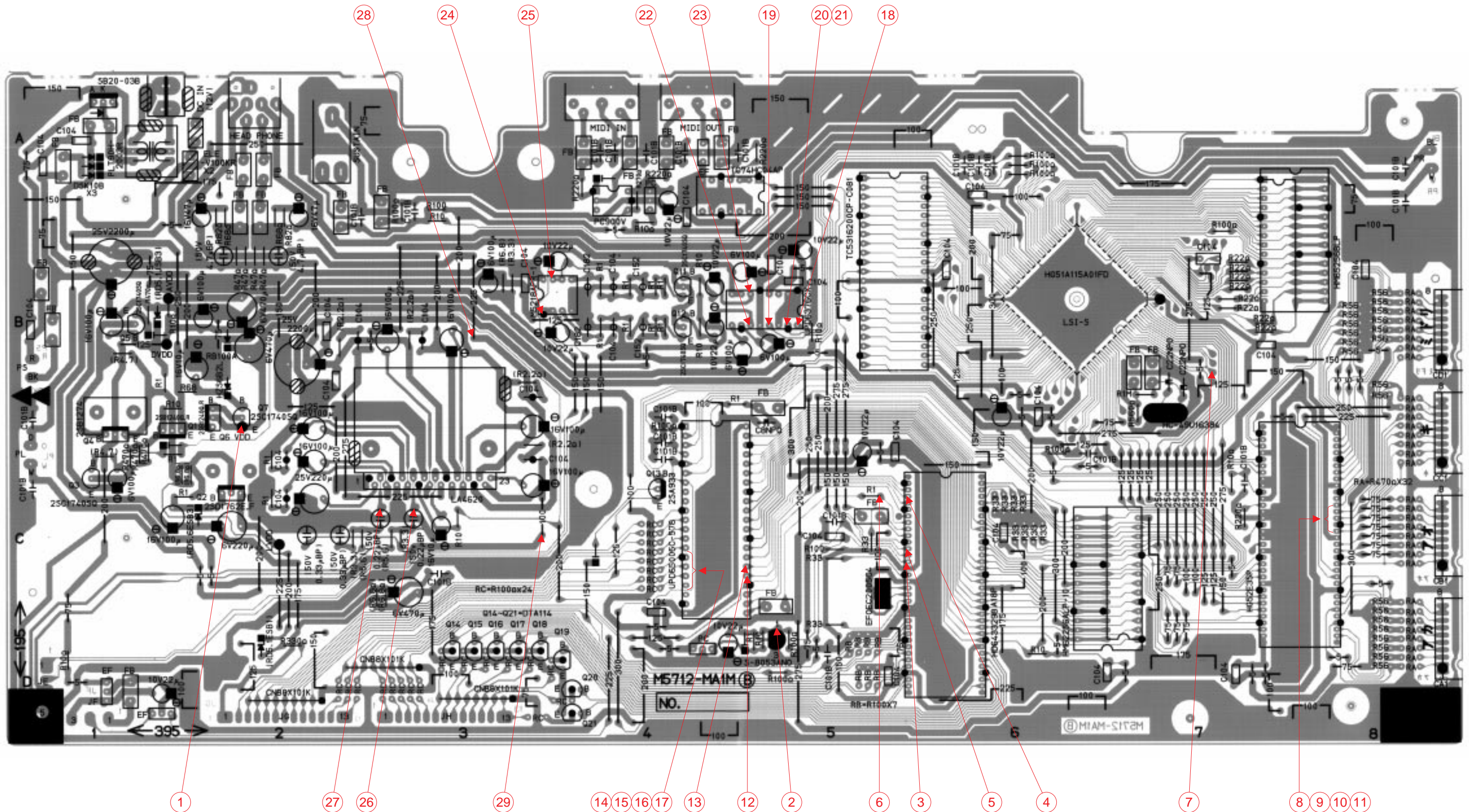
SCHEMATIC DIAGRAMS

Main PCB M5712-MA1M

Console PCB M5712-CN1M

MULTI FUNCTION DISPLAY

(Bottom View)

PCB-M5712-CN1M

— 18 —
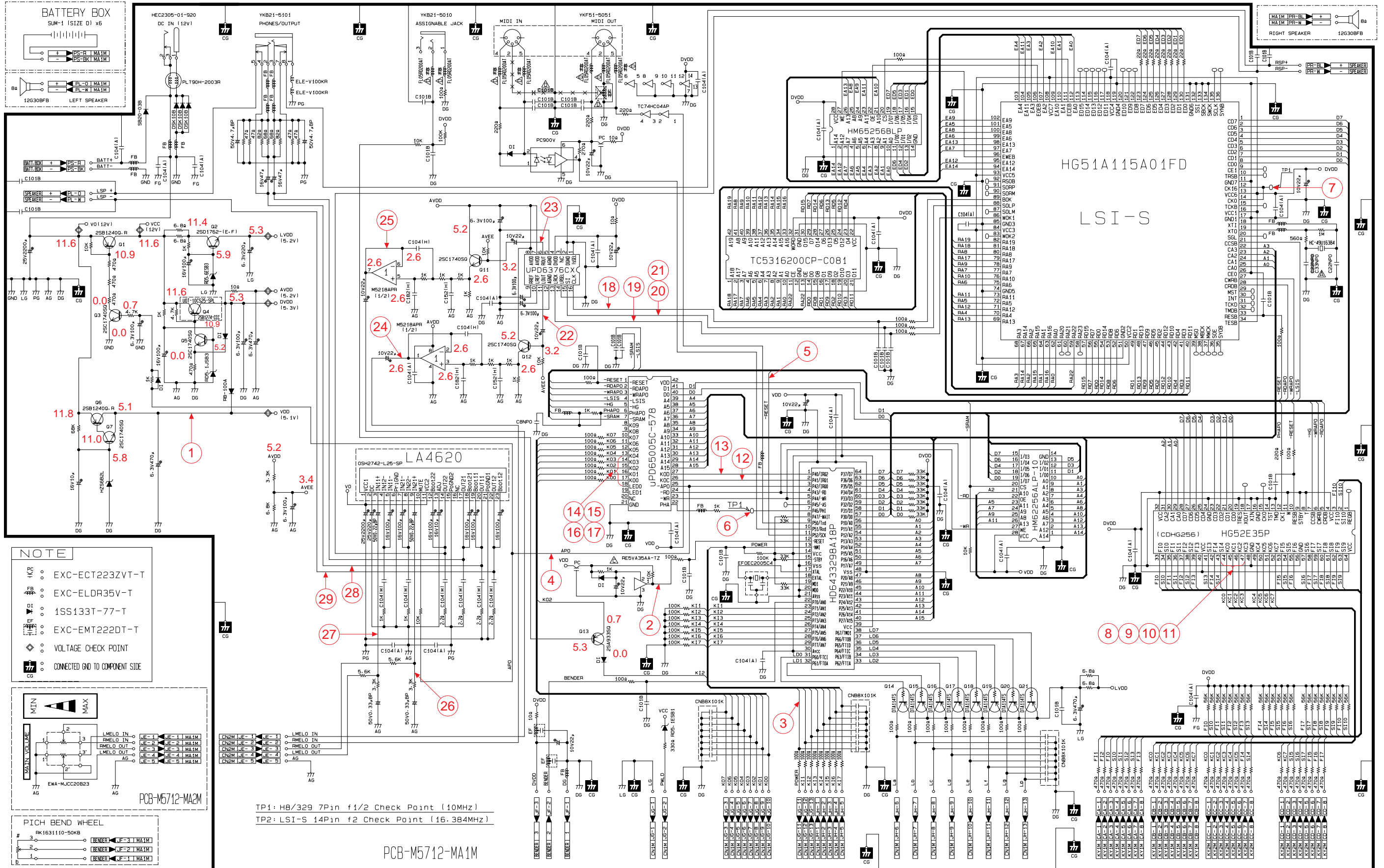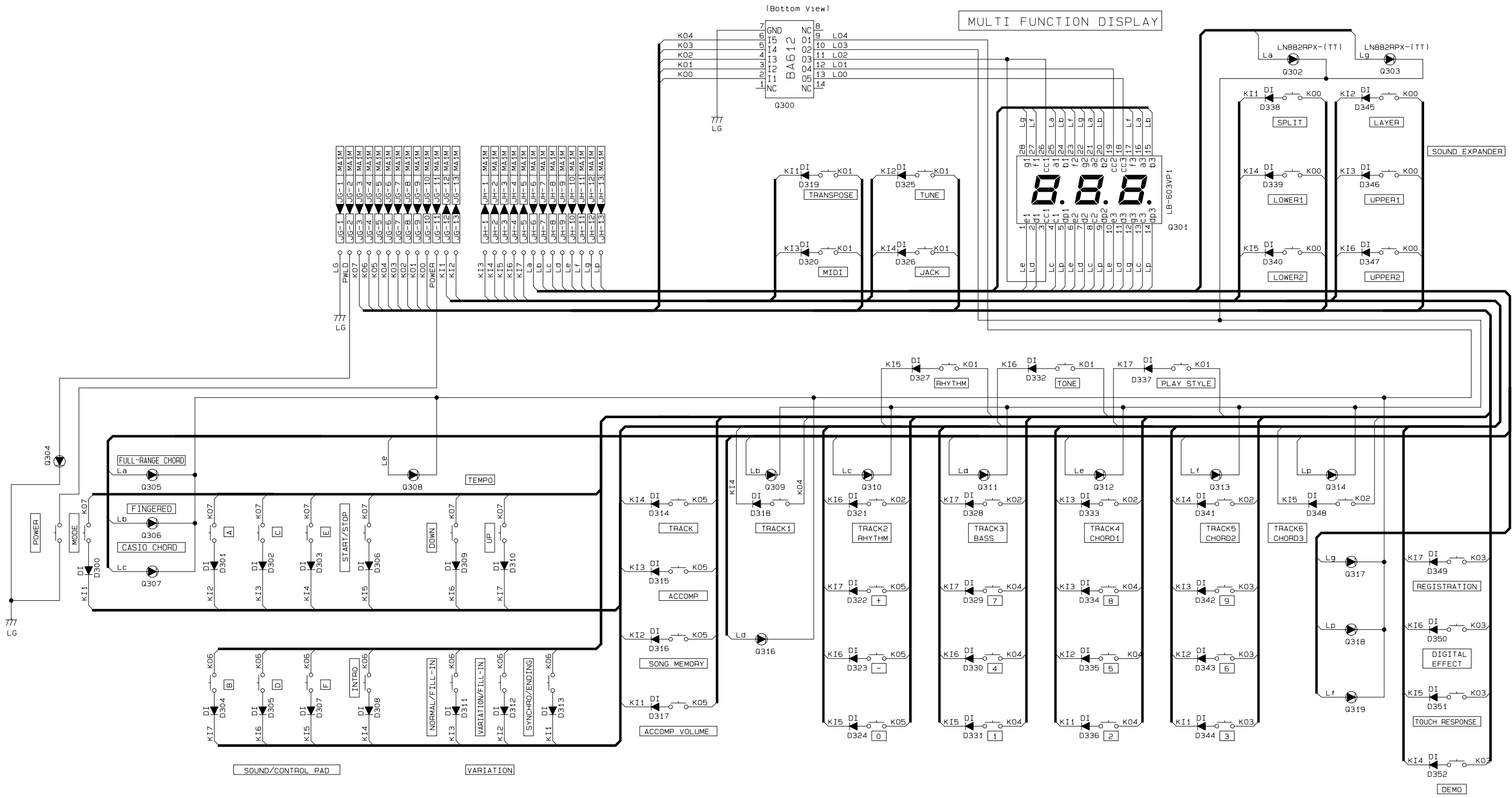
NOTE

DI : 1SS133T-77-T

LN28RPX-(TT)

Keyboard PCBs M615T-KY1M, KY2M

PCB-M615T-KY1M

PCB-M615T-KY2M

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PCB ass'y
M5712-CN1M

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PCB ass'y
M5712-MA2M

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PCB ass'y
M615T-KY2M

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PCB ass'y
M5712-MA1M

PCB ass'y
M615T-KY1M

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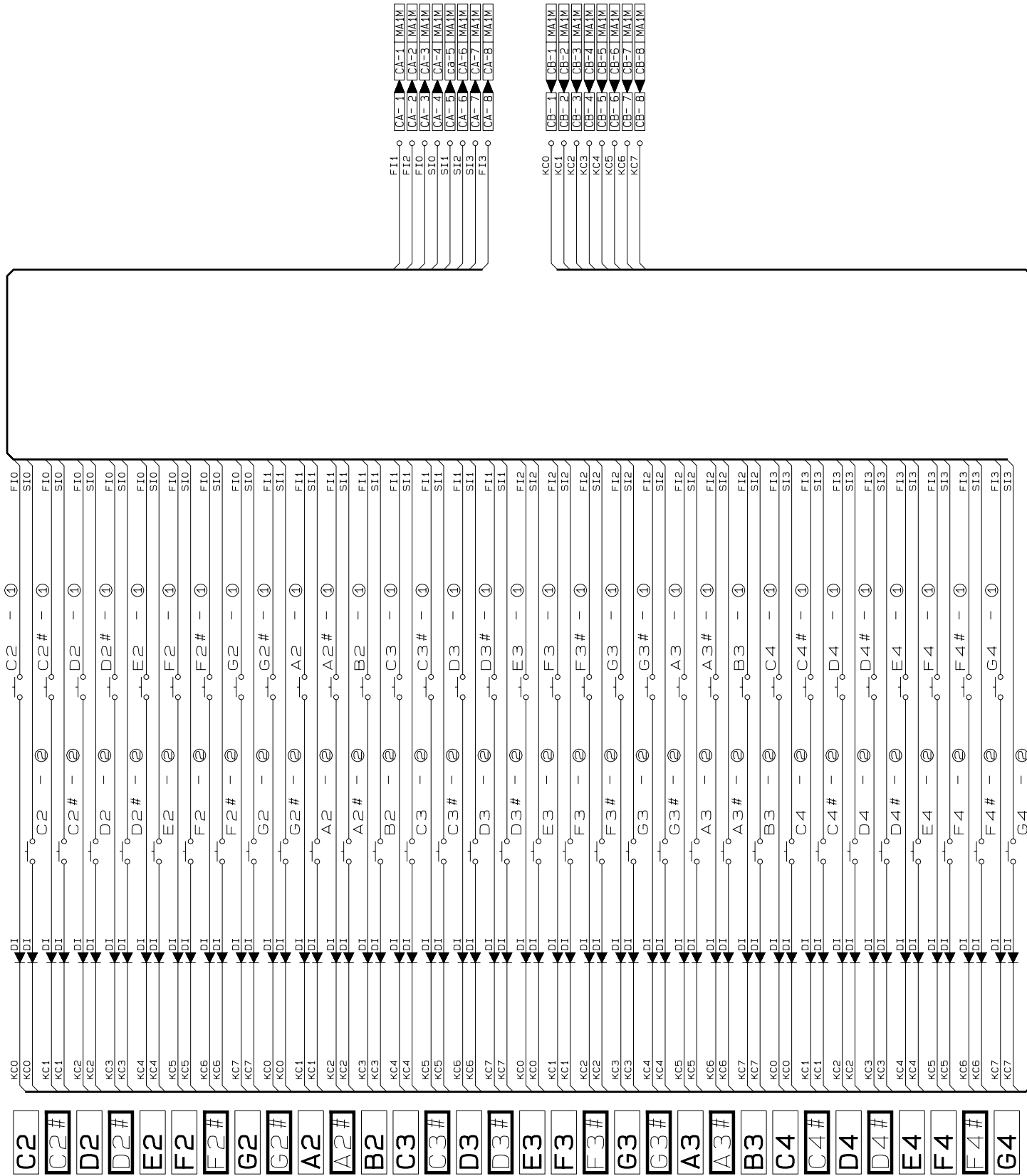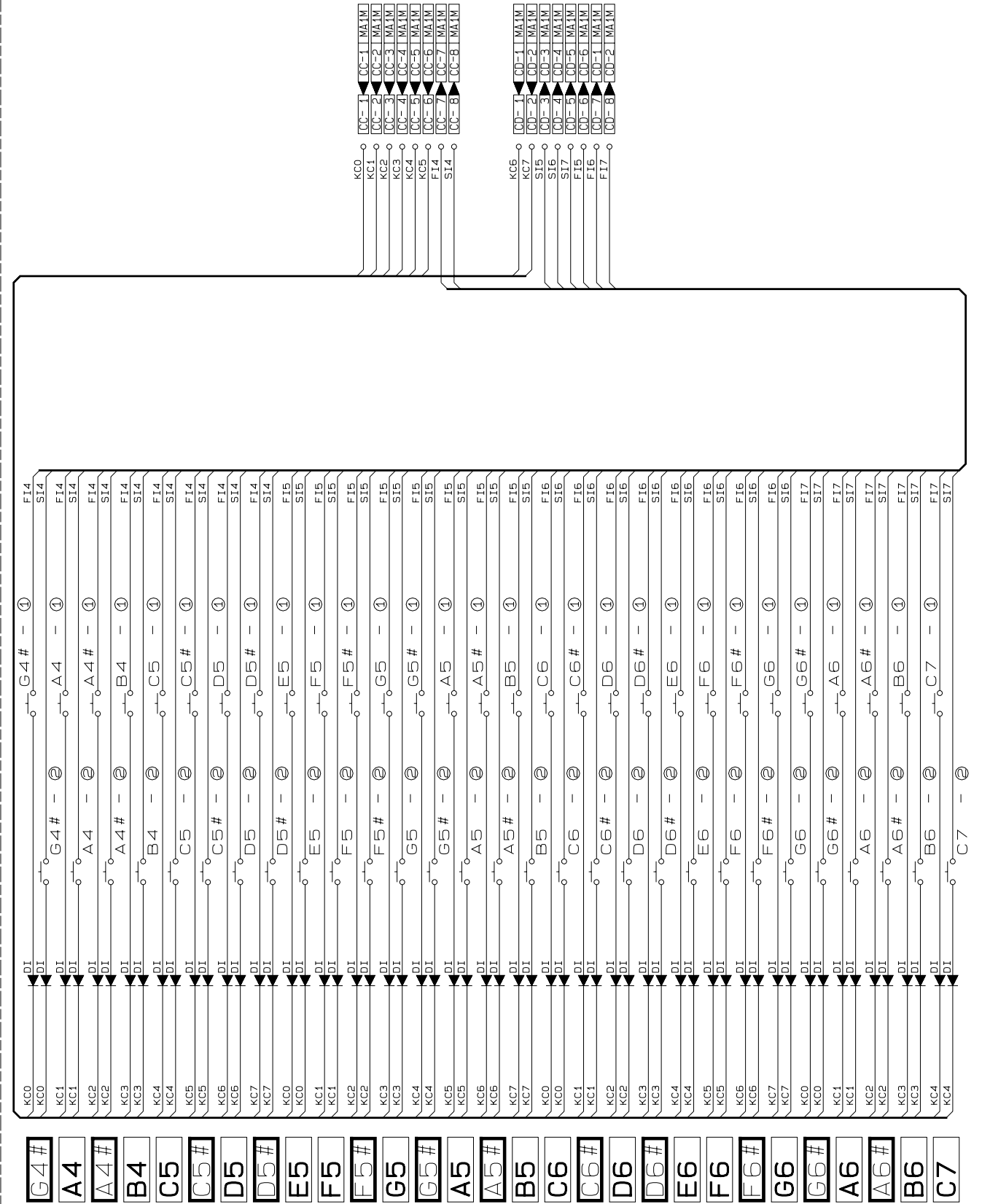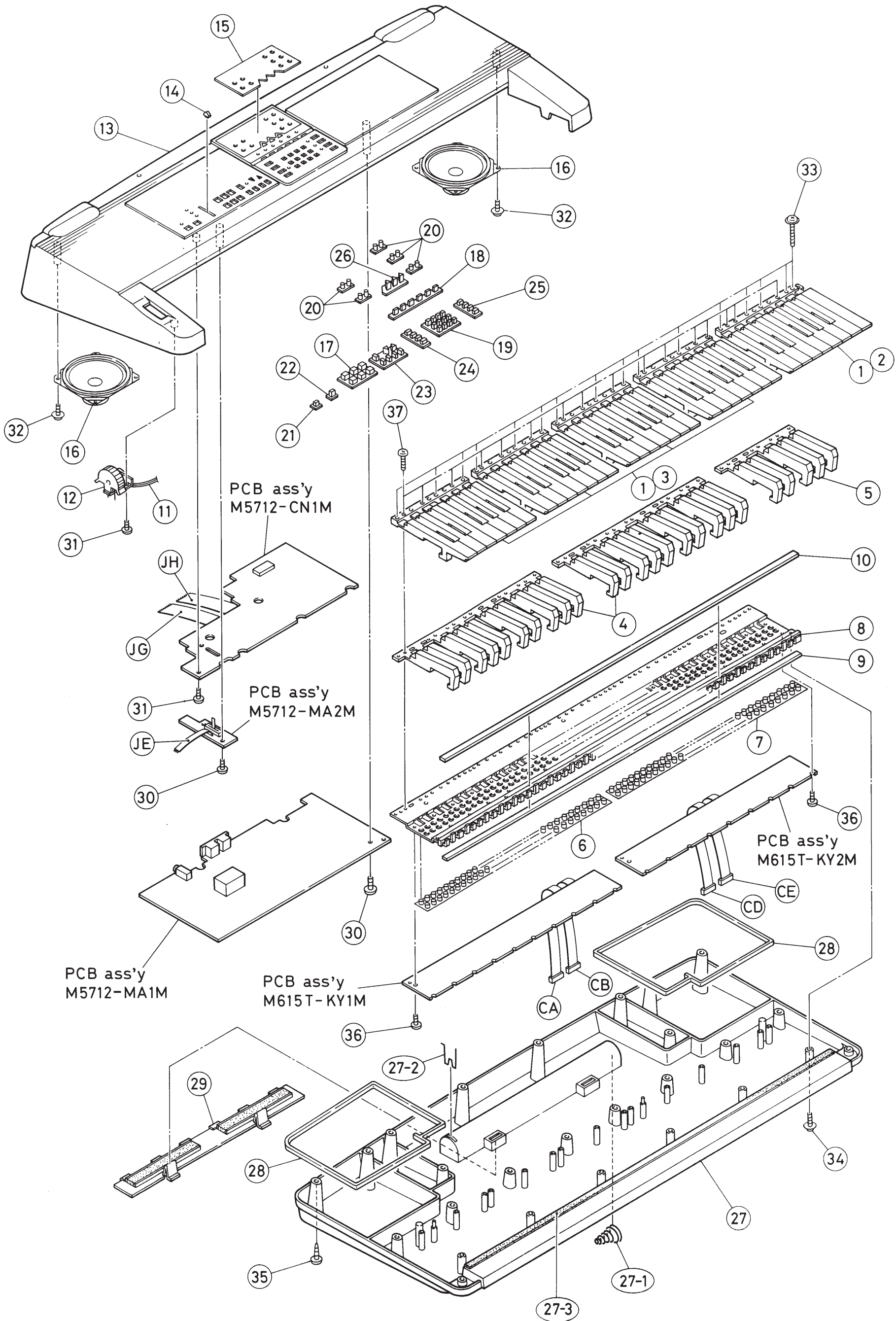
IC LEAD IDENTIFICATION AND INTERNAL DIAGRAM

UPD6376CX
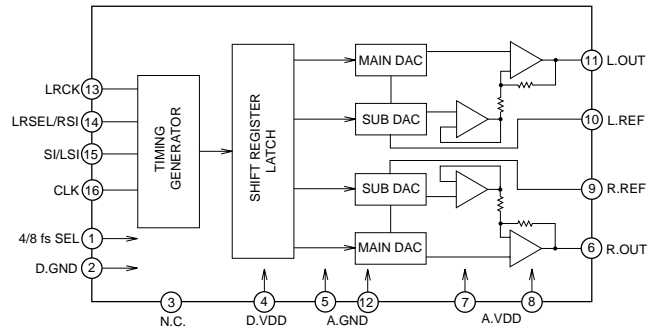
S8053ANO
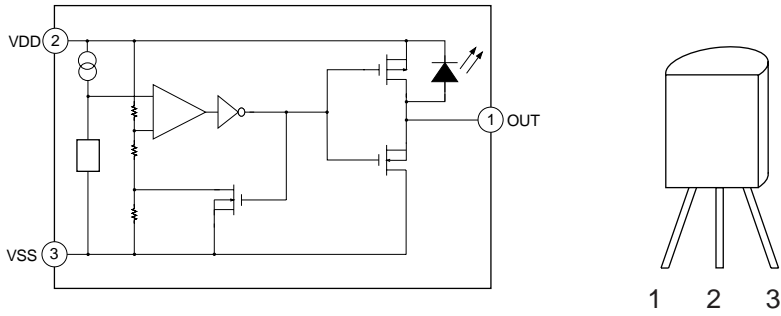
TC74HC04AP
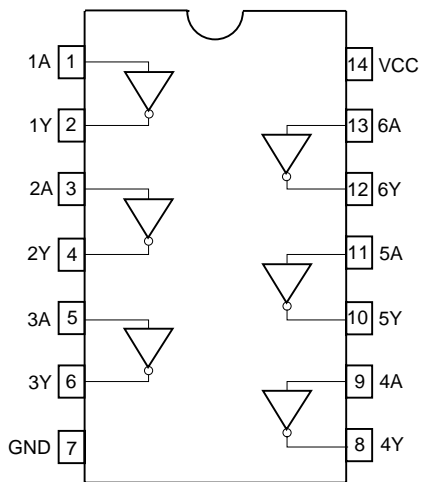
M5218APR
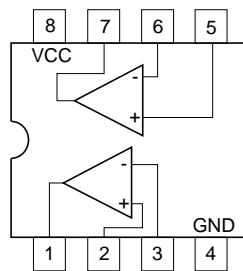
PC900V
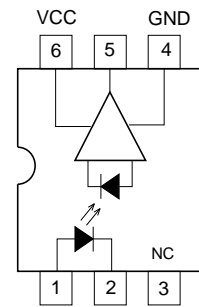
Q2: 2SD1762E,F
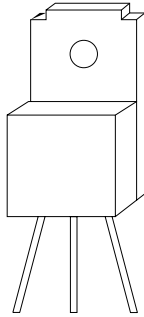
B C E

Q4: 2SB1274
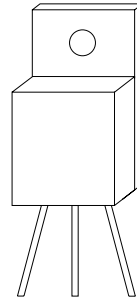
B C E

Q1/6: 2SB1240Q,R

E C B

Q3, Q5, Q7, Q11/12: 2SC1740SQ
Q13: 2SA933SQ
Q14~21: DTA114TS

E C B

PARTS LIST

CTK-750

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.

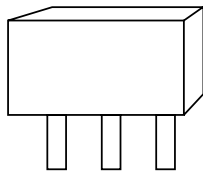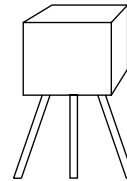| N	Item	Code No.	Parts Name	Specification	Q	M	FOB Japan N.R.Yen Unit Price	R	*
		PCB Ass'y M5712-MA1M							
		2010 4928	LSI	HM65256BLP-10	1	1	720	A	H
		2011 3325	LSI	UPD6376CX	1	1	230	A	C
		2011 5194	LSI	HG52E35P	1	1	600	A	F
		2011 5201	LSI	HG51A115A01FD	1	1	2,820	A	T
N		2011 5810	LSI	UPD43256AC-85L,10L	1	1	620	A	F
N		2011 6867	LSI	UPD65005C-578	1	1	220	A	C
N		2011 7196	LSI	TC5316200CP-C081	1	1	1,230	A	N
N		2011 7203	LSI	HD6433298A18P	1	1	880	A	J
		2105 2219	IC	S-8053ANO	1	1	60	A	B
N		2105 3164	IC	HD74HC04P	1	1	28	A	A
		2114 1421	Photo-coupler	PC900V	1	1	210	A	C
		2114 1799	IC	M5218APR	1	1	38	A	A
		2114 1883	IC	LA4620	1	1	350	A	D
		2250 0441	Transistor	2SA1267Y-AT-T	1	10	9	A	A
		2251 0140	Transistor	2SB1240Q,R-TV6-T	2	10	10	A	A
		2251 0672	Transistor	2SB1548-P.CS	1	10	44	A	A
		2252 0497	Transistor	2SC3199Y-AT-T	5	10	9	A	A
		2253 0455	Transistor	2SD1762E,F	1	1	47	A	A
		2259 1883	Digital transistor	DTA114TS-TP-T	8	10	10	A	A
		2360 1729	Zener diode	MTZJ5.1AT-77-T	1	10	8	B	A
		2360 1946	Zener diode	MTZJ5.6CT-77-T	1	10	8	B	A
N		2360 2254	Zener diode	HZS6B2LTD-T	1	10	9	B	A
N		2360 2261	Zener diode	RD5.1JSB3-T1-T	1	10	9	B	A
		2390 0371	Diode	DSK10B-BT-T	3	10	11	C	A
		2390 1323	Diode	RB100A-T32-T	1	10	29	C	A
		2390 1344	Diode	1SS133T-77-T	5	20	3	C	A
		2390 1463	Schottky diode	SB20-03B	1	5	39	C	A
		2590 1519	Crystal oscillator	HC-49U16384	1	1	100	B	B
N		2590 1547	Ceramic oscillator	EFO-EC2005C4	1	5	64	B	B
		2606 1141	Carbon film resistor	R-20-1K-J-T23-T	16	20	2	C	A
		2606 1148	Carbon film resistor	R-20-220-J-T23-T	4	20	2	C	A
		2606 1155	Carbon film resistor	R-20-330-J-T23-T	1	20	2	C	A
		2606 1162	Carbon film resistor	R-20-10-J-T23-T	5	20	2	C	A
		2606 1169	Carbon film resistor	R-20-100-J-T23-T	33	20	2	C	A
		2606 1176	Carbon film resistor	R-20-100K-J-T23-T	9	20	2	C	A
		2606 1183	Carbon film resistor	R-20-10K-J-T23-T	7	20	2	C	A
		2606 1197	Carbon film resistor	R-20-22-J-T23-T	8	20	2	C	A
		2606 1232	Carbon film resistor	R-20-82-J-T23-T	2	20	2	C	A
		2606 1253	Carbon film resistor	R-20-4.7K-J-T23-T	2	20	2	C	A
		2606 1302	Carbon film resistor	R-20-270-J-T23-T	1	20	2	C	A
		2606 1309	Carbon film resistor	R-20-470-J-T23-T	36	20	2	C	A
		2606 1323	Carbon film resistor	R-20-56K-J-T23-T	22	20	2	C	A
		2606 1330	Carbon film resistor	R-20-68K-J-T23-T	1	20	2	C	A
		2606 1337	Carbon film resistor	R-20-1M-J-T23-T	1	20	2	C	A
		2606 1358	Carbon film resistor	R-20-3.3K-J-T23-T	3	20	2	C	A
		2606 1372	Carbon film resistor	R-20-33K-J-T23-T	11	20	2	C	A
		2606 1428	Carbon film resistor	R-20-5.6K-J-T23-T	2	20	2	C	A
		2606 1435	Carbon film resistor	R-20-560-J-T23-T	1	20	2	C	A
		2606 1491	Carbon film resistor	R-20-6.8K-J-T23-T	1	20	2	C	A
		2606 1694	Carbon film resistor	R-20-68-J-T23-T	2	20	2	C	A
		2606 1708	Carbon film resistor	R-20-47-J-T23-T	4	20	2	C	A
N		2606 1722	Carbon film resistor	R-20-2.2-J-T23-T	4	20	2	C	A
N		2606 1757	Carbon film resistor	R-20-6.8-J-T23-T	4	20	2	C	A
		2800 9091	Electrolytic capacitor	25RE2-220-T2-T	1	10	33	C	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	*
		2802 9231	Electrolytic capacitor	25RE3-2200-S1	2	10	75	C	A
N		2803 6743	Electrolytic capacitor	50RBP2-R22-T2-T	2	20	16	C	A
N		2803 6750	Electrolytic capacitor	50RBP2-R33-T2-T	2	20	16	C	A
N		2803 6757	Electrolytic capacitor	50RBP2-4R7-T2-T	2	20	18	C	A
		2805 3061	Electrolytic capacitor	6.3RE2-220-T2-T	1	10	26	C	A
		2805 3134	Electrolytic capacitor	10RE2-22-T2-T	10	20	14	C	A
		2805 3142	Electrolytic capacitor	16RE2-10-T2-T	2	20	14	C	A
		2807 1015	Electrolytic capacitor	16RE2-47-T2-T	2	10	20	C	A
		2807 1040	Electrolytic capacitor	6.3RE2-470-T2-T	3	10	27	C	A
		2807 1082	Electrolytic capacitor	16RE2-100-T2-T	8	10	27	C	A
		2807 1091	Electrolytic capacitor	6.3RE2-100-T2-T	6	20	18	C	A
		2813 1722	Semiconductive capacitor	DD407SR104K16-T	2	20	9	C	A
		2813 2597	Ceramic capacitor	RT-HE40TKCH080D-T	1	20	5	C	A
		2813 3283	Ceramic capacitor	UP050F104Z-A-B	22	20	8	C	A
N		2813 3381	Semiconductive capacitor	DD404SR152K16-T	2	20	5	C	A
N		2813 3388	Semiconductive capacitor	DD404SR182K16-T	2	20	5	C	A
		2818 0446	Ceramic capacitor	RT-HE40TKYB101K-T	22	20	4	C	A
		2818 3275	Ceramic capacitor	RT-HE40TKCH220J-T	2	20	5	C	A
		2830 6229	Mylar capacitor	AMZV-104K50-T	6	10	13	C	A
		2845 0168	Module capacitor	CNB8X101K	3	5	58	C	B
		2845 3213	Three-polarity capacitor	EXC-ECT223ZVT-T	2	10	14	C	A
		2845 3220	Ferrite beads	EXC-ELDR35V-T	20	10	12	C	A
		3025 0826	EMI filter	EXC-EMT222DT-T	3	10	21	C	A
		3501 4816	DIN jack	YKF51-5051	1	1	110	C	A
		3501 5012	DC jack	HEC2305-01-920	1	10	25	A	A
		3501 7651	Connector	S8B-PH-K-E	1	10	25	C	A
		3501 7658	Connector	S8B-PH-K-M	1	10	25	C	A
		3501 7665	Connector	S8B-PH-K-R	1	10	25	C	A
		3501 7672	Connector	S8B-PH-K-Y	1	10	25	C	A
		3612 0711	Miniature jack	YKB21-5101	1	5	90	B	A
		3612 0789	Jack	YKB21-5010	1	5	60	B	B
		3719 2695	Heat sink	OSH2742-L25-SP	1	1	150	C	B
		3719 4032	Heat sink	UOT-10CS25-SPL	1	5	65	C	B
		3841 0539	Inductor	ELE-V100KR-T	2	20	26	C	A
		3841 0819	Common mode coil	PLT09H-2003R	1	1	140	C	B
N		4317 4242	Blank PCB M5712-MA1M	M211741B-1	1	1	700	C	G
N		6922 4200	PCB ass'y M5712-MA1M	M211743*1	1	1	11,110	B	CC
	PCB Ass'y M5712-MA2M								
		2765 1211	Slide volume	EWA-MJCC20B23	1	1	110	A	B
N	JE	3719 4214	Ribbon cable M712B	DF5H05070-8000M	1	20	16	C	A
N		4317 4262	Blank PCB M5712-MA2M	M211741B-2	1	5	8	C	A
N		6922 4230	PCB ass'Y M5712-MA2M	M312162*1	1	1	360	C	D
	PCB Ass'y M5712-CN1M								
		2114 3318	IC	BA612	1	5	98	A	B
		2370 0343	LED	LN28RPX-(TT)	15	20	16	C	A
		2370 0952	LED	LB-603VP1	1	1	240	C	C
		2370 0959	LED	LN882RPX-(TT)	2	20	27	C	A
		2390 1344	Diode	1SS133T-77-T	53	20	3	C	A
N	JH/JG	3719 4207	Ribbon cable M712A	DF5H13130-8000M	2	10	36	C	A
N		4317 4250	Blank PCB M5712-CN1M	M211742-1	1	1	420	C	D
N		6922 4220	PCB ass'y M5712-CN1M	M211744*1	1	1	1,690	B	P
	PCB Ass'y M615T-KY1M								
		2301 0101	Diode	M111224-1	64	1	8	C	A
	CA	3501 7588	8P connector MHTRASKA	DS-8P-46-MHTRASKA	1	1	110	C	B
	CB	3501 7595	8P connector MHTRASKB	DS-8P-46-MHTRASKB	1	1	130	C	B

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	*
		3637 5220	Ferrite core	ZCAT2032-0930	1	1	170	C	B
		4317 3820	Blank PCB M615T-KY1M	M111575-1	1	1	260	C	C
		6921 8590	PCB ass'y M615T-KY1M	M111608*1	1	1	870	B	I
		6921 9460	Sponge 60x400	M412219-1	1	10	50	C	A
	PCB Ass'y M615T-KY2M								
		2301 0101	Diode	1S2473T-77-T	58	20	8	C	A
	CC	3501 7602	8P connector MHTRASKD	DS-8P-48-MHTRASKC	1	1	110	C	B
	CD	3501 7609	8P connector MHTRASKD	DS-8P-48-MHTRASKD	1	1	110	C	B
		3637 5220	Ferrite core	ZCAT2032-0930	1	1	170	C	B
		4317 3830	Blank PCB M615T-KY2M	M111576-1	1	1	210	C	C
		6921 8600	PCB ass'y M615T-KY2M	M111609*1	1	1	850	B	I
		6921 9460	Sponge 60x400	M412219-1	1	10	50	C	A
	Keyboard								
	1	6920 7581	TR white key set CEGB	M111223A-1	5	1	180	C	C
	2	6920 7591	TR white key set DFAS	M111222A-1	1	1	180	C	C
	3	6920 7601	TR white key set DFA	M111221A-1	4	1	160	C	B
	4	6920 7611	TR black key set 10P	M111220A-1	2	1	230	C	C
	5	6920 7621	TR black key set 5P	M111220A-2	1	1	150	C	B
	6	6920 7560	PET-TAC-TR29	M111224-1	1	1	350	C	D
	7	6920 7570	PET-TAC-TR32	M111225-1	1	1	370	C	D
	8	6921 8610	KB chassis HTRASK61GD	M111547-1	1	1	650	C	G
	9	6921 8621	Upper stopper HTRASK	M412168A-1	1	1	130	C	B
	10	6921 8631	Lower stopper HTRASK	M412169A-1	1	1	110	C	B
	Bender								
		2765 1141	Volume	RK1631110-50KB	1	1	190	C	C
N	11	3719 4270	Ribbon cable M712D	DF0H03390-35353535	1	10	29	C	A
	12	6909 2170	Bender knob	M31488-2	1	10	47	C	A
		6911 5241	Bender chassis A	M31487A-1	1	10	45	C	A
		6911 5250	Bender chassis B	M41946-1	1	10	16	C	A
		6911 5260	Bender spring	M41949-1	1	10	15	C	A
		6911 5390	Felt 152A	M42037-1	1	10	8	C	A
		6921 0550	Felt 5X13	M412026-1	2	20	6	C	A
N		6922 4760	Felt D	M4382-4	1	20	6	C	A
	Upper Case								
N	13	6922 4301	Upper case sub ass'y	M111786A*1	1	1	2,710	C	T
	14	6921 5040	Slide volume knob 601	M311860-1	1	10	13	B	A
N	15	6922 4270	Panel 712	M312134-1	1	1	120	C	B
N	16	3831 0672	Speaker	12G30BFB	2	1	330	B	D
N	17	6922 4310	Rubber button 712A	M312131-1	1	1	130	B	B
N	18	6922 4320	Rubber button 712B	M312132-1	1	1	70	B	B
	19	6922 2660	Rubber button 710C	M312088-1	1	1	97	B	B
	20	6922 2680	Rubber button 710D	M312082-2	5	10	29	B	A
	21	6922 3830	Rubber button 711A	M312122-1	1	10	31	B	A
	22	6922 3840	Rubber button 711B	M312123-1	1	10	32	B	A
	23	6922 3860	Rubber button 711F	M211727-1	1	1	130	B	B
	24	6922 3870	Rubber button 711D	M312125-1	1	5	72	B	B
	25	6922 3880	Rubber button 711D	M312125-2	1	5	73	B	B
	26	6922 3890	Rubber button 711E	M312126-1	1	5	73	B	B
N		3035 0315	Ferrite core	BP59RB140070N0M	2	10	39	C	A
		3719 2422	Ribbon cable M288S	DF5H02260-35353535	1	20	23	C	A
		3719 4046	Ribbon cable M584R	DF0H02300-35353535	1	20	20	C	A
N		6922 5420	Sponge 42X68	M411740-2	2	20	22	C	A
		6910 9170	Sponge 84	M41661-1	2	20	14	C	A
	Lower Case								
N	27	6922 4281	Lower case sub ass'y	M111787A*1	1	1	1,820	C	Q

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	*
	27-1	6902 6140	Battery spring 90	M41226-1	1	10	27	B	A
	27-2	6903 2150	Battery spring B	M41330-1	1	10	18	B	A
	27-3	6919 3190	Key damper 61	M411615-1	1	5	55	B	A
		6917 9300	Rubber foot	M41109-3	5	20	6	C	A
		6920 2290	Clip	CS-3	2	20	9	C	A
N		6921 5490	Sponge 425X54	M412141-1	1	10	44	C	A
N	28	6922 4290	Packing 845X22	M412281-2	2	5	65	C	B
N	29	6918 1634	Battery cover sub ass'y	M311164D*1	1	1	200	B	C
	Screws								
	30	0009 2680	Screw	4 x 8	10	50	2	C	A
	31	0009 2682	Screw	2.6 x 8	20	50	2	C	A
	32	5111 2571	Screw	3 x 8	8	50	2	C	A
	33	0009 5791	Screw	3 x 20	15	50	2	C	A
	34	6919 0420	Screw	3 x 8	6	50	2	C	A
	35	0009 6417	Screw	4 x 10	20	50	2	C	A
	36	5111 2679	Screw	3 x 8	38	50	2	C	A
	37	0009 2698	Screw	3 x 14	16	50	2	C	A
	Accessory								
		6920 8691	Music stand 590	M311760A-1	1	1	130	C	B

Notes: N – New parts

M – Minimum order/supply quantity

R – Rank