

DIGITAL SYNTHESIZER

**DS-8**

**SERVICE  
MANUAL**



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**KORG**

# 1. SPECIFICATIONS

Keyboard	: 61 keys (C—C), Initial Touch, Aftertouch.
Voice	: 8 voices simultaneously (Single Mode).
Program	: DS-8: 100 Programs, 10 Combinations. MCR-01 RAM Card: 1 Bank (100 Programs, 10 Combinations). MCR-02 RAM Card: 2 Banks (200 Programs, 20 Combinations). MCR-03 RAM Card: 4 Banks (400 Programs, 40 Combinations).
Function Mode	: Master Tune: +/– 50 cents. Transpose: +/– 12 semitones. Foot Switch Assign: Program Down, OSC select, Velocity, Multi Effect, Aftertouch, Portamento. Pedal Assign: Volume, Timbre, Pitch Modulation Generator, Timbre Modulation Generator. Memory Protect: Internal Off/On, External Off/On. Save to RAM Card. Load from RAM Card. MIDI: Transmit/Receive Channel, Omni Off/On, Local Off/On. MIDI Filtering: Active Sensing Off/On, Program Change Off/On, Control Change Off/On, Exclusive Off/On. Data Transfer.
Voice Parameter Mode	: Pitch: OSC 1, OSC 2, Detune. Pitch EG: Start Level, Attack, Attack Level, Decay, Release, Release Level. OSC 1 Waveform: Type, Spectrum, Ring, Limit, Keyboard Track. OSC 2 Waveform: Type, Spectrum, Ring, Limit, Keyboard Track. OSC 1 Timbre EG: Timbre, EG Intensity, Attack, Decay, Sustain, Release, Keyboard Track. OSC 2 Timbre EG: Timbre, EG Intensity, Attack, Decay, Sustain, Release, Keyboard Track. OSC 1 Ampl. EG: Level, Attack, Decay, Sustain, Release, Keyboard Track. OSC 2 Ampl. EG: Level, Attack, Decay, Sustain, Release, Keyboard Track. Modulation Generator: Waveform (Triangle, Sawtooth, Square, Sample & Hold), Frequency, Delay Time, Pitch Intensity, Timbre/Ampl. Intensity, Timbre Select (Off, OSC 1, OSC 2, OSC 1 + 2), Ampl. Select (Off, OSC 1, OSC 2, OSC 1 + 2). Portamento: Mode, Time Joystick: Bend Pitch (+/– 1 octave max.), Bend Timbre, Modulation Speed. Velocity: OSC 1 Timbre EG, OSC 2 Timbre EG, OSC 1 Ampl. EG, OSC 2 Ampl. EG. Aftertouch: Pitch MG, Timbre, OSC 1 Ampl. Level, OSC 2 Ampl. Level. Assign Mode: Poly/Unison, Trigger (Single/Multi: in Unison Mode only), Detune (in Unison Mode only). Voice Name: Max. 10 characters. Multi Effect: Mode (Manual Delay, Long Delay, Short Delay, Doubling, Flanger, Chorus), Time, Feedback, Speed/Modulation Frequency, Modulation Intensity, Effect Level.
Combi Parameter Mode	: Controller: Source, Group 1—8 Off/On. Modulation Generator: Source, Group 1—8 Off/On. Multi Effect: Source, Mode (Manual Delay, Long Delay, Short Delay, Doubling, Flanger, Chorus; only when source is Combination). Multi Effect In/Out: In (A, B, A + B), Out (A, B, A + B). Interval/Detune: Interval (0—12 semitones), Detune (+/–25 cents). Key Split/Octave Shift: Key Split Group 1 (C1—C8), Key Split Group 2 (C1—C8), Octave Shift Group 1 (+1, +2 octaves), Octave Shift Group 2 (–1, –2 octaves). No. of Voices: Group 1—8 (max. 8 voices). MIDI Receive Channel: Group 1—8 (MIDI Channel 1—16). Pan: Group 1—8 (A, B, A + B).
Panel Mode Switches	: Program, Combination, Function Mode, Voice Parameter Mode, Combi Parameter Mode.
Keyboard Mode Switches	: Single, Layer, Double, Multi.
Programmer Controls	: Numeric keys (0—9), Int, Ext, Cursor keys (<, >), Write, Compare, Value slider, Up/Yes, Down/No.
Performance Editor Controls	: Timbre slider, EG1 slider, EG2 slider, OSC Select (1, 2, 1 + 2), Velocity (Off/On), Aftertouch (Off/On), Portamento (Off/On), Multi Effect (Off/On), Multi Effect Select (Manual Delay, Long Delay, Short Delay, Doubling, Flanger, Chorus).
Balance Slider	: A—A + B—B.
Volume Slider	: 0—Max.
Display	: LCD (Liquid Crystal Display), Backlit, 40 Characters × 2 Rows.
Card Slot	: 1
Input Jacks	: Damper, Program Up, Assignable Pedal, Assignable Switch.
Output Jacks	: Output (A/Mono, B), Phones.
MIDI Jacks	: IN, OUT, THRU.
Power Consumption	: 16W.
Power Supply	: Local Voltage.
Weight	: 10 kg (21 lbs. 16 oz.).
Dimensions (W × H × D)	: 1024 × 94 × 317mm (40.3" × 3.7" × 12.5").
Supplied Accessories	: AC Power Cord, Connection Cable.

\*Specifications and exterior appearance are subject to change without notice due to product improvement.

## NOTICE

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# 2. MIDI IMPLEMENTATION

## 1. TRANSMITTED DATA

### 1-1. CHANNEL MESSAGES

STATUS	SECOND	THIRD	DESCRIPTION	ENA
1000 nnnn	0kkk kkkk	0100 0000	Note Off kkkkkkk = 24 ~ 108 (61key + Transpose)	A
1001 nnnn	0kkk kkkk	0vww vvvv	Note On kkkkkkk = 24 ~ 108 (61key + Transpose) vvvvvvv = 16 ~ 127	A
1011 nnnn	0000 0001	0vww vvvv	Pitch Modulation (Joy Stick (+Y)) vvvvvvv = 00 ~ 127	C
1011 nnnn	0000 0010	0vwww vvvv	Timbre Modulation (Joy Stick (-Y)) vvvvvvv = 00 ~ 127	C
1011 nnnn	0000 0110	0vww vvvv	Data Entry vvvvvvv = 00 ~ 127	E
1011 nnnn	0000 0111	0vww vvvv	Volume (Volume Pedal) vvvvvvv = 00 ~ 127	C
1011 nnnn	0100 0000	0000 0000	Damper Off (Damper Pedal)	C
1011 nnnn	0100 0000	0111 1111	Damper On (Damper Pedal)	C
1011 nnnn	0100 0001	0000 0000	Portamento Off	C
1011 nnnn	0100 0001	0111 1111	Portamento On	C
1011 nnnn	0110 0000	0000 0000	Data increment	E
1011 nnnn	0110 0001	0000 0000	Data Decrement	E
1100 nnnn	0ppp pppp		Program Change ppppppp = 00 ~ 99	P
1011 nnnn	0vww vvvv		Channel Pressure (After Touch) vvvvvvv = 00 ~ 127	C
1100 nnnn	0000 0000	0bbb bbbb	Bender Change (Joy Stick (X)) Note 1 bbbbbbb = 00 ~ 64 ~ 127	C
1110 nnnn	0111 1111	0111 1111	Bender Change (Max) (J.S (X)) Note 1	C

**Remark:** nnnn: MIDI Channel Number (0 ~ 15)

ENA : Trans Enable Mode

A = Always Enable

C = Control On Mode

P = P. Change On Mode

E = Exclusive On Mode

**Note 1:** Normally, the upper 8 bits change and the lower 8 bits are fixed at 00. However, the lower 8 bits may change to 127 when the maximum data is input (in 128 steps).

0000H      4000H      7F7FH  
(Min)      (Center)      (Max)

### 1-2. SYSTEM REAL TIME MESSAGES

STATUS	DESCRIPTION
1111 1110	Active Sensing

\*Trans Enable at ACT ON.

### 1-3. SYSTEM EXCLUSIVE MESSAGES

#### (1) DEVICE ID

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
1111 0111	E0X

#### (2) 1 VOICE DUMP

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0100 0000	1 Voice Dump 40H
0ddd dddd	
:	
0ddd dddd	1 Voice Data (96 bytes)
1111 0111	E0X

#### (3) ALL VOICE DUMP

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0100 1100	All Voice Dump 4CH
0ddd dddd	
:	
0ddd dddd	All Voice Data (7544 bytes)
1111 0111	E0X

#### (4) 1 COMBI DUMP

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0100 1001	1 Combi Dump 49H
0ddd dddd	
:	
0ddd dddd	1 Combi Data (56 bytes)
1111 0111	E0X

#### (5) ALL COMBI DUMP

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0100 1101	All Combi Dump 4DH
0ddd dddd	
:	
0ddd dddd	All Combi Dump (440 bytes)
1111 0111	E0X

**(6) PANEL MODE**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0100 0010	Panel Mode 42H
0000 0ddd	Panel Mode Data
1111 0111	E0X
	ddd = 000: Program 001: Voice Parm 010: Combi Parm 011: Function 100: Combi

**(7) PANEL MODE CHANGE**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0100 1110	Panel Mode Change 4EH
0000 0ddd	Panel Mode Data
1111 0111	E0X
	ddd = 000: Program 001: Voice Parm 010: Combi Parm 011: Function 100: Combi

**(8) KEYBOARD MODE**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0100 1011	Keyboard Mode 4BH
0000 00dd	Keyboard Mode Data
1111 0111	E0X
	dd = 00: Single 01: Layer 10: Double 11: Multi

**(9) KEYBOARD MODE CHANGE**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0100 1010	Keyboard Mode Change 4AH
0000 00dd	Keyboard Mode Data
1111 0111	E0X
	dd = 00: Single 01: Layer 10: Double 11: Multi

**(10) PARAMETER CHANGE**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0100 0001	Parameter Change 41H
0ddd dddd	Parameter No.
0ddd dddd	Parameter Value LSB
0000 000d	Parameter Value MSB
1111 0111	EOX

**(11) DATA LOAD COMPLETED**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0010 0011	Data Load Completed 23H
1111 0111	EOX

**(12) DATA LOAD ERROR**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0010 0100	Data Load Error 24H
1111 0111	EOX

**(13) WRITE COMPLETED**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0010 0001	Write Completed 21H
1111 0111	EOX

**(14) WRITE ERROR**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0010 0010	Write Error 22H
1111 0111	EOX

\*Trans Enable at Exclusive ON.

## 2. RECOGNIZED RECEIVED DATA

### 2-1. CHANNEL MESSAGES

STATUS		SECOND		THIRD		DESCRIPTION	ENA
1000	nnnn	0kkk	kkkk	0xxx	xxxx	Note Off Note 2	A
1001	nnnn	0kkk	kkkk	0000	0000	Note Off Note 2	A
1001	nnnn	0kkk	kkkk	0vvv	vvvv	Note On Note 2 vvvvvv = 1~127	A
1011	nnnn	0000	0001	0vvv	vvvv	Pitch Modulation	C
1011	nnnn	0000	0010	0vvv	vvvv	Timbre Modulation	C
1011	nnnn	0000	0110	0vvv	vvvv	Data Entry vvvvvv = 00~127	E
1011	nnnn	0000	0111	0vvv	vvvv	Volume	C
1011	nnnn	0000	1010	000x	xxxx	Panpot (A)	C
1011	nnnn	0000	1010	001x	xxxx	Panpot (A + B)	C
1011	nnnn	0000	1010	010x	xxxx	Panpot (A + B)	C
1011	nnnn	0000	1010	011x	xxxx	Panpot (B)	C
1011	nnnn	0100	0000	0000	0000	Damper Off	C
1011	nnnn	0100	0000	0111	1111	Damper On	C
1011	nnnn	0100	0001	0000	0000	Portamento Off	C
1011	nnnn	0100	0001	0111	1111	Portamento On	C
1011	nnnn	0110	0000	0000	0000	Data Increment	E
1011	nnnn	0110	0001	0000	0000	Data Decrement	E
1011	nnnn	0111	1010	0000	0000	Local Off	A
1011	nnnn	0111	1010	0111	1111	Local On	A
1011	nnnn	0111	1011	0000	0000	All Notes Off	A
1011	nnnn	0111	1100	0000	0000	OMNI Off (A.N. Off)	A
1011	nnnn	0111	1101	0000	0000	OMNI On (A.N. Off)	A
1011	nnnn	0111	1110	0xxx	xxxx	(All Notes Off)	A
1011	nnnn	0111	1111	0000	0000	(All Notes Off)	A
1100	nnnn	0ppp	pppp			Program Change Note 3	P
1101	nnnn	0vvv	vvvv			After Touch	C
1110	nnnn	0xxx	xxxx	0bbb	bbbb	Bender Change	C

**Remark:** nnnn: MIDI Channel Number (0~15)

xxxx: Don't Care

ENA: Receive Enable Mode

A = Always Enable

C = Control On Mode

P = P. Change On Mode

E = Exclusive On Mode

**Note 2:** Data of notes 24~108 will be accepted as they are. Data outside the range (0~23, 109~127) will be shifted an octave at a time until the data falls in the range.

**Note 3:** PROGRAM modes can be selected from numbers 00 to 99. 0 to 9 can be used to select COMBINATION PROGRAM modes. However, when three digit numbers are entered into the PROGRAM mode, only the last two digits are valid (for example, 100 is received as 00; 127 is received as 27). If two digit numbers are entered into the COMBINATION PROGRAM mode, only the final digit is valid (for example, 10 is received as 0; 127 is received as 7).

### 2-2. SYSTEM REAL TIME MESSAGES

STATUS		DESCRIPTION
1111	1110	Active Sensing

\*Receive Enable at ACTION.

### 3. SYSTEM EXCLUSIVE MESSAGE REFERENCE

#### (1) DEVICE ID REQUEST

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0100 nnnn	Format ID 4nH (n = ch)
1111 0111	EOX

#### (2) 1 VOICE DUMP REQUEST

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0001 0000	1 Voice Dump Request 10H
1111 0111	EOX

#### (3) 1 VOICE DUMP

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0100 0000	1 Voice Dump 40CH
0ddd dddd	1 Voice Data (96 bytes)
: 0ddd dddd	
1111 0111	EOX

#### (4) ALL VOICE DUMP REQUEST

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0001 1100	All Voice Dump Request 1CH
1111 0111	EOX

#### (5) ALL VOICE DUMP

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0100 1100	All Voice Dump 4CH
0ddd dddd	All Voice Data (7544 bytes)
: 0ddd dddd	
1111 0111	EOX

\*Receive Enable at Exclusive ON.



**(6) 1 COMBI DUMP REQUEST**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0001 1001	1 Combi Dump Request 19H
1111 0111	EOX

**(7) 1 COMBI DUMP**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0100 1001	1 Combi Dump 49H
0ddd dddd	
:	
0ddd dddd	1 Combi Data (56 bytes)
1111 0111	EOX

**(8) ALL COMBI DUMP REQUEST**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0001 1101	All Combi Dump Request 1DH
1111 0111	EOX

**(9) ALL COMBI DUMP**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0100 1101	All Combi Dump 4DH
0ddd ddd	
:	
0ddd dddd	All Combi Dump (440 bytes)
1111 0111	EOX

**(10) PANEL MODE REQUEST**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0001 0010	Panel Mode Request 12H
1111 0000	EOX

**(11) PANEL MODE CHANGE**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0100 1110	Panel Mode Change 4EH
0000 0ddd	Panel Mode Data
1111 0111	E0X

ddd = 000: Program  
001: Voice Parm  
010: Combi Parm  
011: Function  
100: Combi

**(12) KEYBOARD MODE REQUEST**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0001 1011	Keyboard Mode Request 1BH
1111 0111	E0X

**(13) KEYBOARD MODE CHANGE**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0100 1010	Keyboard Mode Change 4AH
0000 00dd	Keyboard Mode Data
1111 0111	E0X

dd = 00: Single  
01: Layer  
10: Double  
11: Multi

**(14) PARAMETER CHANGE**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0100 0001	Parameter Change 41H
0ddd dddd	Parameter No.
0ddd dddd	Parameter Value LSB
0000 000d	Parameter Value MSB
1111 0111	E0X

**(15) VOICE WRITE REQUEST**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 0011	DS-8 ID 13H
0001 0001	Voice Write Request 11H
0ddd dddd	Program No. 00 ~ 63H
1111 0111	E0X

**(16) COMBI WRITE REQUEST**

BYTE	DESCRIPTION
1111 0000	Exclusive Status
0100 0010	KORG ID 42H
0011 nnnn	Format ID 3nH (n = ch)
0001 1011	DS-8 ID 13H
0001 1010	Combi Write Request 1AH
0ddd dddd	Combi Program No. 00~09H
1111 0111	EOX

\*Receive Enable at Exclusive ON.

#### 4. DS-8 MIDI IMPLEMENTATION CHART DEC. 1, 1986. VERSION: 1-0

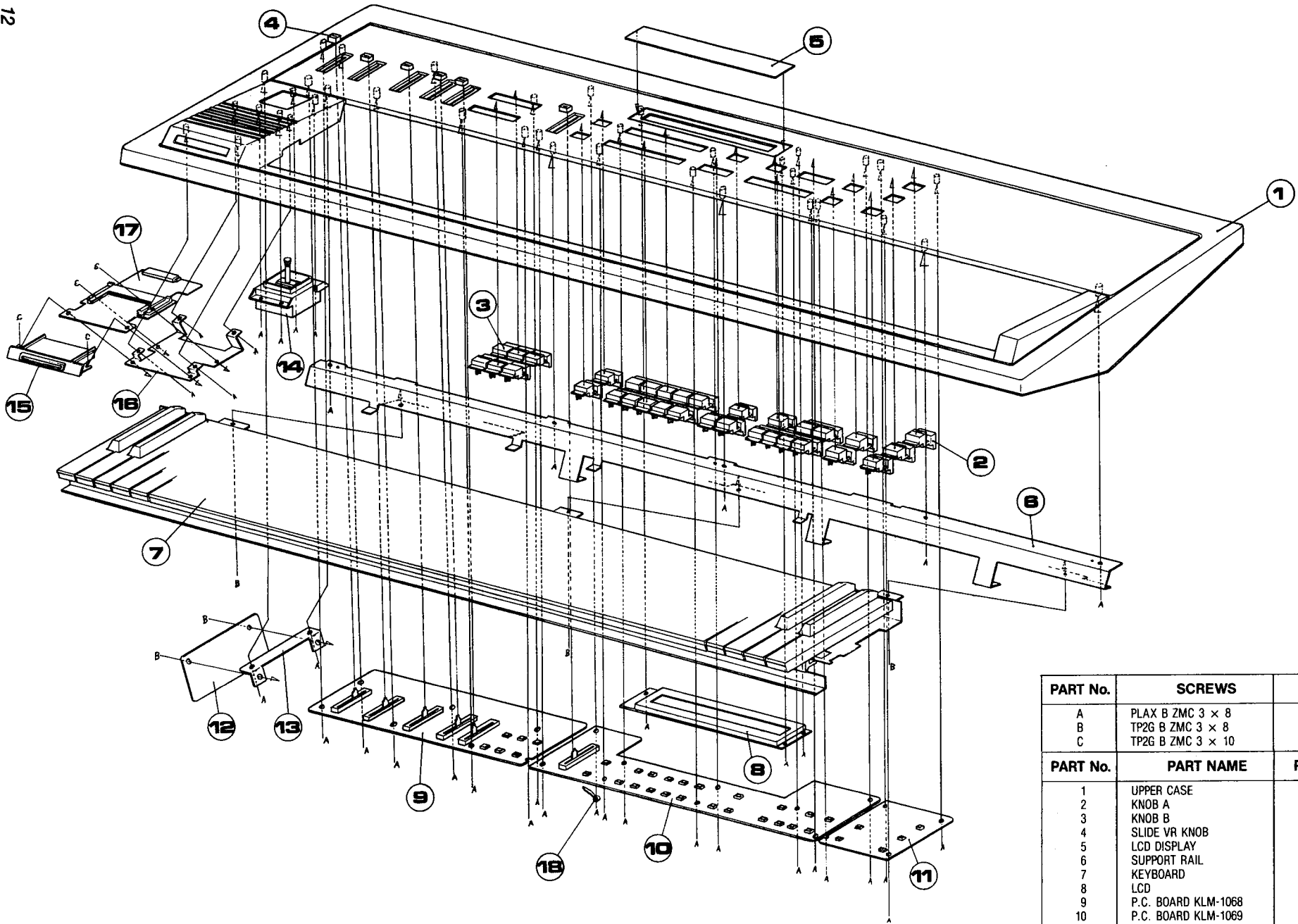
Function		Transmitted	Recognized	Remarks
Basic Channel	Default Changed	1~16 1~16	1~16 1~16	Memorized
Mode	Default Messages Altered	1 x *****	1 OMNI = ON/OFF	Ignore
Note Number	True voice	24-108 *****	0-127 24-108	
Velocity	Note On Note OFF	○ 9n, V = 1-127 x	○ 9n, V = 1-127 x	
After Touch	Keys Channels	x ○	x ○	*
Pitch Bender		○	○	*
Control Change	1	○	○	Pitch MG *
	2	○	○	Timbre MG *
	6	○	○	Data entry ***
	7	○	○	Volume *
	10	x	○	Panpot *
	64	○	○	Damper pedal *
	65	○	○	Porta switch *
Program Change	96	○	○	Data increment ***
	99	○	○	Data decrement ***
Program Change	: True #	0-99 *****	0-99 0-127	**
System Exclusive		○	○	Voice dump, etc.
System Common	: Song Pos : Song Sel : Tune	x x x	x x x	
System Real Time	: Clock : Commands	x x	x x	
Aux Messages	: Local ON/OFF : All Notes OFF : Active Sense : Reset	x x ○ x	○ ○ 123-127 ○ x	***
Notes	:* Transmit/Receive if CNTRL is ON in FUNCTION :** Transmit/Receive if PROG is ON in FUNCTION :*** Transmit/Receive if EXCLUSIVE is ON in FUNCTION :**** Transmit/Receive if ACT is ON in FUNCTION			

Mode 1: OMNI ON, POLY  
Mode 3: OMNI ON, MONO

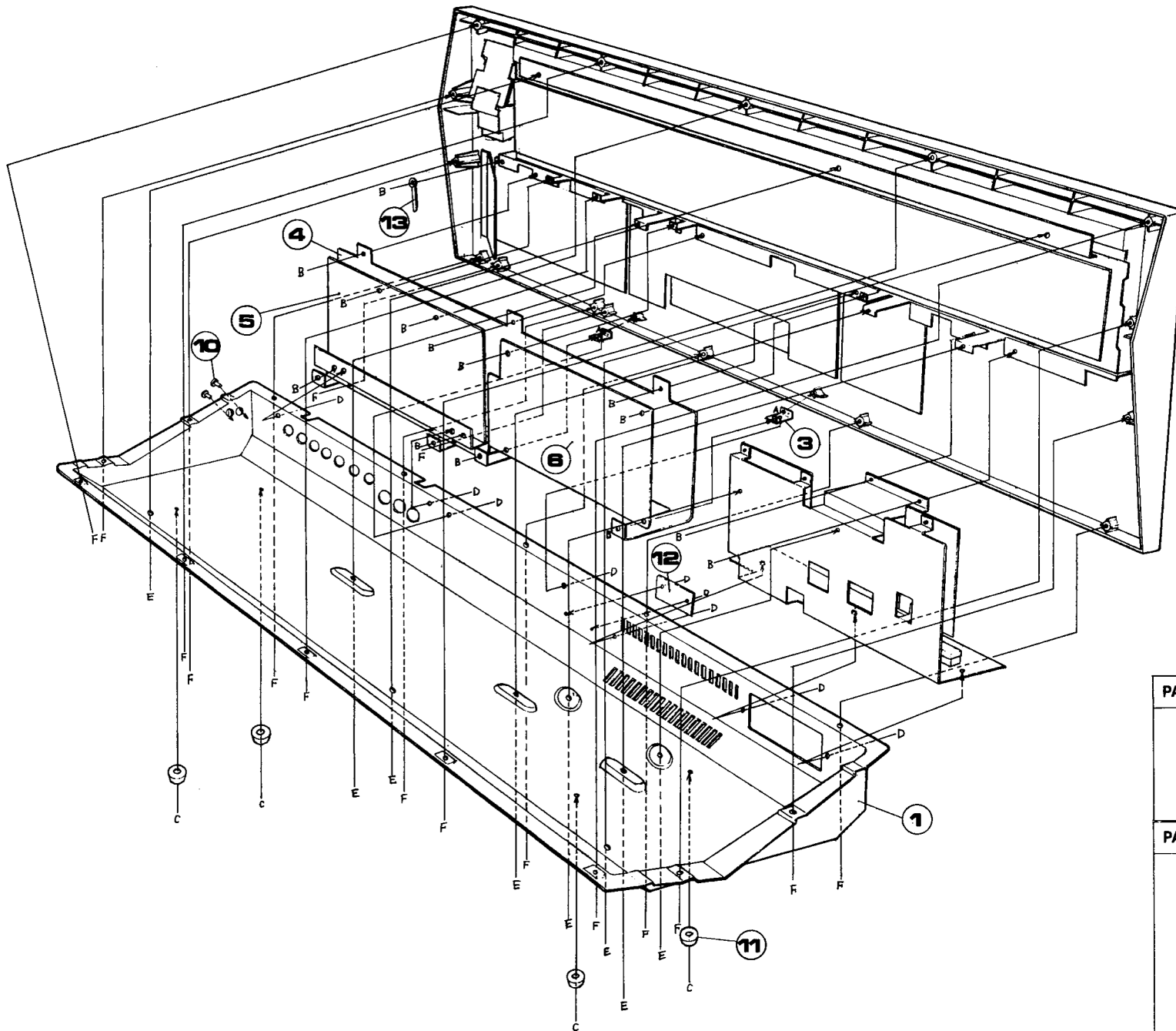
Mode 2: OMNI OFF, POLY  
Mode 4: OMNI OFF, MONO

○: YES  
x: NO

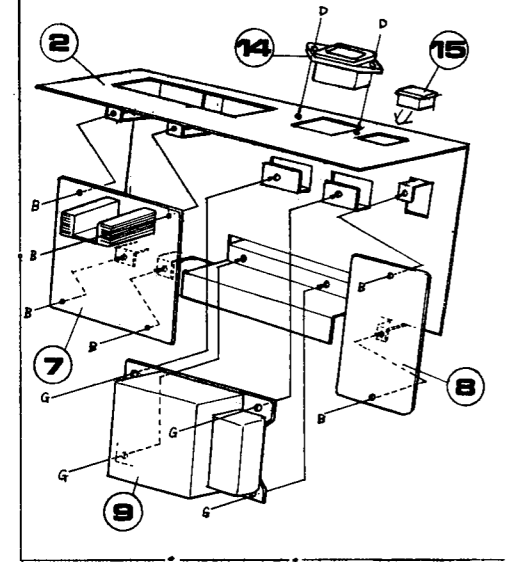
# 3. STRUCTURAL DIAGRAM



PART No.	SCREWS	QTY
A	PLAX B ZMC 3 × 8	38
B	TP2G B ZMC 3 × 8	5
C	TP2G B ZMC 3 × 10	4
PART No.	PART NAME	PART CODE
1	UPPER CASE	646023900
2	KNOB A	620016400
3	KNOB B	620016600
4	SLIDE VR KNOB	620016300
5	LCD DISPLAY	630004600
6	SUPPORT RAIL	640083900
7	KEYBOARD	420003701
8	LCD	313000800
9	P.C. BOARD KLM-1068	343010680
10	P.C. BOARD KLM-1069	343010680
11	P.C. BOARD KLM-1070	343010680
12	P.C. BOARD KLM-1074	343010740
13	AT HOLDER	640084400
14	JOY STICK ASS.	
15	CARD ESCUTCHEON	646023200
16	CARD HOLDER	640084200
17	P.C. BOARD KLM-1080	
18	SPIRAL CLIP	540008600



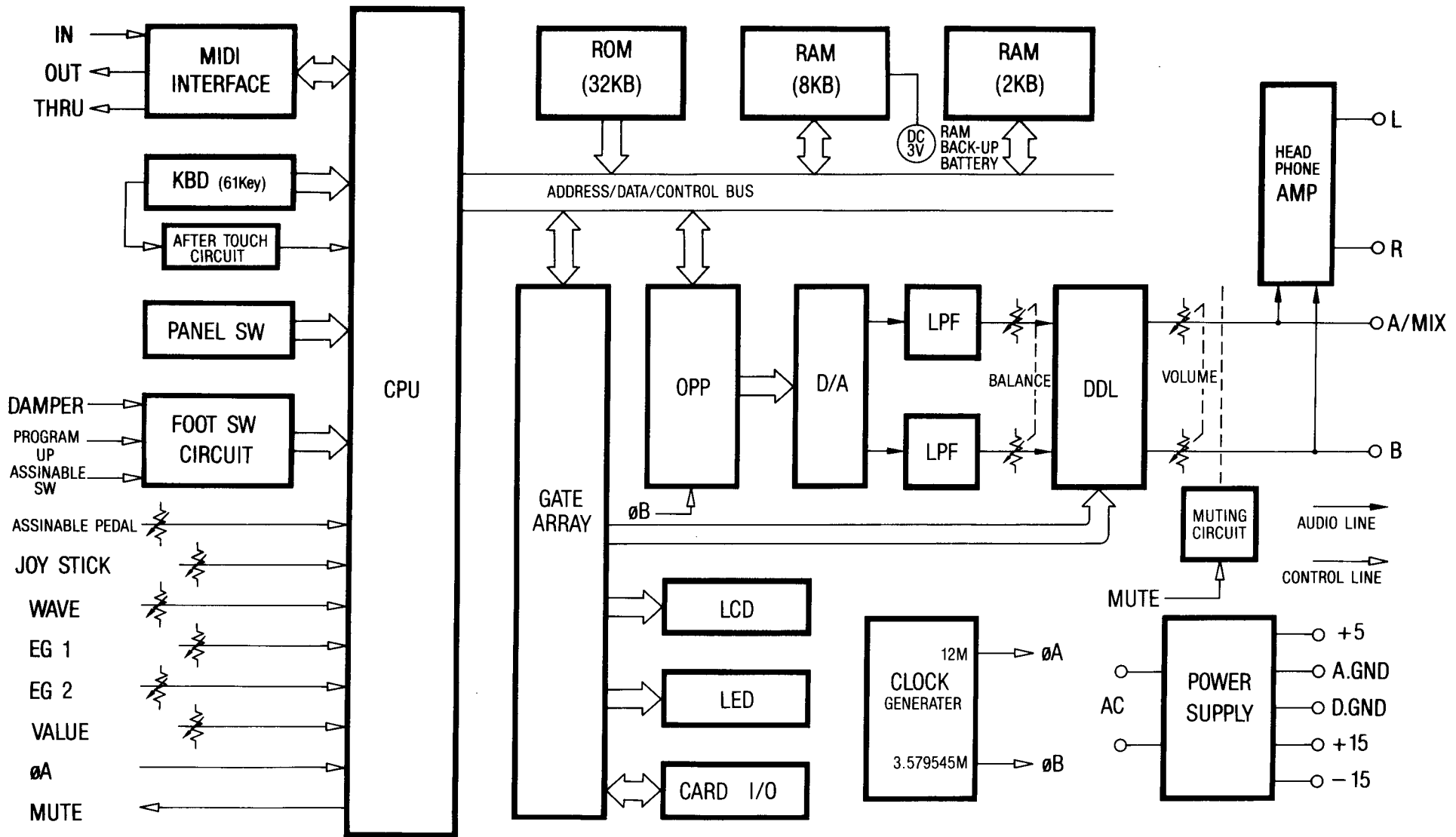
### POWER UNIT



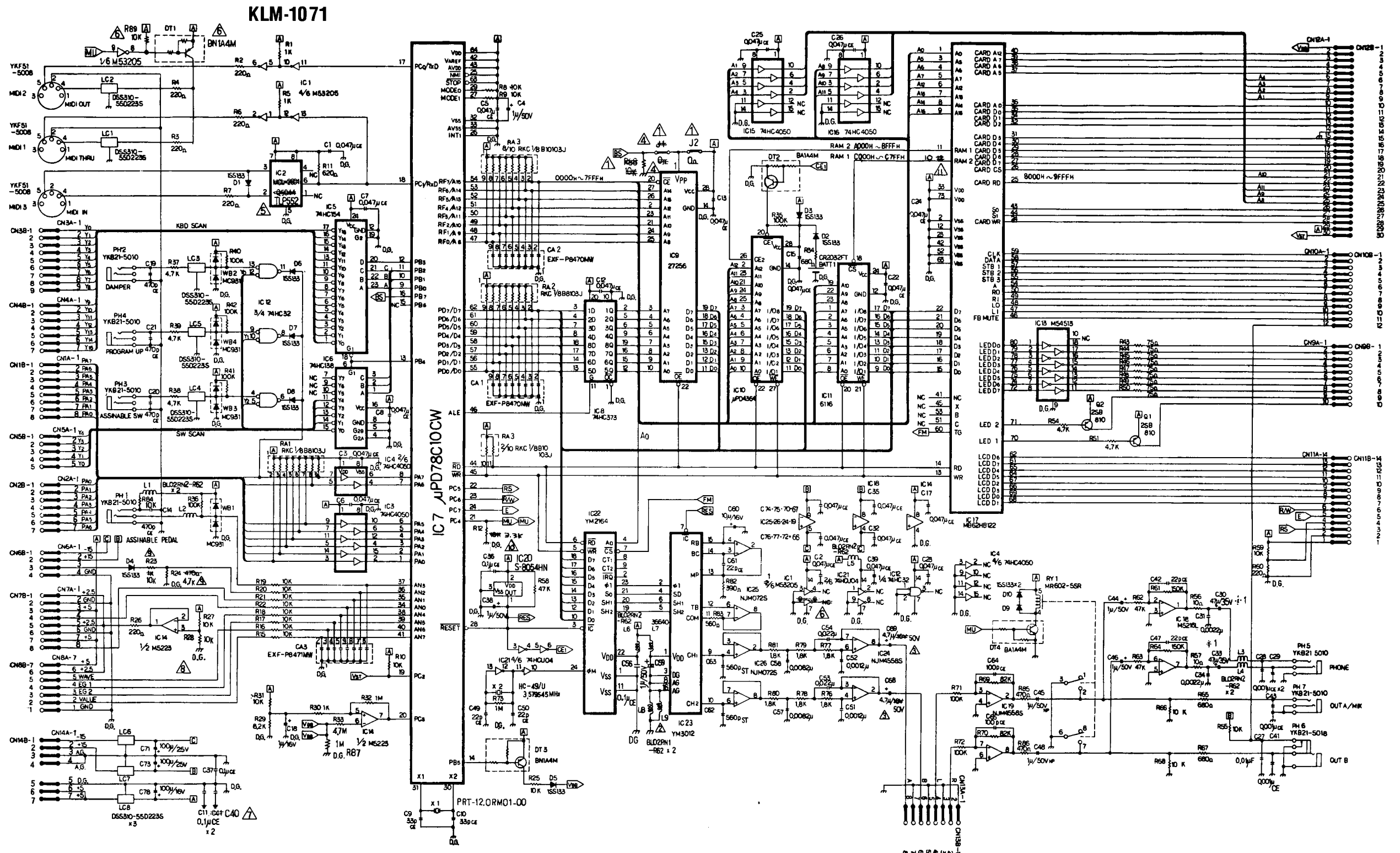
This manual was scanned, cleaned and made available as free download by synfo.nl

PART No.	SCREWS	QTY
A	PLAX B ZMC 3 × 8	2
B	TP2G B ZMC 3 × 8	26
C	TP2G B BZMC 3 × 14	4
D	TP2G B BZMC 3 × 8	11
E	FE B BZMC 4 × 8	8
F	PLAX B BZMC 4 × 8	16
G	FE WSE2 BZMC 4 × 10	4
PART No.	PART NAME	PART CODE
1	LOWER CASE	640083800
2	POWER UNIT CHASSIS	640084000
3	P.C. BRD HOLDER	640084300
4	SHIELDING SHEET	630004900
5	P.C. BOARD KLM-1071	343010710
6	P.C. BOARD KLM-1072	343010720
7	P.C. BOARD KLM-1073	343010730
8	P.C. BOARD KLM-1075	343010750
9	POWER TRANSFORMER	400011000
10		
11	RUBBER FEET	500009500
12	NAME PLATE	
13	SPIRAL CLIP	540008600
14	INLET SOCKET	540011900
15	POWER SW.	375009300

# 4. BLOCK DIAGRAM

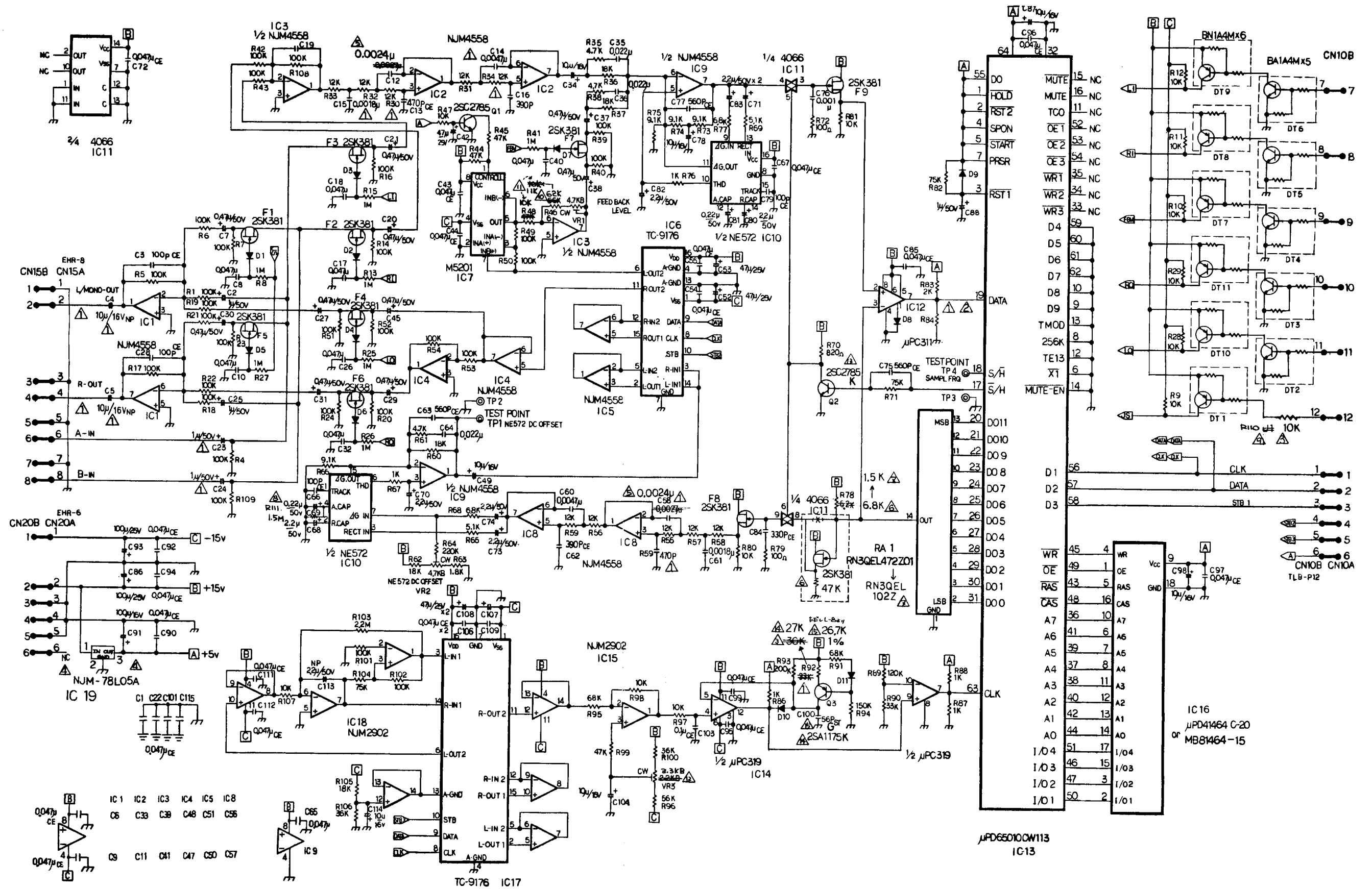


# 5. CIRCUIT DIAGRAM

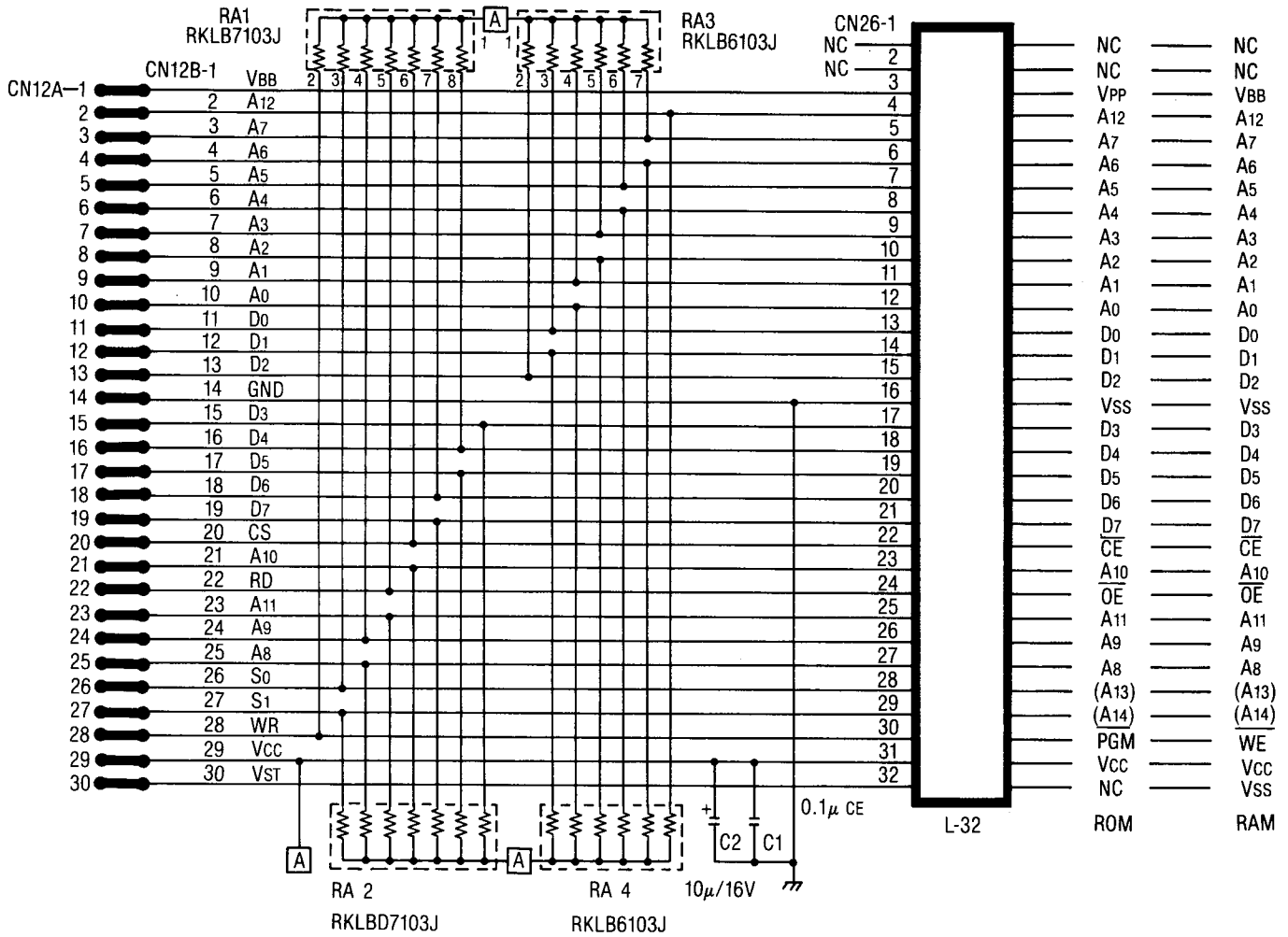




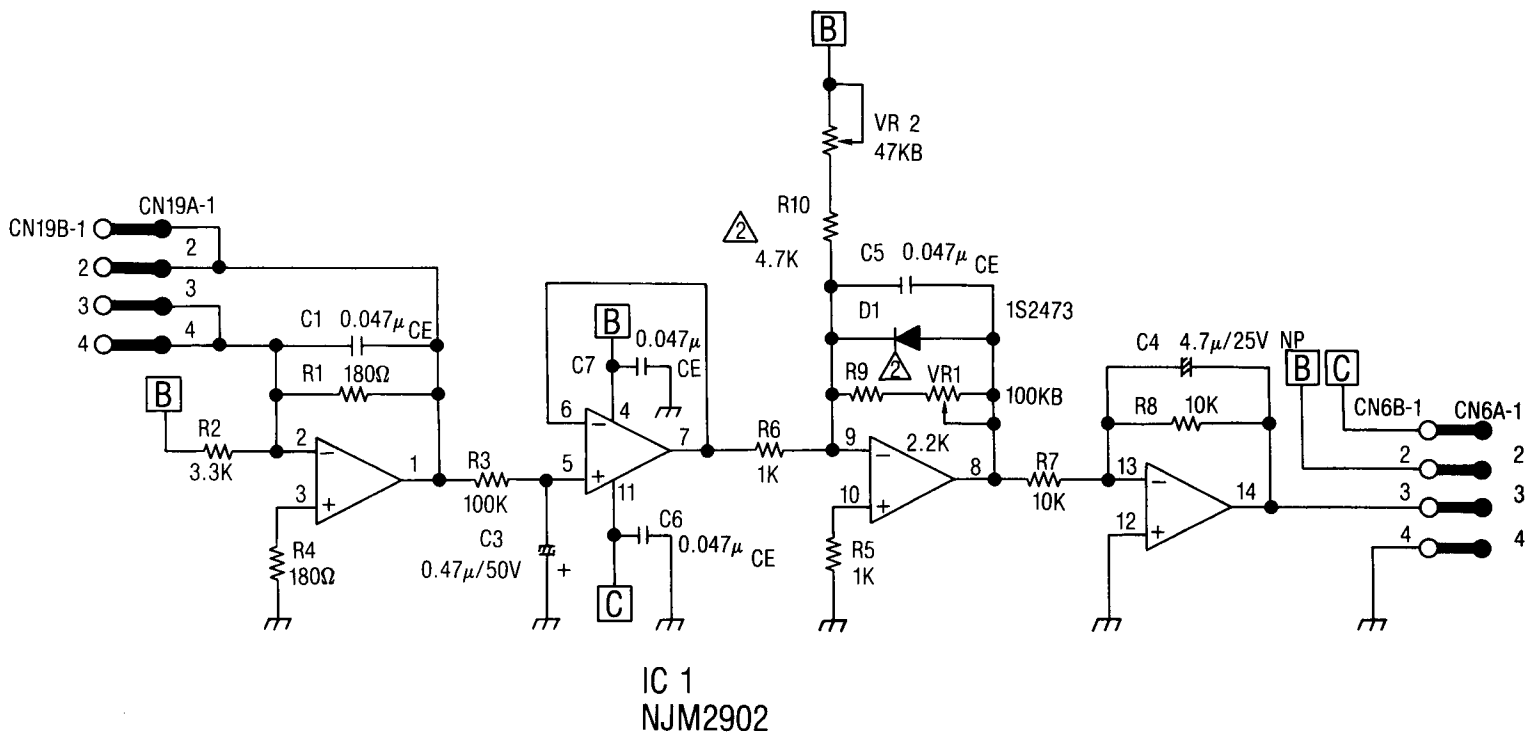
KLM-1072



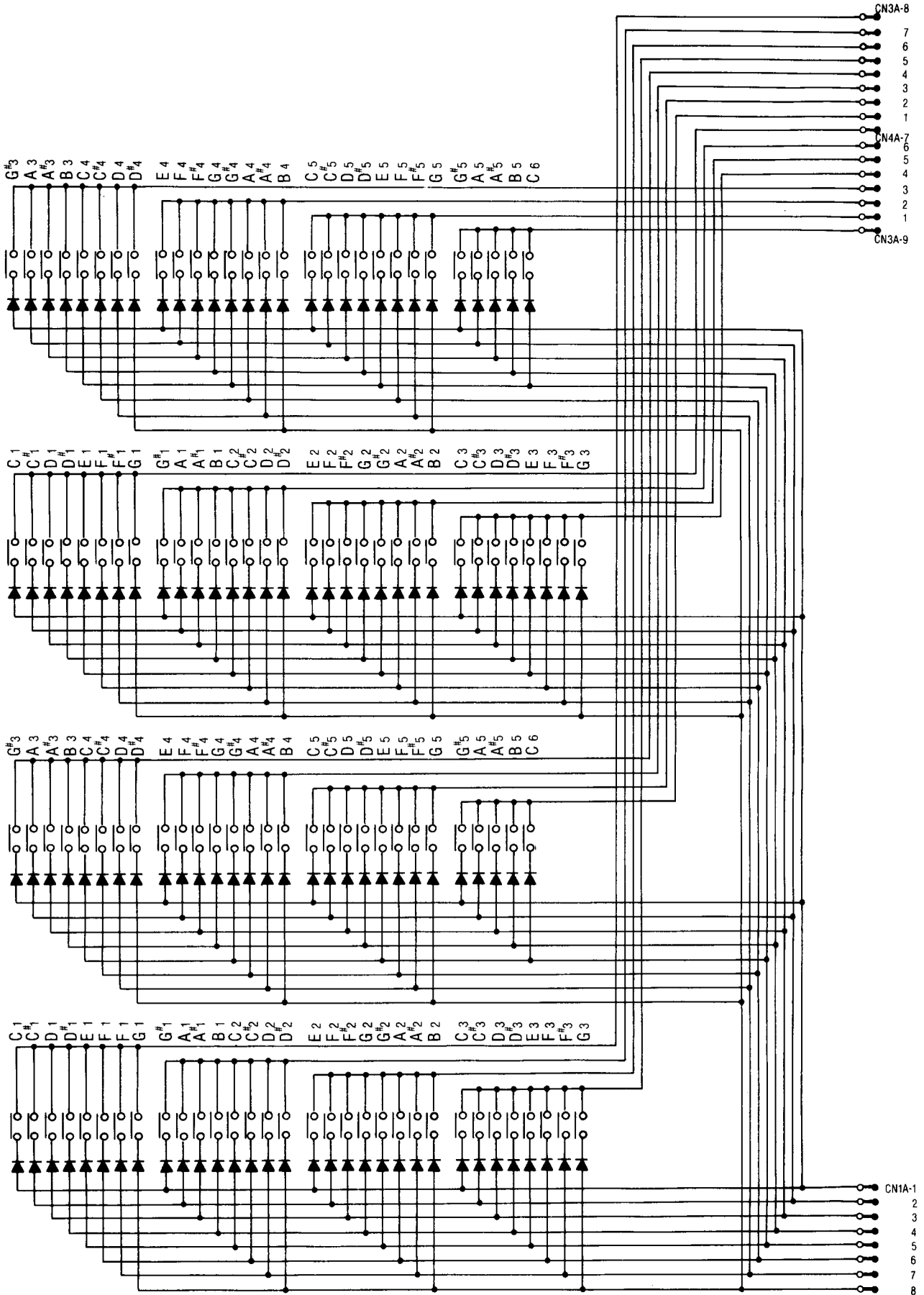
### KLM-1083

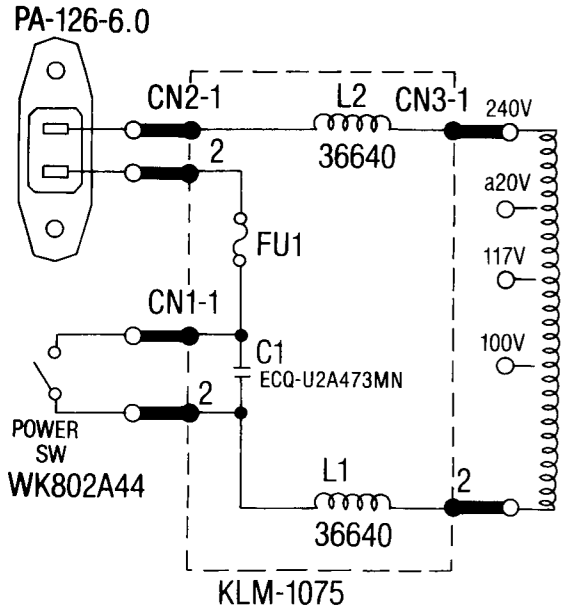


### KLM-1074

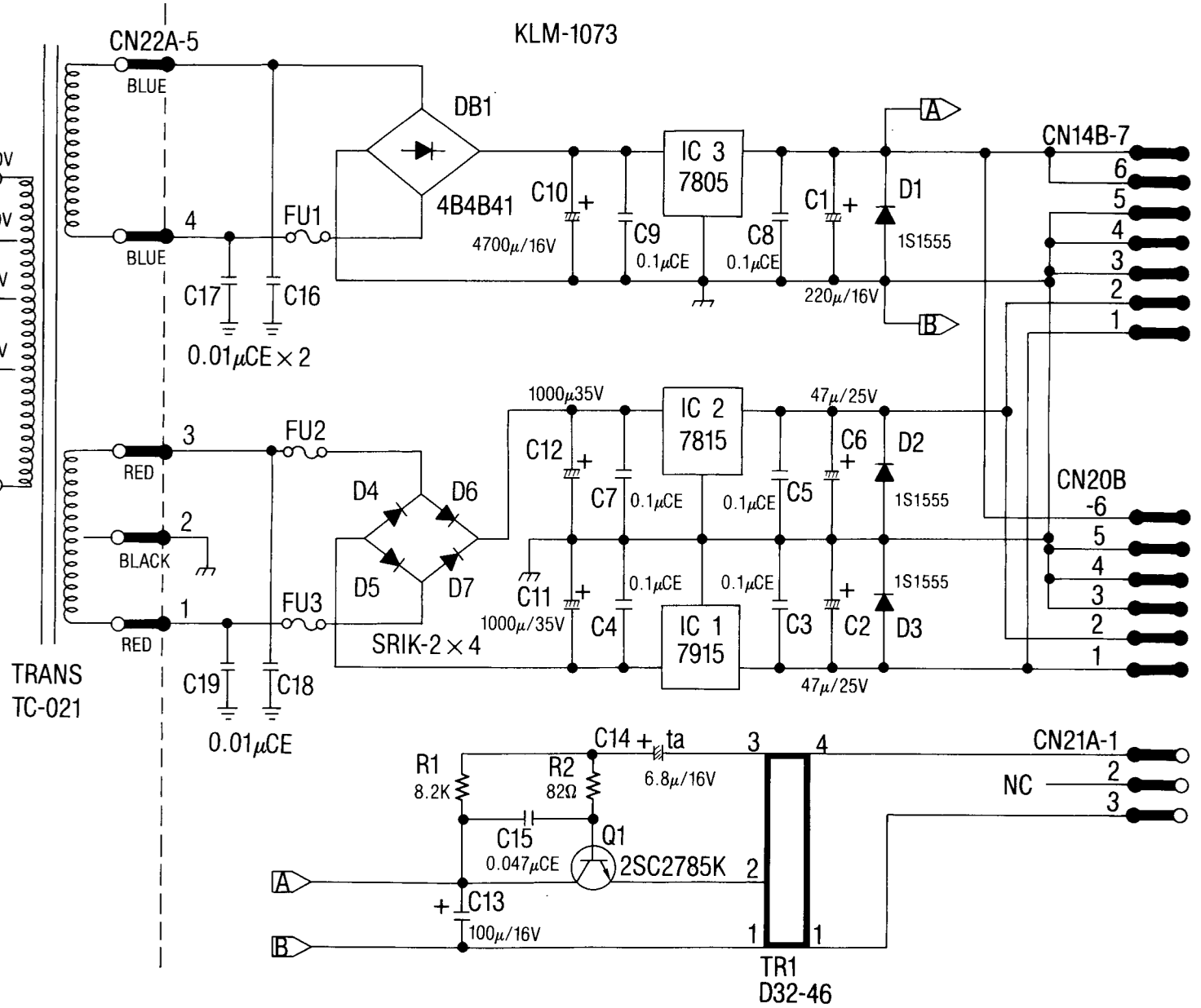


# KEYBOARD

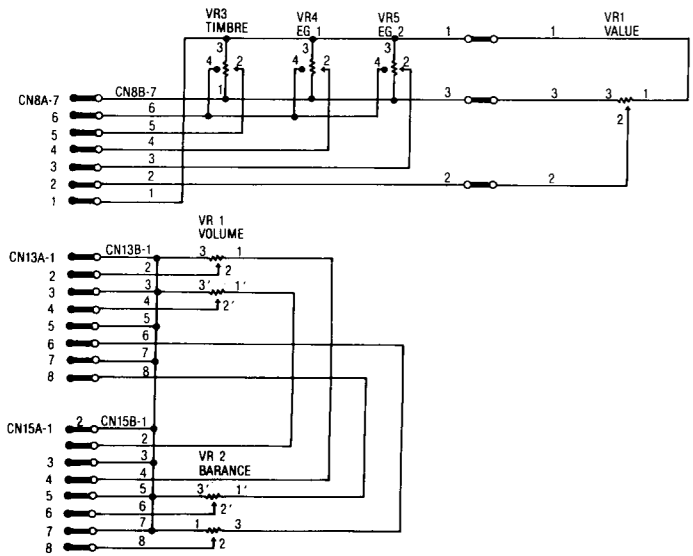
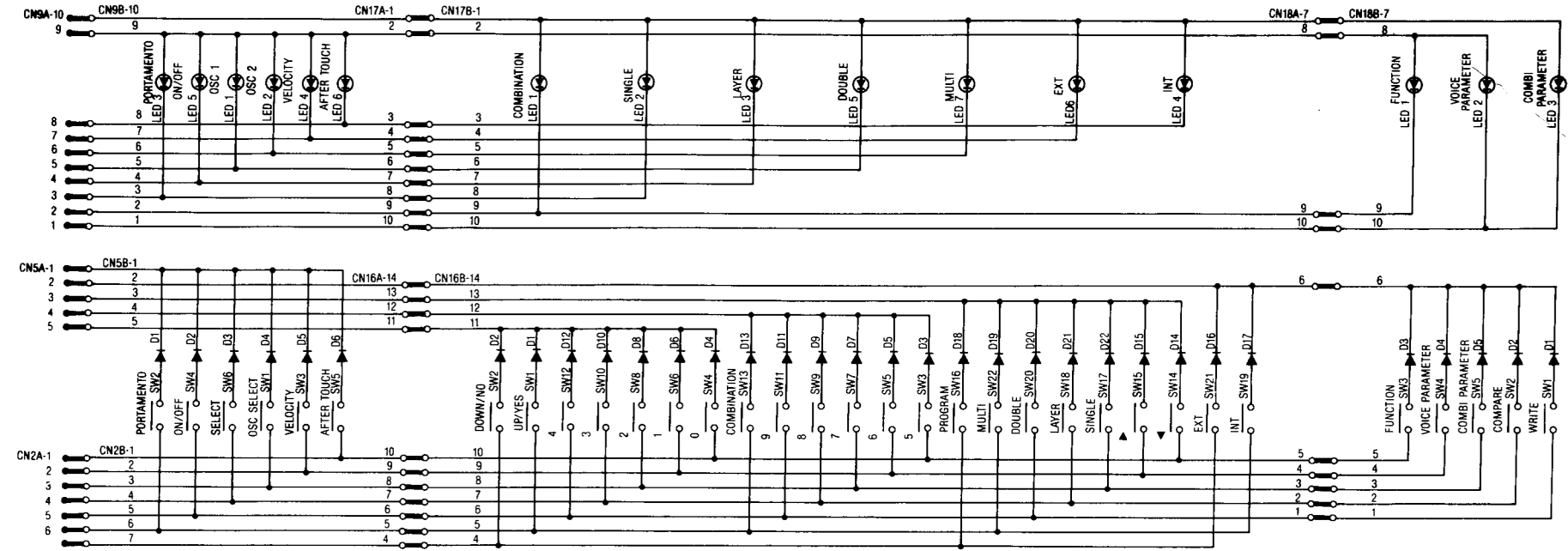




	100V	200V
KLM-1073		
FU1	125V 2.5A	250V T1A
FU2	250V 1A	250V T500mA
FU3	250V 1A	250V T500mA
KLM-1075		
FU1	250V 800mA	250V T250mA



KLM-1073/1075



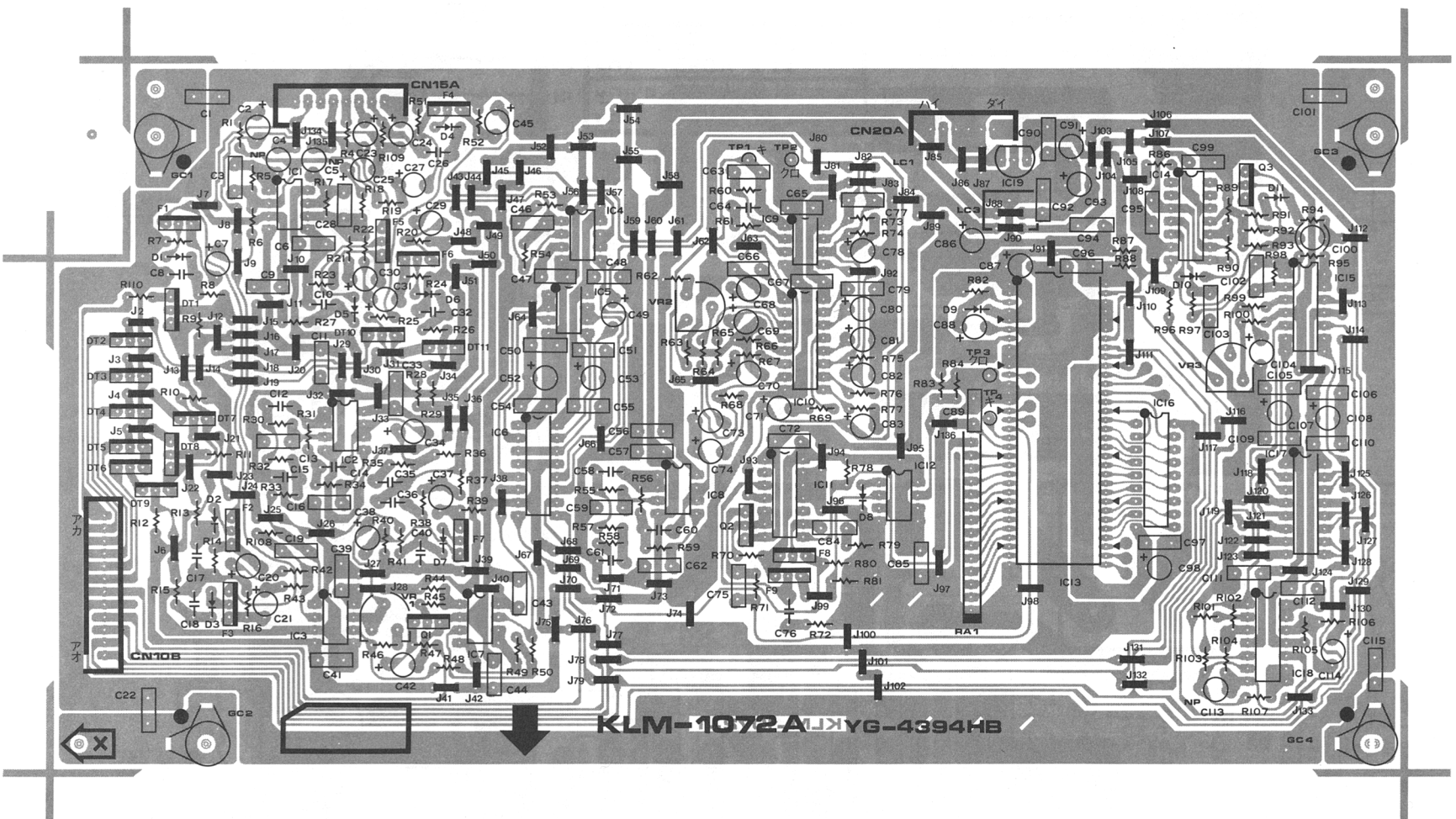
	LED 1	LED 2
D 0	COMBI PARAMETER	VOICE PARAMETER
D 1	COMBINATION	FUNCTION
D 2	SINGLE	PORTAMENTO
D 3	LAYER	ON/OFF
D 4	DOUBLE	OSC 1
D 5	MULTI	OSC 2
D 6	EXT	VELOCITY
D 7	INT	AFTER TOUCH

LED

	Y0	Y1	Y2	Y3	Y4
PA 0	0	5	◀	FUNCTION	AFTER TOUCH
PA 1	1	6	▶	VOICE PARAMETER	VELOCITY
PA 2	2	7	SINGLE	COMBI PARAMETER	OSC SELECT
PA 3	3	8	LAYER	COMPARE	SELECT
PA 4	4	9	DOUBLE	WRITE	ON/OFF
PA 5	UP/YES	COMBINATION	MULTI	INT	PORTAMENTO
PA 6	DOWN/NO	X	PROGRAM	EXT	X

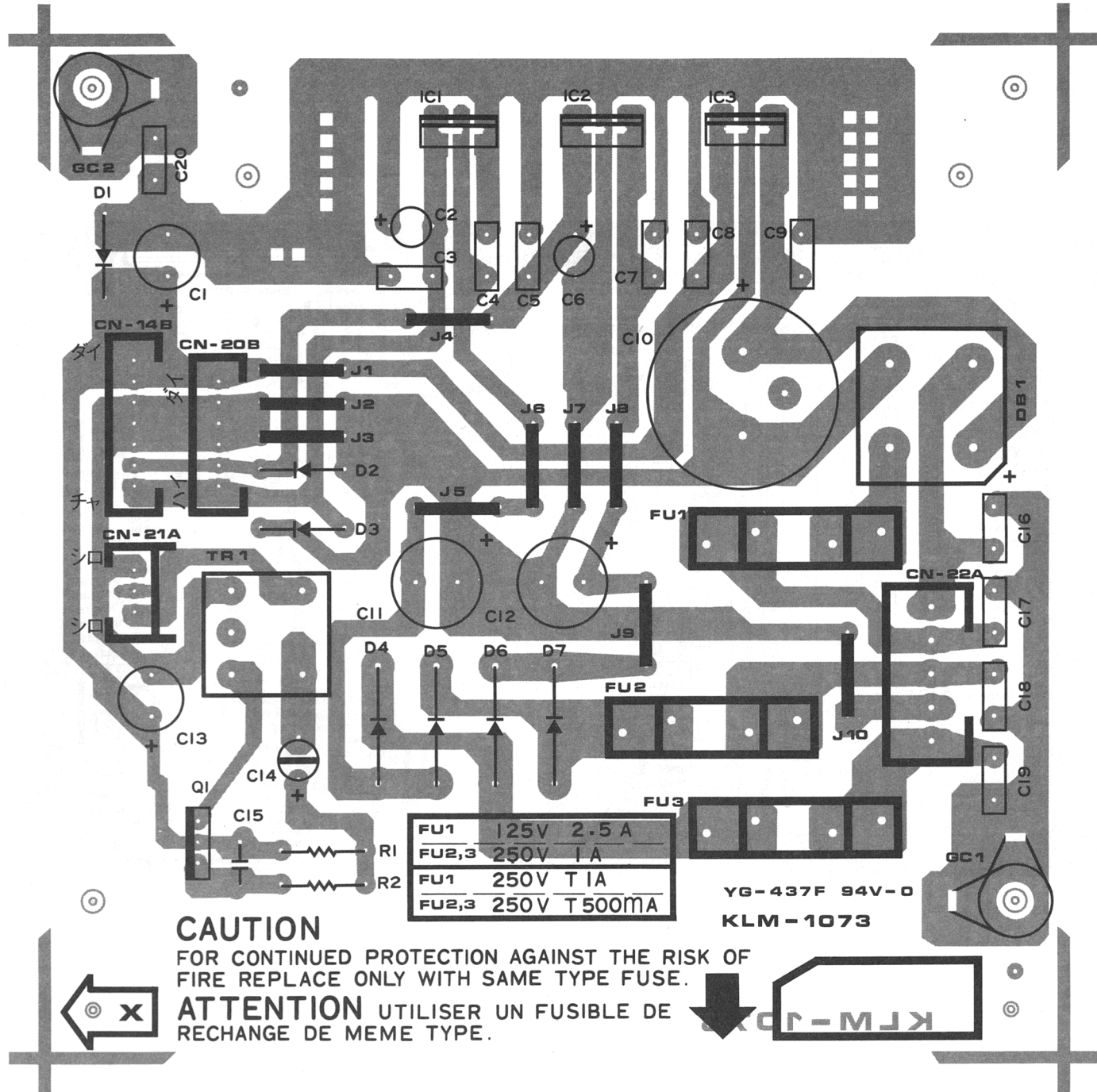
KLM-1068/1069/1070

# 6. P.C. BOARD



KLM-1072

KLM-1072A JYG-4394HB



FU1	125V	2.5 A
FU2,3	250V	1 A
FU1	250V	T 1 A
FU2,3	250V	T 500mA

YG-437F 94V-0  
KLM-1073

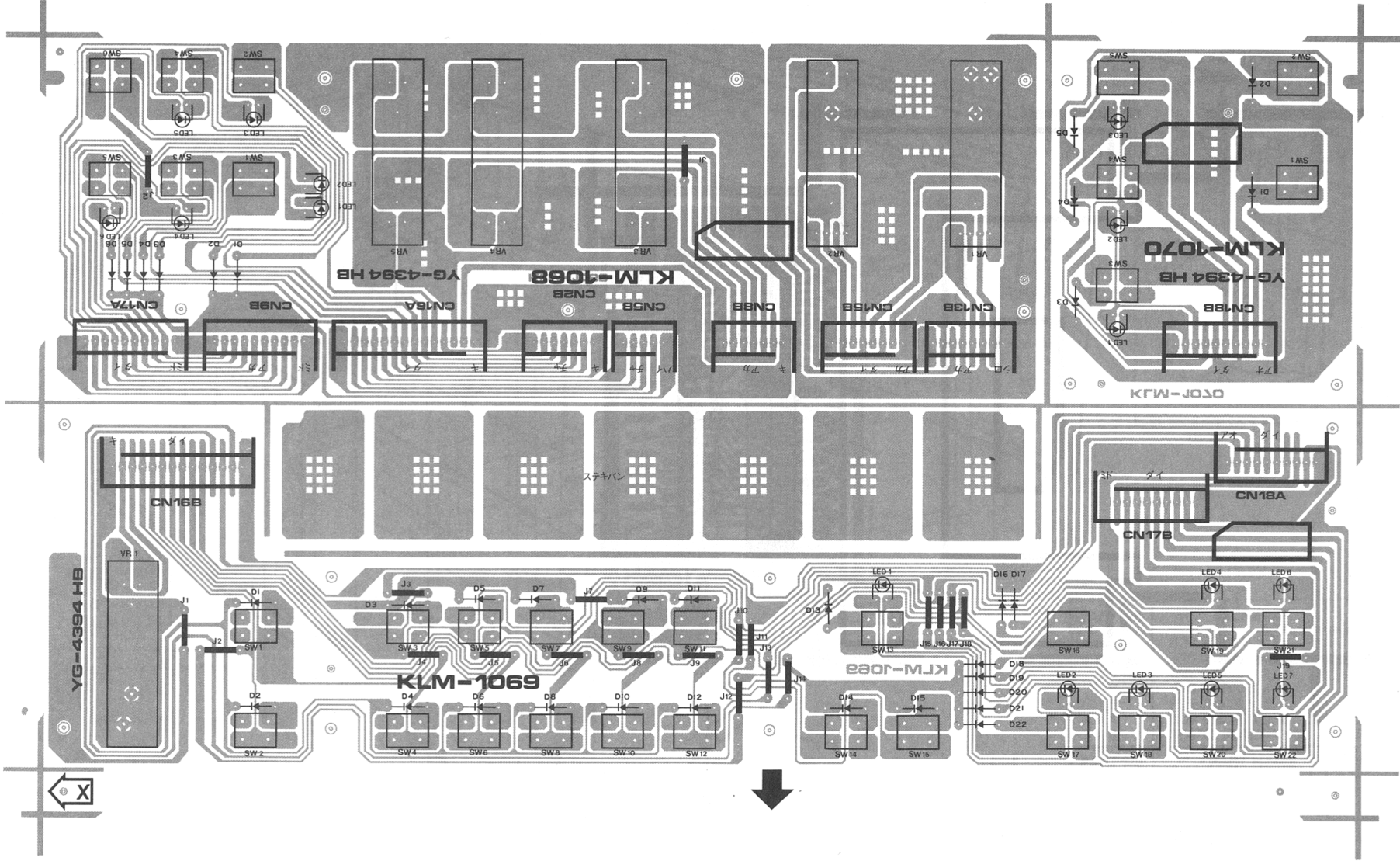
**CAUTION**

FOR CONTINUED PROTECTION AGAINST THE RISK OF FIRE REPLACE ONLY WITH SAME TYPE OF FUSE.

**ATTENTION** UTILISER UN FUSIBLE DE RECHANGE DE MEME TYPE.



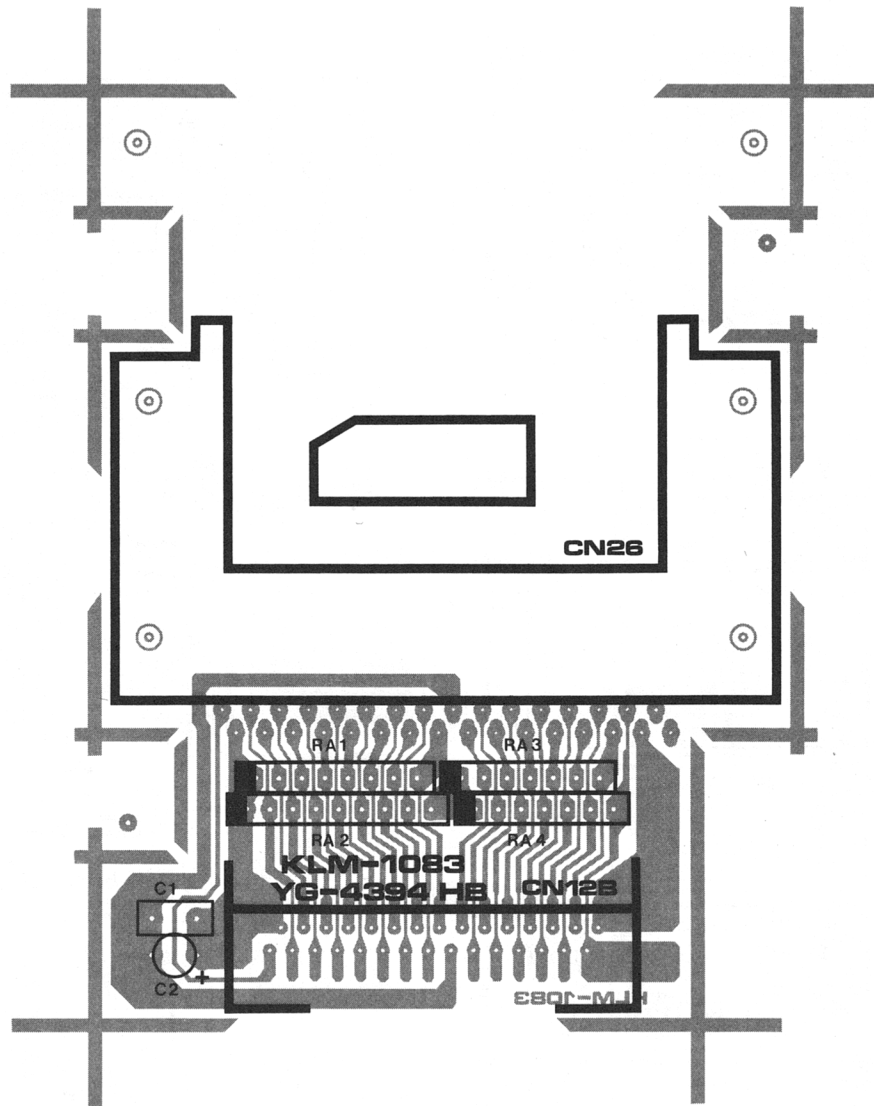
KLM-1073



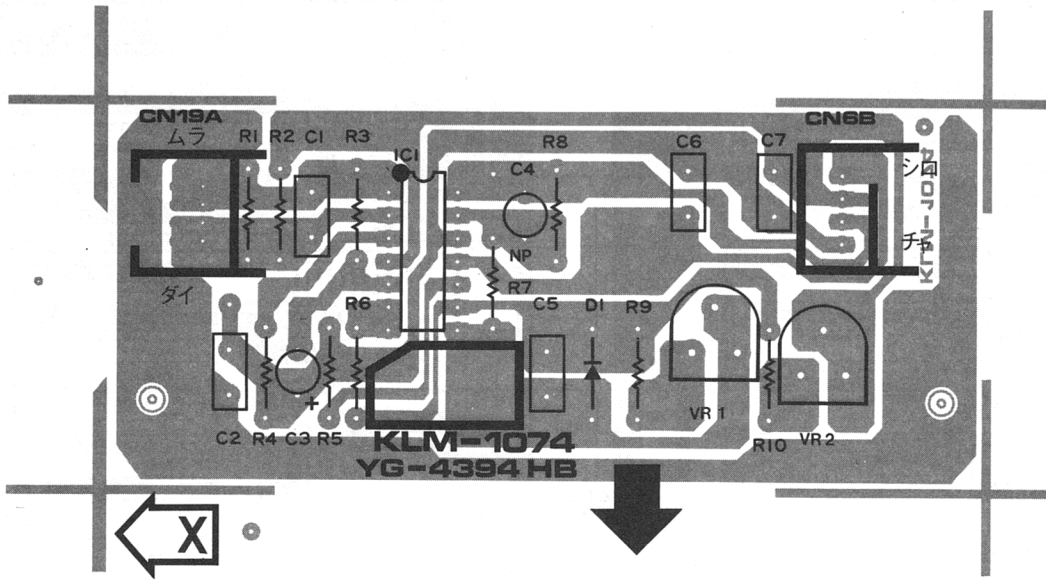
KLM-1068/1069/1070



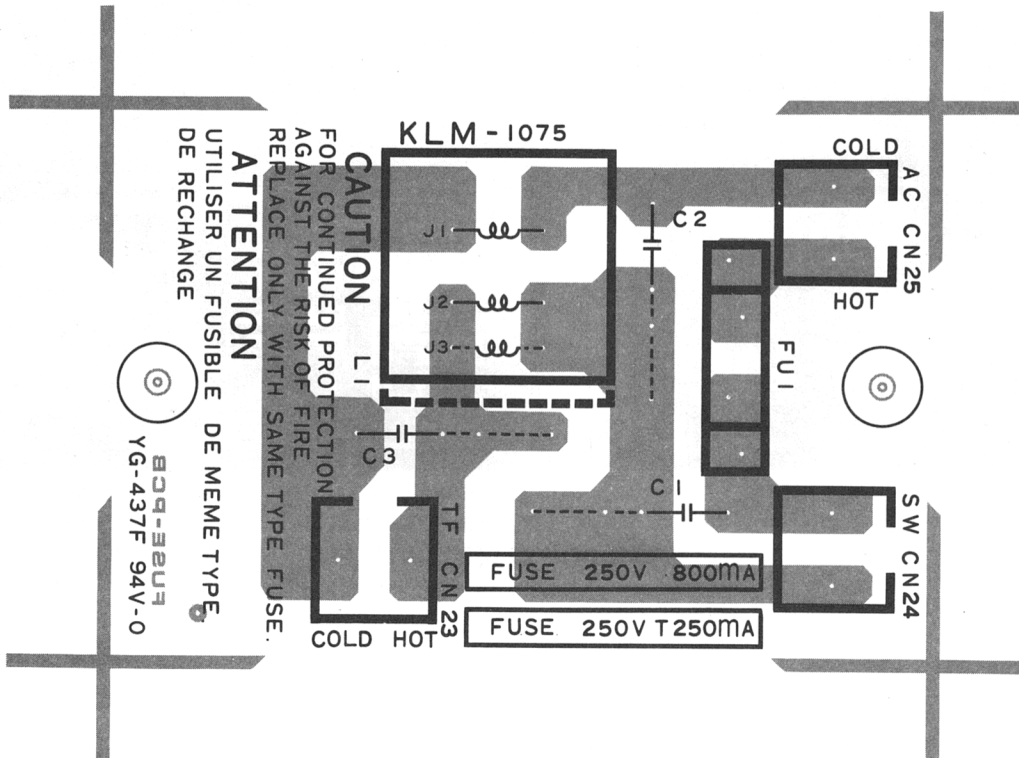
KLM-1083

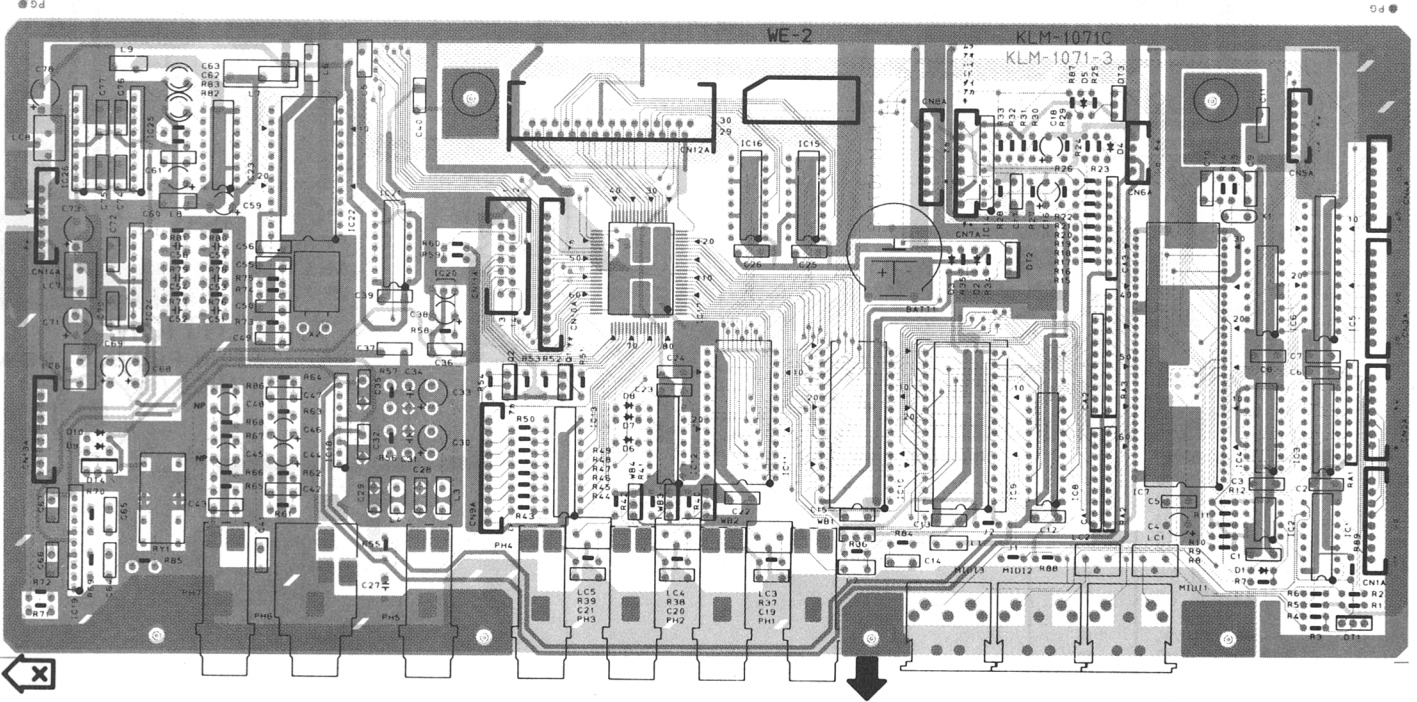
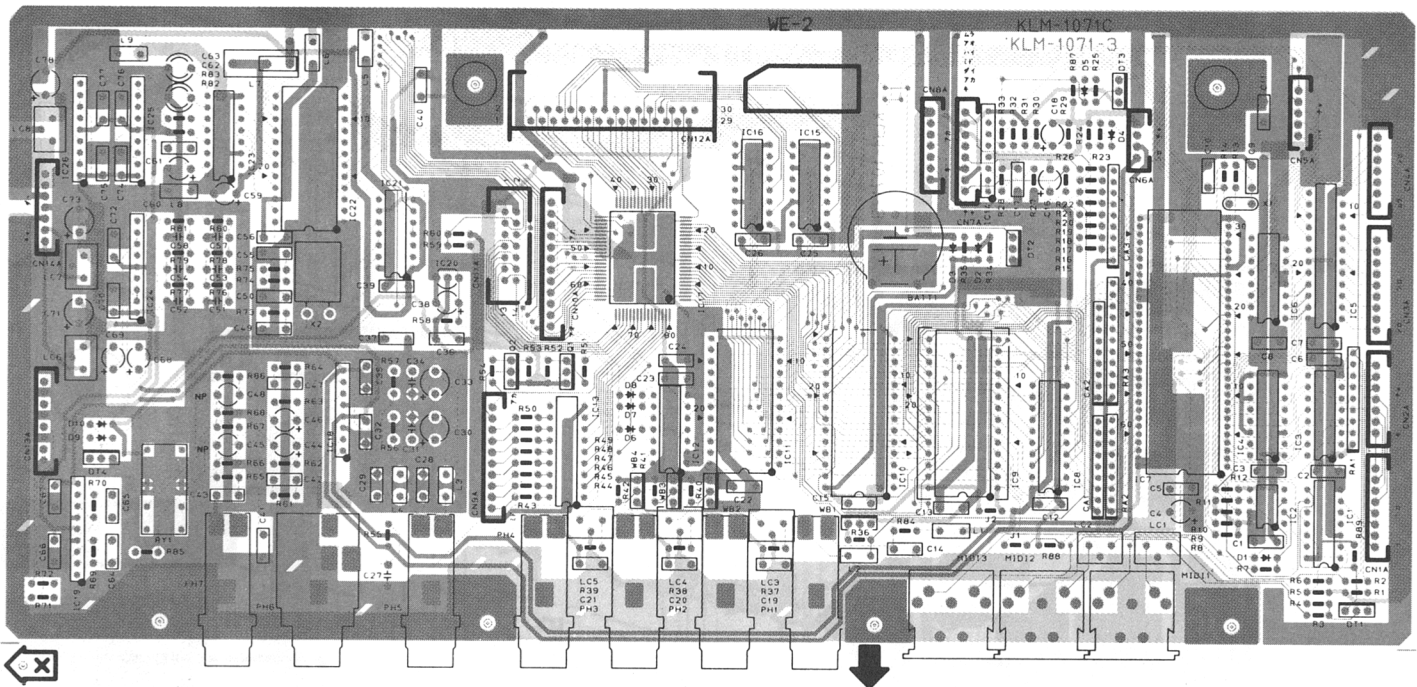


# KLM-1074



# KLM-1075





KLM-1071

# 7. CHECK AND ADJUSTMENT PROCEDURE

## KLM-1073 Check

Connect a digital voltage meter with a connector CN14B of KLM-1073 and check if everything is like below.

Pin No.	Voltage (V)
1	-15
2	+15
3	GND
4	GND
5	GND
6	+5
7	+5

## KLM-1072 Check and adjustment

### 1. Clock check and adjustment

(1) On the program number "99" of DS-8, make the following parameter setting. (do not write)

#### Voice parameter setting (1)

Parameter name	Value setting
1 PITCH	OSC = 1, OSC = 1, DTN = 0
2 PITCH EG	All 0
3 WFRM 1	TYPE = 1, SPCT = 1, RING = 1, LIMIT = OFF, KBD = 0
4 WFRM 2	Ditto
5 T. EG 1	All 0
6 T. EG 2	All 0
7 A. EG 1	LEVEL = 63, ATK, DEC = 0, SUS = 15, REL, KBD = 0
8 A. EG 2	Ditto
9 MG	All 0 and OFF
01~04	All 0 and OFF
05 KBD MODE	POLY
07 DELAY	LEVEL = 0

(2) Connect frequency counter with TP4 of KLM-1072. (GND: TP3)

(3) Confirm that the display of frequency counter shows 25.0 kHz. If it shows other than 25 kHz, adjust VR3 so that 25 kHz. If it shows other than 25 Hz, adjust VR3 so that 25 kHz shown.

### 2. Off set, check and adjustment

(1) Connect oscilloscope with TP1 of KLM-1072. (GND: TP2)

(2) Play C<sub>4</sub> key, and confirm if the center of output waveform were will-balanced with center line as below. If not, adjust VR2, to obtain as below. (fig 1)

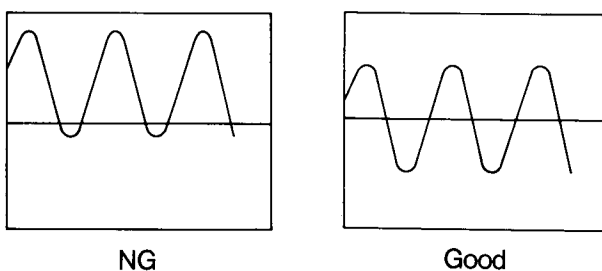


fig 1

### 3. Check and adjustment Feed Back Level

(1) Edit the following function of DS-8 voice parameter setting.

7 A. EG1 DEC = 7, SUS = 0  
 8 A. EG2 The same as A. EG1  
 07 DELAY MANUAL, Time = 20.0,  
 FB = +15, MFRQ,  
 MINT = 0, LEVEL = 15

(2) When you play C<sub>4</sub>, confirm that the decay time of output wave is like the chart below. If it is different, adjust. (fig 2) VR1 to obtain as below

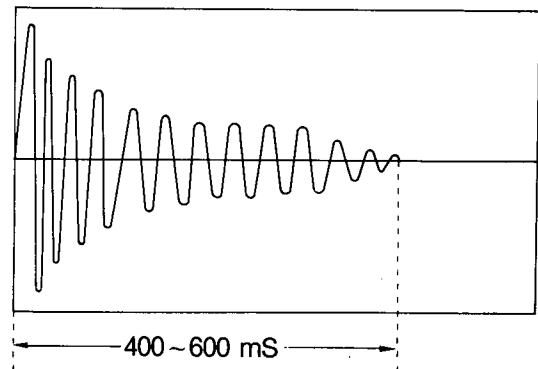


fig 2

(3) Edit the following function of voice parameter.

1 PITCH OSC1, OSC2 = 2  
 7 A. EG1 DEC = 0  
 8 A. EG2 DEC = 15  
 07 DELAY TIME = 850

(4) When you play C<sub>4</sub>, confirm if output effect sound doesn't have unusual and noise sound.

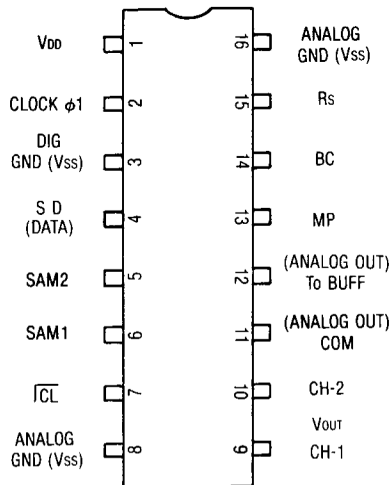
# 8. REFERENCE DATA

## PIN FUNCTION OF 78C10

PORT	I/O	FUNCTION
PA 0 }	I	KEYBOARD & SW. DATA
PA 7		
PB 0 }	0	KEYBOARD & SW. SCAN
PB 4		
PB 5	I	V <sub>BB</sub>
PC 0	0	MIDI OUT
1	I	MIDI IN
2	I	CARD (L: Insert)
3	I	CARD (CARD BATT.)
4	0	MUTE
5	0	RS (LCD)
6	0	R/W (LCD)
7	0	E (LCD)
AN 0	I	JOY STICK X
1	I	JOY STICK Y
2	I	AFTER TOUCH
3	I	FOOT VOLUME
4	I	EG1
5	I	EG2
6	I	TONE
7	I	EDIT

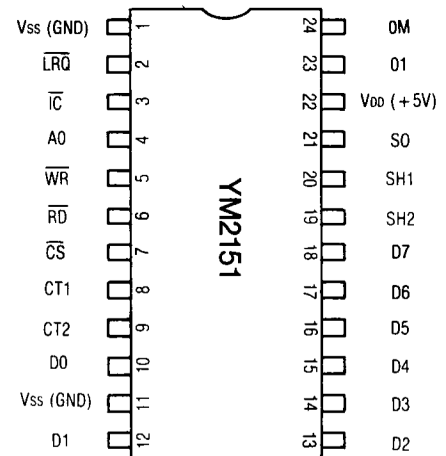
8	ANALOG V <sub>SS</sub>	Bass Voltage (Low-Level) for Analog Part (GND)
9	Vout CH1	Sample Hold Analog Switch Output for CH1
10	Vout CH2	Sample Hold Analog Switch Output for CH2
11	COM	Common Input for CH1 & CH2 Analog Switch
12	To BUFF	Analog Output of DAC. Connect to buffer Op. Amp.
13	MF	This pin can get exponential analog value by S signal based on voltage of MP Regular bias voltage is 1/2 V <sub>DD</sub>
14	BC	This pin and 13 pin are connect to resistor that deny an err by input bias current of buffer Op. Amp...Connecting to capacitance for phase compensation is recommended.
15	Rb	1/2 V <sub>DD</sub> Voltage output maked inside of this chip.
16	ANALOG V <sub>SS</sub>	Low-Level Voltage to make 1/2 V <sub>DD</sub> of 15 pin

## PIN FUNCTION of YM3012



PIN No.	SIGN	FUNCTION
1	V <sub>DD</sub>	Bass Voltage (High-Level)
2	CLOCK	Clock (to Sift-register & Timing-Generator (01))
3	DIG-V <sub>SS</sub>	Bass Voltage (Low-Level) for Digital Part
4	SD	Serial Input of Digital Signal (for Convert)
5	SAM2	CH2 Sampling Tern when This Pin is ON
6	SAM1	CH1 Sampling Tern when This Pin is ON This chip make Latch Signal from down edge of SAM1, SAM2
7	$\overline{ICL}$	ON-Normal OFF-Same as S2 = S1 = 0, S <sub>n</sub> = 1 in Spite of SD's Signal

## PIN FUNCTION OF YM2151



PORT	I/O	FUNCTION
D0 ~ D7	I/O	Address/Data Bus
A0	I	Address/Data Select ('0': Address 1: Data)
$\overline{WR}$	I	Write
$\overline{RD}$	I	Read
$\overline{CS}$	I	Chip Select
$\overline{IC}$	I	Initial Clear
S0	0	Serial Output
SH1, SH2	0	Sample/Hold
O0	I	System Clock
O1	0	Clock For D/A
V <sub>DD</sub>	I	+5V
V <sub>SS</sub>	I	GND

## MEMORY MAP

0000H	ROM 256K																		
7FFF																			
8000	CARD 64K																		
9FFF																			
A000	RAM 64K																		
BFFF																			
C000	RAM 16K																		
C7FF																			
C800																			
DFFF																			
E000	FM OPERATOR DATA	E000H	YM 2164 ADDRESS																
E01F		E001H	YM 2164 DATA																
E020	DDL CONTROL DATA	E020H			FB ±	STB 3	STB 2	STB 1	DATA	CLK									
E03F																			
E040	LINE SELECT & MUTE	E040H	S0	S1		L OUT	R OUT	FB	R (B) IN	L (A) IN									
E05F																			
E060	LCD DATA	E060H	DATA																
E07F																			
E080	LED DATA	E080H	1	2	3	4	5	6	7	8									
E09F		E081H	9	10	11	12	13	14	15	16									
E0A0																			
E0BF																			
E0C0																			
E0DF																			
E0E0																			
E0FF																			
E100																			
FEFF																			
FF00	CPU INTERNAL RAM																		

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
<b>CARBON RESISTORS</b>				
104013282	S1/4JY 82 OHM	KLM-1073		1
104013318	S1/4JYTP 180 OHM	KLM-1074		2
104013410	S1/4JYTP 1K			2
104013422	S1/4JYTP 2.2K			1
104013433	S1/4JYTP 3.3K			1
104013447	S1/4JYTP 4.7K			1
104013482	S1/4JYTP 8.2K	KLM-1073		1
104013510	S1/4JYTP 10K	KLM-1074		2
104013610	S1/4JYTP 100K			1
104016000	1/6JTP 0 OHM	KLM-1071		5
		KLM-1072		35
104016210	1/6JTP 10 OHM	KLM-1071		2
104016275	1/6JY 75 OHM			8
104016310	1/6JTP 100 OHM	KLM-1072		2
104016322	1/6JTP 220 OHM	KLM-1071		7
104016339	1/6JTP 390 OHM			1
104016347	1/6JTP 470 OHM			2
104016356	1/6JTP 560 OHM			1
104016362	1/6JTP 620 OHM			1
104016368	1/6JTP 680 OHM			3
104016382	1/6JTP 820 OHM	KLM-1072		1
104016410	1/6JTP 1.0K	KLM-1071		3
		KLM-1072		6
104016415	1/6JTP 1.5K			1
104016418	1/6JTP 1.8K	KLM-1071		6
		KLM-1072		1
104016420	1/6JTP 2.0K			1
104016447	1/6JTP 4.7K	KLM-1071		6
		KLM-1072		3
104016451	1/6JTP 5.1K			2
104016468	1/6JTP 6.8K			2
104016482	1/6JTP 8.2K	KLM-1071		1
104016491	1/6JTP 9.1K	KLM-1072		4
104016510	1/6JTP 10K	KLM-1071		23
		KLM-1072		14
104016511	1/6JTP 11K			1
104016512	1/6JTP 12K			10
104016518	1/6JTP 18K			5
104016533	1/6JTP 33K			1
104016536	1/6JTP 36K			2
104016547	1/6JTP 47K	KLM-1071		3
		KLM-1072		3
104016556	1/6JTP 56K			2
104016568	1/6JTP 68K			2

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
104016575	1/6JTP 75K	KLM-1072		3
104016582	1/6JTP 82K	KLM-1071		2
104016610	1/6JTP 100K			7
		KLM-1072		29
104016612	1/6JTP 120K			1
104016615	1/6JTP 150K	KLM-1071		2
		KLM-1072		1
104016620	1/6JTP 200K			1
104016622	1/6JTP 220K			1
104016710	1/6JTP 1.0M	KLM-1071		3
		KLM-1072		7
104016715	1/6JTP 1.5M			1
104016722	1/6JTP 2.2M			1
104016747	1/6JY 4.7M	KLM-1071		1
<b>METAL FILM RESISTOR</b>				
125015267	1/6TP 26.7K	KLM-1072		1
<b>BLOCK RESISTORS</b>				
135008510	RKC1/8B8J 10K	KLM-1071		2
135010510	RKC1/8B10J 10K			1
138007004	RN3QEL 102Z	KLM-1072		1
139000610	RKLB6J 10K	KLM-1083		2
139000710	RKLB7J 10K			1
139001710	RKLBD7J 10K			1
<b>MYLAR CAPACITORS</b>				
204001424	50V 0.0024UF	KLM-1072		2
204002410	50V 0.001UF			1
204002412	50V 0.0012UF	KLM-1071		2
204002418	50V 0.0018UF	KLM-1072		2
204002422	50V 0.0022UF	KLM-1071		2
204002447	50V 0.0047UF	KLM-1072		2
204002482	50V 0.0082UF	KLM-1071		2
204002510	50V 0.01UF			1
204002522	50V 0.022UF			2
		KLM-1072		3
204002547	50V 0.047UF	KLM-1073		1
		KLM-1072		7
<b>STYROL CAPACITORS</b>				
205002256	50V GT 56PF	KLM-1072		1
205002356	50V GT 560PF	KLM-1071		2
<b>CERAMIC CAPACITORS</b>				
214052220	50V 22PF TP	KLM-1071		5
214052330	50V 33PF TP			2
214053100	50V 100PF TP			2

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
214053100	50V 100PF TP	KLM-1072		4
214053330	50V 330PF TP			1
214053390	50V 390PF			2
214053470	50V 470PF TP	KLM-1071		4
		KLM-1072		2
214053560	50V 560PF TP			3
214054100	50V 1000PF TP	KLM-1071		4
214055100	50V 0.01UF TP	KLM-1073		4
214055470	50V 0.047UF TP	KLM-1071		27
		KLM-1072		35
		KLM-1074		5
214056100	25V 0.1UF TP	KLM-1071		5
		KLM-1083		1
		KLM-1072		1
		KLM-1073		6
<b>SPARK KILLER</b>				
219000600	ECQ-U2A473MN	KLM-1075		1
<b>EMI FILTER</b>				
219050100	DSS310-55D223S	KLM-1071		8
<b>TAMTALUM CAPACITORS</b>				
224007168	16V 6.8UF	KLM-1073		1
<b>ELECTROLYTIC CAPACITORS</b>				
235013410	35V 1000UF	KLM-1073		2
239007447	16V 4700UF			1
254003210	16V 10UF	KLM-1071		1
		KLM-1072		7
		KLM-1083		1
254003310	16V 100UF	KLM-1071		1
		KLM-1072		1
		KLM-1073		1
254003322	16V 220UF			1
254004247	25V 47UF	KLM-1073		2
		KLM-1072		5
254004310	25V 100UF	KLM-1071		2
		KLM-1072		2
254005247	35V 47UF	KLM-1071		2
254006022	50V 0.22UF	KLM-1072		2
254006047	50V 0.47UF			10
		KLM-1074		1
254006110	50V 1UF	KLM-1071		6
		KLM-1072		5
254006122	50V 2.2UF			8

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
254006147	50V 4.7UF	KLM-1071		2
254063210	16V 10UF	KLM-1072		2
254064147	25V 4.7UF	KLM-1074		1
254066110	50V 1UF	KLM-1071		2
254066122	50V 2.2UF	KLM-1072		1
<b>BLOCK CAPACITORS</b>				
248014347	50V 470PF × 8	KLM-1071		1
248015247	40V 47PF × 8			2
<b>TRANSISTORS</b>				
304000020	2SA1175 K TN	KLM-1072		1
304010010	2SB810-T	KLM-1071		2
304020020	2SC2785 K TN	KLM-1072		2
304020070	2SC2785	KLM-1073		1
304020100	BA1A4M	KLM-1071		2
		KLM-1072		5
304020110	BN1A4M	KLM-1071		2
		KLM-1072		6
<b>FET</b>				
304060020	2SK381-34-B	KLM-1072		9
<b>DIODES</b>				
310001500	SR1K-2	KLM-1073		4
314000100	1S1555			3
314000300	1S-2473	KLM-1068		33
		KLM-1074		1
314001300	1SS-133	KLM-1071		10
		KLM-1072		11
<b>BRIDGE DIODE</b>				
310010200	4B4B41	KLM-1073		1
<b>LEDs</b>				
312005400	SLP-175B	KLM-1068		2
312006700	SLP-981C-50			14
<b>LCD</b>				
313000800				1
<b>DOUBLE DIODE</b>				
315000100	MC931	KLM-1071		4
<b>ICs</b>				
320001023	UPD-4066 BC	KLM-1072		1
320001068	UPD74HCU04C	KLM-1071		1
320001069	74HC32C			1
320001071	74HC (40H) 138C			1
320001073	74HC (40H) 373C			1



PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
320001085	UPD65010CW-113	KLM-1072		1
320001087	UPC319C			1
320001090	UPC311C			1
320001091	UPD4364C-15	KLM-1071		1
320001113	UPD78C10CW			1
320003076	TC74HC4050P			4
320003143	TC74HC154P			1
320003201	TC-9176	KLM-1072		2
320004028	HM-6116LP-4	KLM-1071		1
320009001	NJM-4558D-V	KLM-1072		7
320009004	NJM-78L05A			1
320009005	NJM-4558S	KLM-1071		2
320009007	NJM-2902N	KLM-1072		2
		KLM-1074		1
		KLM-1073		1
320009011	NJM-7805A			1
320009023	NJM-7815A			1
320009024	NJM-7915A			1
320009050	NJM-072S	KLM-1071		2
320011025	M-54513P			1
320011026	M-5216L			1
320011061	M53205P			1
320011065	M5223L			1
320011077	M5201P	KLM-1072		1
320012017	MBM27256-25			1
320012034	MB81464-15			1
320015002	YM2164	KLM-1071		1
320015006	YM3012			1
320023005	S-8054HN			1
320025003	NE572N	KLM-1072		1
<b>GATE ARRAY</b>				
320012037	MB62HB122	KLM-1071		1
<b>PHOTO COUPLER</b>				
330001000	TLP-552	KLM-1071		1
<b>CERAMIC OSCILLATORS</b>				
335002500	PRT-12.0RM	KLM-1071		1
335003800	HC-49/U3.579545MHZ			1
<b>P.C. BOARDS</b>				
343010680	KLM-1068/1069/1070	KLM-1068		1
343010710	KLM-1071	KLM-1071		1
343010720	KLM-1072	KLM-1072		1
343010730	KLM-1073	KLM-1073		.50
343010740	KLM-1074	KLM-1074		.25
343010750	KLM-1075	KLM-1075		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
343010830	KLM-1083	KLM-1083		1
<b>SEMI FIXED VRs</b>				
350002233	RH0615C N3 3.3K	KLM-1072		1
350002247	RH0615C 4.7K			2
350002347	RH0615C 47K	KLM-1074		1
350002410	RH0615C 100K			1
<b>VR</b>				
360015600	K16200005 10KB			2
<b>SLIDE VRs</b>				
365007700	RS30111-10KB	KLM-1068		3
365007800	RS30111-10KB			1
365007900	RS30112-10KB × 2			1
365008000	RS30112-10KB × 2			1
<b>TACT SW</b>				
375008500	SKHHAJ	KLM-1068		33
<b>SW</b>				
375009300	WK802A44			1
<b>POWER TRANSFORMER</b>				
400011000	TC-021			1
<b>COILS</b>				
402002200	36640	KLM-1071		1
		KLM-1075		2
402002700	BL02RN1-R62	KLM-1071		2
402002300	BL02RN2-R62			6
<b>INVERTER</b>				
402002400	NEL-D32-46	KLM-1073		1
<b>RELAY SW.</b>				
403001200	MR-602-5SR	KLM-1071		1
<b>KEYBOARD</b>				
420003701	ESK-8011A			1
<b>PHONE JACKS</b>				
454004400	YKB21-5010	KLM-1071		6
454005800	YKB21-5018			1
<b>DIN JACK</b>				
454005400	YKF51-5008	KLM-1071		3
<b>FUSES</b>				
464002401	125V 2.5A UL CSA		100JP 117EX 117CN	1 1 1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
464002401	125V 2.5A UL CSA		117US	1
464011901	250V 0.8A UL		100JP	1
			117US	1
			117CN	1
			117EX	1
464012003	250V 1.0A UL		117US	2
			117CN	2
			117EX	2
			100JP	2
464061401	250V T250MA		220SE	1
			220WG	1
			240AF	1
			220SC	1
			240GE	1
			220GE	1
			240AU	1
			240UK	1
			220FR	1
464061701	250V T500MA		220GE	2
			240AU	2
			240GE	2
			220FR	2
			240UK	2
			240AF	2
			220SC	2
			220WG	2
			220SE	2
464062001	250V T1.0A		220SC	1
			220GE	1
			240UK	1
			220FR	1
			220WG	1
			240AF	1
			220SE	1
			240AU	1
			240GE	1
<b>HARNES</b>				
470075300	HNS-653	KLM-1068		1
470075400	HNS-654			1
470075500	HNS-655			1
470075600	HNS-656			1
470075700	HNS-657			1
470075800	HNS-658	KLM-1074		1
470075900	HNS-659			1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
470076000	HNS-660	KLM-1068		1
470076100	HNS-661			1
470076200	HNS-662	KLM-1072		1
470076300	HNS-663			1
470076400	HNS-664			1
470076500	HNS-665			1
470076600	HNS-666			1
470076800	HNS-668			1
470076900	HNS-669			2
<b>CONNECTORS</b>				
471060400	B4B-EH	KLM-1071		1
471060500	B5B-EH			1
471060600	B6B-EH	KLM-1072		1
		KLM-1073		1
471060700	B7B-EH	KLM-1071		4
		KLM-1073		1
471060800	B8B-EH	KLM-1071		3
		KLM-1072		1
471060900	B9B-EH	KLM-1071		1
471061000	B10B-EH			1
471061200	B12B-EH			1
471090200	TOP 5096-02C	KLM-1075		3
471095000	TOP 5273-5A	KLM-1073		1
472060300	S3B-EH			1
472070400	S4B-PH	KLM-1074		1
<b>CARD FIT CONNECTORS</b>				
474004719	ZC-130	KLM-1071		1
474004720	CF-130E	KLM-1083		1
<b>BC CONNECTOR</b>				
474009900	L-32	KLM-1083		1
<b>HEADER</b>				
474010500	HIF3FB-14PA-2.54DSA	KLM-1071		1
<b>IC SOCKET</b>				
480001283	28P	KLM-1071		1
<b>RUBBER FEET</b>				
500009500				4
<b>FUSE HOLDERS</b>				
515002300	S-N5057 #01	KLM-1073		6
515002300	S-N5057 #01	KLM-1075		2
<b>LITHIC BATTERY</b>				
520001300	CR2032-FT			1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
<b>TEST PINS</b>				
540007100	LC-2-G-YELLOW	KLM-1072		2
540011901	LC-2-G	KLM-1072		2
<b>WIRE BAND</b>				
540007200	PLT-1M			8
<b>ISOLATING WASHER</b>				
540007300	B-1725K	KLM-1073		3
<b>SPIRAL CLIP</b>				
540008600	CS-8			3
<b>INLET SOCKET</b>				
540010900	PA-126			1
<b>JUMPER CORD</b>				
545020150				1
<b>RADIATOR</b>				
560004300		KLM-1073		1
<b>RADIATION SHEET</b>				
565000300	BFG-30	KLM-1073		3
<b>LED HOLDER</b>				
575003800		KLM-1068		14
<b>LED SPACER</b>				
575004700		KLM-1068		2
<b>FCC LABEL</b>				
580021000			117US	1
<b>FTZ LABEL</b>				
580021700			220WG	1
<b>WIRING CAUTION</b>				
580023400	FOR 2 PINS		240UK	1
<b>AC CORDS</b>				
600002100	SPT-2 UC-695-S01		117US	1
			117EX	1
600002200	CEE EC-215-S01		220GE	1
			240GE	1
			240AF	1
			220SC	1
			220FR	1
			220WG	1
600002300	SAA SC-455-S01		240AU	1
600002400	DC-325-S01		100JP	1
600002500	BS BH-115-S01		240UK	1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
600002600	CSA UC-707-S01		117CN	1
600002900	SE EX-221-S01		220SE	1
<b>CONNECTION CORD</b>				
602001302	6.3PHY PLUG 2.5			1
<b>JOY STICKS</b>				
620015800	LEVER KNOB			1
640058400	Y-SUPPORT			1
640058402	LEVER FIX PIN			2
646010100	BOX			1
646010101	X-SUPPORT			1
646022400	LEVER BLACK			1
<b>SLIDE VR KNOB</b>				
620016300				6
<b>NTS KNOBS</b>				
620016400				14
620016600				19
<b>LCD DISPLAY</b>				
630004600				1
<b>SHIELDING SHEET</b>				
630004900				1
<b>LOWER CASE</b>				
640083800				1
<b>SUPPORT RAIL</b>				
640083900				1
<b>POWER UNIT CHASSIS</b>				
640084000				1
<b>JACK PLATE</b>				
640084100				1
<b>CARD HOLDER A</b>				
640084200				1
<b>P.C. BOARD HOLDER</b>				
640084300				2
<b>AT HOLDER</b>				
640084400				1
<b>GROUNDING CONTACT</b>				
640084600		KLM-1073		1
		KLM-1072		4

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
<b>CARD ESCUTCHEON</b>				
646023200				1
<b>UPPER CASE</b>				
646023900				1
<b>P.C. SENSOR</b>				
649006600				.34
<b>NAME PLATES</b>				
686000700			117US	1
			117EX	1
686003100			220GE	1
			240AF	1
			240AU	1
			220FR	1
			220WG	1
			220SE	1
			240GE	1
			240UK	1
686003300			117CN	1
<b>GUARANTEE SEAL</b>				
686002500			100JP	1
686002900			220SC	1
<b>SCREWS</b>				
705030308	FE B ZMC 3 × 8	KLM-1073		3
705060408	FE B BZMC 4 × 8			8
725030308	TP2G B ZMC 3 × 8			31
725030310	TP2G B ZMC 3 × 10			4
		KLM-1073		2
725060308	TP2G B BZMC 3 × 8		240GE	11
			220SE	11
			220GE	11
			240UK	11
			220FR	11
			220SC	11
			117EX	11
			100JP	9
			240AU	11
			117CN	11
			117US	11
			220WG	11
			240AF	11

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
725060314	TP2G B BZMC 3 × 14			4
745030308	PLAX B ZMC 3 × 8			40
745060408	PLAX B BZMC 4 × 8			16
790063410	FE WSE2 BZMC 4 × 10			4

# MEMO

**ADVARSEL!**

Lithiumbatteri. Eksplosionsfare. Udskiftning må kun foretages af en sagkyndig, og som beskrevet i service manualen. Batteriet må kun udskiftes med batterier af samme fabrikat og type.

**Litiumparisto!**

Pariston saa vaihtaa ainoastaan huoltohenkilöstö saman valmistajan vastaavalla tyypillä. Virheellisestä käsittelystä syntyy räjähdysvaara.

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