

SERVICE MANUAL

OBR/W

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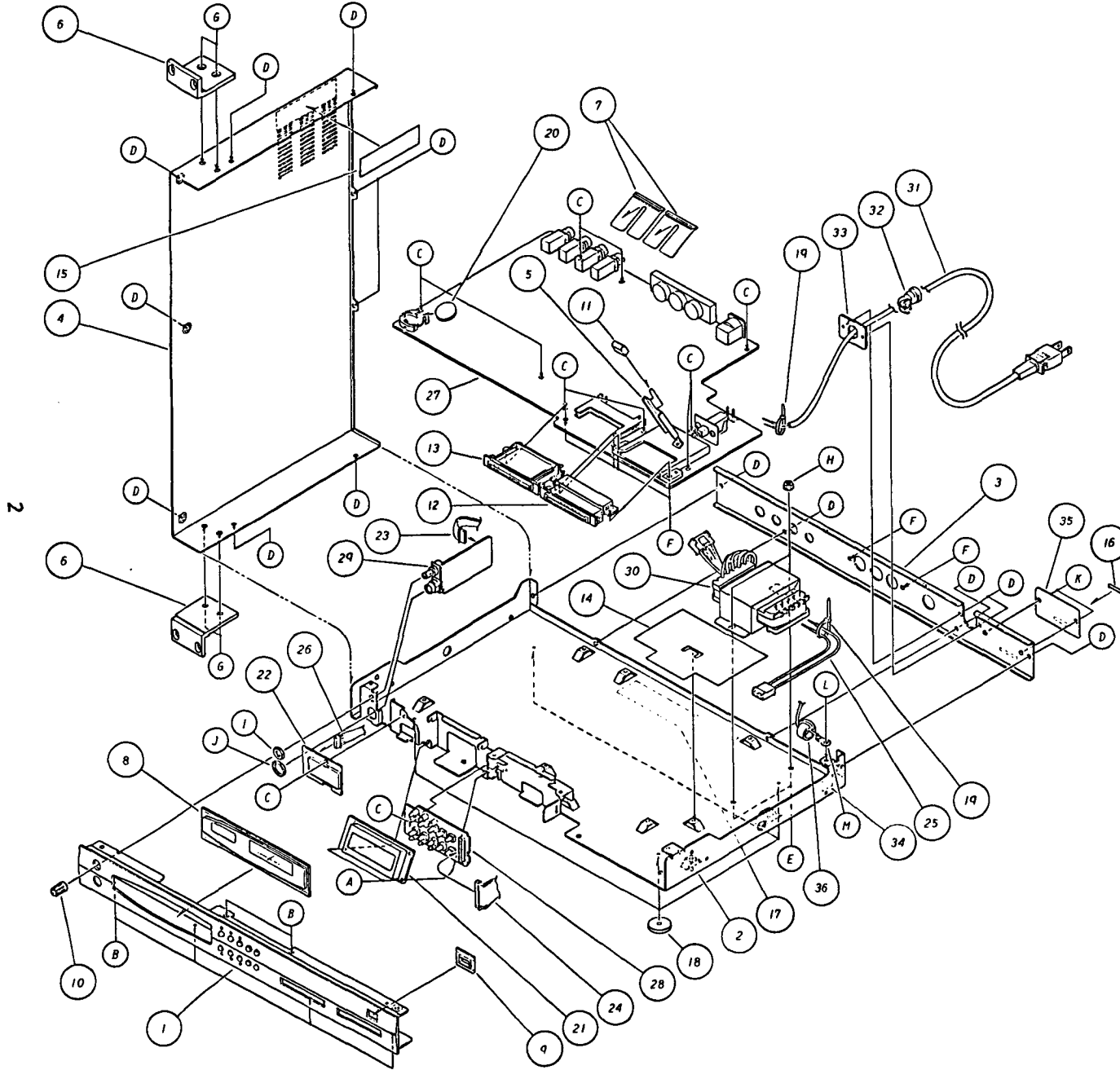
KORG

1. SPECIFICATIONS

1. Tone generator : 32 Voice 32 oscillators (Single Mode)
16 Voice 32 oscillators (Double Mode)
2. Oscillation method : 32 Voice, 32 Filters, AMPS, LFOS and ENVELOPES
TG88,DF88,MDE1
3. Tone generation method : AI square synthesis system
(full digital processing)
Multi sounds 255
Drum sounds 114
8MBit Mask ROM x 5
4. Sampling Frequency : 31.25KHz
5. Programs : RAM 100 Programs
ROM 129 Programs (for general MIDI)
6. Combinations : RAM 100 Combinations
7. Effects : 47 Effects
8. Demonstration Songs : 5 Songs
9. Outputs : 1/L, 2/R (output impedance 10K, remaining noise
less than -80dBm JIS-A)
3, 4 (output impedance 1K, remaining noise less
than -80dBm JIS-A)
Phones : (output impedance 100HM)
10. MIDI : IN,OUT,THRU
11. Remote : DIN 8 PIN(IN,OUT,POWER) 50mA for RE-1 only
12. Cards : PCM data card slot
Program data card slot
13. Indicators : 16 x 2 LCD with backlight
LED Module for Timber and MIDI
14. Dimensions : 482 x 262 x 45mm
15. Weight : 3.5Kg
16. Power consumption : 16W

※ Appearance and specifications are subject to change without notice
for product improvement.

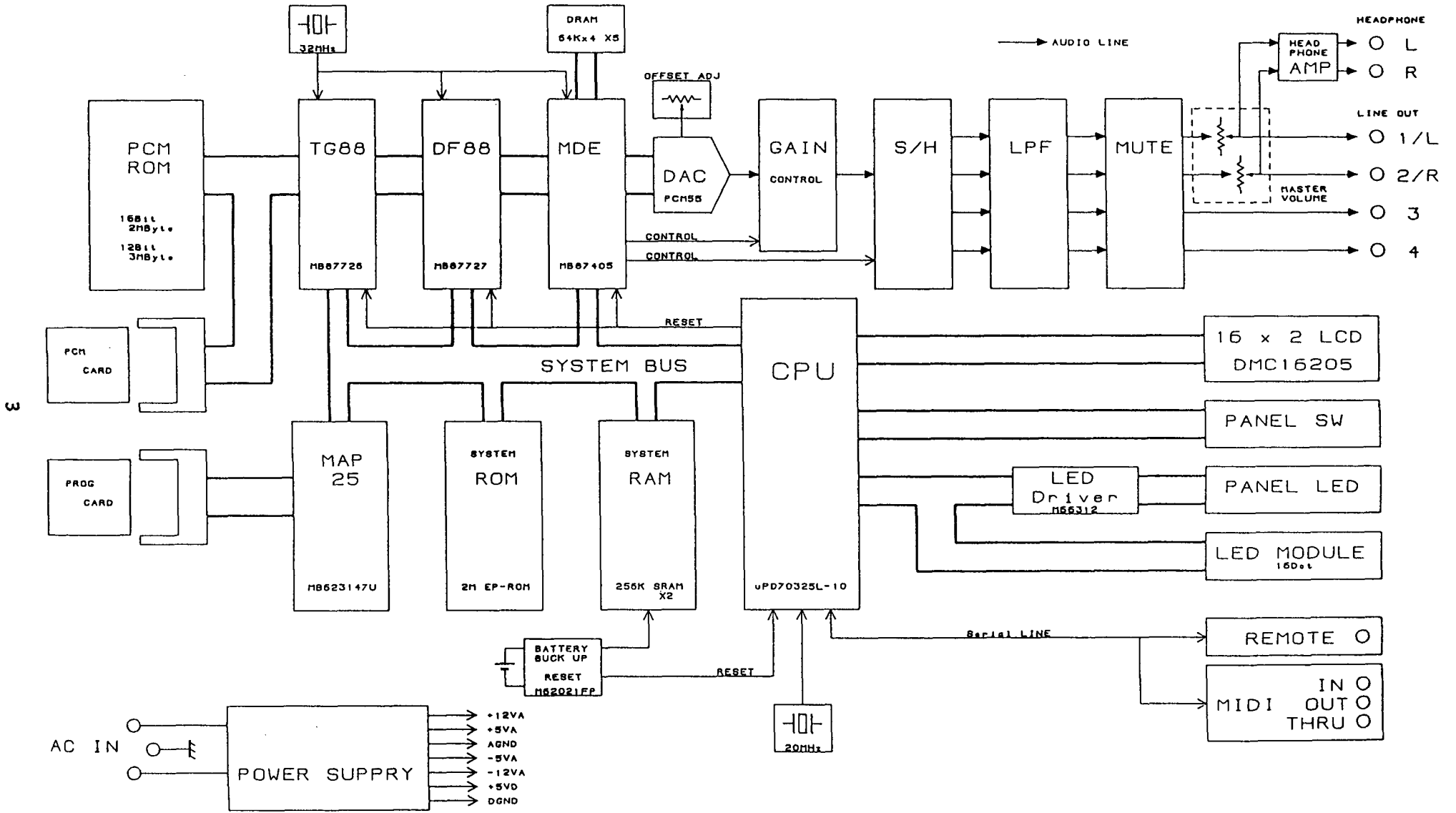
2. STRUCTURAL DIAGRAM



PART NO.	SCREWS & NUTS	PART CODE
A	BT B ZMC 2.6 x 6	791072806
B	TS F BZMC 3 x 6	711160306
C	CT B ZMC 3 x 6	715230306
D	CT B BZMC 3 x 8	715260308
E	CT B BZMC 4 x 10	715260410
F	PLAX B BZMC 3 x 12	745060312
G	TP2G F BZMC 4 x 10	721060410
H	FHN ZMC 4	770030400
I	VN BZMC 7	773060700
J	VN BZMC 12	773061200
K	CT B BZMC 3 x 8	715260308
L	TS SSE ZMC 4 x 10	715130411
M	LUG \varnothing 4 N-3	672001600

PART NO.	PART NAME	PART CODE
1	X-144 FRONT PANEL ASSEMBLY	641028500
2	X-144 LOWER CASE	641027900
3	X-144 REAR PANEL	641028000
4	X-144 COVER	641028100
5	X-144 POWER SW BAR	641028200
6	X-052 RACK MOUNT ADAPTER	641020000
7	X-507 GROUND SPRING	644003000
8	X-144 LCD WINDOW	630017100
9	X-757G POWER SW FRAME	646030200
10	X-943 VR KNOB	620023600
11	POWER SW KNOB	620018200
12	X-011/012 CARD GUIDE	646039400
13	X-011/012 CARD SLOT	646039500
14	X-144 ISOLATION SHEET	630017300
15	TAPE	-----
16	SERIAL NO. SEAL	-----
17	SERVICE MAN CAUTION 3	-----
18	RUBBER FOOT 3 x 22 x 3	500018300
19	WIRE BAND PLT-1M	540007200
20	LITHIC BATTERY CR2032	520001700
21	LCD DMC16205NYU-LY-B7	313002700
22	LED MODULE BU5067	312011800
23	HARNESS HNS-951 (7pin)	470195100
24	HARNESS HNS-953 (14pin)	470195300
25	HARNESS HNS-954 (2pin)	470195400
26	HARNESS HNS-955 (5pin)	470195500
27	MAIN P.C.BOARD ASSEMBLY KLM-904	001090400
28	SW P.C.BOARD ASSEMBLY KLM-905	001090400
29	VR P.C.BOARD ASSEMBLY KLM-906	001090400
30	POWER TRANSFORMER TC-801	400013000
31	AC CORD	-----
32	BUSHING	-----
33	BUSHING PLATE	-----
34	GROUND SEAL	-----
35	NAME PLATE	-----
36	DATA LINE FILTER ESD-R-16	525000800

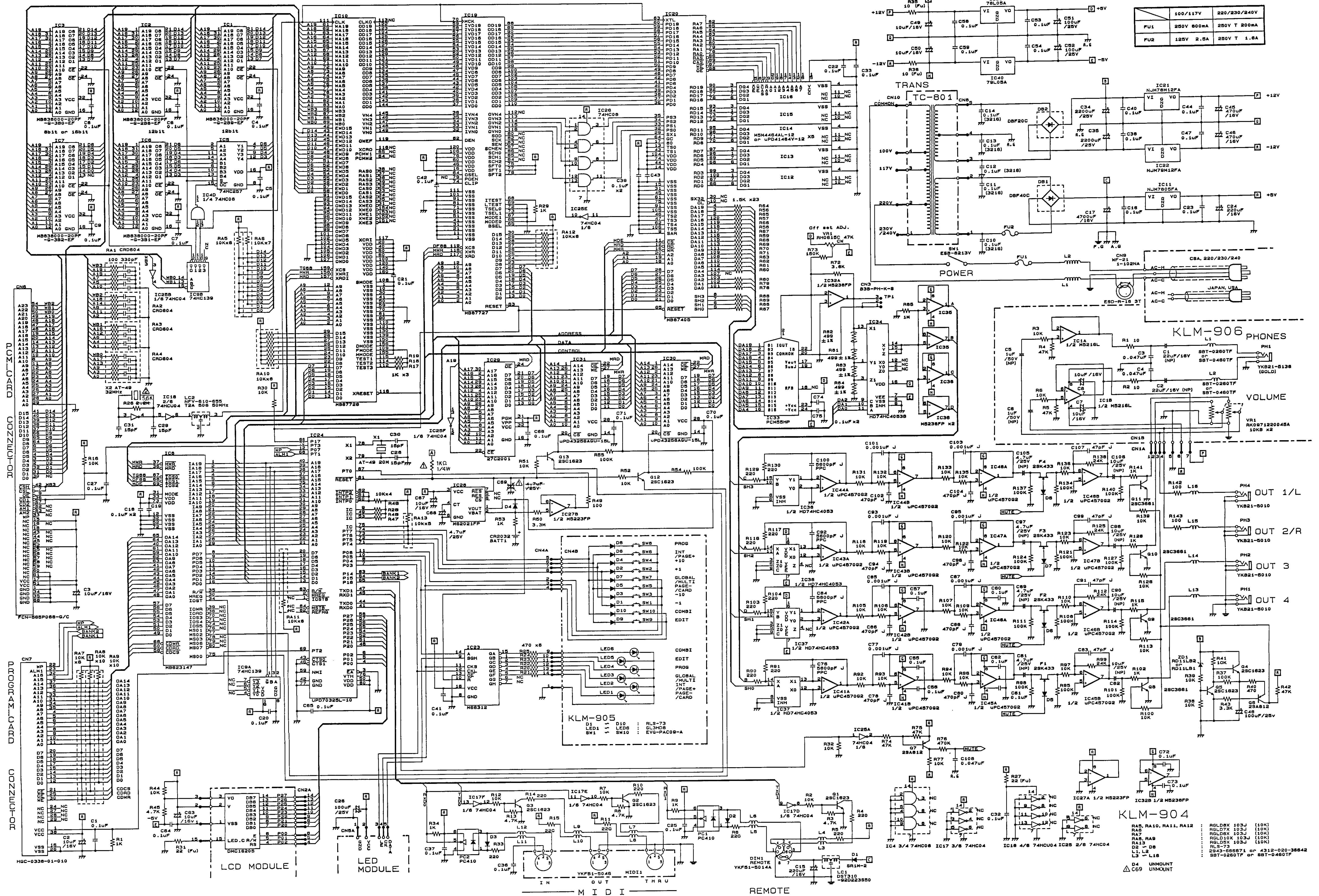
3. BLOCK DIAGRAM



3

4. CIRCUIT DIAGRAM

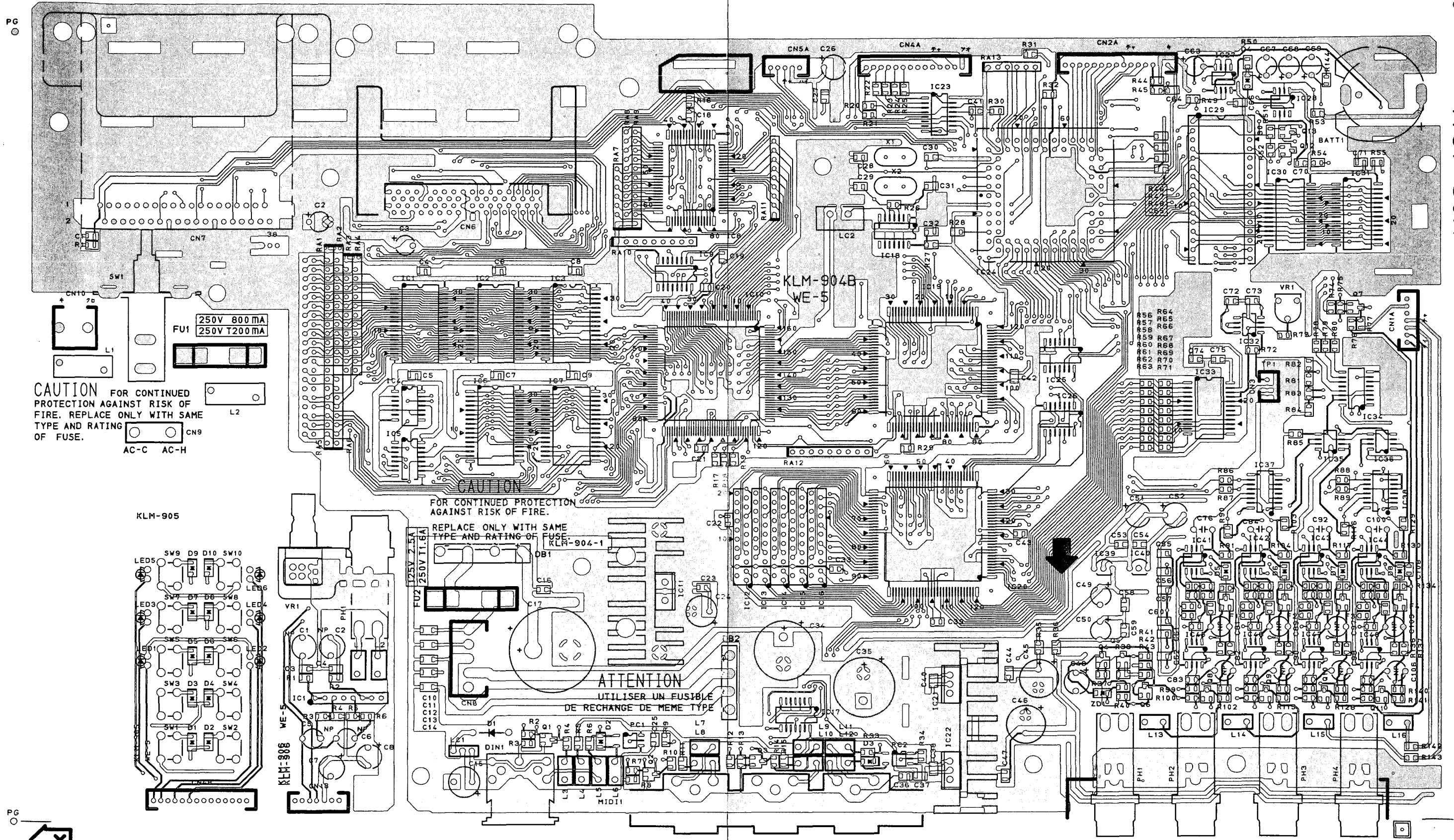
KLM-904/905/906



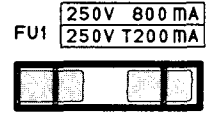
5. P.C. BOARDS

KLM-904/905/906

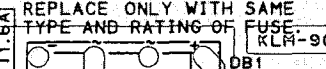
PG



CAUTION FOR CONTINUED PROTECTION AGAINST RISK OF FIRE. REPLACE ONLY WITH SAME TYPE AND RATING OF FUSE.

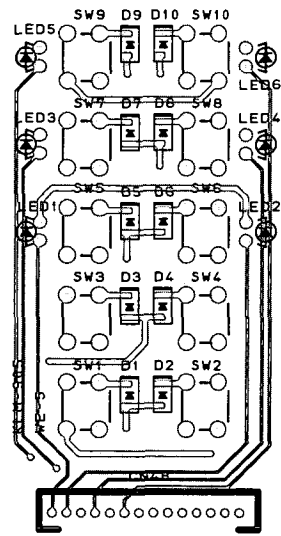


CAUTION FOR CONTINUED PROTECTION AGAINST RISK OF FIRE. REPLACE ONLY WITH SAME TYPE AND RATING OF FUSE.

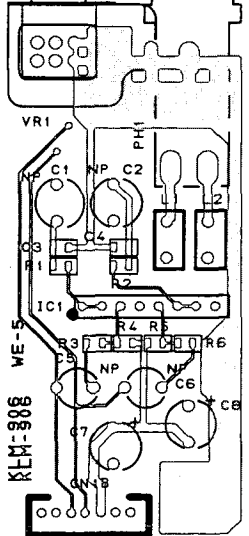


ATTENTION
UTILISER UN FUSIBLE
DE RECHANGE DE MEME TYPE

KLM-905



KLM-906



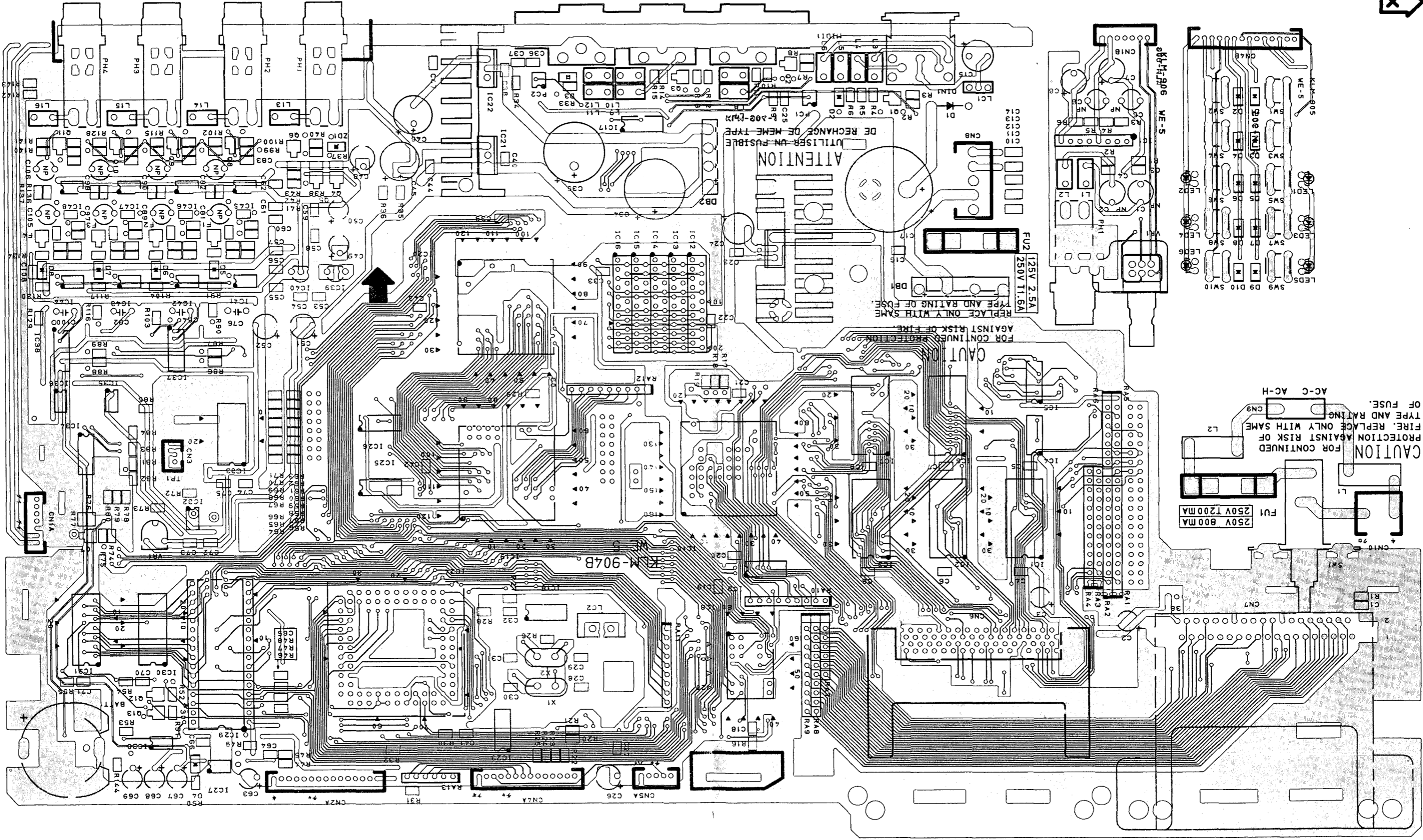
MOUNT PARTS SIDE

ぶひん面シルク

Y03-1811

KLM-904/905/906

Y084480Y



NO MOUNT PARTS SIDE

REV 1



6. DIAGNOSTIC TEST

《 0. Before you start the diagnostic test 》

Once this diagnostic test is started, the data in the O3R/W will be initialized. If necessary data are memorized in it, please save the data into a RAM card, etc. before starting the test.

《 1. Starting the test program 》

The test program is memorized in the system ROM.

- 1) Connect MIDI IN and OUT with a MIDI cable.
- 2) Connect a short plug for the test to the remote terminal. (The short plug should be the 8 pin DIN plug whose 1 pin and 4 pin, 3 pin and 5 pin are short-circuited.)
- 3) Insert a PCM card (XSC-801) and a RAM card (SRC-512) into each card slot. At this time the protect switch of the RAM card must be set to OFF.
- 4) The test program will start when the power is turned on while pressing [PROG] and [+10] simultaneously. Then, when you turn the power on while pressing [+1] and [-1] simultaneously, you can omit the internal check #04~#10.

《 1. INTERNAL CHECK 》

When the test mode starts, the following test will be automatically carried out.

- * System ROM CheckSum (Internal Test #00)
- * S_RAM Check (Internal Test #01)
- * LCD RAM Check (Internal Test #02)
- * LSI Interface Check (Internal Test #03)
- * Internal Battery Check (Internal Test #04)
- * Card Battery Check (Internal Test #05)
- * RAM Card Write/Read Check (Internal Test #06)
- * MIDI Loop Check (Internal Test #07)
- * Remote Terminal Check (Internal Test #08)
- * PCM Card Interface Check (Internal Test #09)
- * PCM ROM Check (Internal Test #10)

In case that an error occurs at the internal test #00 : System ROM Check Sum, the following message will be indicated in the LCD and the test program will stop.

SystemROM ChkSum
Error: Verify

In case that an error occurs at the internal test #01 : S_RAM check, the following message will be indicated in the LCD and the test program will stop.

SRAM Write/Read
Error: Verify

In case that an error occurs at the internal test #02 : LCD RAM Check, the following message will be indicated in the LCD and the test program will stop.

LCD RAM W/R
Error: Verify

In case that an error occurs at the internal test #03 : LSI Interface Check, the following message will be indicated in the LCD and the test program will stop.

*In case that something is wrong with TG88 or the circuit between TG88 and CPU,

TG88 CPU I/F
Error: VoiceFlag

*In case that something is wrong with DF88 or the circuit between DF88 and CPU,

DF88 CPU I/F
Error: Verify

In case that an error occurs at the internal test #04 : Internal Battery Check, the following message will be indicated in the LCD and the test program will stop.

*In case that the voltage is low,

Internal Battery
Error: Low ****

*In case that the voltage is high or no battery is attached,

Internal Battery
Error: High ****

NOTE : The voltage(V) will be indicated at " **** ".

In case that an error occurs at the internal test #05 : Card Battery Check, the following message will be indicated in the LCD and the test program will stop.

*In case that the voltage is low,

Card Battery
Error: Low

*In case that no card is inserted into the card slot,

Card Battery
Warning: No Card

In case that an error occurs at the internal test #06 : RAM Card Write/Read Check, the following message will be indicated in the LCD and the test program will stop.

*In case that writing/reading is not executed correctly or the protect switch of the RAM card is ON,

Card Write/Read
Error: Verify

*In case that no card is inserted into the card slot,

Card Write/Read
Warning: No Card

In case that an error occurs at the internal test #07 : MIDI Loop Check, the following message will be indicated in the LCD and the test program will stop.

*In case that the transmitted data is different from the received data,

MIDI
Error: OUT-->IN

*In case that a MIDI cable doesn't connect MIDI IN and MIDI OUT,

```
MIDI
Warning:OUT x IN
```

In case that an error occurs at the internal test #08 : Remote terminal Check, the following message will be indicated in the LCD and the test program will stop.

*In case that the transmitted data is different from the received data,

```
Remote
Error: OUT-->IN
```

*In case that a short plug isn't connected to the remote terminal,

```
Remote
Warning:OUT x IN
```

In case that an error occurs at the internal test #09 : PCM Card Interface Check, the following message will be indicated in the LCD and the test program will stop.

```
PCMCARD A:*****
P:#### R:xxxx
```

NOTE :

1. The address of the PCM card with which something is wrong is indicated at "*****".
2. The data which should be written into the address is indicated at "####".
3. The data which was read from the address is indicated at "xxxx".

In case that an error occurs at the internal test #10 : PCM ROM Check, the following message will be indicated in the LCD and the test program will stop.

```
PCMIntn A:*****
P:#### R:xxxx
```

NOTE :

1. The bank number of the PCM ROM with which something is wrong is indicated at " n ".
2. The address of the PCM ROM with which something is wrong is indicated at "*****".

3. The data which should be written into the address is indicated at "####".
4. The data which was read from the address is indicated at "xxxx".

address	data			
	bank0	bank1	bank2	card
00000	8000	F0BE	002E	4BFE
00001	8000	F8EE	003E	4FFE
00002	8000	F3CE	004E	52FE
00004	8000	F8EE	FF7E	1FFE
00008	0000	F64E	038E	54FE
00010	4000	FEBE	036E	7CFE
00020	2000	15BE	FDDE	A2FE
00040	0800	FDBE	FCFE	0000
00080	0080	19EE	FE6E	F820
00100	0000	F7CE	0CBE	FDA0
00200	0000	ED2E	1BEE	C150
00400	85DC	E60E	15CE	05C0
00800	62F0	F2AE	0A7E	0130
01000	04CC	1C9E	0BBE	0216
02000	FFF0	F79E	CF5E	FE4C
04000	F68E	EA1E	09BE	2CD8
08000	013E	18EE	2BFE	E610
10000	0530	FA1E	A96E	DE18
20000	0296	11AE	473E	054E
40000	FB08	0C5E	FF4E	D912

address	data			
	bank0	bank1	bank2	card
80000	1EDE	E22E	E88E	
80001	1D96	E26E	E29E	
80002	1C3A	E2DE	E20E	
80004	196A	E23E	E3EE	
80008	1386	E16E	007E	
80010	0BAE	E42E	1AEE	
80020	0032	EB6E	374E	
80040	E790	FA0E	ED9E	
80080	F372	0BDE	F98E	
80100	0862	F72E	17CE	
80200	2BF0	FB3E	1A6E	
80400	0844	D4AE	07AE	
80800	E0BE	F9BE	16CE	
81000	21B6	F94E	1B5E	
82000	F90E	E42E	EE2E	
84000	DAA2	0E2E	086E	
88000	FBE6	C8EE	1F0E	
90000	FC76	F9FE	2A3E	
A0000	4406	183E	497E	
C0000	131C	DE1E	E3FE	

《 3. SWITCH & LED CHECK 》

When the internal check has been finished normally, the test program will proceed to the SWITCH & LED CHECK automatically and the panel switch and the LED can be checked.

Also, pressing [+10] or [-10] enables to advance or return the checking item. But while the SWITCH & LED CHECK is being carried out, those switches will not function.

- 1) Confirm that the following is indicated in the LCD and that all the LEDs light up.

TO:SW/LED

- 2) Confirm that the name of the switch which is supposed to be checked is indicated after pressing [+1] as follows.

TO:SW/LED
COMBI

The turn to check the switch is as follows.

[COMBI], [EDIT], [PROG], [GLOBAL·MULTI], [INT/CARD·PAGE+], [PAGE--BANK], [+10·▶], [◀·-10], [+1·▲], [▼·-1]

Also, in case that each switch has an LED, confirm that the LED lights up when the switch is pressed.

When the checks of all the switches have been finished, press [+1] to proceed to the check of the MIDI indicator.

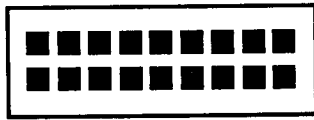
- 3) Confirm that " 1CH " is indicated in the LCD and that the LED which corresponds to the channel lights up.
- 4) Press [+1] and check from 1CH to 16CH. When the check has been finished, press [+1] to the next check.

《 4. LCD CHECK 》

- 1) Confirm that the following is indicated in the LCD.

T1:LCD

2) Press [+1] and confirm that all the dots in the LCD light up.



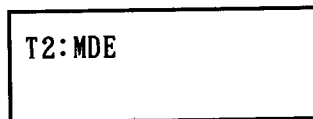
3) Press [+1] and confirm that nothing is indicated in the LCD.



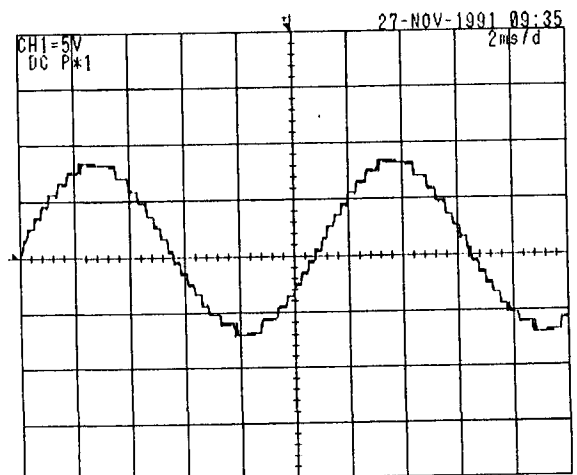
When this check has been finished, press [+1] to proceed to the next check.

« 5. MDE CHECK »

1) Confirm that the following is indicated in the LCD.



2) Connect an oscilloscope to OUTPUT1 and confirm that the following test waveform is transmitted when [+1] is pressed.



MDE TEST WAVEFORM

When something is wrong with this check, check the connected circuit of MDE and the analog circuit.

When this check has been finished, press [+1] to proceed to the next check.

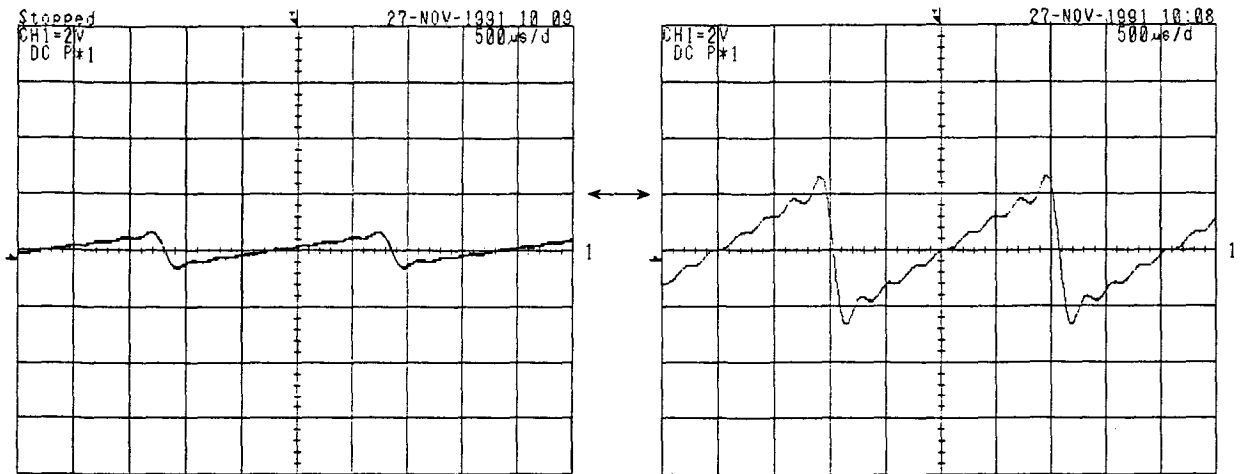
《 6. DF88 CHECK 》

1) Confirm that the following is indicated in the LCD.

T3:DF88

2) Connect an oscilloscope to OUTPUT1 and confirm that the following is indicated in the LCD and the following test waveform appears in the screen of the oscilloscope. At this time confirm that the measured output level of the test waveform changes.

T3:DF88
VDA

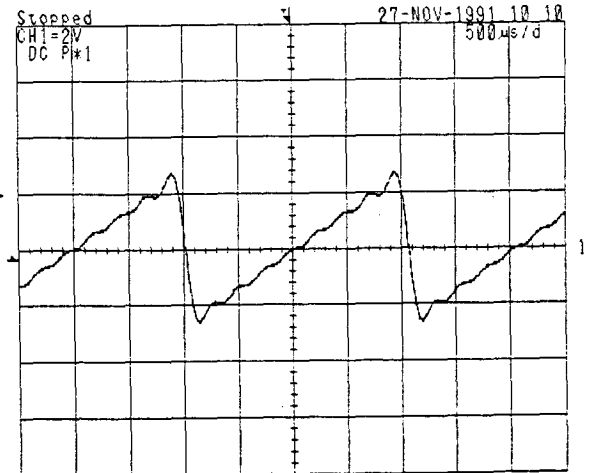
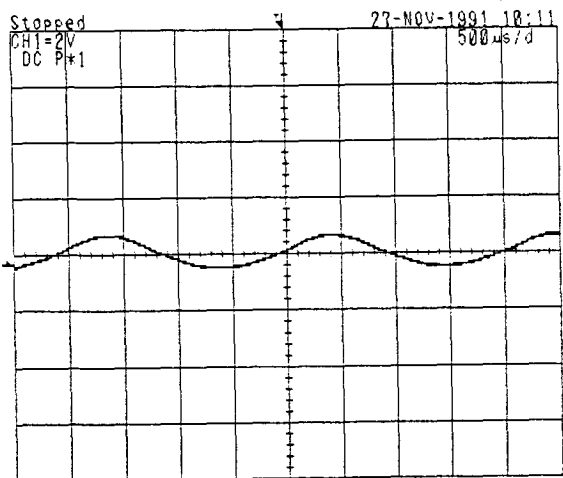


DF88-VDA

3) Confirm that the following is indicated in the LCD when [+1] is pressed.

T3:DF88
VDF

4) Confirm that the measured waveform changes as follows.



DF88-VDF

In case that something is wrong with this check, check the connected circuit of DF88 and TG88.

When this check has been finished, press [+1] to proceed to the next check.

《 7. TG88 CHECK 》

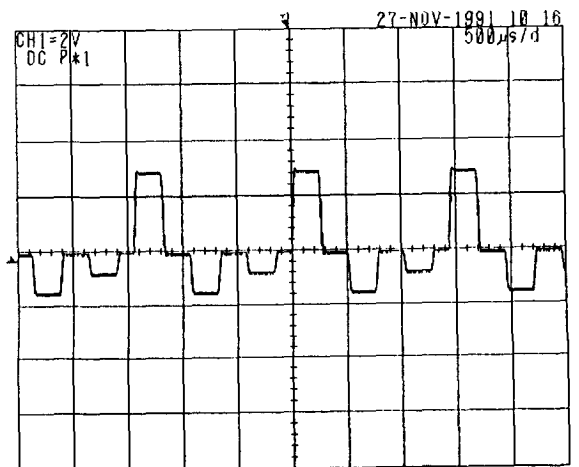
1) Confirm that the following is indicated in the LCD.

T4: TG88

2) Press [+1] and confirm that the following is indicated in the LCD.

T4: TG88
Wave 1

3) Connect an oscilloscope to OUTPUT1 and confirm that the following test waveform appears in the screen of the oscilloscope.

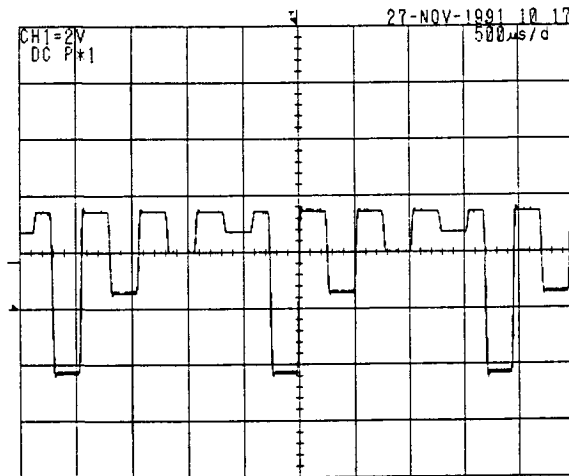


TG88-WAVE1

4) Press [+1] and confirm that the following is indicated in the LCD.

T4: TG88
Wave 2

5) Confirm that the following test waveform appears in the screen of the oscilloscope.

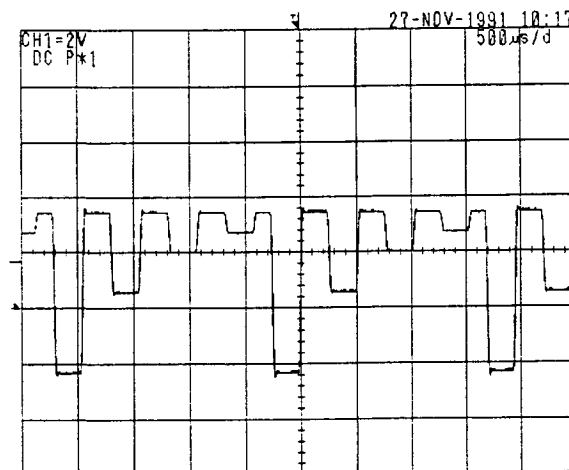


TG88-WAVE2

6) Press [+1] and confirm that the following is indicated in the LCD.

T4: TG88
Wave 3

7) Confirm that the following test waveform appears in the screen of the oscilloscope.

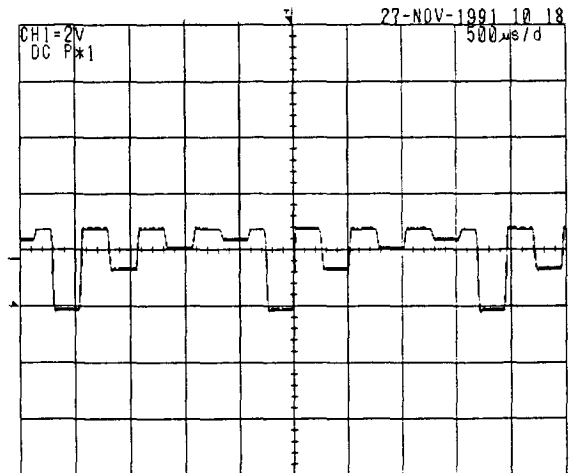


TG88-WAVE3

8) Press [+1] and confirm that the following is indicated in the LCD.

T4: TG88
Wave 4

9) Confirm that the following test waveform appears in the screen of the oscilloscope.



TG88-WAVE4

In case that something is wrong with this check, check the connected circuits of DF88 and TG88.

When this check has been finished, press [+1] to proceed to the next check.

《 8. REMAINING NOISE CHECK 》

Connect a noise meter to each OUTPUT and check the remaining noise.

1) Set the volume of the O3R/W to MAX.

2) Confirm that the following is indicated in the LCD.

T5: NOISE

3) Press [+1] and confirm that the following is indicated in the LCD.
Then, check the noise of OUTPUT1.

T5: NOISE
OUT 1 OFF

- 4) Press [+1] and confirm that the following is indicated in the LCD.
Then, check the noise of OUTPUT2.

```
T5:NOISE
OUT 2 OFF
```

- 5) Press [+1] and confirm that the following is indicated in the LCD.
Then, check the noise of OUTPUT3.

```
T5:NOISE
OUT 3 OFF
```

- 6) Press [+1] and confirm that the following is indicated in the LCD.
Then, check the noise of OUTPUT4.

```
T5:NOISE
OUT 4 OFF
```

- 7) Press [+1] and confirm that the following is indicated in the LCD.
Then, check the noise of PH/L.

```
T5:NOISE
PH/L OFF
```

- 8) Press [+1] and confirm that the following is indicated in the LCD.
Then, check the noise of PH/R.

```
T5:NOISE
PH/R OFF
```

As for the regulation value of the noise, refer to the regulation value table of the following «9.OUTPUT LEVEL CHECK».

« 9. OUTPUT LEVEL CHECK »

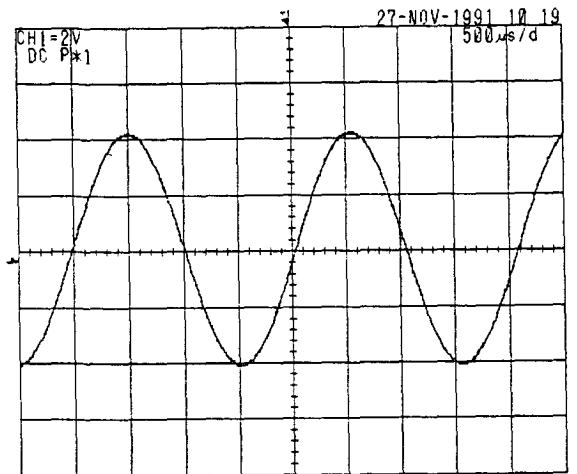
Connect an oscilloscope to each output and check the output level.

- 1) Set the volume of the O3R/W to MAX.
- 2) Confirm that the following is indicated in the LCD.

T6:LEVEL

- 3) Press [+1] and confirm that the following is indicated in the LCD.
Then, check the output level of OUTPUT1.

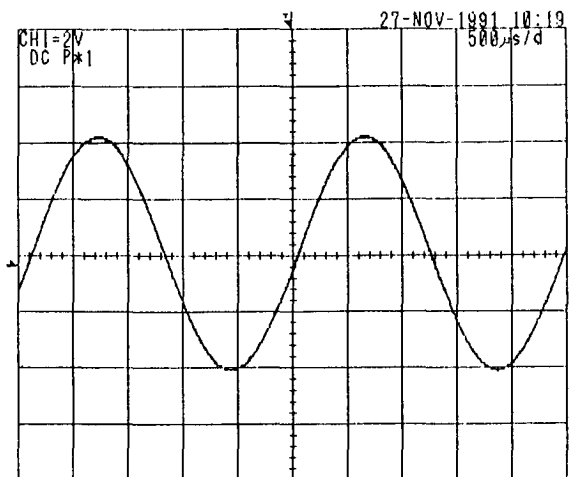
T6:LEVEL
OUT 1 MAX



LEVEL-OUT1

- 4) Press [+1] and confirm that the following is indicated in the LCD.
Then, check the output level of OUTPUT2.

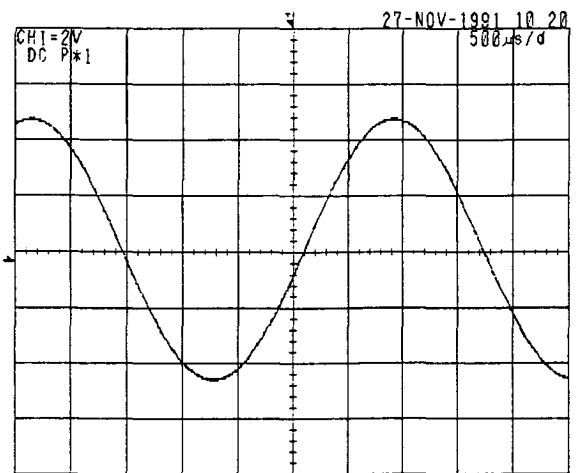
T6:LEVEL
OUT 2 MAX



LEVEL-OUT2

- 5) Press [+1] and confirm that the following is indicated in the LCD.
Then, check the output level of OUTPUT3.

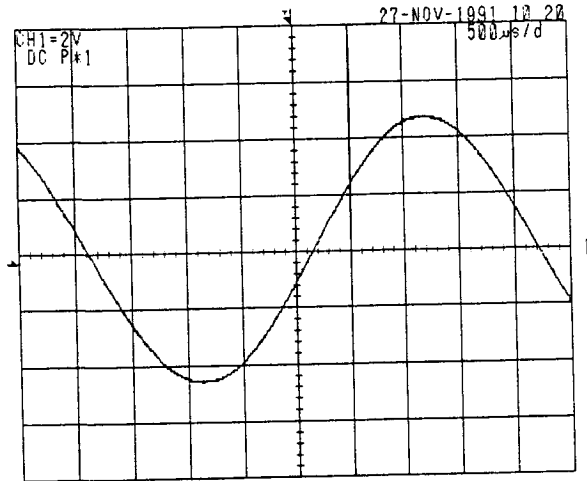
T6:LEVEL
OUT 3 MAX



LEVEL-OUT3

- 6) Press [+1] and confirm that the following is indicated in the LCD.
Then, check the output level of OUTPUT4.

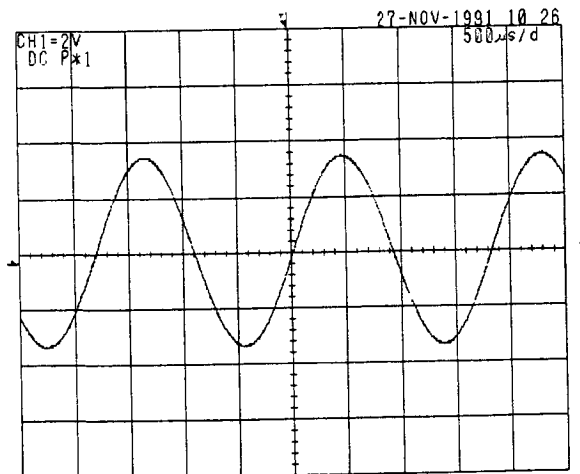
T6:LEVEL
OUT 4 MAX



LEVEL-OUT4

- 7) Press [+1] and confirm that the following is indicated in the LCD.
Then, check the output level of PH/L.

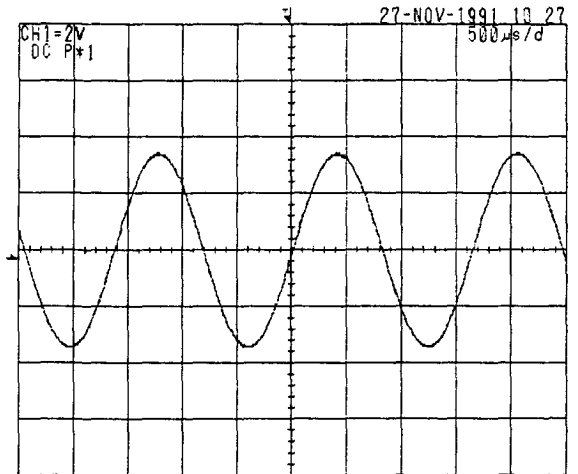
T6:LEVEL
PH/L MAX



LEVEL-PH/L

- 8) Press [+1] and confirm that the following is indicated in the LCD. Then, check the output level of PH/R.

T6:LEVEL
PH/R MAX



LEVEL-PH/R

The regulation value of the output level and the frequency for each output is as follows.

	remaining noise	output signal level	frequency
OUT 1	-87.0dBu ↓	7.5 ~ 14.0 dBu	488 Hz
OUT 2	-87.0 dBu ↓	7.5 ~ 14.0 dBu	412 Hz
OUT 3	-87.0 dBu ↓	8.5 ~ 15.0 dBu	305 Hz
OUT 4	-87.0 dBu ↓	8.5 ~ 15.0 dBu	244 Hz
PH/L	-85.0 dBu ↓	6.0 ~ 12.0 dBu	548 Hz
PH/R	-85.0 dBu ↓	6.0 ~ 12.0 dBu	610 Hz

When the check has been finished, press [+1] and proceed from the test mode to the normal mode. At this time, the preload data will be automatically loaded. Then, check the sound of the preload data and finish all the checks.

《How to confirm the system ROM version number》

When you turn the power on while pressing [Edit] and [GLOBAL·MULTI] simultaneously, the system ROM version number can be indicated in the LCD.

KORG ai² Sy#xx
03R/W

↑
Version NO.

《How to initialize the internal memory》

In case that a system damage happens for the memory crash or the ROM ICs are changed, the internal memory can be initialized. As well as the test mode, save the necessary data into a RAM card before using this function. How to start is as follows.

When you turn the power on while pressing [Edit] and [▼·-1] simultaneously, the system ROM version number will be indicated in the LCD and the internal memory will be initialized.

《OFFSET ADJUSTMENT ON KLM-904 P.C. BOARD》

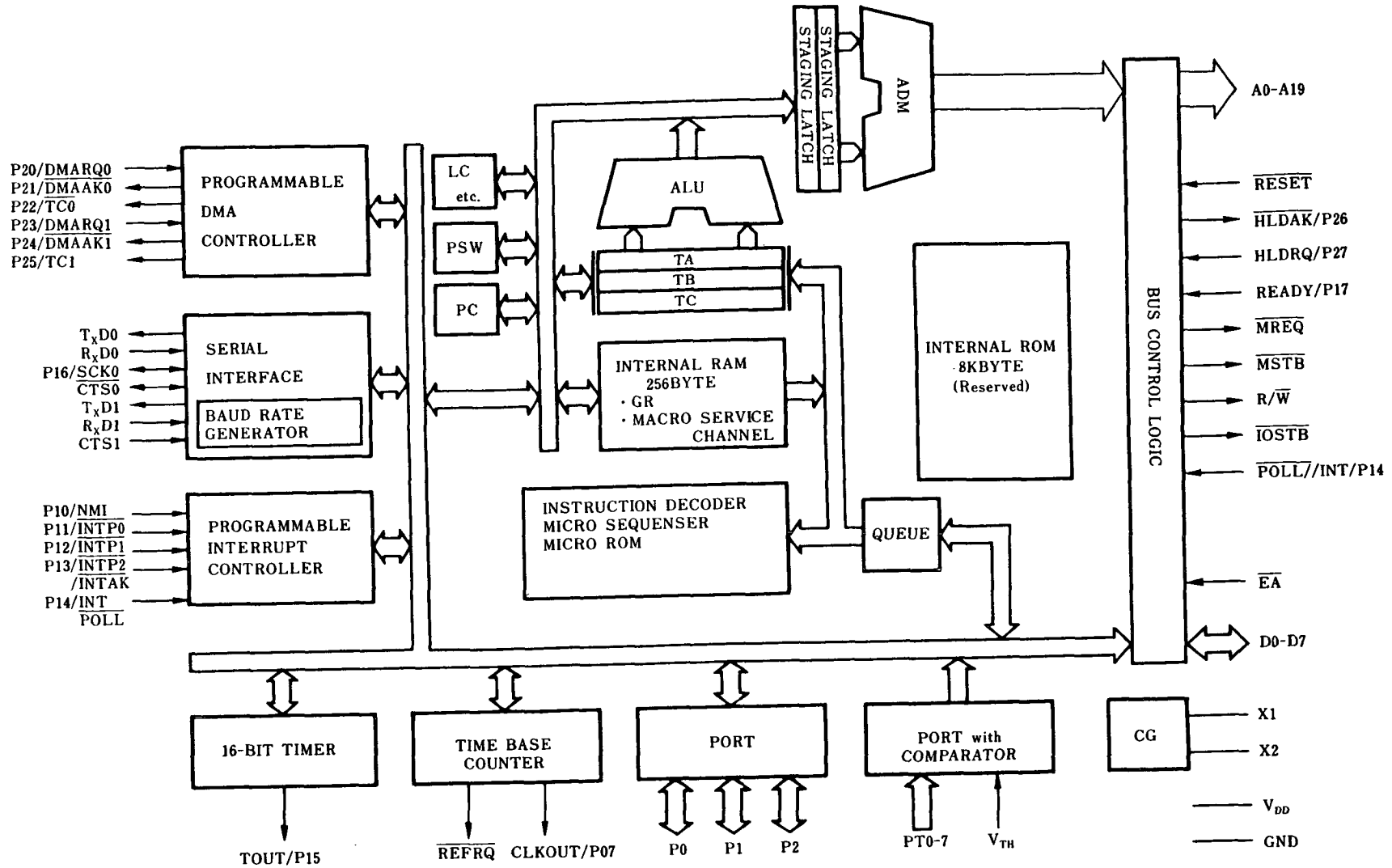
This adjustment has been finished when the product is released from the factory. That is, confirm and adjust the offset only when the D/A converter or any other part connected with the circuit is changed.

1) Connect an oscilloscope to the test point TP1 on the KLM-904 p.c.board.

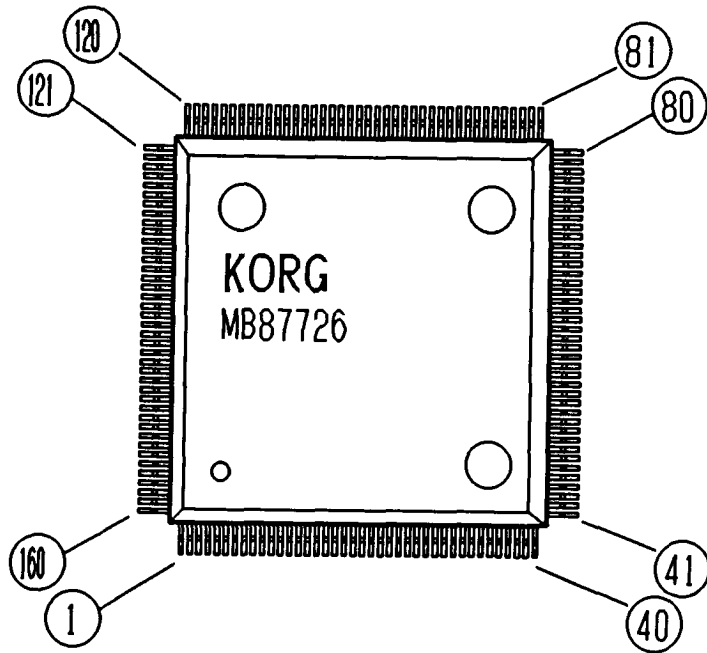
1,2pin : GND 3pin : Signal output

2) Turn the power of the 03R/W on and confirm that the DC level which appears on the screen of the oscilloscope is 0V.
In case that the level misses the point, adjust with VR1 on the KLM-904 p.c.board.

μPD70325-10
INTERNAL BLOCK DIAGRAM



MB87726 (TG88)
PIN ASSIGNMENT

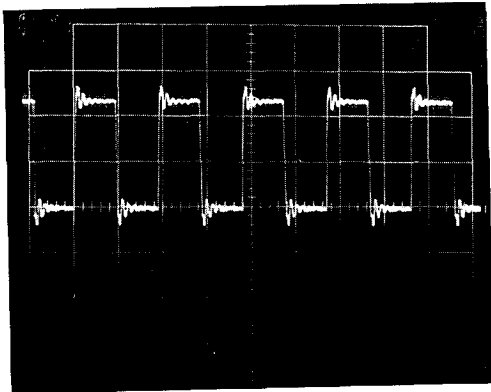


MB87726 (TG88)
PIN FUNCTION

PIN NAME	I/O	FUNCTION
VDD	-	+5V
VSS	-	GND
SMODE	I	Sub TG Mode (H:Sub TG L:Master TG)
FMODE	I	Sampling Rate Switch (H:48KHz L:30KHz)
XRESET	I	Low Active Initial Clear
CLK	I	Master Clock
XCRO	O	System Counter Reset for Sub TG Chip
XCRI	I	System Counter Reset from Master TG Chip
TEST0-3	I	Test Mode Selector
XCSI	I	Chip Select
XWRI	I	Write Pulse Input from CPU
XRDI	I	Read Pulse Input from CPU
A0-9	I	Address Input from CPU
D0-7	I/O	Data Input from CPU
D8-15	I/O	Data Input for 16bit Data Bus
DMODE	I	CPU I/F Data Bus Syze Select (L:8bit H:16bit)
EWDO-15	I	Even-address Wave Data In (from Wave ROM)
OWDO-15	I	Odd-address Wave Data In (from Wave ROM)
WAO-19	O	Address Bus for Wave ROM or RAM
WBO-3	O	Bank Number Out for Wave ROM (16 Banks)
ODO-19	O	Voice Data Out for External Filters or MDE
VNO-4	O	Voice Number Out
RAS0-3	O	for D-RAM
CAS0-3	O	for D-RAM
OWEO-3	O	Write Enable for MDE
OWEF	O	Write Enable for New Filter Chip (MB87727)

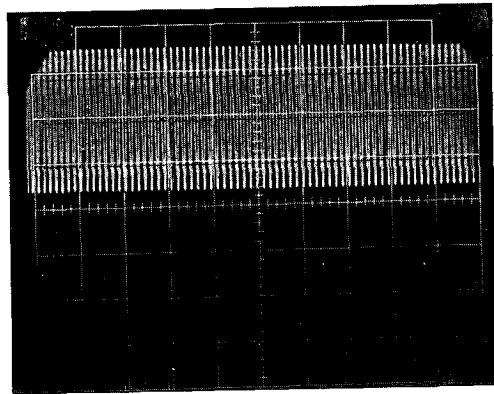
CHECK POINT FOR MB87726

1. OWEF (119pin)



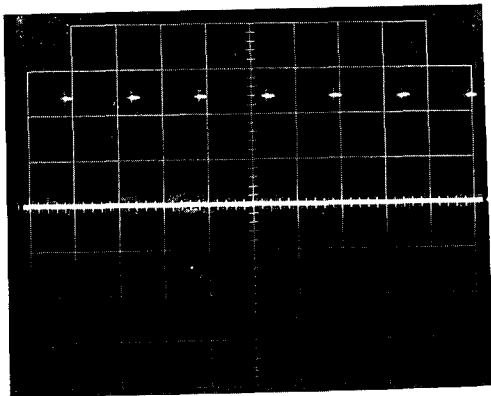
duty cycle of 50% $T=0.1\mu\text{S}$
2V/0.5µS div

2. CLK (111pin)



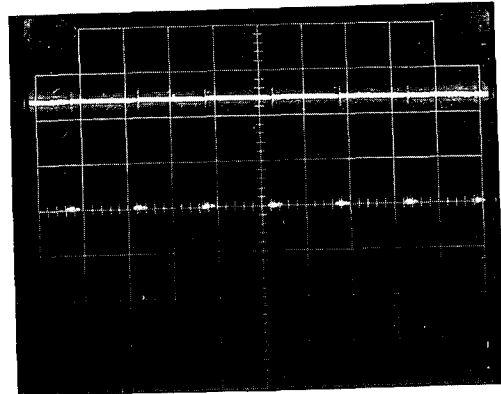
1V/0.2µS div

3. OD0~OD18 (144~123pin)

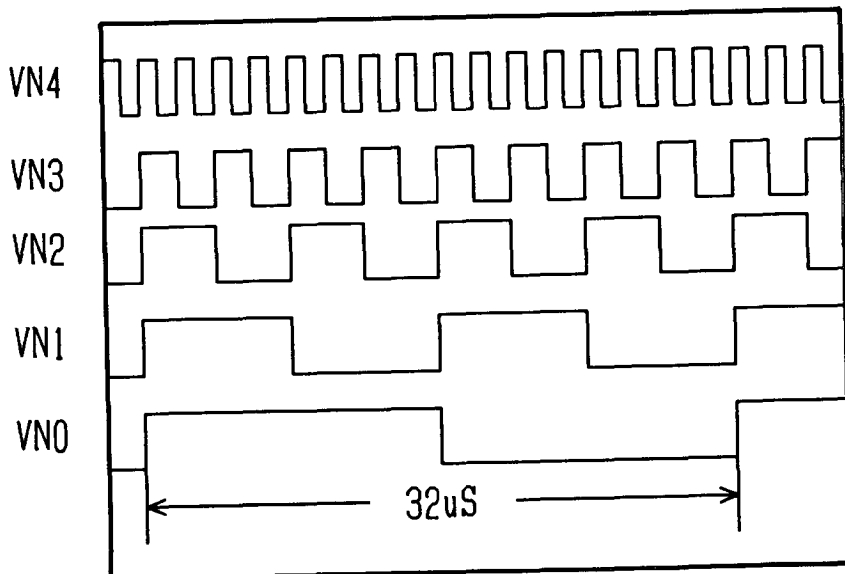


2V/20µS div

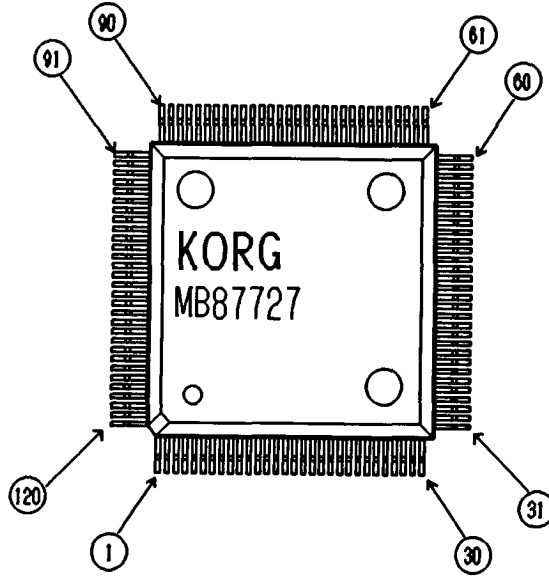
4. OD19 (122pin)



2V/20µS div



MB87727 (DF88)
PIN ASSIGNMENT



MB87727 (DF88)
PIN FUNCTION

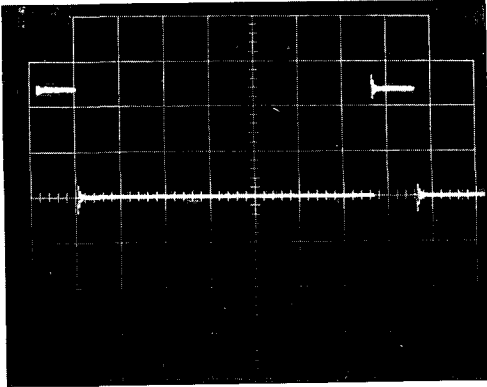
NO.	I/O	PIN NAME	GROUP	NOTE
1	-	VSS	-	
2	I	A0	A	CPU ADDRESS
3	I	A1		
4	I	A2		
5	I	A3		
6	I	A4		
7	I	A5		
8	I	A6		
9	I	A7		
10	I	A8		
11	-	VSS	-	
12	I	A9	B	CPU ADDRESS
13	I/O	D0		CPU DATA BUS
14	I/O	D1		
15	I/O	D2		
16	-	VDD	-	
17	I/O	D3	B	CPU DATA BUS
18	I/O	D4		
19	I/O	D5		
20	I/O	D6		
21	-	VSS	-	
22	I/O	D7	C	CPU DATA BUS
23	I/O	D8		
24	I/O	D9		
25	I/O	D10		
26	I/O	D11		
27	I/O	D12		
28	I/O	D13		
29	I/O	D14		
30	I/O	D15		

NO.	I/O	PIN NAME	GROUP	NOTE
31	-	VSS	-	
32	I	IVNO	D	TG VOICE NO.
33	I	IVN1		
34	I	IVN2		
35	I	IVN3		
36	I	IVN4		TG VOICE DATA
37	I	IVD0		
38	I	IVD1		
39	I	IVD2		
40	I	IVD3		
41	-	VSS	-	
42	I	IVD4	E	TG VOICE DATA
43	I	IVD5		
44	I	IVD6		
45	I	IVD7		
46	-	VDD	-	
47	I	IVD8	E	TG VOICE DATA
48	I	IVD9		
49	I	IVD10		
50	I	IVD11		
51	-	VSS	-	
52	I	IVD12	F	TG VOICE DATA
53	I	IVD13		
54	I	IVD14		
55	I	IVD15		
56	I	IVD16		
57	I	IVD17		
58	I	IVD18		
59	I	IVD19		
60	-	VDD	-	
61	-	VSS	-	
62	I	DEN	G	TG VOICE DATA ENABLE
63	I	XRES		SYSTEM RESET
64	I	OSEL		PARALLEL OUT FORMAT SELECT
65	I	BSEL		CPU DBUS BIT LENGTH SELECT
66	I	MODE0		FILTER MODE SELECT
67	I	MODE1		INCIRCUIT TESTER MODE SELECT
68	I	ITEST		LSI TESTER MODE SELECT
69	I	LTEST		MASTER CLOCK
70	I	MCK		
71	-	VSS	-	
72	I	TSELO	H	NOT USE
73	I	TSEL1		OUTPUT DATA CLIPER ON/OFF
74	I	CLIP		DATA SHIFT SELECT BIT0
75	I	SFT0		
76	-	VDD	-	
77	I	SFT1	H	DATA SHIFT SELECT BIT1
78	I	SFT2		DATA SHIFT SELECT BIT2
79	0	POEN		PARALLEL OUT VOICE DATA ENABLE
80	0	SOD		SERIAL OUT DATA

NO.	I/O	PIN NAME	GROUP	NOTE
81	-	VSS	-	
82	0	SCK	I	SERIAL OUT BIT CLOCK
83	0	SEN		SERIAL OUT DATA ENABLE
84	0	SCH2		SERIAL OUT CH NO. BIT2
85	0	SCH1		SERIAL OUT CH NO. BIT1
86	0	SCHO		SERIAL OUT CH NO. BIT0
87	0	SCHEN		SERIAL OUT CH DATA ENABLE
88	0	OD19		VOICE/MIX
89	0	OD18		PARALLEL
90	0	OD17		OUTPUT
91	-	VSS		-
92	0	OD16	J	OUTPUT
93	0	OD15		
94	0	OD14		
95	0	OD13		
96	0	OD12		
97	0	OD11		
98	0	OD10		
99	0	OD9		
100	0	OD8		
101	-	VSS		
102	0	OD7	K	OUTPUT
103	0	OD6		
104	0	OD5		
105	0	OD4		
106	-	VDD	-	
107	0	OD3	K	OUTPUT
108	0	OD2		
109	0	OD1		
110	0	OD0		
111	-	VSS	-	
112	0	OVN4	L	PARALLEL OUT
113	0	OVN3		VOICE NO.
114	0	OVN2		
115	0	OVN1		
116	0	OVNO		
117	I	XRD		CPU RD ENABLE
118	I	XWR		CPU WR ENABLE
119	I	XCS	CHIP SELECT	
120	-	VDD	-	

CHECK POINT FOR MB87727

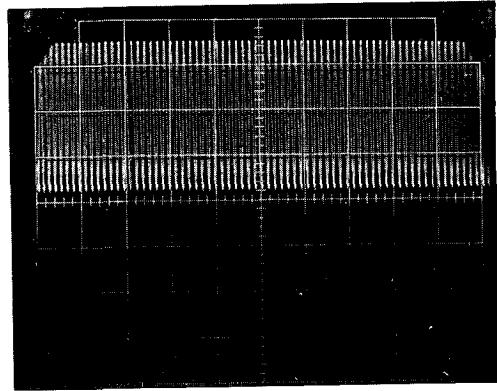
1. OVNO~OVN3 (116~113pin)



T=16uS

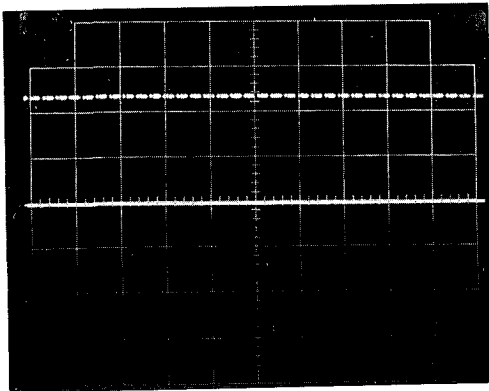
2V/2uS div

2. MCK (52pin)



2V/0.2uS div

3. ODO~OD19 (110~88pin)

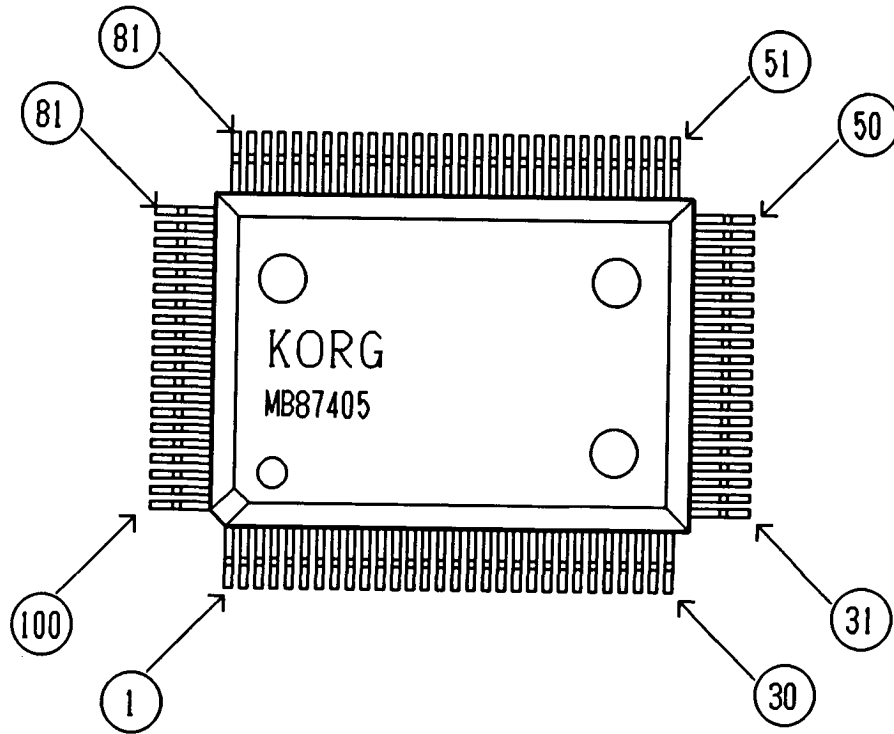


2V/0.1mS div

CLASSIFICATION OF TERMINALS FOR DF88

CLASSIFICATION	TERMINALS
CPU INTERFACE	BSEL, XCS, XRD, XWR A0~A9, D0~D15
PARALLEL OUT (MDE1 INTERFACE)	OSEL, ODO~OD19 OVNO~OVN4, POEN
SERIAL OUT (MDE2 INTERFACE)	SOD, SCK, SEN SCHO~SCH2, SCHEN
MIXER	SFTO~SFT2, CLIP
PARALLEL IN (TG, DF INTERFACE)	IVDO~IVD19 IVNO~IVN4, DEN
MASTER CLOCK	MCK
RESET	XRES
FILTER MODE	MODE0~MODE1
TEST MODE	ITEST, LTEST TSELO, TSEL1
POWER SUPPLY	VDD1~VDD6 VSS1~VSS12

MB87405 (MDE)
PIN ASSIGNMENT

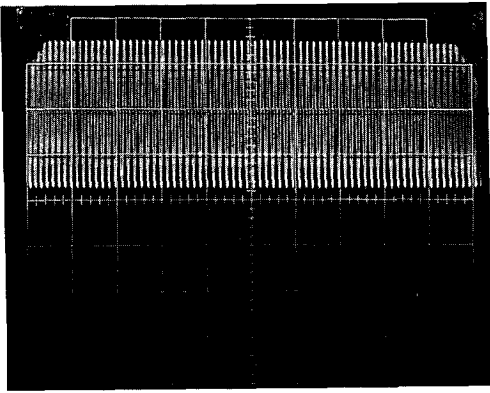


MB87405 (MDE)
PIN FUNCTION

PIN NAME	I/O	PIN NAME	I/O	PIN NAME	I/O
80	I	OE	0	SX1, SX32	0
CS	I	WE	0	PDO~PD19	I
RD	I	RA0~RA7	0	GC	I
WR	I	RDO~RD19	I/O	RESET	I
A0~A2	I	DAO~DA19	0	XTL	I
DO~D7	I/O	SH0~SH3	0	TS0~TS5	I
RAS	0	SAR	I	VDD0~VDD3	---
CAS	0	OL	0	VSS0~VSS7	---

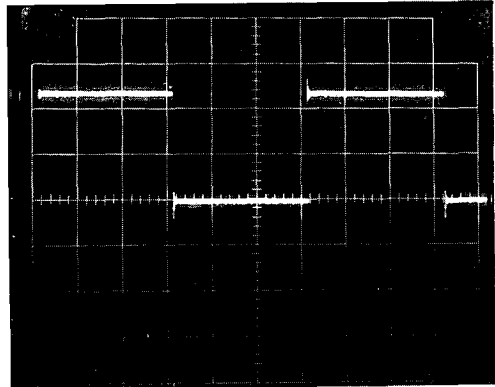
CHECK POINT FOR MB87405

1. XTL (63pin)



1V/0.2uS div

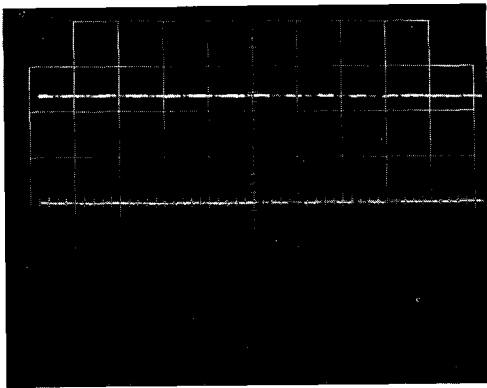
2. SX1 (29pin)



duty cycle of 50% T=32uS

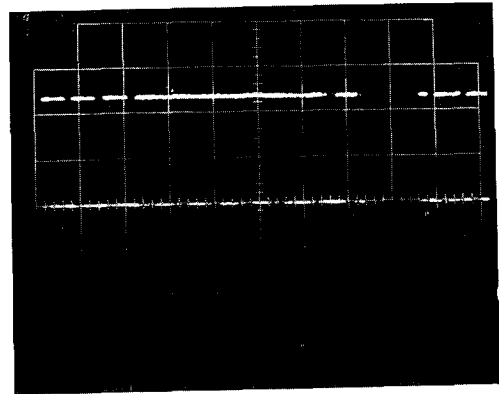
2V/5uS div

3. DA4~DA18 (114~120, 2, 3pin)



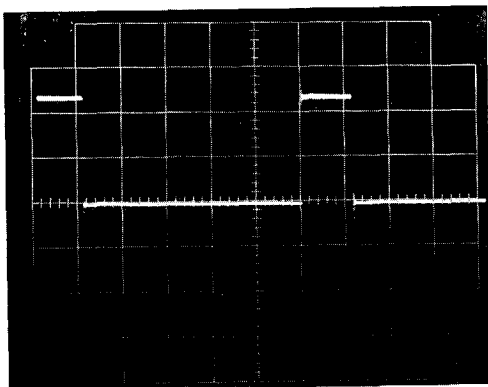
2V/2mS div

4. DA19 (4pin)



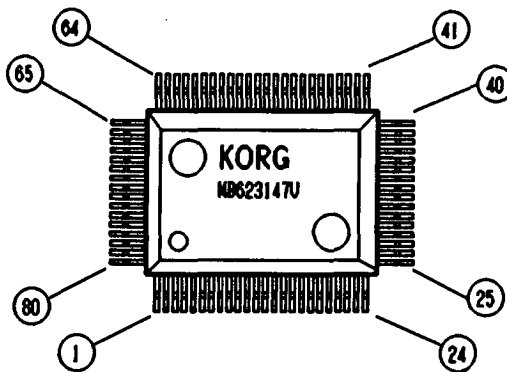
2V/10mS div

5. SH0~SH4 (5~8pin)



2V/5uS div

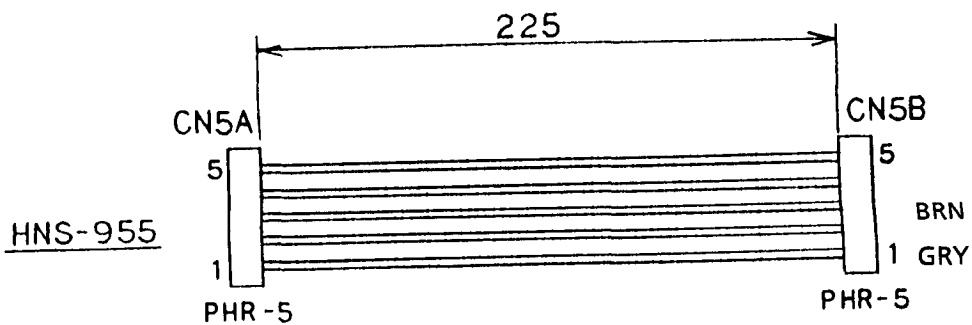
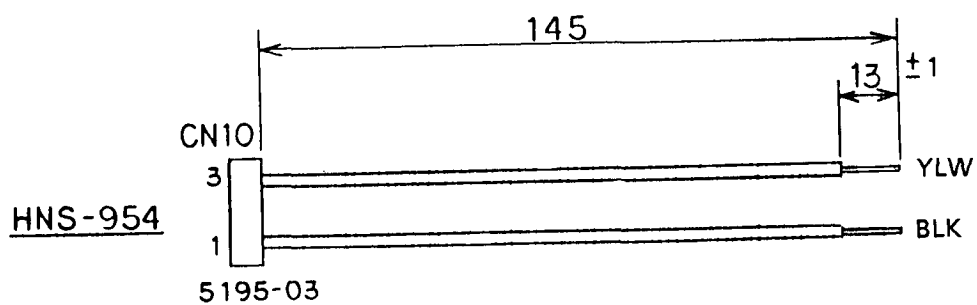
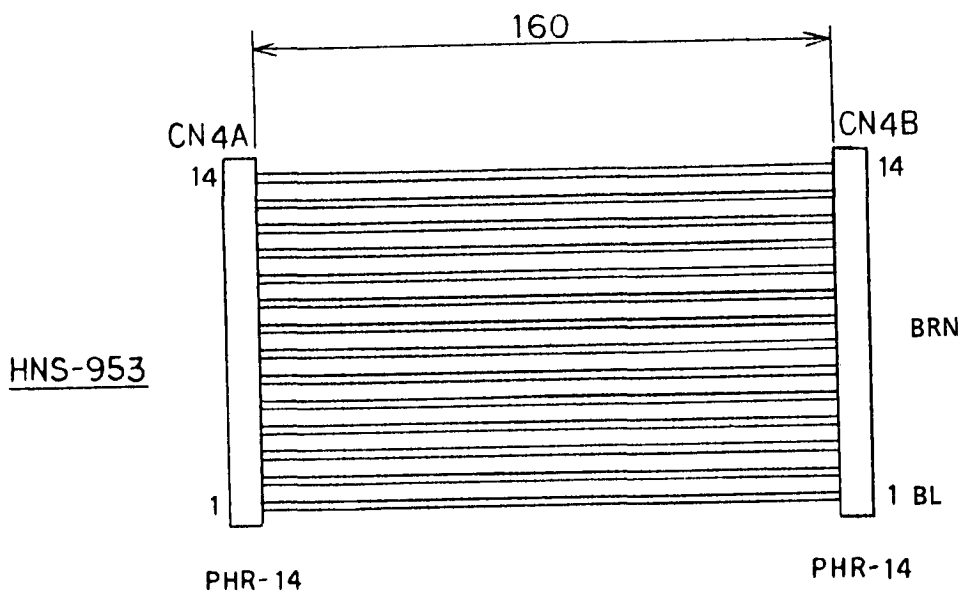
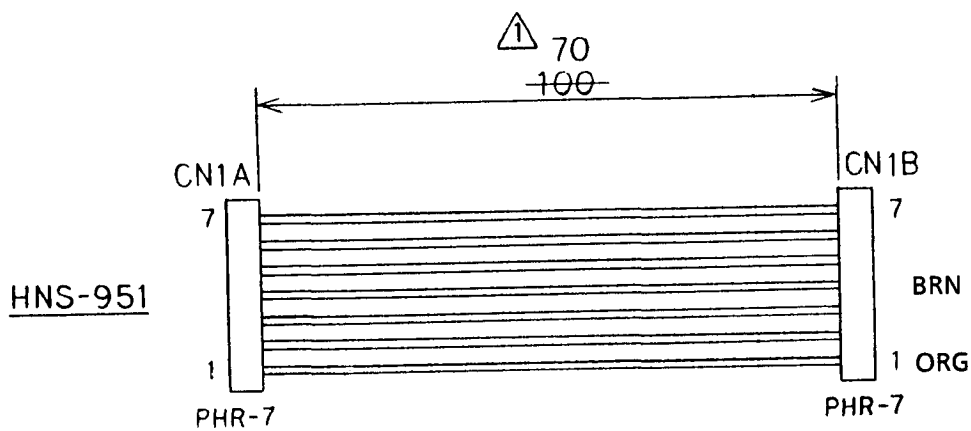
MB623147U (MAP25)
PIN ASSIGNMENT



MB623147U (MAP25)
PIN FUNCTION

NO.	I/O	PIN NAME	NO.	I/O	PIN NAME	NO.	I/O	PIN NAME	NO.	I/O	PIN NAME
1	I	IA19	21	I	IA8	41	0	OA7	61	0	OA11
2	I	IA18	22	I	IA7	42	0	OA6	62	0	OA9
3	I	IA17	23	I	IA6	43	0	OA5	63	0	OA8
4	I	IA16	24	I	IA5	44	0	OA4	64	0	OA13
5	I	IA15	25	I	IA4	45	0	OA3	65	0	OA14
6	I	IA14	26	I	IA3	46	0	OA2	66	0	CDWR
7	I	IA13	27	I	IA2	47	0	OA1	67	0	IOS0
8	I/O	PD7	28	I	IA1	48	0	OA0	68	0	IOS1
9	I/O	PD6	29	I	IA0	49	I/O	D0	69	0	IOS2
10	I/O	PD5	30	I	MREQ	50	I/O	D1	70	0	IOS3
11	I/O	PD4	31	I	MODE	51	I/O	D2	71	0	IOS4
12	---	VSS	32	---	VSS	52	---	VSS	72	---	VSS
13	I/O	PD3	33	---	VDD	53	I/O	D3	73	---	VDD
14	I/O	PD2	34	I	IOST	54	I/O	D4	74	0	IOS5
15	I/O	PD1	35	I	R/W	55	I/O	D5	75	0	MS00
16	I/O	PD0	36	0	MRD	56	I/O	D6	76	0	MS01
17	I	IA12	37	0	MWR	57	I/O	D7	77	0	MS02
18	I	IA11	38	0	IORD	58	0	CDCS	78	0	MS03
19	I	IA10	39	0	IOWR	59	0	OA10	79	0	MS06
20	I	IA9	40	0	OA12	60	0	CDRD	80	0	MS07

FOR HARNESSSES



8. PARTS LIST

PART CODE	PART NAME/SPECIFICATION	P. C. BOARD	NOTE	Q'TY
001090400	P. C. BOARD ASSEMBLY KLM-904/05/06	M. PART		1
304000070	TR 2SA812-T1 (M5-7)	904/5/6		2
304020150	TR 2SC1623-T1B (L7)	904/5/6		7
304020230	TR 2SC3661-TA/TB(3K)	904/5/6		4
304060070	FET 2SK433-T12-C	904/5/6		4
310002100	DIODE SR1M-2	904/5/6		1
310011300	BRIDGE DIODE DBF-20C	904/5/6		1
310011400	BRIDGE DIODE DBF-40C	904/5/6		1
311003500	ZENER DIODE RD11LB2-T1	904/5/6		1
312007800	LED GL3HD8	904/5/6		6
312011800	X-144 LED MODULE	M. PART		1
313002700	LCD DMC16205NYU-LY-B7(WITH HARNESS)	M. PART		1
314001400	DIODE RLS-73 TE-11	904/5/6		16
320001237	IC UPD41464V-12	904/5/6	D_RAM	5
320001270	IC UPD70325L-10 (PLCC)	904/5/6	CPU	1
320001282	IC UPD27C2001D-15	904/5/6	EP_ROM	1
320009004	IC NJM-78L05A	904/5/6	REGULATOR	1
320009018	IC NJM-79L05 A	904/5/6	REGULATOR	1
320009057	IC NJM-7805FA	904/5/6	REGULATOR	1
320009078	IC NJM78M12FA	904/5/6	REGULATOR	1
320009079	IC NJM79M12FA	904/5/6	REGULATOR	1
320011026	IC M5216L-600Y	904/5/6	OP. AMP	1
320011150	IC M66312FP (SOP)	904/5/6	LED DRIVER	1
320012052	IC MB87405PF (QFP120)	904/5/6	MDE	1
320012072	IC MB623147PF (QFP80)	904/5/6	MAP25	1
320012084	IC MB87726PF (QFP160)	904/5/6	TG88	1
320012085	IC MB87727PF (QFP120)	904/5/6	DF88	1
320036005	IC PCM55HP	904/5/6	DAC	1
324001006	IC UPD74HC04GS-E2 (SOP)	904/5/6	HC-MOS	1
324001015	IC UPC4570G2-E2 (SOP)	904/5/6	OP. AMP	8
324001037	IC UPD43256AGU-10/12L-E2	904/5/6	S_RAM	2
324004003	IC HD74HC139FPER	904/5/6	HC-MOS	1
324004011	IC HD74HC04FPER	904/5/6	HC-MOS	2
324004012	IC HD74HC08FPER	904/5/6	HC-MOS	2
324004094	IC HD74HC257FPER	904/5/6	HC-MOS	1
324004168	IC HD74HC4053FPER	904/5/6	HC-MOS	3
324011002	IC M5223FP-73A (8P SOP)	904/5/6	OP. AMP	1
324011005	IC M5238FP-73A (8PSOP)	904/5/6	OP. AMP	3
324011009	IC M62021FP-73A (8P SOP)	904/5/6	RESET	1
324012007	IC MB838000-20PF-G-2B8-EF	904/5/6	WAVE_ROM	1
324012008	IC MB838000-20PF-G-2B9-EF	904/5/6	WAVE_ROM	1

PART CODE	PART NAME/SPECIFICATION	P. C. BOARD	NOTE	Q'TY
324012009	IC MB838000-20PF-G-3B0-EF	904/5/6	WAVE_ROM	1
324012010	IC MB838000-20PF-G-3B1-EF	904/5/6	WAVE_ROM	1
324012011	IC MB838000-20PF-G-3B2-EF	904/5/6	WAVE_ROM	1

334000500	SB COIL SBT-0260 TF	904/5/6		16
334000600	PHOTO COUPLER PC-410K-TP	904/5/6		2

335006000	CRYSTAL OSC. AT-49 20.00MHZ	904/5/6		1
335006600	CRYSTAL OSC. AT-49 32MHZ	904/5/6		1

350002347	SEMI FIXED VR RH0615C S4 47K	904/5/6		1
362005300	VR RK0971220X45A 10KBX2	904/5/6		1

375007800	POWER SW ESB-8213V	904/5/6		1
375010500	TOUCH SW EVQ-PAC09K-A	904/5/6		10

400013000	POWER TRANSFORMER TC-801	M. PART		1

402002800	COIL 2943-666671	904/5/6		2

454004400	PHONE JACK YKB21-5010	904/5/6		4
454006700	DIN JACK YKF-51-5014A	904/5/6		1
454008000	PHONE JACK YKB21-5138	904/5/6		1

464002401	FUSE 125V 2.5A UL	M. PART	117US	1
		M. PART	117CN	1
		M. PART	100JP	1
		M. PART	117EX	1
464011901	FUSE 250V 0.8A UL	M. PART	117CN	1
		M. PART	117US	1
		M. PART	100JP	1
		M. PART	117EX	1
464061301	FUSE 250V T200MA	M. PART	240GE	1
		M. PART	220GE	1
		M. PART	230SC	1
		M. PART	230WG	1
		M. PART	230SE	1
		M. PART	230FR	1
		M. PART	230GE	1
		M. PART	240AF	1
		M. PART	240AU	1
		M. PART	240UK	1
464062201	FUSE 250V T1.6A	M. PART	240AU	1
		M. PART	230WG	1
		M. PART	230GE	1
		M. PART	240AF	1
		M. PART	230SE	1
		M. PART	230FR	1

PART CODE	PART NAME/SPECIFICATION	P. C. BOARD	NOTE	Q'TY
464062201	FUSE 250V T1.6A	M. PART	240GE	1
		M. PART	240UK	1
		M. PART	230SC	1
		M. PART	220GE	1

470195100	HARNESS HNS-951	M. PART		1
470195300	HARNESS HNS-953	M. PART		1
470195400	HARNESS HNS-954	M. PART		1
470195500	HARNESS HNS-955	M. PART		1

471050500	CONNECTOR TOP B5P-VH	904/5/6		1
471070300	CONNECTOR TOP B3B-PH-K-S	904/5/6		1
471070500	CONNECTOR TOP B5B-PH-K-S	904/5/6		1
471070700	CONNECTOR TOP B7B-PH-K-S	904/5/6		2
471071400	CONNECTOR TOP B14B-PH-K-S	904/5/6		2
471071500	CONNECTOR TOP B15B-PH-K-S	904/5/6		1
471090200	CONNECTOR TOP 5096-02C	904/5/6		1
474011300	CARD CONNECTOR HGCO338-01-010	904/5/6		1
474015000	BASE POST WF-21 1-102NA (2P)	904/5/6		1
474015400	CARD CONNECTOR FCN-565P068-G/C	904/5/6		1

480001324	IC SOCKET 32P DICF-32CS-E	904/5/6		1
480010200	3P DIN JACK SOCKET YKF51-5046	904/5/6		1
480010280	IC SOCKET PLPS-N84B-T	904/5/6		1

500018300	RUBBER FOOT 3x22x3	M. PART		4

515002300	FUSE HOLDER S-N5057 #01	904/5/6		4

520001700	LITHIC BATTERY CR2032	904/5/6		1

525000800	DATA LINE FILTER ESD-R-16	M. PART	230FR	1
		M. PART	230GE	1
		M. PART	240UK	1
		M. PART	240AF	1
		M. PART	240GE	1
		M. PART	240AU	1
		M. PART	220GE	1
		M. PART	117US	1
		M. PART	230SE	1
		M. PART	117CN	1
		M. PART	230SC	1

540000300	BUSHING SR-4K-4	M. PART	117EX	1
540000400	BUSHING SR-5P-4	M. PART	240AU	1
540000500	BUSHING SR-6W-1	M. PART	230GE	1
		M. PART	240GE	1
		M. PART	220GE	1

PART CODE	PART NAME/SPECIFICATION	P. C. BOARD	NOTE	Q'TY
540000500	BUSHING SR-6W-1	M. PART	240AF	1
		M. PART	230SC	1
		M. PART	230WG	1
		M. PART	230SE	1
		M. PART	230FR	1
		M. PART	240UK	1
540000501	BUSHING SR-6N3-4	M. PART	117US	1
		M. PART	117CN	1
540007200	WIRE BAND PLT-1M	M. PART		4
540016900	BUSHING SR-5M-3	M. PART	100JP	1

560006200	HEAT SINK PC1747A-25-PB	904/5/6		1
560007200	HEAT SINK PC2040-32.2-PB-P19	904/5/6		1

575015000	LED SPACER LS-15-6.5 L=6.5mm	904/5/6		6

600000301	AC CORD CLASS1(SU429-58)	M. PART	240UK	1
		M. PART	230WG	1
		M. PART	230SC	1
		M. PART	220GE	1
		M. PART	230GE	1
		M. PART	240GE	1
600000401	AC CORD SAA(SU428-58)3X.75	M. PART	240AU	1
600000501	AC CORD BS PLUG(SU431A-58)	M. PART	240AF	1
600000901	AC CORD SEV(SU430-58)	M. PART	230SE	1
600001301	AC CORD KP-4819D GTCE-3.75	M. PART	230FR	1
600002000	AC CORD SJT(SU338-56)18/3MM	M. PART	117US	1
		M. PART	117CN	1
600003900	AC CORD SPT-2 UP-686-J01	M. PART	117EX	1
600004100	AC CORD DP-127-J06	M. PART	100JP	1

620018200	POWER SW KNOB	M. PART		1
620023600	X-943 VR KNOB	M. PART		1

630017100	X-144 LCD WINDOW	M. PART		1

630017300	X-144 ISOLATION SHEET	M. PART		1

640096700	X-757 POWER SW SUPPORT	M. PART		1

641019900	VR SHIELD	904/5/6		1

641020000	X-052 RACK MOUNT ADAPTER	M. PART		2

641027900	X-144 LOWER CASE	M. PART		1

641028000	X-144 REAR PANEL	M. PART		1

PART CODE	PART NAME/SPECIFICATION	P. C. BOARD	NOTE	Q'TY
641028100	X-144 COVER	M. PART		1
641028200	X-144 POWER SW BAR	M. PART		1
641028500	X-144 FRONT PANEL ASSEMBLY	M. PART		1
641028800	X-144 BUSHING PLATE	M. PART	220GE	1
		M. PART	100JP	1
		M. PART	240UK	1
		M. PART	230SC	1
		M. PART	240AU	1
		M. PART	230WG	1
		M. PART	230SE	1
		M. PART	240AF	1
		M. PART	240GE	1
		M. PART	230GE	1
		M. PART	117EX	1
		M. PART	230FR	1
641028801	X-144 BUSHING PLATE	M. PART	117CN	1
		M. PART	117US	1
644003000	X-507 GND SPRING	M. PART		2
646030200	X-757G POWER SW FRAME	M. PART		1
646039400	X-011/012 CARD GUIDE	M. PART		1
646039500	X-011/012 CARD SLOT	M. PART		1
649007400	BATTERY HOLDER	904/5/6		1

MEMO

MEMO

VAROITUS

Paristo voi räjähtää, jos se on virheellisesti asennettu.
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

ADVARSEL!

Lithiumbatteri – Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri af samme fabrikat og type.
Levér det brugte batteri tilbage til leverand ø ren.

ADVERSEL

Lithiumbatteri – Eksplosjonsfare.
Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten.
Brukt batteri returneres apparatleverand ø ren.

VARNING

Explosionsfara vid felaktigt batteribyte.
Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren.
Kassera använt batteri enligt fabrikantens instruktion.

CAUTION

Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type recommended by the equipment manufacturer.
Discard used batteries according to manufacturer's instructions.

KORG

KORG INC. 15-12, Shimotakaido 1-chome, Suginami-ku, Tokyo 168
