

# SERVICE MANUAL

AI Synthesis Module

# MBR

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# KORG

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# 1. SPECIFICATIONS

System	: AI synthesis system (full digital processing)
Tone generator	: 16 voice, 16 oscillator
Wave memory	: PCM 16 Mbit
Effect section	: 2 systems of digital multi-effects
Number of program	: 100 programs
Number of combinations	: 100 combinations
Demo	: 5 songs
Outputs	: 1/L, 2/R, 3, 4, headphones
Card slot	: PCM data programs
MIDI	: IN, OUT, THRU REMOTE jack
Display	: 16 character x 2 line backlit LCD
Options	: RAM card (MCR-03), ROM cards, PCM cards
Power consumption	: 11 W nominal
External dimensions	: 430 (W) x 405 (D) x 88 (H) mm
Weight	: 5.9Kg (not including rack-mount adapter)

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

## ADVARSEL!

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

## Litiumparistor!

Paristori saa vaihtaa ainoastaan huoltohenkilöstö saman valmistajan vastaavalla tyypillä. Virheellisestä käsitteystä syntyy räjähdysvaara.

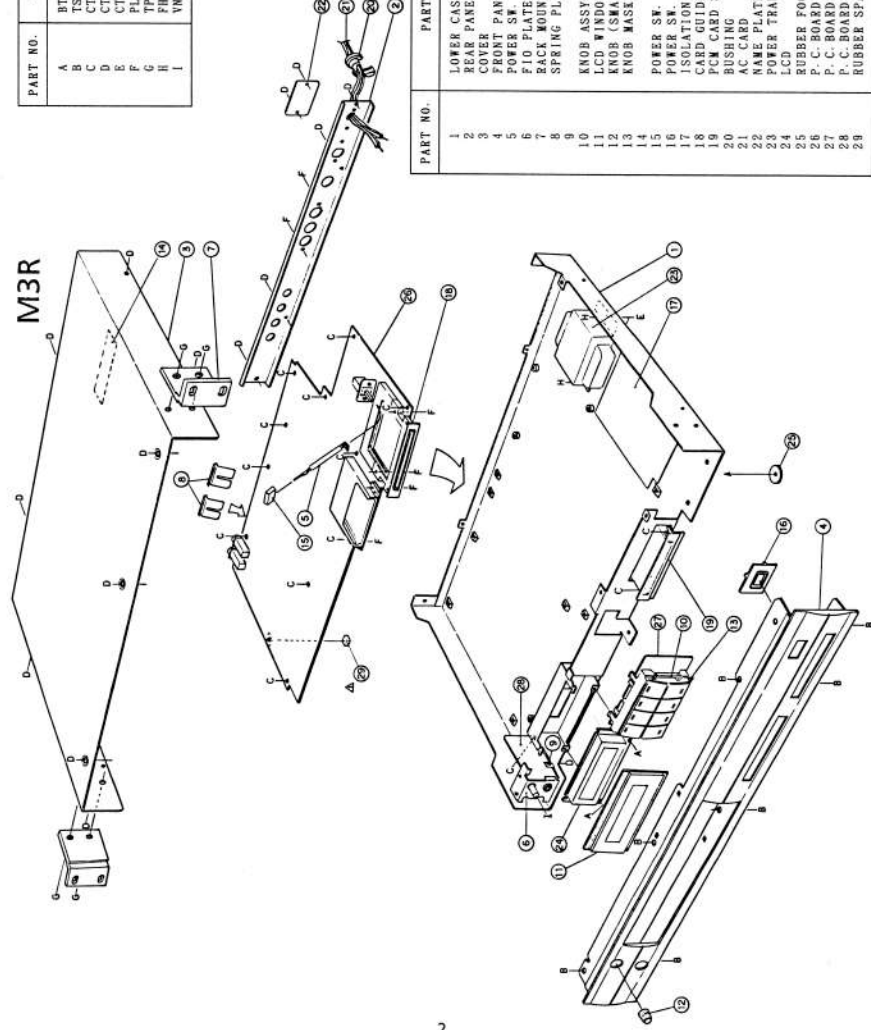
PARTS CODE	PARTS NAME SPECIFICATIONS	P. C. BOARD	IDENTIFICATION NO. FUNCTION	Q' TY
600002000	SJT (SU338-56)	M. PRT	117CN	1
600003900	SPT-2 UP-686-J01		117US	1
600004100	DP-127-J06		117EX 100JP	1
POWER SW. KNOB				
620018200		M. PRT		1
KNOB				
620020900	(SMALL)	M. PRT		1
KNOB ASSY.				
620021800		M. PRT		1
ISOLATION SHEET				
630007500		M. PRT		1
LCD WINDOW				
630010600		M. PRT		1
PARAMETER SHEET				
630010900		M. PRT		1
CARD GUIDE				
640088500		M. PRT		1
MIDI SHIELD				
640094300		871		1
COVER				
640096600		M. PRT		1
PSW SUPPORT				
640096700		871		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P. C. BOARD	IDENTIFICATION NO. FUNCTION	Q' TY
PSW BAR				
640096800		M. PRT		1
FIO PLATE				
640096900		M. PRT		1
RACK MOUNT ADAPTOR				
640097000		M. PRT		2
FRONT PANEL				
641005200		M. PRT		1
REAR PANEL				
641005500		M. PRT		1
LOWER CASE				
641005600		M. PRT		1
SPRING PLATE				
644003000		M. PRT		2
PCM CARD SLOT				
646028300		M. PRT		1
PSW FRAME				
646030200		M. PRT		1
BATTERY HOLDER				
649007400		871		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P. C. BOARD	IDENTIFICATION NO. FUNCTION	Q' TY
484061601	250V T100WA	M PRT	240AF 220WG 220SC 220FR 240UK	2 2 2 2 2
484062201	250V T1.6A		220GE 220SE 240GE 240AF 240WF 220WG 220SC 220FR 240UK	1 1 1 1 1 1 1 1 1
HARNESSES				
470180500	HNS-905 (14P)	M PRT		1
470180600	HNS-906 (13P)	871		1
470180700	HNS-907 (8P)	873		1
470180800	HNS-908 (3P)	M PRT		1
470180900	HNS-909 (2P)			1
CONNECTOR TOPS				
471050500	B5P-VH	871		1
471090200	5096-92C			1
471094000	TLL-948P-BI			2
471094100	TLL-948P-BI			1
471094130	TLL-P13P-BI			1
471094140	TLL-P14P-BI			1
BC CONNECTOR				
474009900	L-32	871		1
CARD CONNECTOR				
474011300	H6C0338	871		1
LV CONNECTOR				
474012700	B2P-LV-7W	871		1
IC SOCKET				
480001324	32P DICF-32CS-E	871		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P. C. BOARD	IDENTIFICATION NO. FUNCTION	Q' TY
480010180	M-1704 (x3)	871	DIN JACK SOCKET	1
500012900		M PRT	RUBBER SPACER	1
500013000	3x22x3	M PRT	RUBBER FOOT	4
515002300	S-A5057 #01	871	FUSE HOLDER	8
LITHIC BATTERY				
520001700	CR2032	871		1
550012700		M PRT	KNOB MASK	1
HEAT SINKS				
580006100	BL40H-30-RS-AN-0	871		1
580006200	WSD-25-BS-AN-0			1
575013908	L-28W	872	LED SPACER	8
AC CORDS				
600000301	CLASS1 (SU429-58)	M PRT	220GE 240GE 220WG 220SC 240UK	1 1 1 1 1
600000401	SAA (SU429-58)		240AF	1
600000501	RS-PIRG(SU431-58)		240WF	1
600000901	SEV (SU430-58)		220SE	1
600001301	EP-4819D		220FR	1

M3R



PART NO.	SCREWS & NUT	Q' TY
A	BT B ZMC 2x5	2
B	CT B ZMC 3x6	7
C	CT B ZMC 3x6	14
D	CT B B2MC 3x8	16
E	CT B B2MC 4x10	2
F	PLAX B B2MC 3x10	6
G	TP2G F B2MC 4x10	4
H	FNZ ZMC 4	2
I	VN B2MC 7	1

PART NO.	PART NAME	PART CODE
1	LOWER CASE	641005600
2	REAR PANEL	641005500
3	COVER	640096600
4	FRONT PANEL	641005200
5	POWER SW. BAR	640098800
6	PIO PLATE	640098900
7	RACK MOUNT ADAPTOR	640097000
8	SPRING PLATE	644005000
10	KNOB ASSY.	620021800
11	LCD WINDOW	630010600
12	KNOB (SMALL)	620020900
13	KNOB MASK	550012700
14		
15	POWER SW. KNOB	620018200
16	POWER SW. FRAME	646030200
17	ISOLATION SHEET	630007500
18	PCB MOUNTING	646028300
19	PCB CARD SLOT	
20	BUSHING	646028300
21	AC CARD	
22	NAME PLATE	
23	POWER TRANSFORMER	400012000
24	LCD	313001900
25	RUBBER FOOT	500013000
26	P. C. BOARD KLM-871	001087100
27	P. C. BOARD KLM-872	001087200
28	RUBBER SPACER	500012900



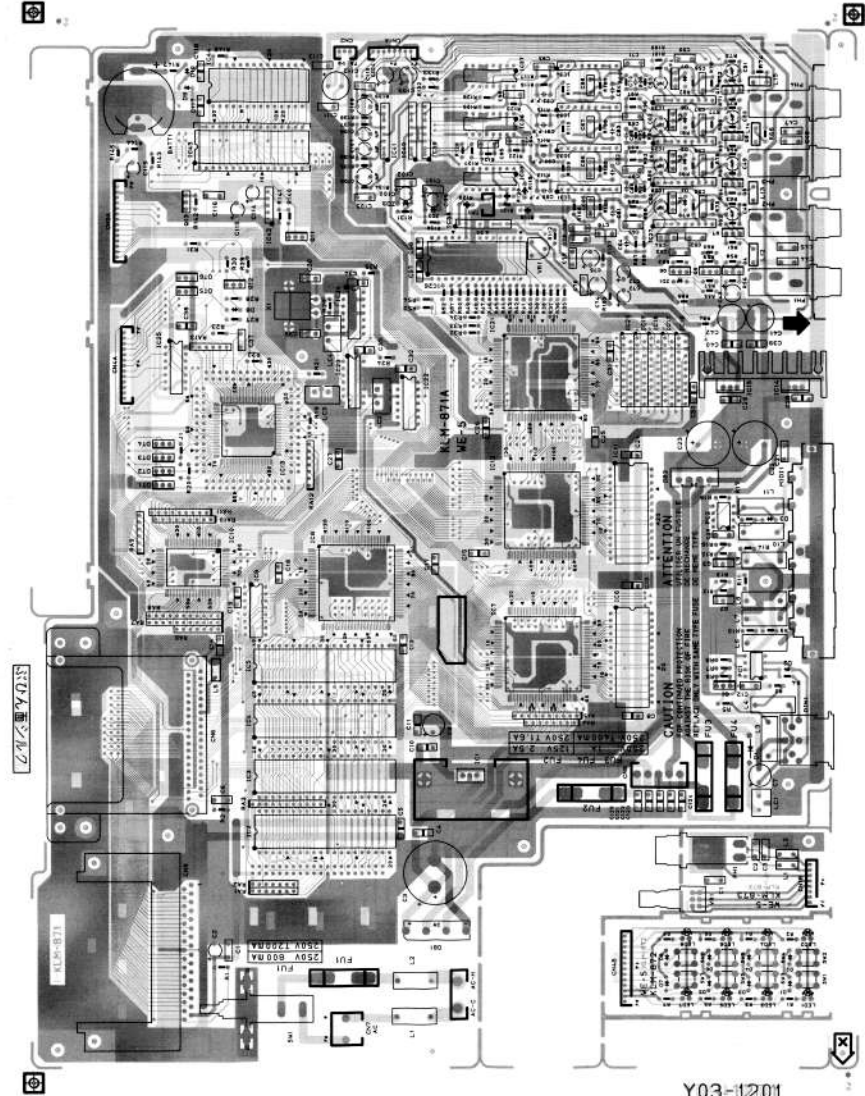
## 8. PARTS LIST

PARTS CODE	PARTS NAME SPECIFICATIONS	P. C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
BLOCK RESISTORS				
304000022	25K381-T11-B/C	871	PET	4
310002100	SR1M-2	871	DIODES	1
314001300	1SS-133	872		8
BRIDGE DIODES				
310011000	KB502L-6176	871		1
310011100	KB502ML6127			1
LED				
312007800	GL3HRD8	872		8
LCD				
313001900	LM162F03	M. PRT		1
ZENER DIODES				
314023900	RD5.1ES81-T	871		2
314024900	RD1.1ES82-T			1
ICs				
320001063	UPD-40538C	871	C MOS	3
320001068	UPD74HC04C		IC MOS	1
320001094	UPD74HC139C		IC MOS	2
320001094	UPD74HC04C		IC MOS	2
320001158	UPD27C1000AD-15		S. RAM	1
320001182	UPD24C512EC-039		EP ROM	1
320001209	UPD48256AC-15LL		MASK ROM	1
320001210	UPD70320GJ-8-58G		S. RAM	1
320004057	NJM-7805FA		CPU	1
320004972	NJM-5532S		REG	1
320004972	NJM-5532S		OP AMP	1
320008078	NJM78M12FA		REG	1
320011028	M-3216L		OP AMP	1
320011074	M5585T4P		OP AMP	1
320011078	M5585L		OP AMP	3

PARTS CODE	PARTS NAME SPECIFICATIONS	P. C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
BLOCK RESISTORS				
135005510	KKCI/885J 10K	871		2
135005510	KKCI/885J 10K			4
135005510	KKCI/885J 10K			1
135005510	KKCI/885J 10K			2
135009510	KKCI/885J 10K			1
135010510	KKCI/8810J 10K			3
FUSE RESISTOR				
184016233	1/6WJ 33 OHM	871		2
EMI FILTERS				
219050100	DSS310-55D223S			1
219050800	MFV610-655 T2A 206	871		2
219050900	MFV610-655 T2A 506			1
ELECTROLYTIC CAPACITORS				
235011422	25V 2200UF	871		2
239027447	16V 4700UF			1
254003210	16V 100UF			1
254003277	16V 470UF			2
254003277	16V 470UF			3
254004310	25V 100UF			5
254006010	50V 0.1UF			1
254063222	16V 22UF			2
254084210	25V 10UF			8
254086110	50V 1UF			2
PPC				
264008433	100V 3300PF	871		4
TRANSISTORS				
304000020	2SA1175 TK	871		3
304020020	2SC2785 TK			6
304020100	BA144M-T			4
304020110	BN144M-T			2
304020180	2SC2878 A/B			4

## 5. P.C. BOARD

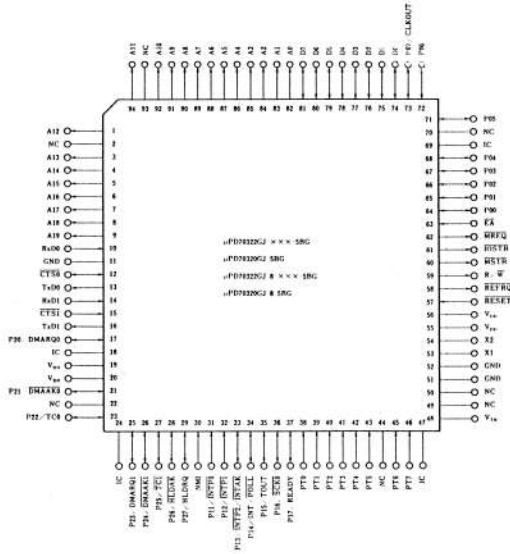
KLM871/872/873



Y03-11201

# 6. REFERENCE DATA

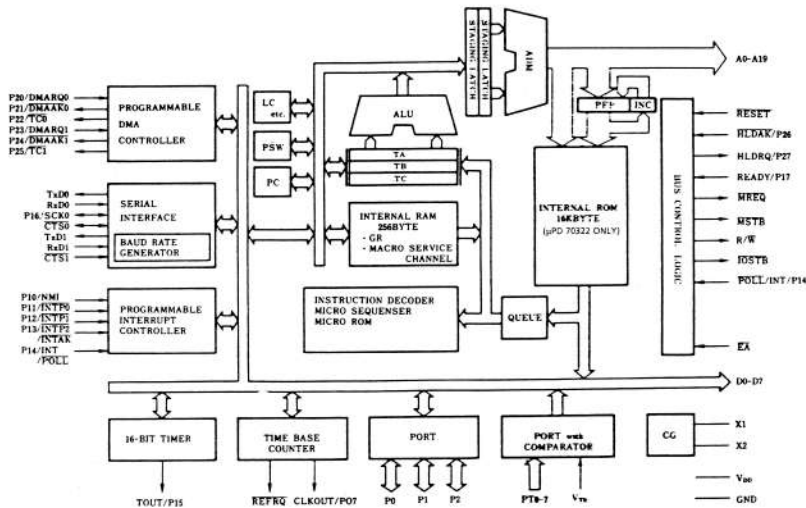
UPD 70320 G-8-5-BG



## PIN FUNCTION

Pin Name	I/O	Pin Name	I/O	Pin Name	I/O
P00-P06	I/O	TXD0	0	EA	1
P07	I/O	TXD1	0	X1	1
NW1	I	RXD0	1	X2	1
INTP0	I	RXD1	1	D0-D7	I/O
INTP1	I	CTS0	I/O	A0-A19	0
INTP2	I	CTS1	1	WREQ	0
P14-P17	I/O	REFRQ	0	WSTB	0
P20-27	I/O	VTH	1	R/W	0
P10-P17	I	RESET	1	IOSTB	0
VDD	-	GND	-	IC	-

## BLOCK DIAGRAM



T3:OUT  
OUT 1 MAX

Sin wave is output from OUT 1. When [▲/YES] SW. is pressed in order, the output changes from OUT 1 to PH/R as the noise is measured. Refer to the fig.2 to see each output level and frequency. In this case, confirm that the difference of the level of the pair outputs(OUT 1 and OUT 2, OUT 3 and OUT4, PH/R and PH/L) should be within 400mV.

T3:OUT  
PH/R MAX

	OUT 1	OUT 2	OUT 3	OUT 4	PH/L	PH/R
NOISE LEVEL (-dBm)	73.0	73.0	72.0	72.0	74.0	74.0
OUTPUT LEVEL (Vpp)	5.0~9.0	5.0~9.0	6.0~10	6.0~10	6.0	6.0
FREQUENCY (Hz)	488	411	305	244	549	610

fig.2

### 6) VDF, MDE CHECK

T4:VDF

When [▲/YES] SW. is pressed at this time, the program for VDF check starts. Confirm that the sound like the explosion is output while [▲/YES] SW. is being pressed for less than 2 second. Press [▲/YES] SW. and proceed to the next check.

T5:MDE  
TEST 1

The program for MDE check starts by pressing [▲/YES] SW. again. About 12Vpp sin wave is output on TEST 1. (fig.3) Press [▲/YES] SW. again and the display changes to TEST 2. If [▲/YES] SW. is pressed for 3 sec. and no sound is heard, it's normal. Press [▲/YES] SW. and proceed to the next check.

### 7) RAM CARD TEST

T6:RAM CARD  
Insert RAM CARD

When RAM CARD (MCR-03) is put into the card slot, the protect switch is off and [▲/YES] SW. is pressed here, RAM CARD WRITE/READ TEST is done.

When this test is finished normally, PRELOAD DATA is transmitted from M3R ROM to M3R RAM and TEST MODE is changed to the normal mode.

#### 4) TG TEST

Connect the oscilloscope to OUT 1 of M3R.  
Turn the master volume of M3R to MAX.

T2:TG  
WAVE

LCD display indicates as left.  
Press [▲/YES] SW.

T2:TG  
WAVE 1

While the display is indicating as left,  
TG TEST WAVE 1 is output from OUT 1.

Confirm that WAVE 1 outputs neither sound nor noise.  
Press [▲/YES] SW.

T2:TG  
WAVE 2

Confirm that WAVE 2 also outputs neither sound nor noise.  
Press [▲/YES] SW.

T2:TG  
WAVE 3

Confirm the waveform like fig.1.  
Press [▲/YES] SW.

T2:TG  
WAVE 4

Confirm the waveform like fig.2.  
Press [▲/YES] SW.

T2:TG  
WAVE 5

Confirm the waveform like fig.3.  
When [▲/YES] SW. is pressed again,  
the process changes to the next.

#### 5) OUTPUT TEST

T3:OUT

LCD display indicates as left.  
Press [▲/YES] SW.

T3:OUT  
OUT 1 OFF

The display indicates as left.  
Connect the noise meter to the output that is indicated  
on the display and measure the noise level.

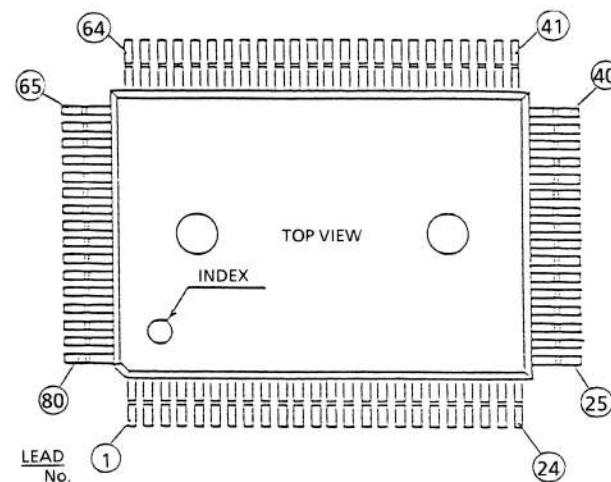
T3:OUT  
OUT 2 OFF

Press [▲/YES] SW. in order at this time  
and measure the noise level of OUT 1~ OUT 4. PH/L. PH/R.

T3:OUT  
PH/R OFF

The next is the measure of the output level.  
Press [▲/YES] SW.

#### MB 623147 (MAP 25)



#### PIN FUNCTION

No.	I/O	Pin Name	No.	I/O	Pin Name
1	I	IA19	21	I	IA8
2	I	IA18	22	I	IA7
3	I	IA17	23	I	IA6
4	I	IA16	24	I	IA5
5	I	IA15	25	I	IA4
6	I	IA14	26	I	IA3
7	I	IA13	27	I	IA2
8	I/O	PD7	28	I	IA1
9	I/O	PD6	29	I	IA0
10	I/O	PD5	30	I	WREQ
11	I/O	PD4	31	I	MODE
12	-	VSS	32	-	VSS
13	I/O	PD3	33	-	VDD
14	I/O	PD2	34	I	IOS1
15	I/O	PD1	35	I	EW
16	I/O	PD0	36	O	WRD
17	I	IA12	37	O	WFR
18	I	IA11	38	O	IORD
19	I	IA10	39	O	IOWR
20	I	IA9	40	O	OA12

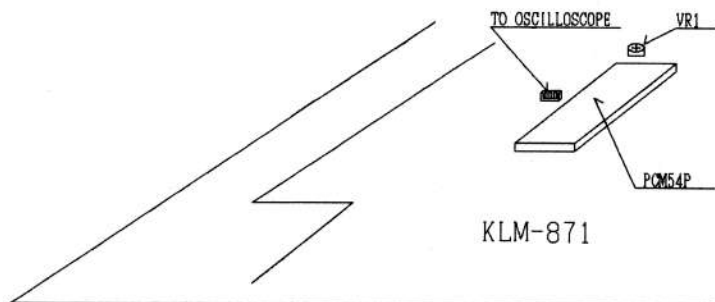
No.	I/O	Pin Name	No.	I/O	Pin Name
41	O	OA7	61	O	OA11
42	O	OA6	62	O	OA9
43	O	OA5	63	O	OA8
44	O	OA4	64	O	OA13
45	O	OA3	65	O	OA14
46	O	OA2	66	O	CDWR
47	O	OA1	67	O	IOS0
48	O	OA0	68	O	IOS1
49	I/O	D0	69	O	IOS2
50	I/O	D1	70	O	IOS3
51	I/O	D2	71	O	IOS4
52	-	VSS	72	-	VSS
53	I/O	D3	73	-	VDD
54	I/O	D4	74	O	IOS5
55	I/O	D5	75	O	MS00
56	I/O	D6	76	O	MS01
57	I/O	D7	77	O	MS02
58	O	CDCS	78	O	MS03
59	O	OA10	79	O	MS6
60	O	CDRD	80	O	MS7

# 7. CHECK AND ADJUSTMENT

## Check and adjustment of KLM-871 p. c. board

- 1) Connect the oscilloscope to the test point (TP1) on KLM-871.  
(The right side is GND and the left side is the output signal when you see the test point from the front side of M3R.)

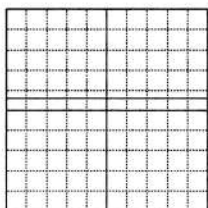
fig.1



- 2) When power is turned on, two indications below are appeared in order.

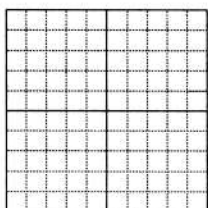
KORG AI Synthesis M3R	-----	100 Krypton 129 174 135 127	(This example is appeared in case of PRELOAD DATA.)
--------------------------	-------	--------------------------------	--------------------------------------------------------

Confirm that DC level on the oscilloscope indicates 0V at this time.  
If not, adjust with VR1 on KLM-871.



NG

5mV/div  
1m sec/div



GOOD

## Before you start TEST MODE

When M3R is changed to TEST MODE, all data is broken.  
So save the important data to RAM card etc. before you start.

### 1 How to start TEST MODE

Turn the switch on while pressing [COMBI] and [PROG].  
The display indicates TEST MODE after the SELF TEST is finished automatically.  
SELF TEST ---- Confirm that the inside SRAM works normally.  
Note that the data in M3R is lost by this operation.

### 2 TEST MODE

#### 1) MENU SCREEN

After the SELF TEST is finished normally, the display indicates these letters below automatically.

M3R TEST MODE Ver. xx	xx indicates the ROM version number.
--------------------------	--------------------------------------

#### 2) SW & LED TEST

T1:SW/LED	When [▲/YES] SW. is pressed, the display indicates as left.
-----------	----------------------------------------------------------------

T1:SW/LED PLAY	When [▲/YES] SW. is pressed again, the display indicates the name of the key which should be pressed as left and LEDs with SW light simultaneously.
-------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------

Press SWs whose LEDs light exactly in order.

T1:SW/LED NO	When the last [▲/YES] SW. is pressed, the process changes to the next.
-----------------	---------------------------------------------------------------------------

#### 3) LCD TEST

T1:LCD	LCD display indicates as left.
--------	--------------------------------

██████████	When [▲/YES] SW. is pressed, all dots are lit as left.
------------	--------------------------------------------------------

	When [▲/YES] SW. is pressed again, all dots are put out. When [▲/YES] SW. is pressed again, the process changes to the next.
--	------------------------------------------------------------------------------------------------------------------------------------