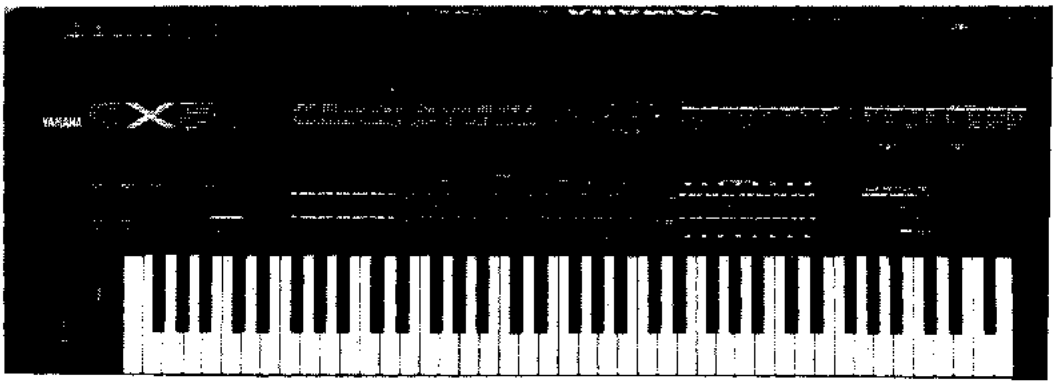
DIGITAL PROGRAMMABLE ALGORITHM SYNTHESIZER

DX-5

SERVICE MANUAL



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DX-5

006678

SINCE 1887 YAMAHA
NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN
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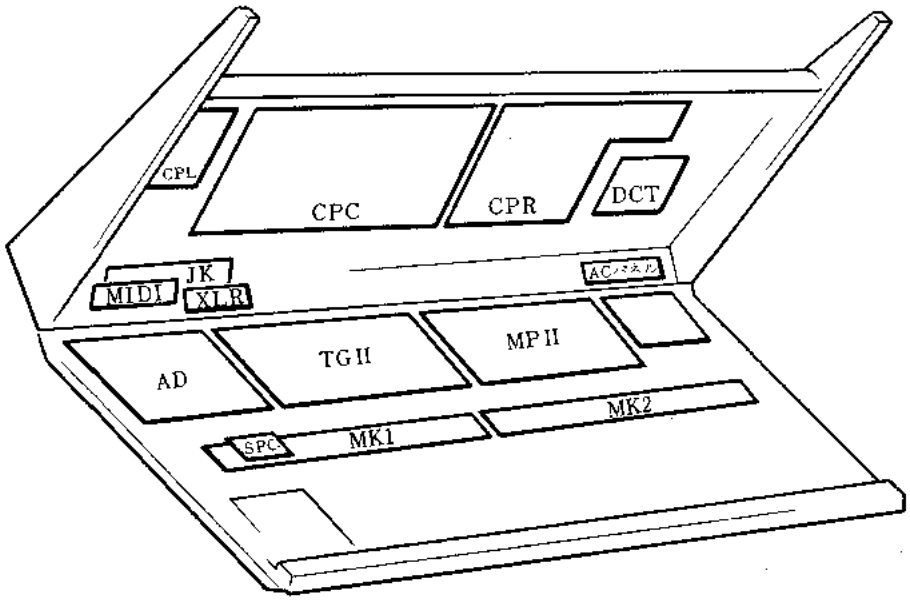
■UNIT LAYOUT(ユニットレイアウト)



IMPORTANT NOTICE

This manual has been provided for the use of authorized Yamaha Retailers and their service personnel. It has been assumed that basic service procedures inherant to the industry, and more specifically Yamaha Products, are already known and understood by the users, and have therefore not been restated.

WARNING: Failure to follow appropriate service and safety procedures when servicing this product may result in personal injury, destruction of expensive components and failure of the product to perform as specified. For these reasons, we advise all Yamaha product owners that all service required should be performed by an authorized Yamaha Retailer or the appointed service representative.

IMPORTANT: The presentation or sale of this manual to any individual or firm does not constitute authorization, certification, recognition of any applicable technical capabilities, or establish a principle-agent relationshiP of any form.

The data provided is believed to be accurate and applicable to the unit(s) indicated on the cover. The research, engineering, and service departments of Yamaha are continually striving to improve Yamaha products. Modifications are, therefore, inevitable and changes in specification are subject to change without notice or obligation to retrofit. Should any discrepancy appear to exist, please contact the distributor's Service Division.

WARNING: Static discharges can destroy expensive components. Discharge any static electricity your body may have accumulated by grounding yourself to the ground buss in the unit (heavy gauge black wires connect to this buss).

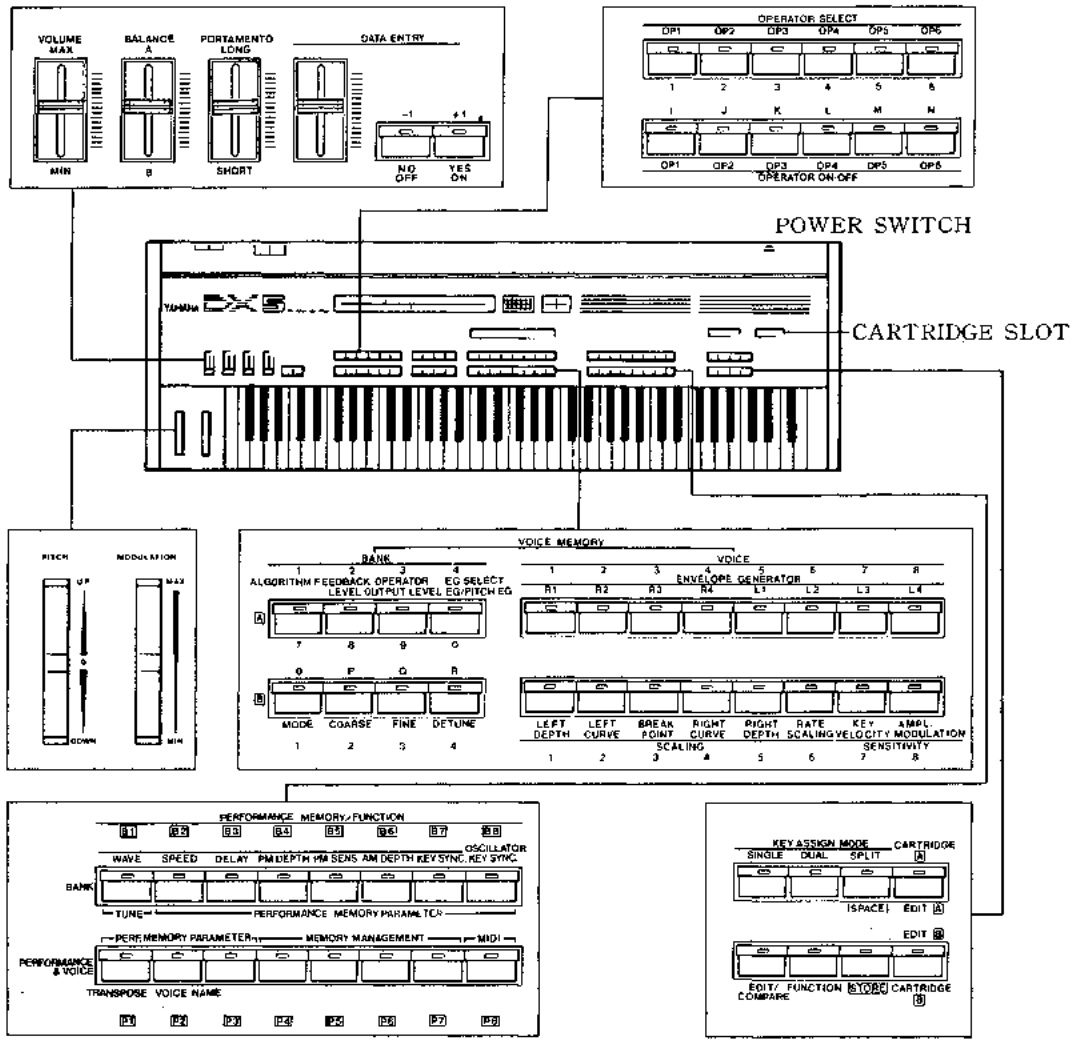
IMPORTANT: Turn the unit OFF during disassembly and parts replacement. Recheck all work before you apply power to the unit.

■SPECIFICATIONS(仕様)

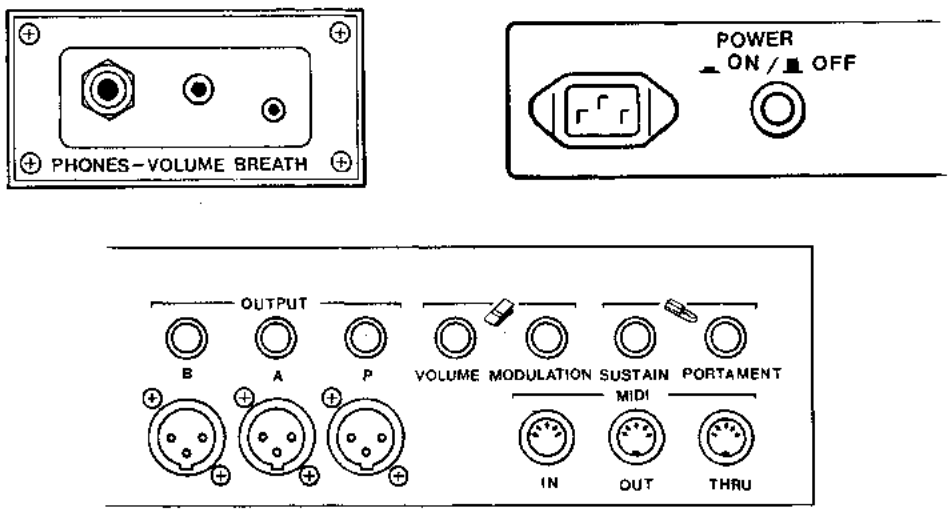
KEYBOARD (鍵盤)	76KEYS INITIAL & AFTER TOUCH SENSITIVITY (イニシャル及びアフタータッチ付)
SOUND SOURCE (音源)	FM TONE GENERATOR (6 OPERATOR×A·B 2 CHANNELS)
NUMBER OF SOUNDS PRODUCED SIMULTANEOUSLY (同時発音数)	POLYPHONIC : SINGLE 32／DUAL 16／SPLIT 16+16 MONOPHONIC: SINGLE 1／DUAL 1／SPLIT 1+ 1
INTERNAL MEMORY (内部メモリー)	VOICE MEMORY 64 (4 BANK×8 VOICE×A·B 2 CHANNELS) PERFORMANCE MEMORY 64 (8 BANK×8 PERFORMANCE)
CONTROLLER (コントローラー)	VOLUME : VOLUME SLIDER, BALANCE SLIDER, PHONES VOLUME EFFECT CONTROLLER : PORTAMENTO TIME SLIDER, PITCH BEND WHEEL, MODULATION WHEEL DATA ENTRY : DATA ENTRY SLIDER, +/− SWITCH MEMORY & PARAMETER SELECT : EDIT PARAMETER, VOICE MEMORY, PERFORMANCE MEMORY/FUNCTION KEY ASSIGN MODE SINGLE, DUAL, SPLIT MODE SELECTOR : EDIT/COMPARE, FUNCTION, STORE OTHER : OPERATOR SELECT, OPERATOR ON/OFF, CARTRIDGE A·B
LCD	40 CHARACTORS×2LINES (40文字×2行)
EDIT PARAMETER	ALGORITHM : ALGORITHM, FEEDBACK OSCILLATOR : MODE, COARSE, FINE, DETUNE ENVELOPE GENERATOR : RATE (R1～R4), LEVEL (L1～L4) KEYBOARD LEVEL SCALING : LEFT DEPTH, RIGHT DEPTH, LEFT CURVE, RIGHT CURVE, BREAK POINT, RATE SCALING SENSITIVITY : KEY VELOCITY, AMPLITUDE MODULATION OUTPUT LEVEL PITCH ENVELOPE GENERATOR : RATE (R1～R4), LEVEL (L1～L4) LFO WAVE, SPEED, DELAY, PM DEPTH, PM SENSE, AM DEPTH, KEY SYNC, OSCILLATOR KEY SYNC, KEY TRANSPOSE, VOICE NAME
FUNCTION PARAMETER	TUNE B1 : MASTER TUNE, DETUNE PERFORMANCE MEMORY PARAMETER B2 : POLY/MONO, SOURCE SELECT B3 : PITCH BEND (RANGE, STEP) B4 : PORTAMENTO (PORTAMENTO/GLISSANDO, PORTAMENTO MODE, PORTAMENTO TIME) B5 : SUSTAIN PEDAL ASSIGN, PORTAMENTO PEDAL ASSIGN B6 : OUTPUT LEVEL ATTENUATE, PROGRAM OUTPUT ASSIGN B7 : MODULATION WHEEL (SENSITIVITY, ASSIGN) B8 : FOOT CONTROLLER (SENSITIVITY, ASSIGN) P1 : BREATH CONTROLLER (SENSITIVITY, ASSIGN) P2 : AFTER TOUCH (SENSITIVITY, ASSIGN) P3 : SPLIT POINT, KEY SHIFT, PERFORMANCE NAME MEMORY MANAGEMENT P4 : COPY OP DATA, SAVE TEMP. OPERATOR P5 : INITIALIZE MEMORY, RECALL EDIT BUFFER P6 : SAVE TO CARTRIDGE, LOAD FROM CARTRIDGE, CHANGE CARTRIDGE FORMAT P7 : PROTECT MEMORY WRITE, CLEAR ALL MEMORY, CHECK BATTERY MIDI P8 : MIDI ON/OFF REMOTE SEQ., SET STATUS, TRANSMIT DATA
DIMENSIONS/WEIGHT (寸法/重量)	1,229W×225D×113H mm、19kg (41.9 lbs) (48－1/8"×8－3/8"×4－1/8")
POWER REQUIRMENT (定格電源電圧)	100～115V (J.UL.C Model) 250V (G.WG Model)
POWER CONSUMPTION (定格消費電力)	30W
ACCESSORIES (付属品)	MUSIC STAND POWER CABLE VOICE ROM CARTRIDGE×2 PERFORMANCE ROM CARTRIDGE

■PANEL LAYOUT(パネルレイアウト)

1 . Control Panel



2 . Rear Panel

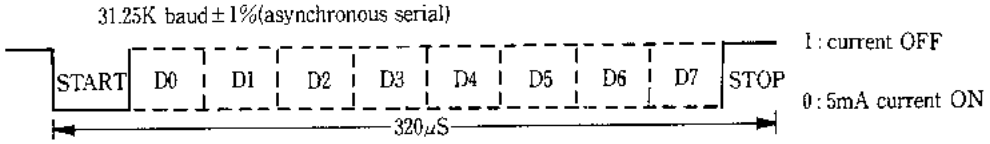


■MIDI SPECIFICATIONS (MIDI仕様)

1. HARD WARE

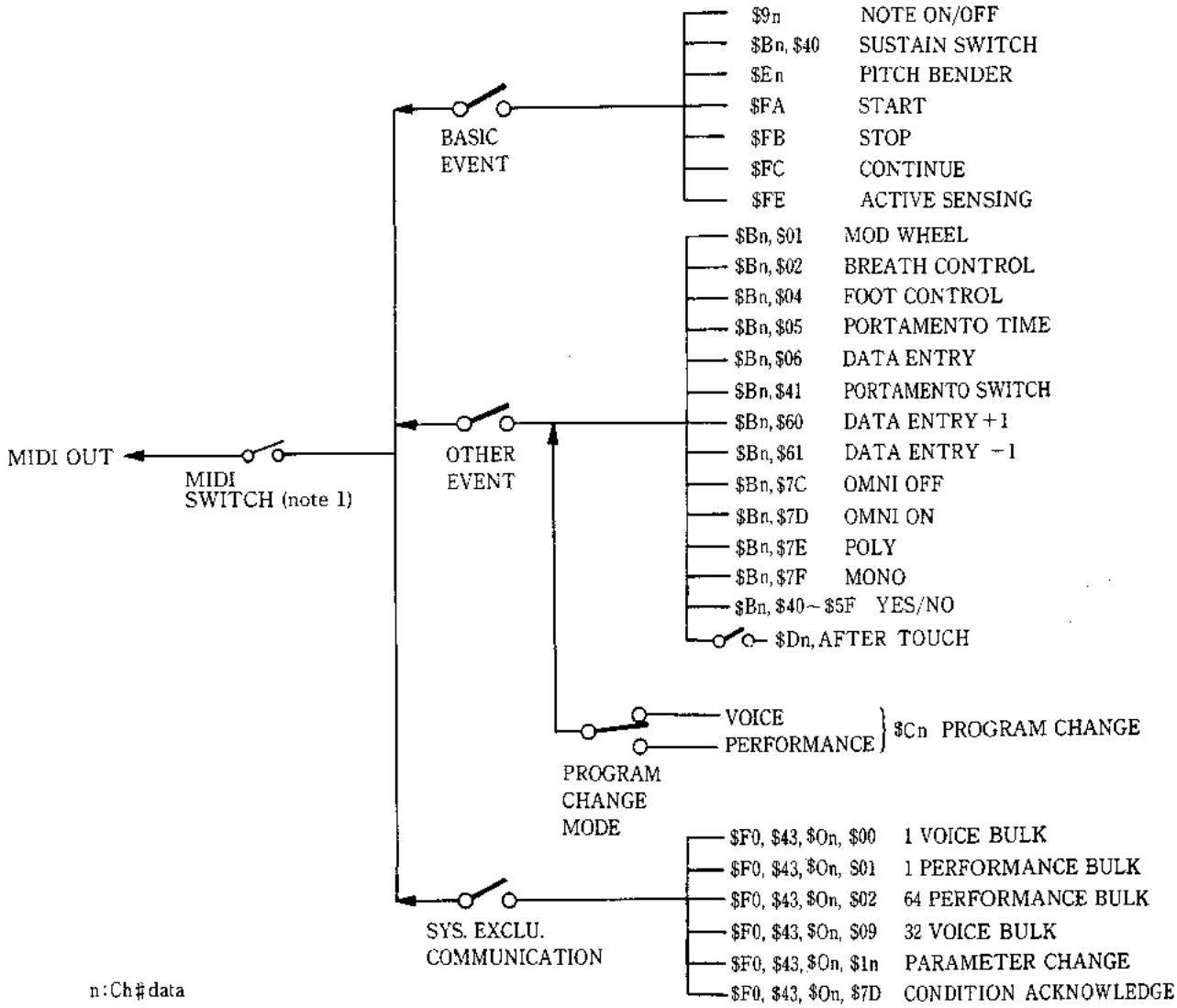
MIDI INPUT/OUTPUT ..... TYPE : ASYNCHRONOUS SERIAL
BAUD RATE : 31.25k baud±1%
HARDWARE : 5mA CURRENT LOOP
"0"=CURRENT ON
FORMAT : START BIT, DATA BYTE
(8BIT : D0~D7), STOP BIT
D7 : 1STATUS BYTE/0DATA BYTE

CONNECTION TERMINALS ..... MIDI IN (DIN JACK 5P)
MIDI OUT (DIN JACK 5P)
MIDI THRU (DIN JACK 5P)



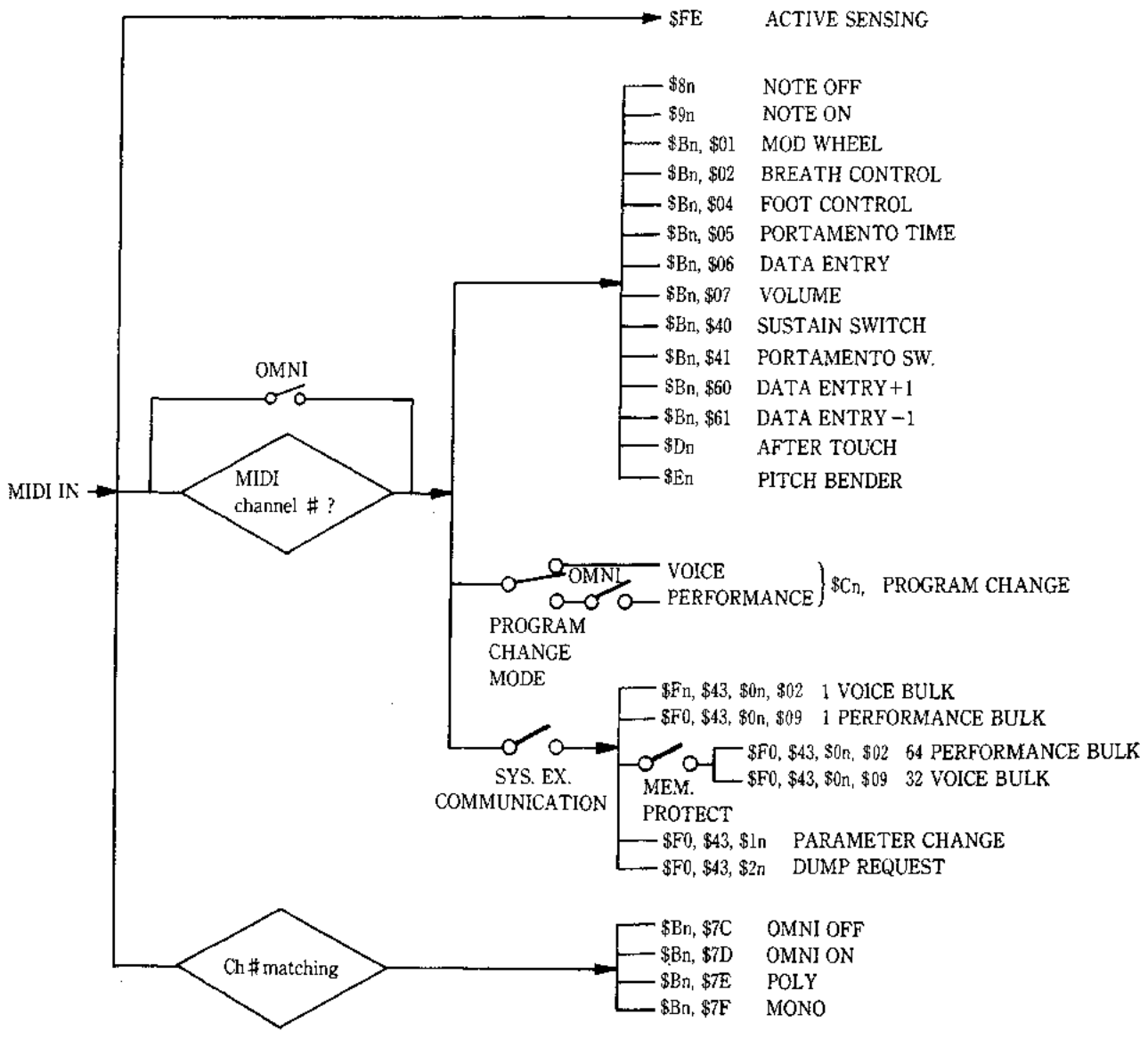
2. MIDI INPUT/OUTPUT CONDITIONS (送受信条件)

1) TRANSMIT DATA AND CONDITIONS



n : Ch# data

2) RECEIVE DATA AND CONDITIONS



n : Ch # data

3 . DATA FORMAT

1) TRANSMIT DATA

①CHANNEL INFORMATION

KE ON

STATUS 1001nnnn Channel No.(n=0~15)
NOTE No. 0kkkkkkk k=28~103
VELOCITY 0vvvvvvv v=0 Key off
v=1~127 Key on

CONTROL CHANGE

STATUS 1011nnnn Channel No.(n=0~15)
CONTROL No. 0ccccccc
CONTROL VALUE 0vvvvvvv

C	CONTROL NAME	v
1	Modulation wheel	0~127
2	Breath controller	0~127
4	Foot controller	0~127
5	Portamento time	0~127
6	Data entry	0~127
64	Sustain foot switch	0 : OFF~127 : ON
65	Portamento	0 : OFF~127 : ON
96	Data increment (+1)	127 : ON
97	Data decrement (−1)	127 : ON
124	Omni mode off	0
125	Omni mode on	0
126	Mono mode on	1
127	Poly mode on	0
64~95	Y/N Swith (Play Mode)	0 : NO 127 : YES

PROGRAM CHANGE

STATUS	1 1 0 0 n n n n	Channel No. (n=0~15)
PROGRAM No.	0 p p p p p p p	

Program change mode=VOICE
P=0~31(Voice Memory BANK-A)
P=32~63(Voice Memory BANK-B)
Program change mode=PERFORMANCE
P=0~63(Performance Memory)

AFTER TOUCH

STATUS	1 1 0 1 n n n n	Channel No. (n=0~15)
PRESSURE	0 v v v v v v v	(0~127)

PITCH BEND

STATUS	1 1 1 0 n n n n	Channel No. (n=0~15)
VALUE(LSB)	0 u u u u u u u	
VALUE(MSB)	0 v v v v v v v	
		v=0~64, u=0
		v=65~127, u=2·(v-64)

②SYSTEM EXCLUSIVE INFORMATION

1 VOICE BULK DATA

STATUS	1 1 1 1 0 0 0 0	
ID	0 1 0 0 0 0 1 1	ID=$43
SUBSTATUS/CH	0 0 0 0 n n n n	Channel No. (n=0~15)
FORMAT No.	0 f f f f f f f	f=0
BYTE COUNT	0 0 0 0 0 0 0 1	
BYTE COUNT	0 0 0 1 1 0 1 1	
DATA	0 d d d d d d d ↓ 0 d d d d d d d	155 bytes
CHECK SUM	0 e e e e e e e	
EOX	1 1 1 1 0 1 1 1	

1 PERFORMANCE BULK DATA

STATUS	1 1 1 1 0 0 0 0	
ID	0 1 0 0 0 0 1 1	ID=$43
SUBSTATUS/CH	0 0 0 0 n n n n	Channel No. (n=0~15)
FORMAT No.	0 f f f f f f f	f=1
BYTE COUNT	0 0 0 0 0 0 0 0	
BYTE COUNT	0 1 0 1 1 1 1 0	
DATA	0 d d d d d d d ↓ 0 d d d d d d d	94 bytes
CHECK SUM	0 e e e e e e e	
EOX	1 1 1 1 0 1 1 1	

64PER FORMANCE BULK DATA

STATUS	1 1 1 1 0 0 0 0	
ID	0 1 0 0 0 0 1 1	ID=$43
SUBSTATUS/CH	0 0 0 0 n n n n	Channel No. (n=0~15)
FORMAT No.	0 f f f f f f f	f=2
BYTE COUNT	0 0 1 0 0 0 0 0	
BYTE COUNT	0 0 0 0 0 0 0 0	
DATA	0 d d d d d d d ↓ 0 d d d d d d d	4096 bytes
CHECK SUM	0 e e e e e e e	
EOX	1 1 1 1 0 1 1 1	

32 VOICE BULK DATA

STATUS	1 1 1 1 0 0 0 0	
ID	0 1 0 0 0 0 1 1	ID=$43
SUBSTATUS/CH	0 0 0 0 n n n n	Channel No. (n=0~15)
FORMAT No.	0 f f f f f f f	f=9
BYTE COUNT	0 0 1 0 0 0 0 0	
BYTE COUNT	0 0 0 0 0 0 0 0	
DATA	0 d d d d d d d ↓ 0 d d d d d d d	4096
CHECK SUM	0 e e e e e e e	
EDX	1 1 1 1 0 1 1 1	

PARAMETER CHANGE

STATUS	11110000	
ID	01000011	ID=$43
SUBSTATUS/CH	0001nnnn	Channel No. (n=0~15)
PAPAMETER GROUP No.	0ggggggg	
PARAMETER No.	0ppppppp	
DATA	0ddddddd	
EOX	11110111	

Please refer to the System exclusive data format

See System exclusive data format.

SYSTEM REAL TIME INFORMATION

STATUS	11111110	ACTIVE SENSING (83mS毎に送信される) (Signal will be sent every 83mS.)
START	11111010	
STOP	11111011	
CONTINUE	11111100	

2) RECEPTION DATA

①CHANNEL INFORMATION

KEY OFF

STATUS	1000nnnn	Channel No. (n=0~15)
NOTE No.	0kkkkkkk	k=0(C_2)~127(G_8)
VELOCITY	0vvvvvvv	Ignored

KEY ON

STATUS	1001nnnn	Channel No. (n=0~15)
NOTE No.	0kkkkkkk	k=0(C_2)~127(G_8)
VELOCITY	0vvvvvvv	v=0 Key off v=1~127 Key on

CONTROL CHANGE

STATUS	1011nnnn	Channel No. (n=0~15)
CONTROL No.	0ccccccc	
CONTROL VALUE	0vvvvvvv	

送信コントロールナンバーはすべて受信可能。

さらに下記も受信。

All transmitted control numbers can be received.

Those below are also received.

C	コントロール名	V
7	Volume	0~127

C	Control	V
7	Volume	0~127

PROGRAM CHANGE

STATUS	1100nnnn	Channel No. (n=0~15)
PROGRAM	0ppppppp	

AFTER TOUCH

STATUS	1101nnnn	Channel No. (n=0~15)
PRESSURE	0vvvvvvv	(0~127)

PITCH BEND

STATUS	1110nnnn	Channel No. (n=0~15)
VALUE(LSB)	0uuuuuuu	Ignored
VALUE(MSB)	0vvvvvvv	(0~64~127)

②SYSTEM EXCLUSIVE INFORMATION

1 VOICE BULK DATA

1 PERFORMANCE BULK DATA

64 PERFORMANCE BULK DATA

32 VOICE BULK DATA

これらバルクデータは、送信と同様のフォーマットで受信。

This bulk data is received in the same format it is transmitted.

DUMP REQUEST

STATUS	11110000	
ID	01000011	ID=$43
SUBSTATUS	0010nnnn	Channel No. (n=0~15)
FORMAT No.	0fffffff	
EOX	11110111	

f=0 1 VOICE BULK DATA
VOICE

f=1 1 PERFORMANCE BULK DATA
PERFORMANCE

f=2 64 PERFORMANCE BULK DATA
PERFORMANCE MEMORY

f=9 32 VOICE BULK DATA

③SYSTEM REAL TIME INFORMATION

STATUS 11111110 Active Sensing

このコードを1度受信すると、センシングを開始します。300mS以上の間ステータスもデータも来ないときは、発音を停止します。

Once this code. is received, sensing begins. when status or data is not received for longer than 300mS, all sound will be halted.

SYSTEM EXCLUSIVE DATA FORMAT

DX VOICE PARAMETER CHANGE (g=0)

SUBGROUP No.	PARAMETER No.	PARAMETER	DATA	REMARKS
0	0	OP6 EG RATE 1	0 ~99	
	1	OP6 EG RATE 2	0 ~99	
	2	OP6 EG RATE 3	0 ~99	
	3	OP6 EG RATE 4	0 ~99	
	4	OP6 EG LEVEL 1	0 ~99	
	5	OP6 EG LEVEL 2	0 ~99	
	6	OP6 EG LEVEL 3	0 ~99	
	7	OP6 EG LEVEL 4	0 ~99	
	8	OP6 KEYBOARD LEVEL SCALING BREAK POINT	0 ~99	✱1
	9	OP6 KEYBOARD LEVEL SCALING LEFT DEPTH	0 ~99	
	10	OP6 KEYBOARD LEVEL SCALING RIGHT DEPTH	0 ~99	
	11	OP6 KEYBOARD LEVEL SCALING LEFT CURVE	0 ~ 3	✱2
	12	OP6 KEYBOARD LEVEL SCALING RIGHT CURVE	0 ~ 3	✱2
	13	OP6 KEYBOARD RATE SCALING	0 ~ 7	
	14	OP6 AMPLITUDE MODULATION SENSITIVITY	0 ~ 3	
	15	OP6 KEY VELOCITY SENSITIVITY	0 ~ 7	
	16	OP6 OPERATOR OUTPUT LEVEL	0 ~99	
	17	OP6 OSCILLATOR MODE	0 ~ 1	✱3
	18	OP6 OSCILLATOR FREQUENCY COARSE	0 ~31	✱4
	19	OP6 OSCILLATOR FREQUENCY FINE	0 ~99	✱4
	20	OP6 OSCILLATOR DETUNE	0 ~15	✱5
	21~41	OP5		
	42~62	OP4		
	63~83	OP3		
	84~104	OP2		
	105~125	OP1		
	126	PITCH EG RATE 1	0 ~99	
	127	PITCH EG RATE 2	0 ~99	
1	0 (128)	PITCH EG RATE 3	0 ~99	
	1 (129)	PITCH EG RATE 4	0 ~99	
	2 (130)	PITCH EG LEVEL 1	0 ~99	
	3 (131)	PITCH EG LEVEL 2	0 ~99	
	4 (132)	PITCH EG LEVEL 3	0 ~99	
	5 (133)	PITCH EG LEVEL 4	0 ~99	
	6 (134)	ALGORITHM SELECT	0 ~31	
	7 (135)	FEEDBACK	0 ~ 7	
	8 (136)	OSCILLATOR KEY SYNC	0 ~ 1	
	9 (137)	LFO SPEED	0 ~99	
	10 (138)	LFO DELAY	0 ~99	
	11 (139)	LFO PITCH MODULATION DEPTH	0 ~99	
	12 (140)	LFO AMPLITUDE MODULATION DEPTH	0 ~99	
	13 (141)	LFO KEY SYNC	0 ~ 1	
	14 (142)	LFO WAVE	0 ~ 5	✱6
	15 (143)	LFO PITCH MODULATION SENSITIVITY	0 ~ 7	
	16 (144)	TRANSPOSE	0 ~48	Consert Pitch at 24
	17 (145)	VOICE NAME 1	ASCII	
	↑ ↑	↑	↑	
	26 (154)	VOICE NAME 10	ASCII	
1	27 (155)	OPERATOR ON/OFF	xeeeeee	✱7
	28 (156)	OPERATOR SELECT	0 ~ 5	✱8
	29 (157)	EDIT		ON DATA=0 OFF DATA=0
	30 (158)	FUNCTION		
	31 (159)	STORE		

※1 BREAK POINT

BREAK POINT	0	1	2	3	4	5	15	27	39	51	63	75	87	99
MIDI NOTE #	21	22	23	24	25	26	36	48	60	72	84	96	108	120
NOTE	A_1	A_1#	B_1	C_0	C_0#	D_0	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8

※2 KEYBOARD LEVEL SCALING CURVE

	0	1	2	3
CURVE	−LIN	−EXP	+EXP	+LIN

※3 OSCILLATOR MODE

"0"……frequency ratio

"1"……fixed frequency

※4 FREQUENCY COARSE/FINE

i) For Frequency Ratio

When FINE=0

COARSE	0	1	2	3	10	30	31
FREQUENCY RATIO	0.5	1	2	3	10	30	31

When COARSE=1

FINE	0	1	2	3	10	50	99
FREQUENCY RATIO	1.00	1.01	1.02	1.03	1.10	1.50	1.99

ii) For Fixed Frequency

When FINE=0

COARSE	0	1	2	3	4	5	6	7		31
FREQUENCY(Hz)	1	10	100	1000	1	10	100	1000		1000

When COARSE=0

FINE	0	1	2	3	4	5	10	20	50	99
FREQUENCY(Hz)	1.000	1.023	1.047	1.072	1.096	1.122	1.259	1.585	3.162	9.772

※5 DETUNE

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
DETUNE	−7	−6	−5	−4	−3	−2	−1	0	1	2	3	4	5	6	7

※6 LFO WAVE

	0	1	2	3	4	5
WAVE	TRIANGLE	SAW DOWN	SAW UP	SQUARE	SINE	SAMPLE/HOLD

※7 OPERATOR ON/OFF

Bit	b_5	b_4	b_3	b_2	b_1	b_0
OP	OP1	OP2	OP3	OP4	OP5	OP6

Bit Map

"0"……OFF "1"……ON

※8 OPERATOR SELECT

	0	1	2	3	4	5
OPERATOR	OP6	OP5	OP4	OP3	OP2	OP1

DX5 PERFORMANCE PARAMETER CHANGE(g=1)

PARAMETER No.	PARAMETER	DATA	REMARKS
0			
1	SOURCE SELECT	0 ~16	※3
2	POLY/MONO	0 ~ 1	
3	PITCH BEND RANGE	0 ~12	
4	PITCH BEND STEP	0 ~12	
5	PORTAMENTO TIME	0 ~99	
6	PORTAMENTO GLISSANDO	0 ~ 1	
7	PORTAMENTO MODE	0 ~ 1	※1
8	PORTAMENTO PEDAL AND KNOB ASSIGN	0 ~ 1	
9	MODULATION WHEEL SENSITIVITY	0 ~15	
10	MODULATION WHEEL ASSIGN	0 ~ 7	※2
11	FOOT CONTROLLER SENSITIVITY	0 ~15	
12	FOOT CONTROLLER ASSIGN	0 ~ 7	※2
13	AFTER TOUCH SENSITIVITY	0 ~15	
14	AFTER TOUCH ASSIGN	0 ~ 7	※2
15	BREATH CONTROLLER SENSITIVITY	0 ~15	
16	BREATH CONTROLLER ASSIGN	0 ~ 7	※2
17			
18			
19			
20			
21			
22			
23			
24			
25			
26	AUDIO OUTPUT LEVEL ATTENUATOR	0 ~ 7	
27	PROGRAM OUTPUT	0 ~ 1	
28	SUSTAIN PEDAL	0 ~ 1	
29	PERFORMANCE KEY SHIFT	0 ~48	Consert Pitch at 24
30	KEY ASSIGN MODE	0 ~ 2	
31	VOICE MEMORY SELECTOR FLAG	0 ~ 1	
32	DUAL MODE DETUNE	0 ~15	
33	SPLIT POINT	0 ~99	
34	PERFORMANCE NAME 1	ASCII	
↓	↓		
63	PERFORMANCE NAME 30		
64	MASTER TUNING	0 ~127	Consert Pitch at 64

※1 PORTAMENTO MODE

"0"……sustain-key pitch retain

"1"…sustain-key pitch follow

※2 EFFECT ASSIGN

BIT	b_2	b_1	b_0
ASSIGN	EG BIAS	AMPLITUDE	PITCH

※3 SOURCE SELECT

Corresponds to RECEIVE BASIC CHANNEL 1~16.

1 VOICE BULK DATA

155 bytes of data. For the data format, see 0~154.

1 PERFORMANCE BULK DATA (f=1)

ADDRESS	PARAMETER	DATA	REMARKS
0			
1	SOURCE SELECT	0 ~16	
2	VOICE A POLY/MONO	0 ~ 1	
3	VOICE A PITCH BEND RANGE	0 ~12	
4	VOICE A PITCH BEND STEP	0 ~12	
5	VOICE A PORTAMENTO TIME	0 ~99	
6	VOICE A PORTAMENTO/GLISSANDO	0 ~ 1	
7	VOICE A PORTAMENTO MODE	0 ~ 1	
8	PORTAMENTO PEDAL AND KNOB ASSIGN	0 ~ 1	
9	VOICE A MODULATION WHEEL SENSITIVITY	0 ~15	
10	VOICE A MODULATION WHEEL ASSIGN	0 ~ 7	
11	VOICE A FOOT CONTROLLER SENSITIVITY	0 ~15	
12	VOICE A FOOT CONTROLLER ASSIGN	0 ~ 7	
13	VOICE A AFTER TOUCH SENSITIVITY	0 ~15	
14	VOICE A AFTER TOUCH ASSIGN	0 ~ 7	
15	VOICE A BREATH CONTROLLER SENSITIVITY	0 ~15	
16	VOICE A BREATH CONTROLLER ASSIGN	0 ~ 7	
17			
18			
19			
20			
21			
22			
23			
24			
25			
26	VOICE A AUDIO OUTPUT LEVEL ATTENUATOR	0 ~ 7	
27	PROGRAM OUTPUT	0 ~ 1	
28	SUSTAIN PEDAL ASSIGN	0 ~ 1	
29	KEY SHIFT	0 ~48	
30			
↓	VOICE B		
59			
60	KEY ASSIGN MODE	0 ~ 2	
61	VOICE MEMORY SELECT FLAG	0 ~ 1	
62	DUAL MODE DETUNE	0 ~15	
63	SPLIT POINT	0 ~99	
64	PERFORMANCE NAME 1	ASCII	
65	PERFORMANCE NAME 2	ASCII	
↓	↓	ASCII	
92	PERFORMANCE NAME 29	ASCII	
93	PERFORMANCE NAME 30	ASCII	

64 PERFORMANCE BULK DATA (f=2)

Data are listed in order for the 64 performances in units of 64 bytes(64 performance).

ADDRESS	6	5	4	3	2	1	0	PARAMETER	DATA	PARAMETER	DATA
0	P/M							VOICE A POLY/MONO	0 ~ 1		
1	PBS(LO)				PBR			VOICE A P. BEND STEP	0 ~12	PITCH BEND RANGE	0 ~12
2	PTIM							VOICE A PORTA. TIME	0 ~99		
3	SURCE SEL				PHA	M	GL	VOICE A PORTA. MODE	0 ~ 1	PORTAMENTO/GLISSANDO	0 ~ 1
4	MWA				MWS			VOICE A MONO. WHEEL ASN.	0 ~ 7	MOD. WHEEL SENS.	0 ~15
5	FCA				FCS			VOICE A FOOT CONT. ASN.	0 ~ 7	FOOT CONT. SENS.	0 ~15
6	ATA				ATS			VOICE A AFTER TOUCH ASN.	0 ~ 7	AFTER TOUCH SENS.	0 ~15
7	BCA				BCS			VOICE A BREATH CON ASN.	0 ~ 7	BREATH CON. SENS.	0 ~15
8											
9											
10											
11											
12											
13											
14						ATN		VOICE A ATTENUATION	0 ~ 7		
15	PBS (HI)	KSFT						VOICE A PITCH B. STEP	(MSB)	KEY SHIFT	0 ~48
16											
↓	VOICE B										
31									0 ~15		
32	DTUN				VMS	KMOD		DUAL MODE DETUNE VOICE MEMORY SELECT	0 ~ 1	KEY ASSIGN MODE	0 ~ 2
33	SPNT							SPLIT POINT	0 ~99		
34	PNAM1							PERFORMANCE NAME 1	ASCII		
↓	↓							↓	ASCII		
63	PNAM30							PERFORMANCE NAME 30	ASCII		
	6	5	4	3	2	1	0				

With the Key Assign in Single mode (KMOD=0) VOICE A or B are loaded with VMS.

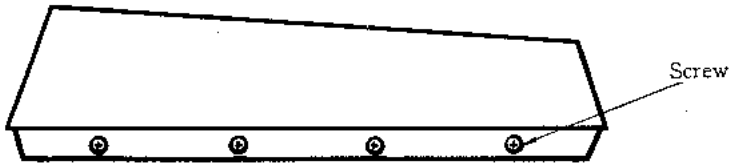
32 VOICE BULK DATA (f=9)

128 bytes of data per voice, voices 1~32.

ADDRESS	6 5 4 3 2 1 0	PARAMETER	DATA	PARAMETER	DATA
0	R1	OP6 EG RATE 1	0 ~99		
1	R2	OP6 EG RATE 2	0 ~99		
2	R3	OP6 EG RATE 3	0 ~99		
3	R4	OP6 EG RATE 4	0 ~99		
4	L1	OP6 EG LEVEL 1	0 ~99		
5	L2	OP6 EG LEVEL 2	0 ~99		
6	L3	OP6 EG LEVEL 3	0 ~99		
7	L4	OP6 EG LEVEL 4	0 ~99		
8	BD	SCALING BREAK P.	0 ~99		
9	LD	SCALING LEFT DEPTH	0 ~99		
10	RD	SCALING RIGNT DEPTH	0 ~99		
11	RC | LC	SCALING RIGNT CURVE	0 ~ 3	LEFT CURVE	0 ~ 3
12	RD | RS	OSCILLATOR DETUNE	0 ~14	RATE SCALING	0 ~ 7
13	KVS | AMS	KEY VELOCITY SENS.	0 ~ 7	AMPLITUDE MOD. SENS.	0 ~ 3
14	OL	OUTPUT LEVEL	0 ~99		
15	FC | M	FREQUENCY COARSE	0 ~31	OSCILLATOR MODE	0 ~ 1
16	FF	FREQUENCY FINE	0 ~99		
17 ↓ 33	OP5				
34 ↓ 50	OP4				
51 ↓ 67	OP3				
68 ↓ 84	OP2				
85 ↓ 101	OP1		0 ~99		
102	PR1	PITCH EG RATE 1	0 ~99		
103	PR2	PITCH EG RATE 2	0 ~99		
104	PR3	PITCH EG RATE 3	0 ~99		
105	PR4	PITCH EG RATE 4	0 ~99		
106	PL1	PITCH EG LEVEL 1	0 ~99		
107	PL2	PITCH EG LEVEL 2	0 ~99		
108	PL3	PITCH EG LEVEL 3	0 ~99		
109	PL4	PITCH EG LEVEL 4	0 ~99		
110	ALS	ALGORITHM SELECT	0 ~31		
111	OKS | FB	OSCILLATOR KEY SYNC	0 ~99	FEEDBACK	0 ~ 7
112	LFS	LFO SPEED	0 ~99		
113	LFD	LFO DELAY	0 ~99		
114	LPMD	LFO PITCH MOD DEPTH	0 ~99		
115	LPMD	LFO AMP MOD DEPTH	0 ~99		
116	LPMS | LFW | LFKS	LFO PITCH MOD SENS.	0 ~ 7	{ WAVE { KEY SYNC	0 ~ 5 0 ~ 1
117	TRNP	TRANSPOSE	0 ~48		
118	VNAM1	VOICE NAME 1	ASCII		
119	VNAM2	VOICE NAME 2	ASCII		
120	VNAM3	VOICE NAME 3	ASCII		
121	VNAM4	VOICE NAME 4	ASCII		
122	VNAM5	VOICE NAME 5	ASCII		
123	VNAM6	VOICE NAME 6	ASCII		
124	VNAM7	VOICE NAME 7	ASCII		
125	VNAM8	VOICE NAME 8	ASCII		
126	VNAM9	VOICE NAME 9	ASCII		
127	VNAM10	VOICE NAME 10	ASCII		
	6 5 4 3 2 1 0				

■DISASSEMBLY PROCEDURE (分解手順)

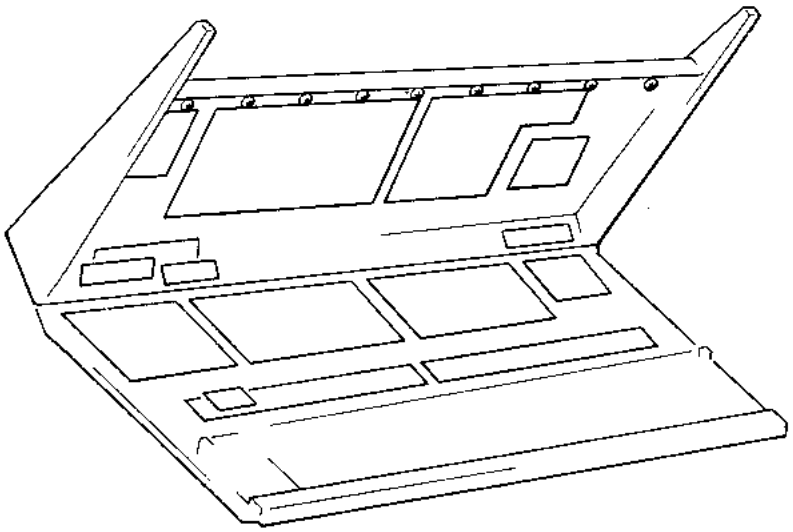
1. Control Panel Opening
コントロールパネルの開け方



SIDE VIEW

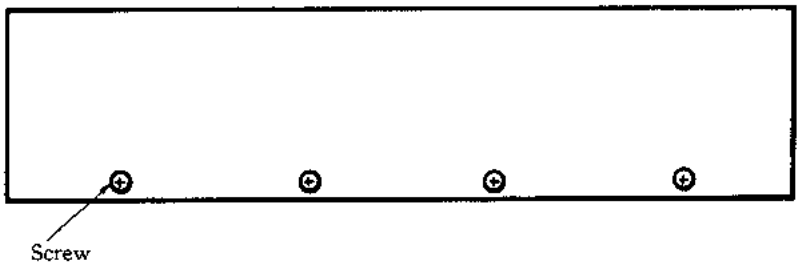
Remove the four tapping screws at the bottom on each side.
左右側面下の8本のビスを外します。

2. Panel Sheet Removal
パネル シートのはずし方



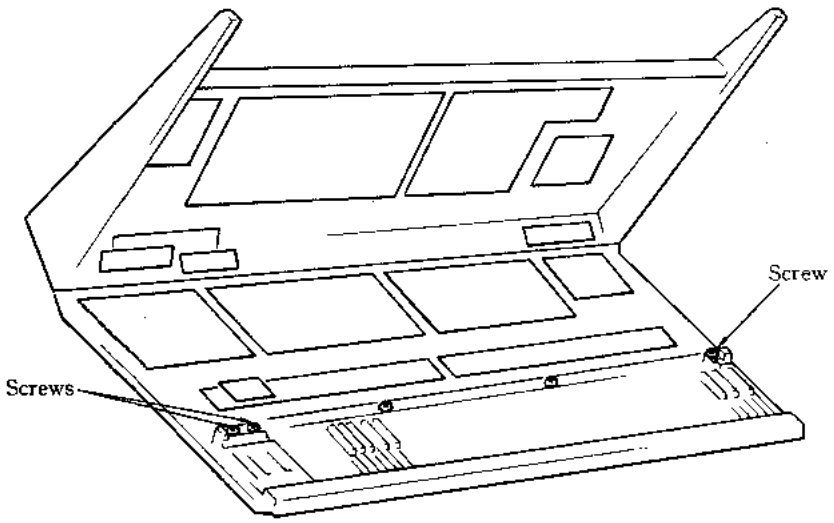
Remove the nine screws underneath the key holding cloth.
鍵盤押さえクロスの裏側にある9本のビスをはずします。

3. Key Board Assembly Removal
鍵盤 ASSY のはずし方



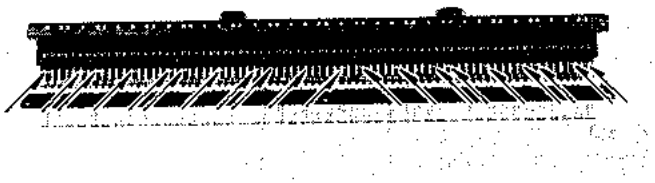
BOTOM VIEW

Remove the four screws at the front of the bottom board.
底板、前方の4本のビスをはずします。



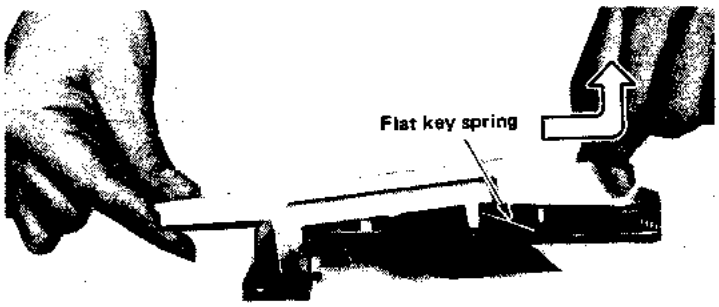
Remove the two screws on the left hand endbloack, one screw on the right-hand endblock and the two screws on the keyboard back.
左拍子木の2本のビス、右拍子木の1本のビス、さらに鍵盤後方の2本のビスをはずします。

4. MK Circuit Board Removal
MKシートのはずし方



Since the MK circuit board consists of 2 pieces, remove screws from the necessary places to take the circuit board off.
MKシートは2つに分離していますので、必要な箇所のネジをはずします。

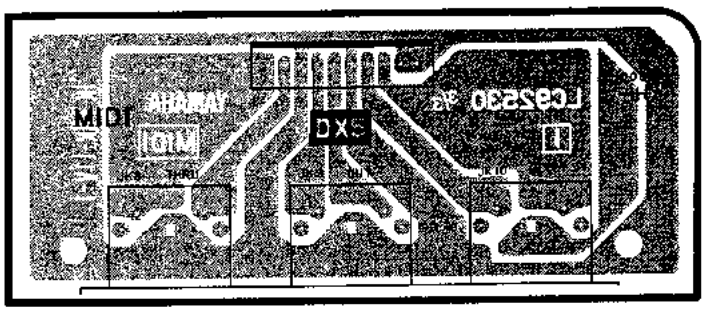
5. Key Removal
鍵盤のはずし方



1) Take out the key spacer.
キーボードスペーサーをはずします。
2) Push the key horizontally in the direction indicated by the arrow. Then take the hook from the fulcrum and lift the key to remove it.
鍵盤を矢印の方向に水平に押して、フックを支点から外して、上に持ち上げはずします。
- When installing, insert the key spring into the key spring catcher gutter properly install white keys after the black ones.
- 取り付ける場合、板バネを切りミゾにしっかり固定して取り付けて下さい。
必ず黒鍵を取り付けてから白鍵を取り付けてください。

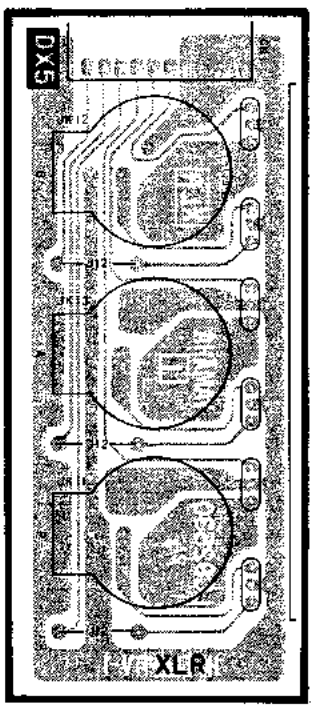
■CIRCUIT BOARD

MIDI CIRCUIT BOARD (NA81449-51 ⚠3/3)



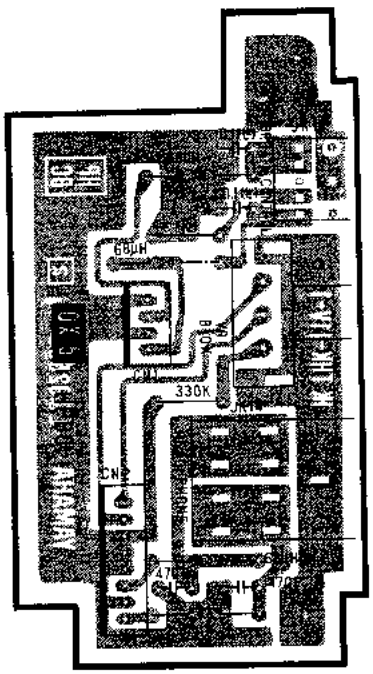
Parts Side

XLR CIRCUIT BOARD (NA81449-51 ⚠2/3)



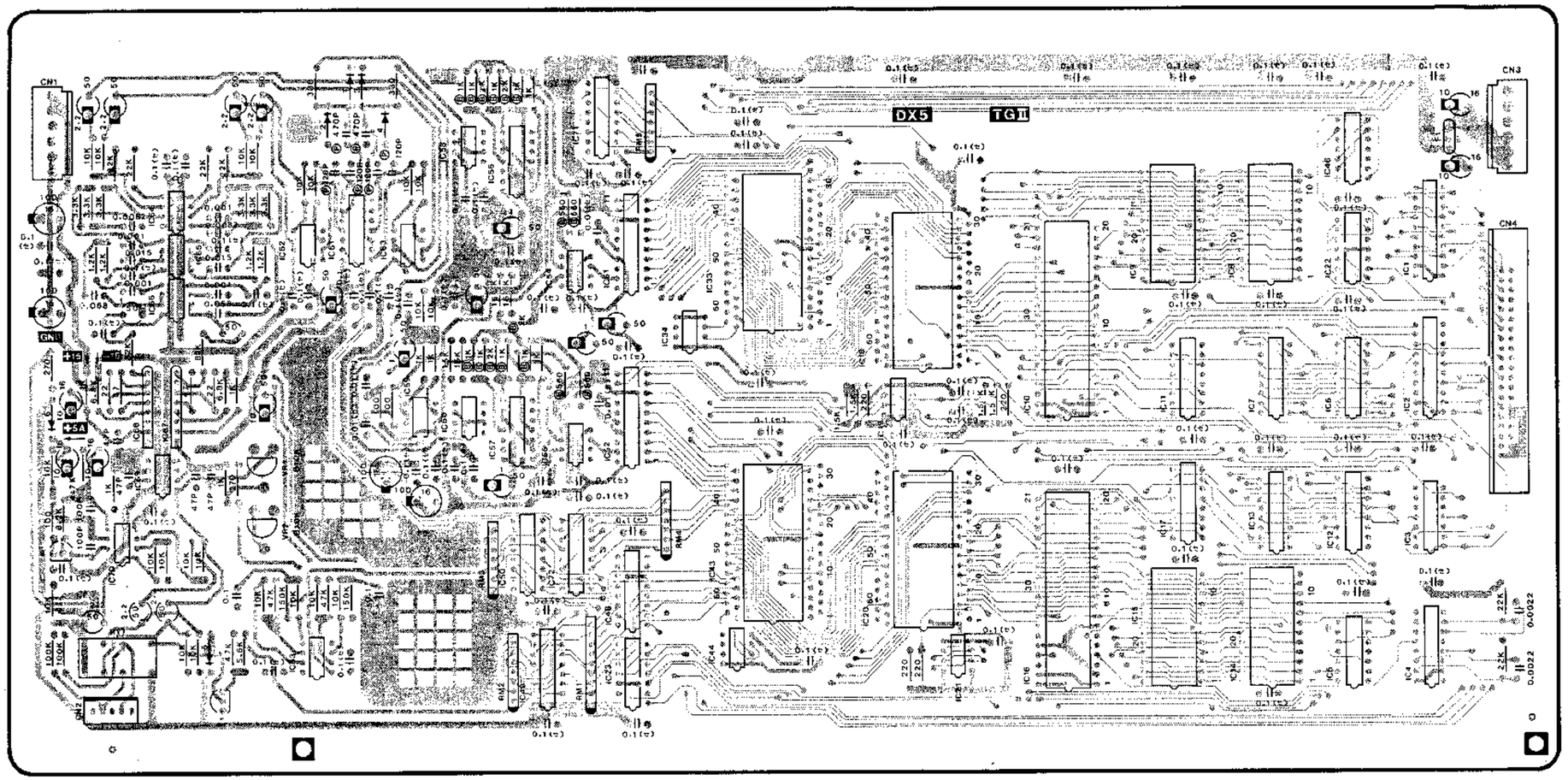
Parts Side

HPBC CIRCUIT BOARD (NA81451-51 ⚠4/4)



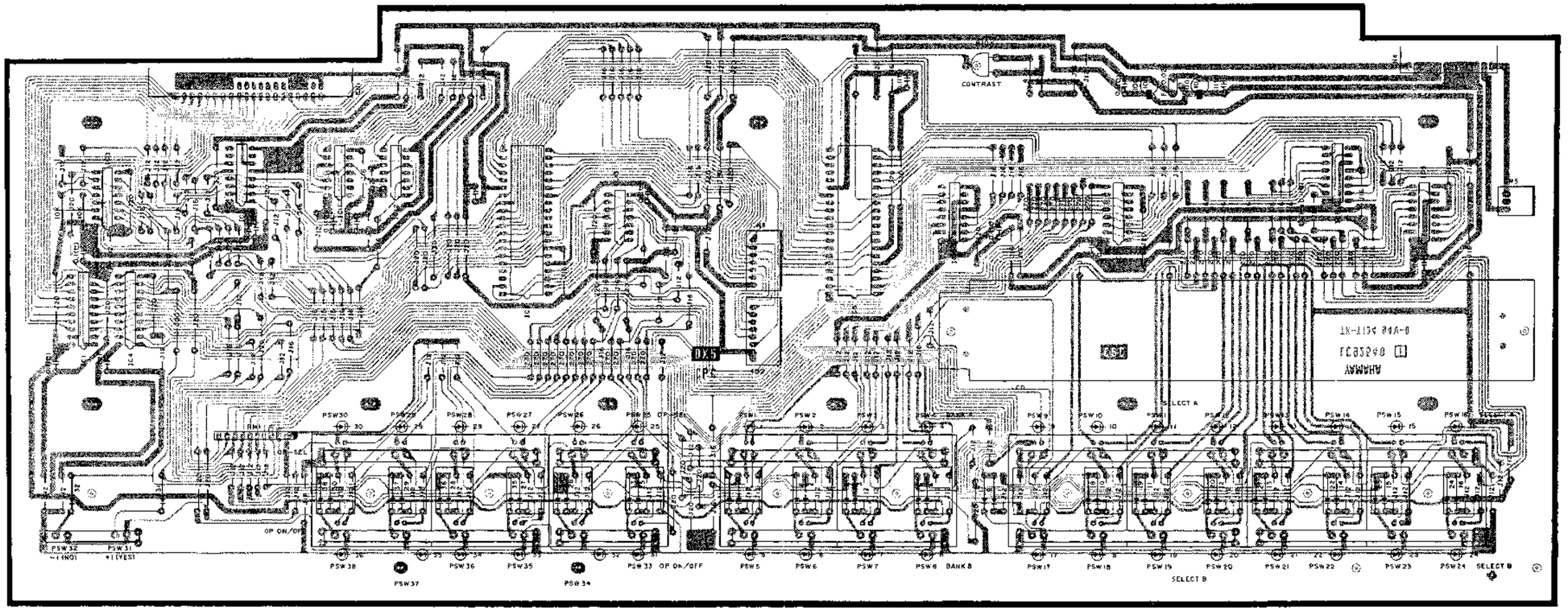
Parts Side

TGII CIRCUIT BOARD (NA81448-51 ⚠)



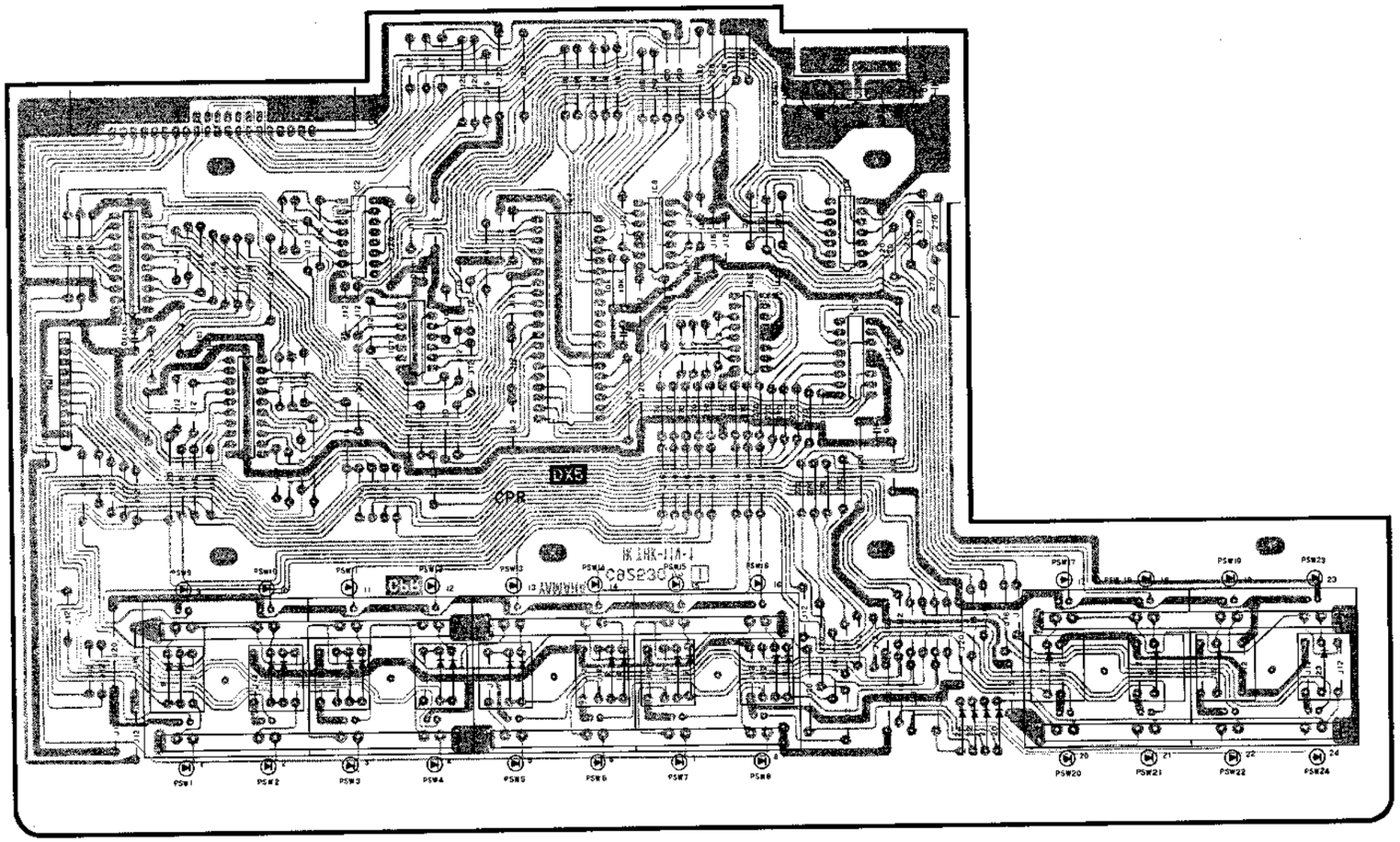
Parts Side

CPC CIRCUIT BOARD (NA81450-48 ⚠)



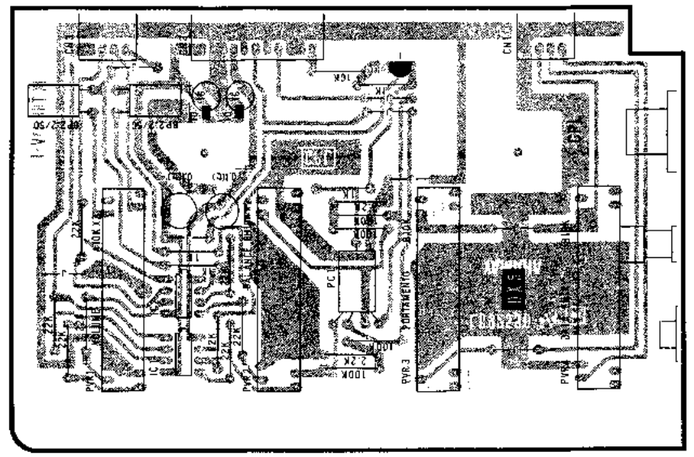
Parts Side

CPR CIRCUIT BOARD (NA81449-51 ⚠1/3)



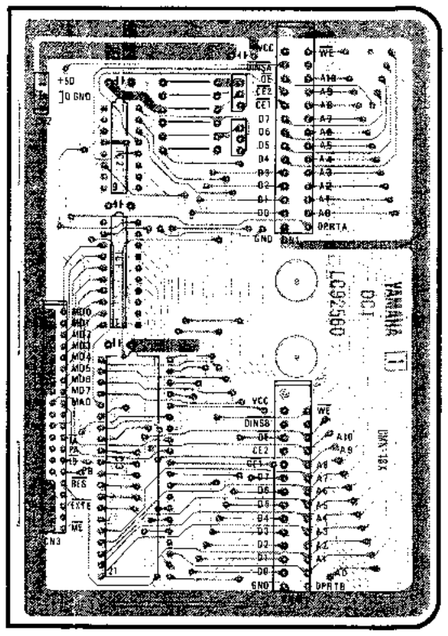
Parts Side

CPL CIRCUIT BOARD (NA81451-51 ⚠3/4)



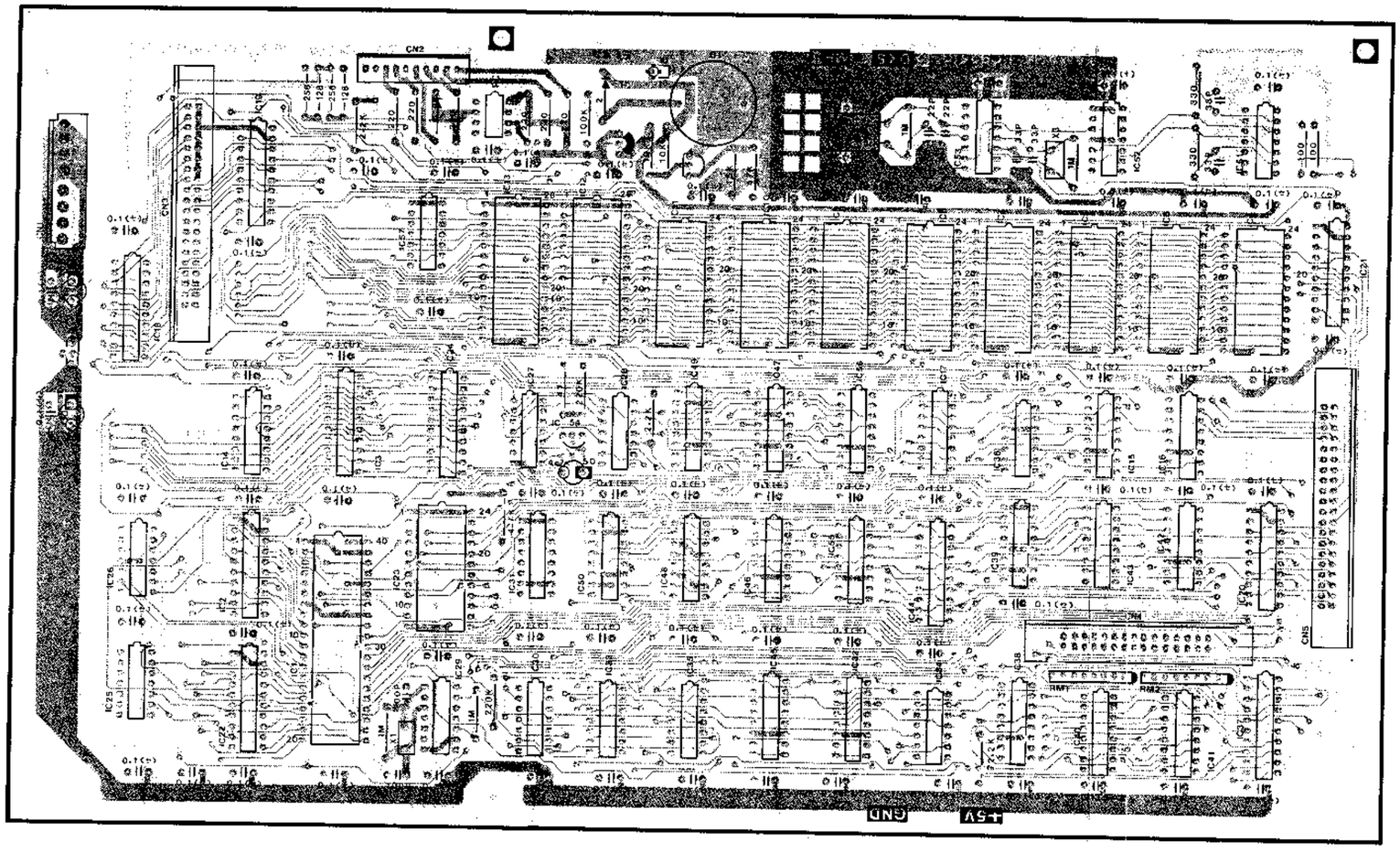
Parts Side

DCT CIRCUIT BOARD (NA81452-4X⚠)



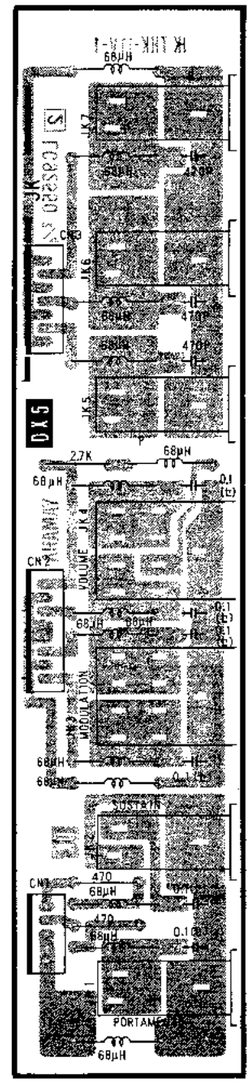
Parts Side

MP II CIRCUIT BOARD (NA81447-51 ⚠)



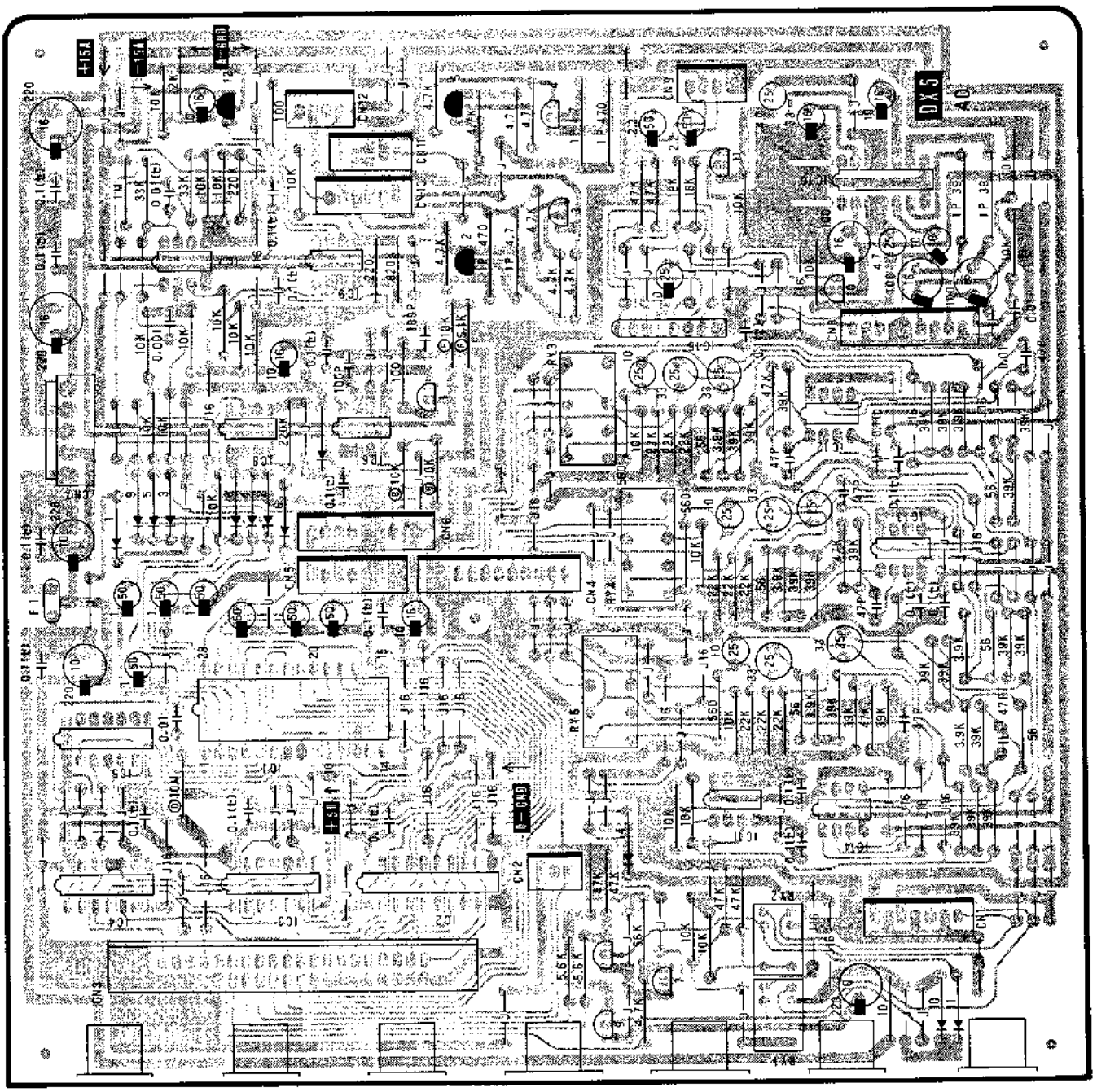
Parts Side

JK CIRCUIT BOARD (NA81451-51 ⚠2/4)



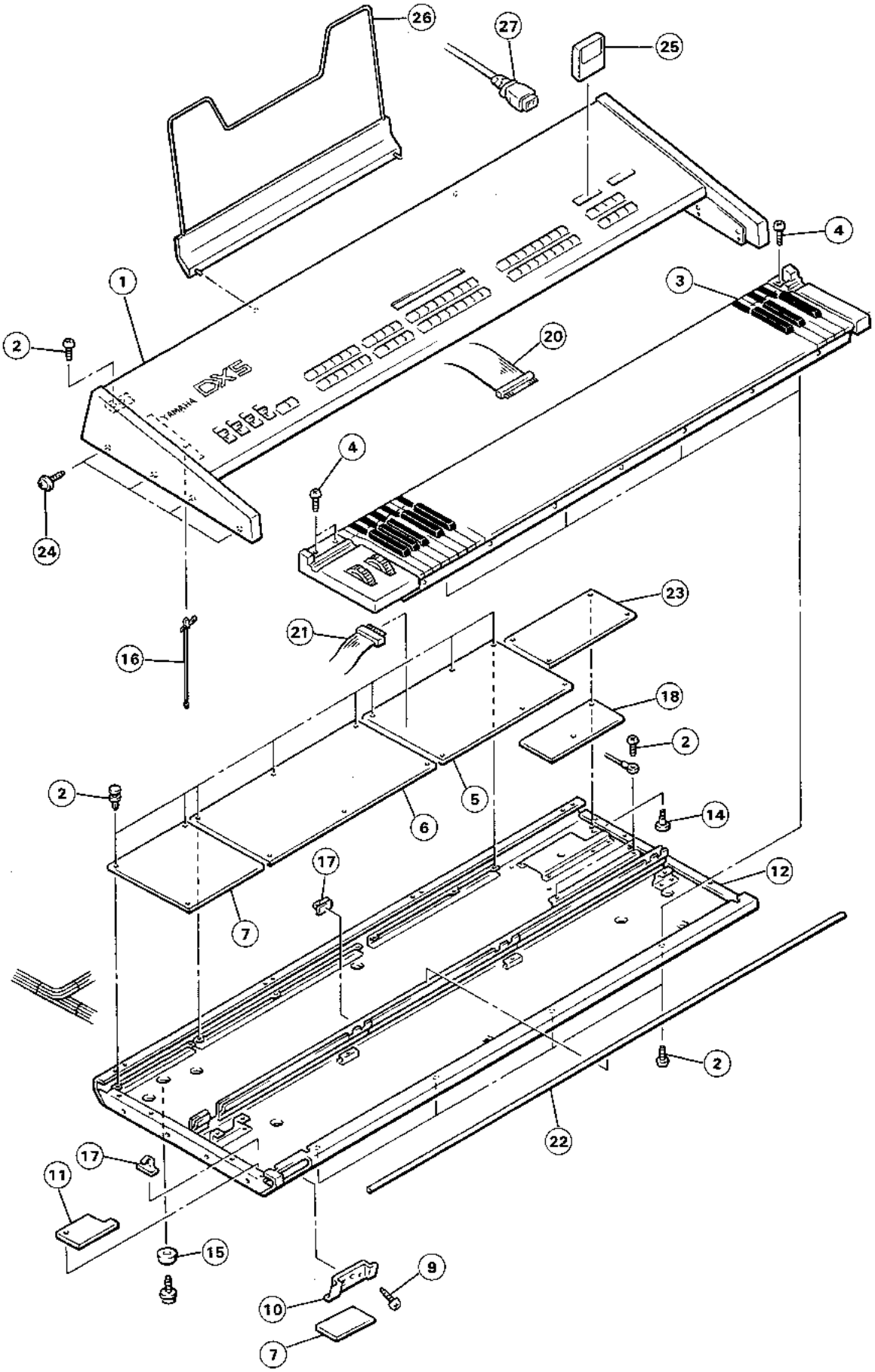
Parts Side

AD CIRCUIT BOARD (NA81451-51 ⚠¼)



Parts Side

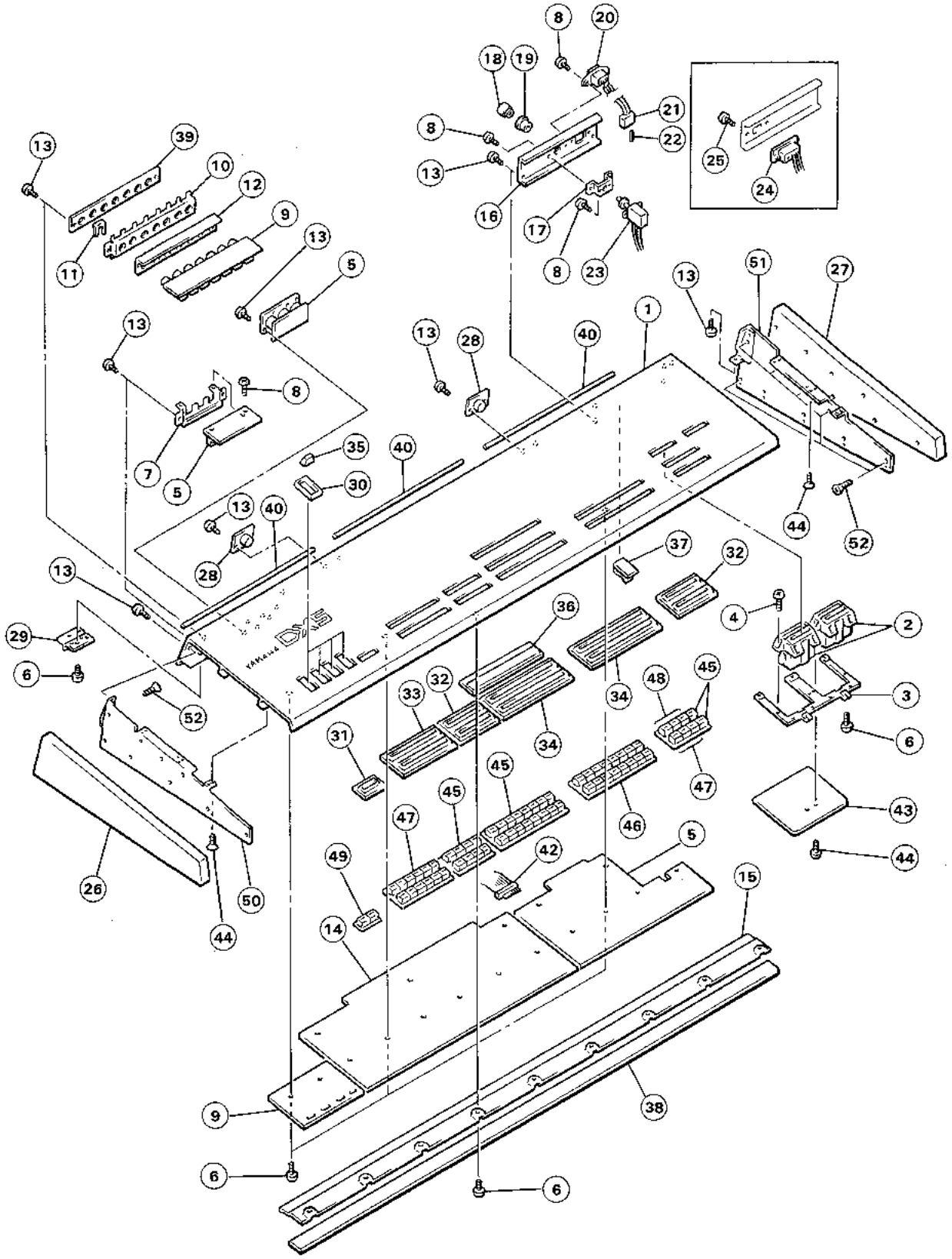
OVER ALL ASSEMBLY



	Ref. No.	Part No.	Description		部品名	Remarks	Common Model	Markets	ランク
	1		Panel Assembly		パネル Ass'y	Refer to page 29			
	2	Ei 34 00 86	Bind Tapping Screw	M4×8 Bℓ	バインドタッピングネジ				01
	3		Keyboard	76 Keys	鍵盤	Refer to page 31			
	4	Ei 34 01 06	Bind Tapping Screw	M4×10 Bℓ	バインドタッピングネジ				01
※	5	NA 81 44 70	Circuit Board, MP2		MP II シート	Refer to page 34			65
※	6	NA 81 44 80	Circuit Board, TG2		TG II シート	Refer to page 35			70
※	7	NA 81 45 10	Circuit Board, AD		AD シート	Refer to page 37			36
※	9	EF 33 00 56	Oval Head Screw	M3×5 Bℓ	丸皿小ネジ				01
※	10	CB 83 60 80	Phones Panel		ホーンパネル				02
※	11	CB 83 60 90	Insulation Sheet		インシュレーションシート				02
※	12	NB 83 29 20	Bottom Cover Assembly		ボトムカバー集成				55
	14	CB 83 49 20	Card Spacer	KGLS 12R	カードスペーサー				01
	15	CB 82 77 80	Flange Leg		すべり座				01
※	16	CB 83 64 50	Panel Rope		パネルロープ				03
※	17	CB 83 61 90	Clamp	DKN-10	クランプ				02
※	18	CB 83 76 70	Insulation Sheet		インシュレーションシート				02
※	20	MZ 82 15 60	Wire Kit, MK		MK 線材 Ass'y				09
※	21	MZ 82 17 70	Wire Kit, MP, TG		MP・TG線材 Ass'y				08
※	22	BB 80 71 80	Shield Line B		シールドライン B				10
※	23	NP 81 80 00	Power Supply Unit		電源ユニット	Refer to page 38		J	25
※	〃	NP 81 90 00	〃		〃			U	
※	〃	NP 82 00 00	〃		〃			G	
※	〃	NP 82 10 00	〃		〃			WG	
※	〃	NP 82 70 00	〃		〃			C	
	24	ED 34 00 86	Bind Head Screw	M4×8 Bℓ	バインド小ネジ				01
※		CA 80 91 70			ボイスライブラリーシート	Accessory			04
	25	NB 82 86 10	Voice ROM	VROM1	ボイスROMカートリッジ	〃	DX1		20
	〃	NB 82 86 20	〃	VROM2	〃	〃	DX1		20
※	24	NB 83 34 00	Performance ROM		パフォーマンスROMカートリッジ	〃			18
	26	NB 82 63 60	Music Rest		譜面板 Ass'y	〃			06
	24	MG 00 10 30	AC Cord		電源コード	〃		J	06
	〃	MG 00 12 80	〃		〃	〃		U	
	〃	MG 00 05 80	〃		〃	〃		C	
	〃	MG 00 10 50	〃		〃	〃		G	
	〃	MG 00 10 60	〃		〃	〃		WG	

※New Parts（新規部品）

PANEL ASSEMBLY



	Ref. No.	Part No.	Description	部 品 名	Remarks	Common Model	Markets	ランク
※	1	8A 81 02 30	Control Panel	コントロールパネル				51
	2	N8 82 69 10	Cartridge Guide Assembly	蓋 ガ イ ド Ass'y				05
※	3	AA 83 35 10	Angle, Cartridge Guide	カートリッジアングル				08

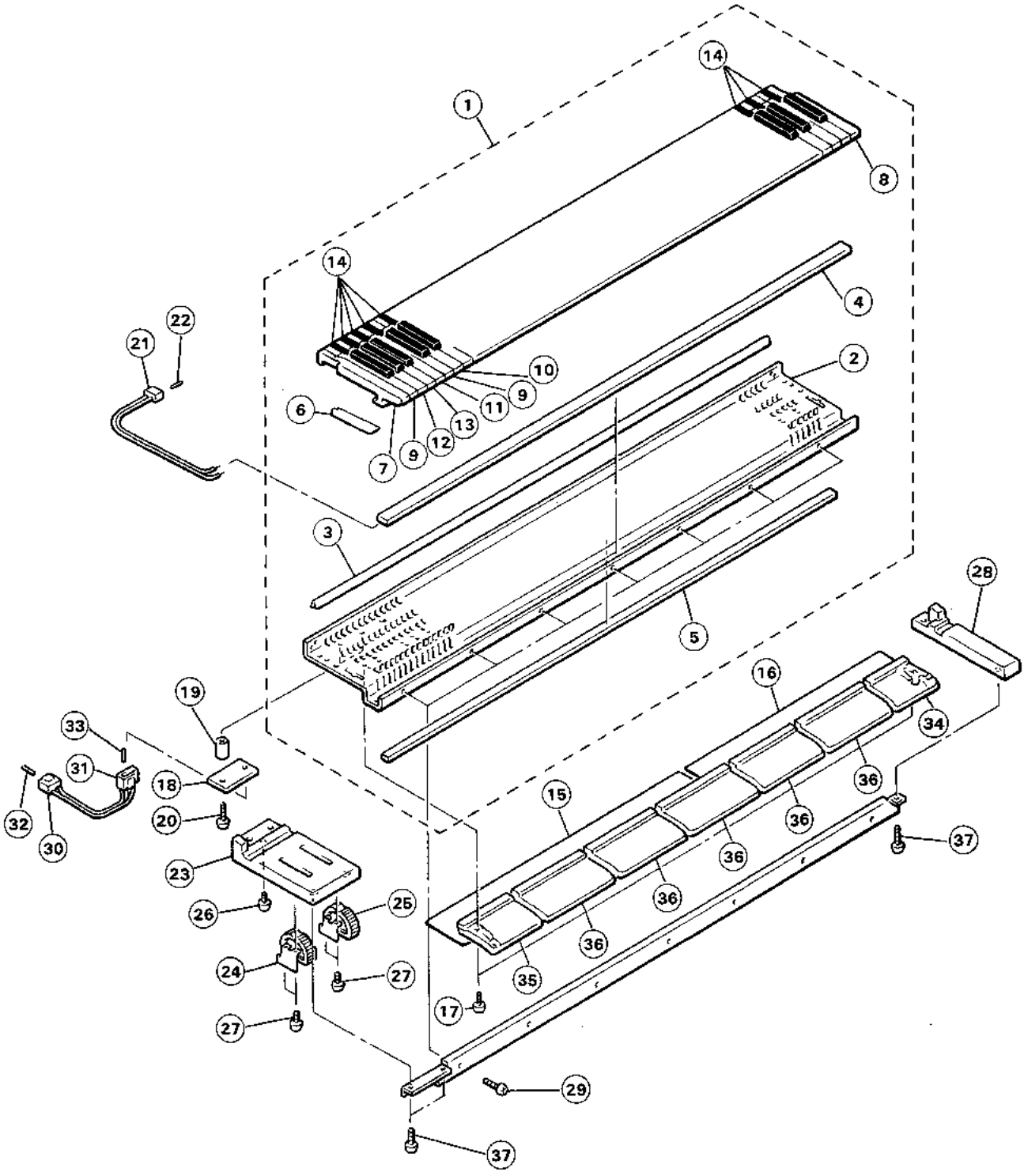
※New Parts (新規部品)

	Ref. No.	Part No.	Description		部品名	Remarks	Common Model	Markets	ランク
	4	ED 34 00 86	Bind Head Screw	M4×8 Bℓ	バインド小ネジ				01
※	5	NA 81 44 90	Circuit Board, CPR		C P R シ ー ト	Refer to page 36			27
	6	Ei 34 00 86	Bind Tapping Screw	M4×8 Bℓ	バインドタッピングネジ				01
※	7	AA 83 44 00	DIN Angle		D I N アングル				08
	8	ED 33 00 66	Bind Head Screw	M3×6 Bℓ	バインド小ネジ				01
※	9	NA 81 45 10	Circuit Board, AD		A D シ ー ト	Refer to page 37			36
※	10	AA 83 44 10	JK Angle		J K アングル				08
	11	LB 30 19 10	Metal Fittings	11JJ 0999-01-480	U 字 金 具				01
	12	CB 83 05 70	Earth Film		アースフィルム		DX1		02
	13	ED 33 01 06	Bind Head Screw	M3×10 Bℓ	バインド小ネジ				01
※	14	NA 81 45 00	Circuit Board, CPC		C P C シ ー ト	Refer to page 40			53
※	15	BA 81 02 40	Shield Rail		シールドレール				08
※	16	AA 83 35 50	Panel, P		P パ ネ ル			J,U	08
※	〃	AA 83 35 60	〃		〃			C	
※	〃	AA 83 35 70	〃		〃			G	
※	〃	AA 83 35 80	〃		〃			WG	
※	17	AA 83 36 00	Holder, Push Switch		P. SW. ホルダー				04
	18	CB 82 53 80	Knob, Push Switch		プッシュボタン				01
	19	CB 81 92 00	Switch Escutcheon		スイッチエスカッション				02
	20	LB 20 18 60	AC Inlet	2P	A C イ ン レ ッ ト			J,U,G	
	〃	LB 30 05 60	〃	3P	〃			C,WG	
※	21	LB 01 50 40	Connector Housing	4P	VHコネクタハウジング				01
※	22	LB 10 17 10	Contact Pin		VHコンタクトピン				01
	23	KA 80 36 10	Power Switch		パ ワ ー ス イ ッ チ				03
	24	KA 40 08 30	Voltage Changer		電 圧 切 替 器			G,WG	01
	25	Ei 33 00 86	Bind Tapping Screw	M3×8 Bℓ	バインドタッピングネジ				01
	26	DB 83 20 70	Side Panel, Left		サイドパネルL				14
	27	DB 83 20 80	Side Panel, Right		サイドパネルR				14
	28	CB 82 81 30	Bush, Music Rest		譜面板ブッシュ				01
	29	AA 82 99 40	Hinge		蝶 番				04
	30	CB 82 81 20	Escutcheon, Slide Pot		スライドVRエスカッション				03
※	31	CB 83 61 00	Escutcheon	2	エ ス カ ッ シ ョ ン				04
※	32	CB 83 61 10	〃	8	〃				04
※	33	CB 83 61 20	〃	12	〃				05
※	34	CB 83 61 30	〃	16	〃				04
	35	CB 82 81 40	Knob		ツ マ ミ				01
※	36	CB 83 60 50	Lens, LCD		L C D レ ン ズ				06
	37	CB 83 01 10	Clamp, Cable		ミニフラットケーブルクリップ				02
※	38	CC 01 80 10	Felt		フ ェ ル ト				04
※	39	BB 80 71 90	JK Earth Film		JKアースフィルム				05
※	40	BB 80 71 70	Shield Line A		シールドライン A				06
	41	EO 34 00 86	Flat Head Tapping Screw	M4×8 Bℓ	皿タッピングネジ				01
※	42	MZ 82 15 70	Wire Kit, Panel		パネル線材 Ass'y				14
※	43	NA 81 45 20	Circuit Board, DCT		D C T シ ー ト	Refer to page 42			17
	44	Ei 33 02 06	Bind Tapping Screw	M3×20 Bℓ	バインドタッピングネジ				01
	45	CB 83 04 40	Knob, A	Blue	ツ マ ミ A	Voice			02
	46	CB 83 04 50	Knob, B	Green	ツ マ ミ B	Performance			02
	47	CB 83 04 60	Knob, C	Beige	ツ マ ミ C	Operator			02
	48	CB 83 04 70	Knob, D	Grey	ツ マ ミ D	Key Assign			03
	49	CB 83 04 90	Knob, E	Beige	ツ マ ミ E	DATA ENTRY			03
※	50	AA 83 35 30	Shieald Panel L		シールドパネルL				11
※	51	AA 83 35 40	Shieald Panel R		シールドパネルR				11
※	52	EO 34 01 26	Flat Head Tapping Screw	M4×12 Bℓ	皿タッピングネジ				01

※New Parts（新規部品）

■PARTS LIST

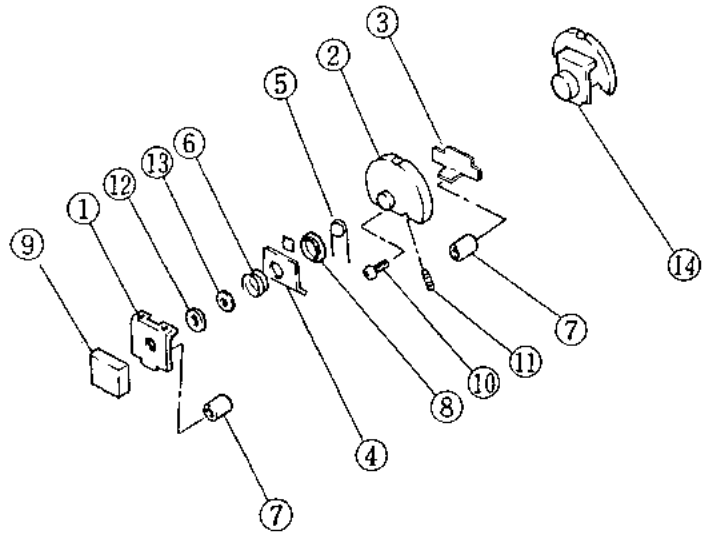
KEYBOARD



	Ref. No.	Part No.	Description		部品名	Remarks	Common Model	Markets	ランク
※	*1*	***NB 83 15 90***	***Frame Assembly***		フレーム Ass'y				34
※	2	NX 80 14 90	Frame		MK フレーム				16
	3	CB 82 73 10	Key Stopper		キーストッパー				03
※	4	PB 00 07 90	PC Sensor		PC センサー				18
	5	CC 03 05 60	Felt	1025×6×3	フェルト				03
	6	AA 05 54 30	Spring		MK バネ				02
	7	NB 82 60 10	Key Assembly	E'	キー Ass'y				04
	8	NB 82 60 20	〃	G'	〃				04
	9	NB 10 75 40	〃	C, F	〃		PF10		03
	10	NB 10 75 50	〃	D	〃		PF10		03
	11	NB 10 75 60	〃	E, B	〃		PF10		03
	12	NB 10 75 70	〃	G	〃		PF10		03
	13	NB 10 75 80	〃	A	〃		PF10		03
	14	NB 10 76 00	〃	Black	〃		PF10		03
	15	NB 82 59 40	Switch Unit	33K	スイッチユニット				17
	16	NB 82 59 50	〃	43K	〃				19
	17	ED 33 01 66	Bind Head Screw	M3×16	バインド小ネジ				01
	18	NA 10 97 20	Circuit Board		PC シート				07
	19	VA 03 26 00	Spacer		スペーサー				01
	20	ED 33 01 06	Bind Head Screw	M3×10	バインド小ネジ				01
	21	LB 30 07 20	Connector Housing	3P	NHコネクタハウジング				01
	22	BB 00 44 30	Cohtact Pin		NH コンタクトピン				01
	23	CB 82 80 20	End Block, Left		拍子木左		DX7		09
	24	NB 82 66 70	Wheel Assembly		ホイール Ass'y	Pitch Bend	DX7		15
	25	NB 82 66 80	〃		〃	Modulation	DX7		08
	26	ED 33 00 66	Bind Head Tapping Screw	M3×6	バインドタッピングネジ				01
	27	EM 33 00 86	Oval Tapping Screw	M3×8	丸皿タッピングネジ				01
	28	CB 82 80 30	End Block, Right		拍子木右				07
	29	Ei 34 00 86	Bind Tapping Screw	M4×8 Bℓ	バインドタッピングネジ				01
	30	LB 00 90 50	Connector Housing	5P	XH ハウジング				01
	31	LB 60 24 80	〃	8P	NH ハウジング				01
	32	LB 10 11 30	Contact Pin		XH コンタクトピン				01
	33	BB 00 44 30	〃		NH コンタクトピン				01
	34	NB 10 71 30	Switch Assembly	9i	スイッチ Ass'y				08
	35	NB 10 71 20	〃	12Q	〃				08
	36	NB 10 71 50	〃	7G	〃				08
	37	Ei 34 01 06	Bind Tapping Screw	M4×10 Bℓ	バインドタッピングネジ				01

※New Parts（新規部品）

WHEEL ASSEMBLY



Ref. No.	Part No.	Description		部品名	Remarks	Common Model	Markets	ランク
		Wheel Ass'y		ホイール Ass'y				
1	AA 81 74 61	Frame		フレーム				03
2	CB 82 82 81	Wheel		ホイール				03
3	AA 81 74 70	Wheel Angle		ホイールアングル				03
4	AA 81 74 80	Wheel Plate		ホイールプレート				03
5	AA 81 74 90	Return Spring		リターンスプリング				01
6	AA 81 75 00	Friction Spring		フリクションスプリング				01
7	CB 81 90 20	Wheel Tube		ホイールチューブ				02
8	EK 80 12 60	Wheel Ring		CS型止め輪				01
9	HS 41 21 60	Variable Resistor	B10K	ロータリーボリューム	Pitch			10
10	ED 33 00 86	Bind Head Screw	M3×8	バインド小ネジ	Black			01
11	EK 80 12 70	Wheel Screw	3×12	スリワリ付止めネジ				01
12	EV 22 00 70	Flat Washer	7S	特殊平座金				01
13	EZ 30 70 10	Hexagonal Nut	M7	特殊六角ナット				01
14	HS 31 24 60	Variable Resistor	B10K	ロータリーボリューム	Modulation			04

ELECTRIC PARTS

	Ref. No.	Part No.	Description	部品名	Remarks	Common Model	Markets	ランク
			P.C. Board, MP II	*MP II シート*				
		FZ 00 41 10	SC Ceramic Capacitor	0.1 16V	半導体セラコン			01
		FZ 00 59 20	Electro Magnetic Cap.	0.022	エミフィル			02
		HZ 00 50 40	Module Resistor	10K×7 コモン付	モジュール抵抗			02
		iA 10 15 71	Transistor	2SA1015(O,Y)	トランジスタ			03
		iC 18 15 50	〃	2SC1815(Y,GR)	〃			03
		iG 00 17 20	IC	TC4069UBP	IC			03
		iG 06 36 10	〃	M74LS00	〃			03
		iG 04 37 00	〃	M74LS08	〃			03
		iG 04 40 00	〃	M741S74A	〃			04
		iG 04 44 00	〃	74LS161	〃			05
		iG 04 99 00	〃	M74LS139	〃			05
		iG 05 11 00	〃	TC40H074P	〃			04
		iG 05 26 00	〃	74LS05	〃			03
		iG 05 96 10	〃	M741S157	〃			04
		iG 06 00 50	〃	M741S244	〃			06
		iG 04 46 00	〃	74LS245	〃			08
		iG 09 66 00	〃	TC40H166	〃			06
		iG 10 62 00	〃	M5M5118P	〃	RAM		12
		iG 10 63 00	〃	M741S14	〃			05
		iG 10 64 00	〃	M74LS32	〃			03
		iG 10 67 00	〃	M74LS138	〃			03
		iG 11 49 00	〃	HD68B09P	〃	CPU		13
		iG 11 54 00	〃	74LS283	〃			04
		iG 11 58 00	〃	MC68B50P	〃			10
		iG 11 62 00	〃	PST518	〃			04
※		iG 13 75 10	〃	iG13751	〃			07
※		iN 01 23 50	〃	HN4827128G-30	〃	ROM		17
※		iN 01 24 50	〃	〃	〃	ROM		17
		iR 00 04 00	〃	TC74HC04P	〃			03
※		iR 00 08 00	〃	TC74HC08P	〃			03
※		iF 00 34 50	Diode	ISS133	ダイオード			01
		iF 00 56 40	〃	OA95	〃			01
		iK 00 04 70	Photo Conductor	TLP552	フォトカプラー			06
		LB 91 81 00	Connector, XH	10P(T,E)	XHコネクタ			02
※		LB 93 20 80	Connector, VH	8P (T,E)	VHコネクタ			01
		LB 60 66 50	Flat Cable Connector	40P(T,E)ロック付	フラットケーブルコネクター			06
※		LB 60 81 90	〃	30P(T,E)ロック付	〃			05
		LB 60 60 50	IC Socket	28P	ICソケット			04
		PC 90 00 40	Battery	CR2032	リチウム電池			03
		QU 00 47 00	Piezoelectric Ceramic Vibrator	500KHz	セラロック			03
※		QU 00 91 00	〃	CSA750MT	〃			03
		QU 00 52 00	Crystal Resonator	9.4265MHz	水晶振動子			05

※New Parts（新規部品）

	Ref. No.	Part No.	Description		部品名	Remarks	Common Model	Markets	ランク
			P.C. Board, TG II		*T G II シート*				
※		FZ 00 59 20	Electro Magnetic Interference	0.022	エミフィル				02
※		FZ 00 41 10	SC Ceramic Capacitor	0.1 16V	半導体セラコン				01
※		FZ 00 42 40	BP Electrolytic Capacitor	1/50	BPケミコン				01
		HZ 00 46 50	Module Resistor	RM6-103	モジュール抵抗				02
		HZ 00 46 60	〃	RM8-103	〃				02
※		HZ 00 50 50	〃	RKC5L103	〃				03
※		iC 18 15 50	Transistor	2SC1815(Y,GR)	トランジスタ				03
		iG 00 13 90	IC	NJM4558DV	IC				03
※		iG 04 40 00	〃	M74LS74A	〃				04
		iG 05 06 00	〃	HD74LS393	〃				07
※		iG 06 00 50	〃	M74LS244	〃				06
※		iG 02 90 00	〃	M74LS02	〃				04
		iG 06 25 00	〃	UPC1252H2	〃				05
		iG 06 41 00	〃	TC40H174	〃				05
		iG 07 95 00	〃	iG07950(8PDIL)	〃				05
		iG 10 60 00	〃	BA9221(20P)	〃	ADC			10
		iG 10 62 00	〃	M5M5118P-15	〃	RAM			12
		iG 10 64 00	〃	M74LS32	〃				03
		iG 10 67 00	〃	M74LS138	〃				03
		iG 10 70 00	〃	NJM072	〃				04
		iG 10 71 00	〃	LF356(8PDIL)	〃				05
		iG 11 49 00	〃	HD68B09P	〃	CPU			13
		iG 11 52 00	〃	HD74LS123	〃				03
		iG 11 53 00	〃	74LS670	〃				05
※		iN 01 25 00	〃	2732	〃	ROM			11
※		iR 40 50 00	〃	TC74HC4050	〃				03
※		iR 40 66 00	〃	TC74HC4066	〃				03
		iT 21 28 00	〃	YM2128	〃	OPS			20
		iT 21 29 00	〃	YM2129	〃	EGS			17
		iF 00 34 50	Diode	1SS33	ダイオード				01
※		HT 77 00 60	Pre-set Potentiometer	B10K	半固定VR				02
		KC 00 17 70	Relay	RY5W	リレー				07
※		LB 91 80 50	Connector, XH	5P(T,E)	XHコネクタ				01
※		LB 93 20 60	Connector, VH	6P(T,E)	VHコネクタ				01
		LB 60 66 50	Flat Cable Connector	40P(T,E)ロック付	フラットケーブルコネクタ				06
		LB 60 60 30	IC Socket	24P	ICソケット				05

※New Parts (新規部品)

	Ref. No.	Part No.	Description	部品名	Remarks	Common Model	Markets	ランク
			P.C.Board,CPR	***CPR***				
		FZ 00 41 10	SC Ceramic Capacitor	0.1	半導体セラコン			01
※		HZ 00 47 50	Module Resistor	RM9-472J	モジュール抵抗			01
		iG 04 99 00	IC	M74LS139	I C			05
		iG 04 46 00	〃	M74LS245	〃			08
		iG 10 56 00	〃	μPD8255A-5	〃			07
		iG 10 64 00	〃	M74LS32	〃			03
		iG 10 65 00	〃	M74LS04	〃			03
		iG 10 67 00	〃	M74LS138	〃			03
		iG 10 72 00	〃	TC40H244	〃			07
		iF 00 34 59	Diode	1SS133	ダイオード			01
		iF 00 57 30	LED	GL9HD24	LED			02
		KA 90 63 00	Push Switch	4連	プッシュスイッチ			04
		LB 60 70 80	Flat Cable Connector	40P(S,E)ロック付	フラットケーブルコネクタ			07
		LB 91 81 00	Connector, XH	10P(T,E)	XHコネクタ			02
		LB 91 81 00	Connector, XH	10P(S,E)	〃			02
		LB 50 05 20	Connector, DIN		DINコネクタ			03
※		LB 30 23 50	Connector, XLR		XLRコネクタ			06
		CB 60 56 20	Plastic Rivet		プラスチックリベット			01
※		CB 83 60 60	Bottom Holder		ボトムホルダー			02
※		CB 83 60 70	Top Holder		トップホルダー			01
			P.C. Board, CPC	***CPCシート***				
		FZ 00 41 10	SC Ceramic Capacitor	0.1 16V	半導体セラコン			01
		HZ 00 47 50	Module Resistor	RM9-472J	モジュール抵抗			01
		iG 02 69 00	IC	74LS00	I C			11
		iG 04 99 00	〃	74LS139	〃			05
		iG 05 04 00	〃	74LS367	〃			04
		iG 04 46 00	〃	74LS245	〃			08
		iG 10 56 00	〃	μPD8255AC-5	〃			07
		iG 10 64 00	〃	74LS32	〃			03
		iG 10 65 00	〃	74LS04	〃			03
		iG 10 67 00	〃	74LS138	〃			03
		iG 10 72 00	〃	TC40H244	〃			07
		iF 00 34 50	Diode	1SS133	ダイオード			01
		iF 00 57 30	LED	GL9HD24	LED			02
		HT 77 00 60	Pre-set Potentiometer	B10K	半固定ボリューム			02
		KA 90 63 00	Push Switch	4連	プッシュスイッチ			04
		KA 90 63 30	〃	2連	〃			03
		LB 91 90 30	Connector, XH	3P(S,E)	XHコネクタ			01
		LB 91 90 70	〃	7P(S,E)	〃			01
		LB 91 90 80	〃	8P(S,E)	〃			02
		LB 91 91 20	〃	12P(S,E)	〃			02
		LB 60 70 80	Flat Cable Connector	40P(S,E)ロック付	フラットケーブルコネクタ			07
※		AA 82 82 00	Stopper, LCD		LCD金具			06
※		NB 83 29 19	LCD Assembly		LCD Ass'y			33
		CB 60 56 20	Plastic Rivet		プラスチックリベット			01
※		CB 83 60 60	Bottom Holder		ボトムホルダー			02
※		CB 83 60 70	Top Holder		トップホルダー			01

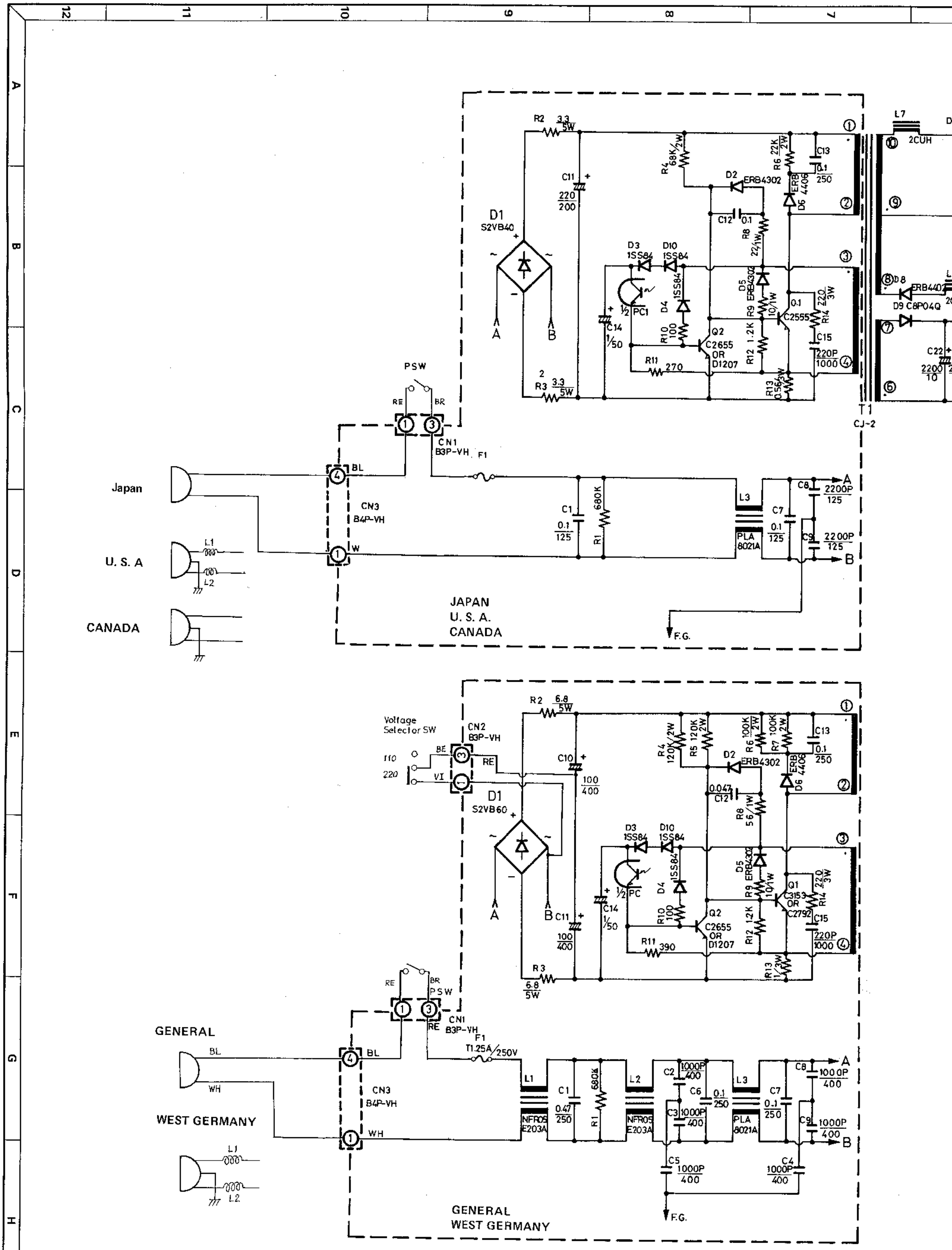
※New Parts (新規部品)

Ref. No.	Part No.	Description		部品名	Remarks	Common Model	Markets	ランク
		P.C. Board, AD		***A D シート***				
	FZ 00 41 10	SC Ceramic Capacitor	0.1 16V	半導体セラコン				01
	HZ 00 17 60	Matal Film Resistor	10K ±0.1%	キンピ抵抗				03
	iA 05 09 20	Transistor	2SA509(O,Y)	トランジスタ				03
	iA 10 15 71	〃	2SA1015(O,Y)	〃				03
	iC 18 15 11	〃	2SC1815(O,Y)	〃				03
	iC 21 20 00	〃	2SC2120(Y)	〃				03
	iG 00 13 90	IC	NJM4558DV	IC				03
	iG 04 25 00	〃	NJM4556DV	〃				04
	iG 04 40 00	〃	74LS74	〃				04
	iG 06 00 50	〃	74LS244	〃				06
	iG 02 90 00	〃	74LS02	〃				04
	iG 10 61 00	〃	M58990P-1	〃				09
	iG 10 64 00	〃	74LS32	〃				03
	iG 12 07 00	〃	M5222L	〃				04
※	iG 15 31 00	〃	LA4170	〃				04
	iF 00 34 50	Diode	1SS133	ダイオード				01
	iK 00 02 90	Photo Conductor	P873-13	フォトカプラー				07
	HQ 23 91 80	Slide Variable Resistor	B10K	スライドVR				03
※	HQ 23 02 20	〃	10K×2	〃				03
※	HQ 23 02 30	〃	BH10K×2	〃				03
※	HS 41 26 40		B10K	ロータリーVR				02
	KC 00 17 70	Relay	RY-5W	リレー				07
※	KC 00 20 30	〃	SY-5	〃				06
※	AA 83 35 90			ホーンジャックステー				08
	LB 91 80 30	Connector, XH	3P(T,E)	XHコネクタ				01
	LB 91 80 40	〃	4P(T,E)	〃				01
※	LB 91 80 50	〃	5P(T,E)	〃				01
※	LB 91 80 60	〃	6P(T,E)	〃				01
※	LB 91 80 70	〃	7P(T,E)	〃				01
※	LB 91 80 80	〃	8P(T,E)	〃				01
	LB 91 80 90	〃	9P(T,E)	〃				01
※	LB 91 81 10	〃	11P(T,E)	〃				01
	LB 91 90 40	〃	4P(S,E)	〃				01
※	LB 91 91 10	〃	11P(S,E)	〃				01
※	LB 93 20 50	Connector, VH	5P(T,E)	VHコネクタ				01
	LB 60 66 50	Connector	40P(T,E)ロック付	ダブルコネクタ				06
	GE 30 93 50	Chock Coil	60μH	チョークコイル				01
	LB 20 23 30	Jack, ohone	モノラル	ジャック				02
	LB 30 17 80	Jack, with switch	ステレオ	〃				03
	LB 30 20 00	Jack, mini-type	〃	〃				03
	LB 30 20 10	Socket, cannon	ミニ	〃				02
		P.C. Board, DCT		***D C T シート***				
	FZ 00 41 10	SC Ceramic Capacitor	0.1 16V	半導体セラコン				01
	iC 18 15 11	Transistor	2SC1815(O,Y)	トランジスタ				03
	iG 04 99 00	IC	M74LS139	IC				05
	iG 04 46 00	〃	M74LS245	〃				08
	iG 10 56 00	〃	μPD8255A-5	〃				07
	LB 91 90 30	Connector, XH	3P(S,E)	XHコネクタ				01
	LB 60 70 80	Flat Cable Connector	40P(S,E)ロック付	フラットケーブルコネクタ				07
	LB 60 53 50	Connector	(T,E)	28Pエネクタソケット				07

※New Parts（新規部品）

	Ref. No.	Part No.	Description		部品名	Remarks	Common Model	Markets	ランク
			Power Supply Unit		電源ユニット				
	VR1	HT 57 05 40	Trim Pot.	B1K	半固定ボリューム				02
	Q1	iC 25 55 00	Transistor	2SC2555	トランジスタ				05
	Q2	iC 26 55 00	〃	2SC2655	〃				03
	Q3	iC 26 34 00	〃	2SC2634	〃				03
	Q4	iC 09 45 30	〃	2SC945	〃				03
	PC1	iK 00 04 80	Photo Conduct	PC-817	ホトカプラー			J,U,C	03
	〃	iK 00 04 90	〃	PC-511	〃			G,WG	
	D1	iH 00 13 00	Diode	S2VB40	ダイオード				04
※	〃	iX 80 13 60	〃	S2VB60	〃				04
	D2,5	iH 00 17 50	〃	ERB4302	〃				01
	D3,4,10	iF 00 13 80	〃	1SS84	〃				01
	D6	iH 00 17 40	〃	ERB4406	〃				01
	D7,8	iF 00 85 90	〃	ERB4402	〃				01
	D9	iX 80 09 80	〃	C8P04Q	〃				05
	ZD1	iF 00 14 70	〃	RD6.2EB2	ツェナーダイオード				01
	IC1	iG 06 39 00	IC	μPC7815H	IC				05
	IC2	iG 07 75 00	〃	μPC7915H	〃				05
※	L1,2	GX 80 01 00	Choke Coil	20MH	チョークコイル	NFR05E203A		G,WG	
	L3	GX 55 03 70	〃	8MH	〃				08
	L4,5	GE 30 08 20	〃	150μH	〃				02
	L6,7,8	GE 30 07 40	〃	20μH					02
※	L9	GX 80 01 10	〃	1.4MH		CLR2BD142			08
※	T1	GX 80 01 20	Transformer		トランス	TYA008		J,U	09
※	〃	GX 80 01 40	〃		〃	TYA017		C	
※	〃	GX 80 01 30	〃		〃	TYA009		G,WG	
※	T2	GX 80 01 50	〃		〃	D32-46			09
	F1	KB 00 12 40	Fuse	2.0A 250V	ヒューズ			U,C	
	〃	KB 00 03 40	〃	1.5A 250V	〃			J	01
	〃	KB 00 06 80	〃	1.25A 250V	〃		*	G,WG	
		CX 55 00 20	Insulator		絶縁紙	for Q1			02
		CX 55 00 10	〃		〃	for D9, IC1, IC2			02

※New Parts（新規部品）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C11 220/200
D1 S2VB40
A
B
R4 68K/2W
R6 22K/2W
C13 0.1/250
D2 ERB4302
ERB 4406 D6
C12 0.1
R8 22/1W
D3 1SS84
D10 1SS84
D4 1SS84
D5 ERB4302
½ PC1
C14 1/50
R10 100
Q2 C2655 OR D1207
R11 270
R12 1.2K
R9 10/1W
0.1
C2555
R14 220/3W
C15 220P/1000
R13 0.56/2W
R3 3.3/5W
L7 2CUH
D8 ERB4402
D9 C8P04Q
C22 2200/10
T1 CJ-2
PSW
RE
BR
CN1 B3P-VH
F1
BL
CN3 B4P-VH
W
Japan
U. S. A
CANADA
L1
L2
C1 0.1/125
R1 680K
L3 PLA 8021A
C7 0.1/125
C8 2200P/125
C9 2200P/125
JAPAN
U. S. A.
CANADA
F.G.
Voltage Selector SW
110
220
CN2 B3P-VH
BE
RE
VI
R2 6.8/5W
C10 100/400
R4 120K/2W
R5 120K/2W
R6 100K/2W
R7 100K/2W
C13 0.1/250
D2 ERB4302
ERB 4406 D6
0.047 C12
R8 56/1W
D3 1SS84
D10 1SS84
D4 1SS84
D5 ERB4302
½ PC
C14 1/50
R10 100
Q2 C2655 OR D1207
R11 390
R12 1.2K
R9 10/1W
Q1 C3153 OR C2792
R14 220/3W
C15 220P/1000
R13 1/3W
R3 6.8/5W
C11 100/400
D1 S2VB60
A
B
RE
BR
PSW
CN1 B3P-VH
RE
F1 T1.25A/250V
GENERAL
WEST GERMANY
BL
WH
CN3 B4P-VH
L1
L2
NFR05 E203A
C1 0.47/250
R1 680K
C2 1000P/400
C6 0.1/250
C3 1000P/400
L3 PLA 8021A
C7 0.1/250
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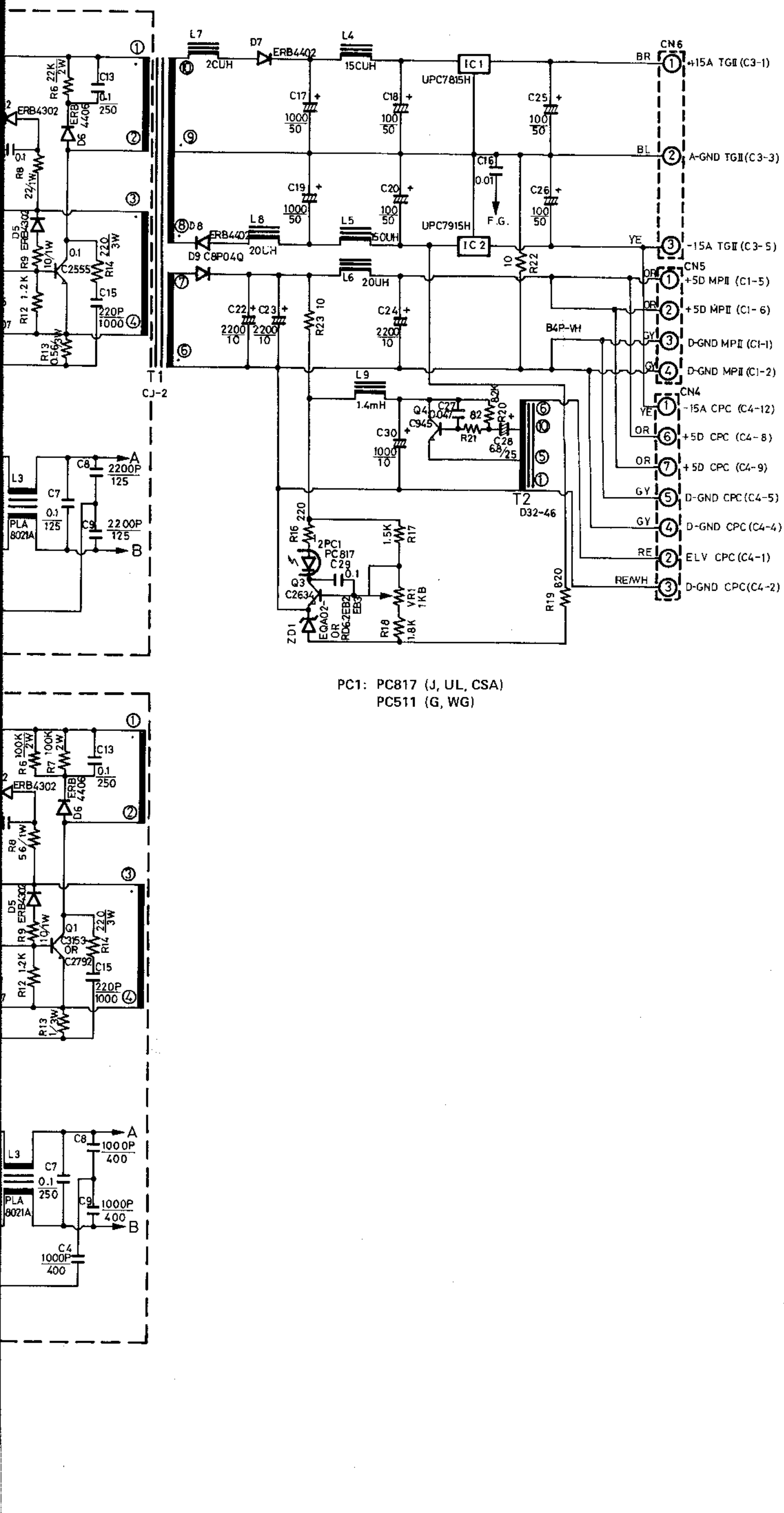
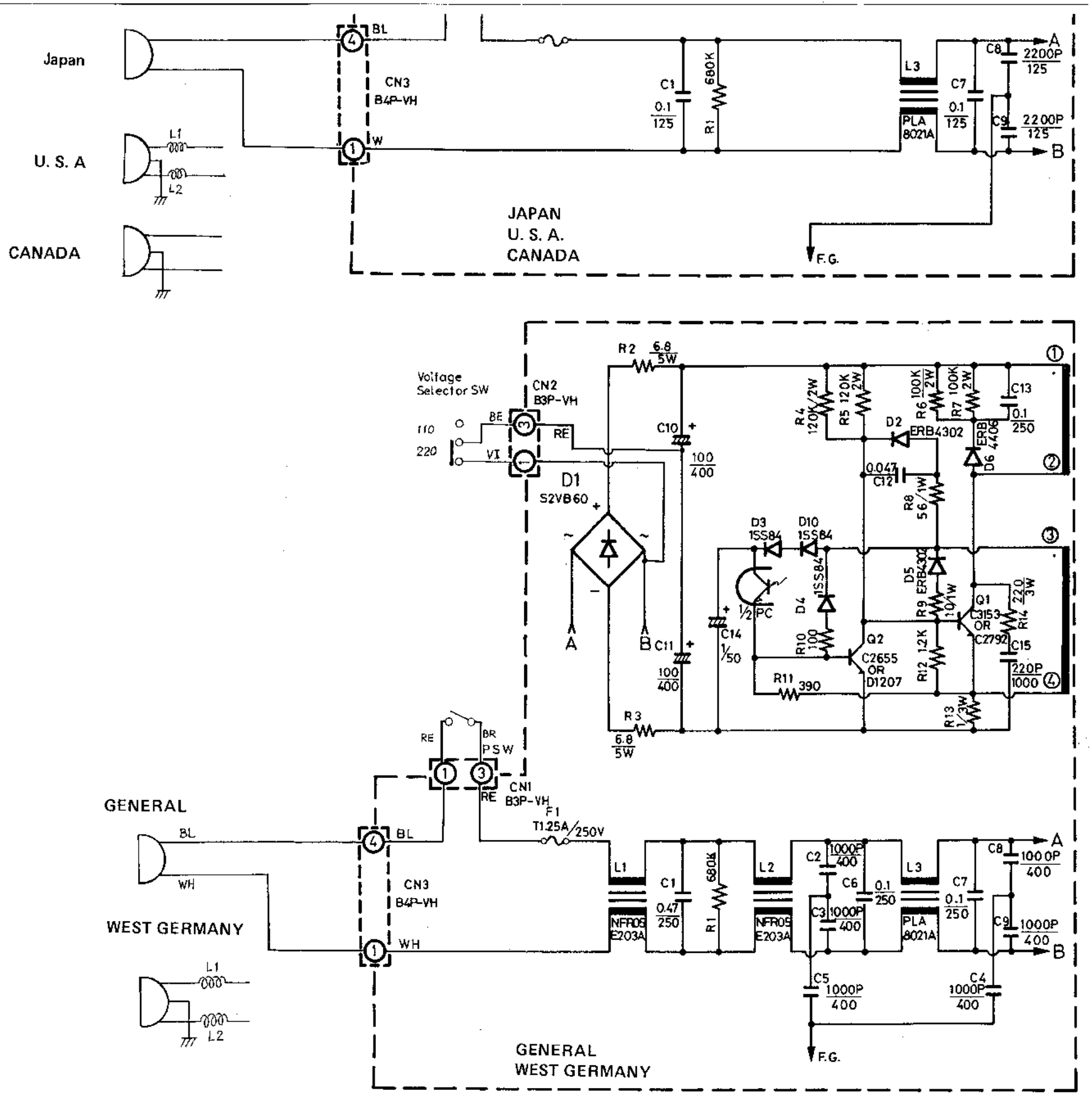
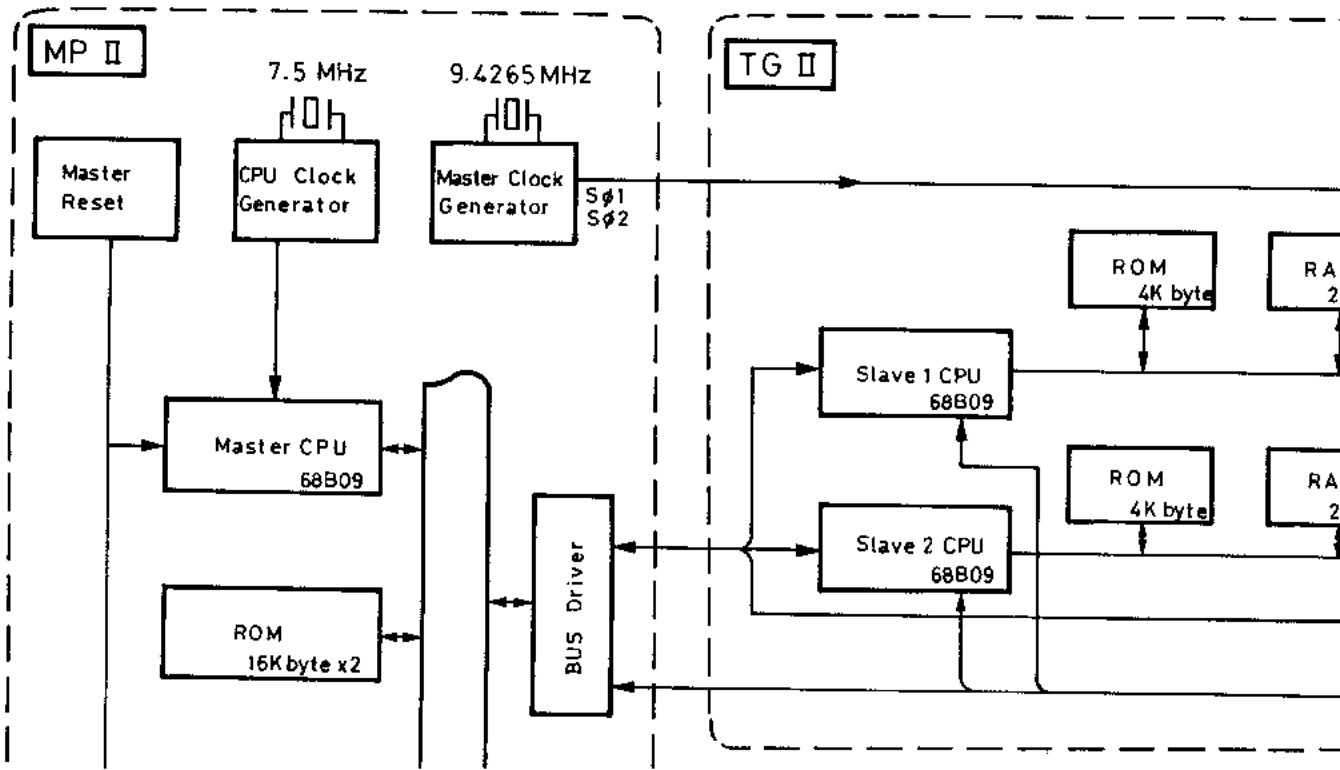
C9 1000P/400
C5 1000P/400
C4 1000P/400
F.G.
GENERAL
WEST GERMANY

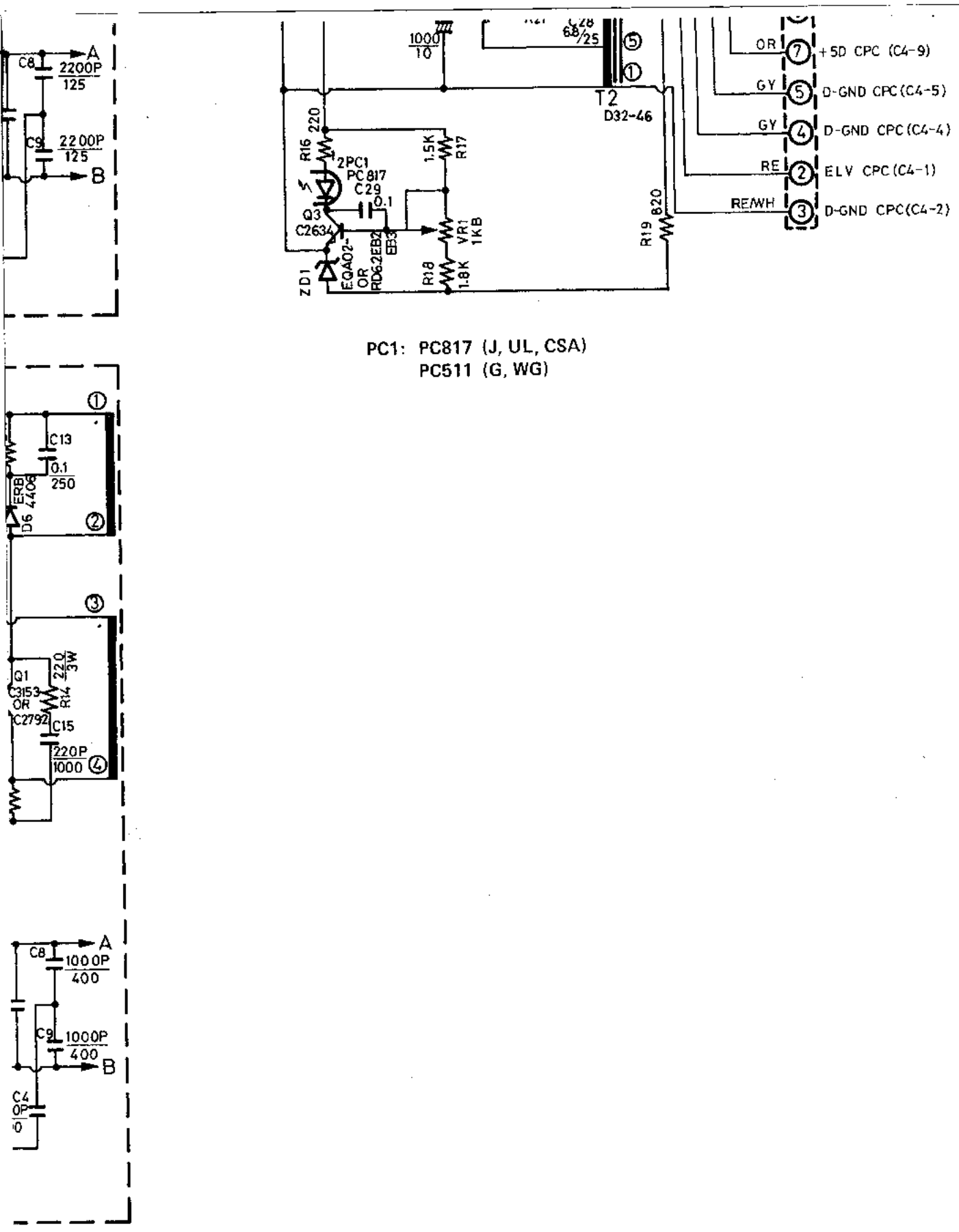


PC1: PC817 (J, UL, CSA)
PC511 (G, WG)

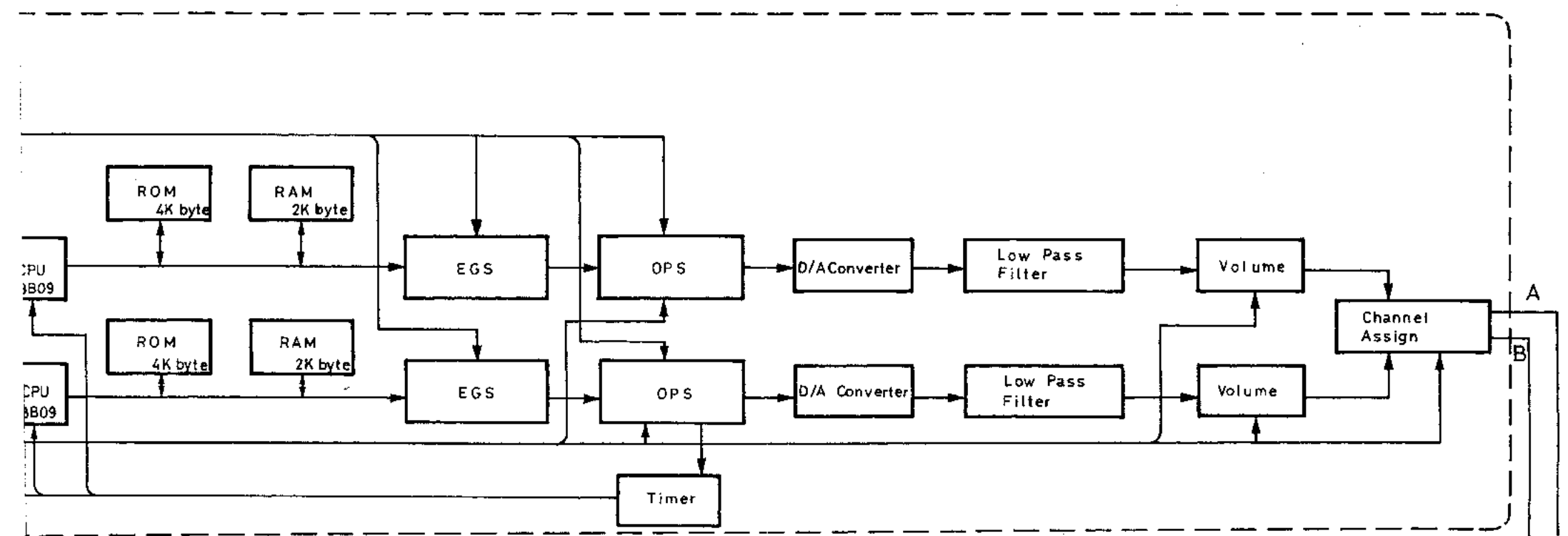


BLOCK DIAGRAM

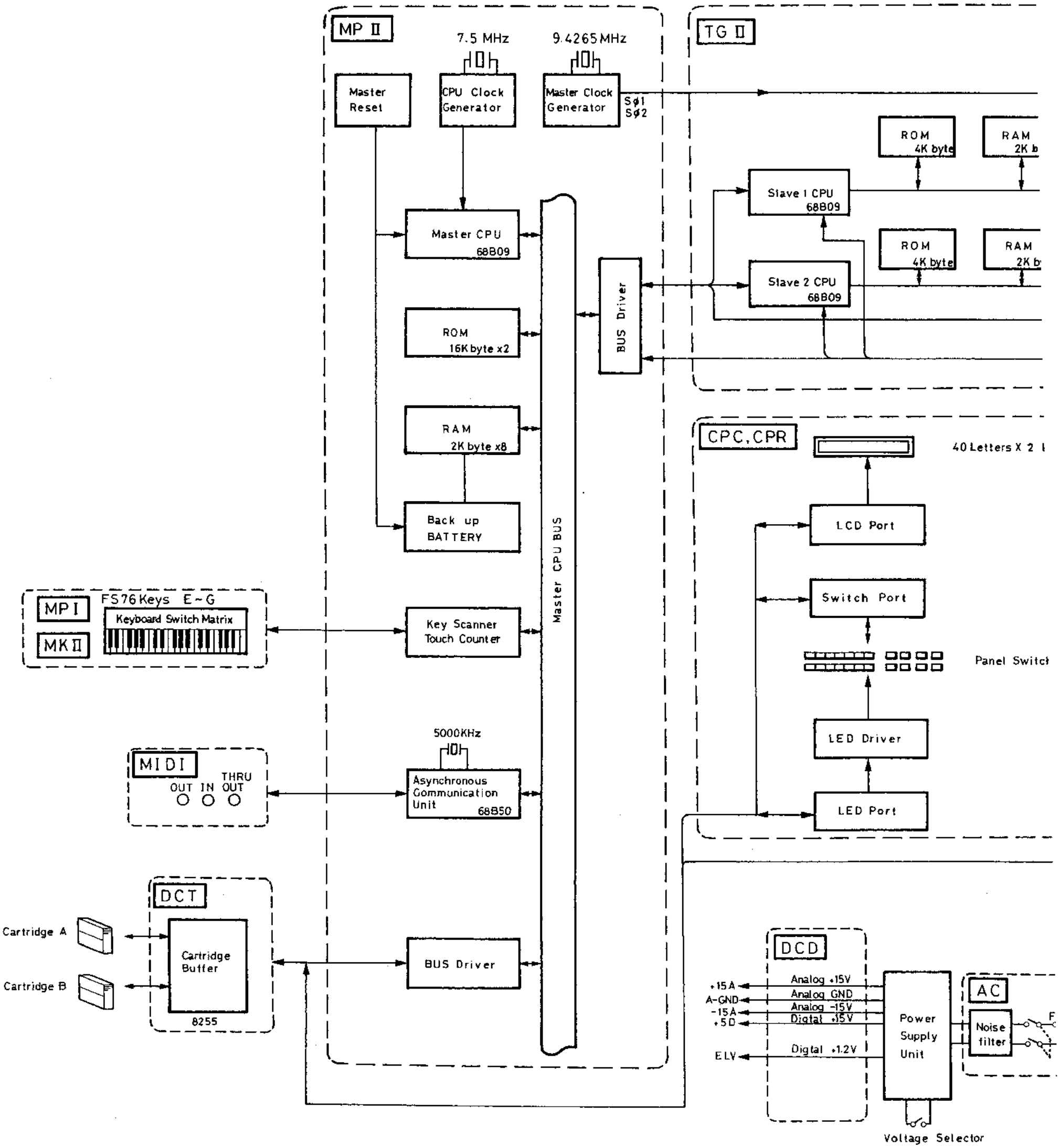




PC1: PC817 (J, UL, CSA)
PC511 (G, WG)



BLOCK DIAGRAM



ROM 4K byte
RAM 2K byte
EGS
OPS
D/AConverter
Low Pass Filter
Volume
Channel Assign
A
B
ROM 4K byte
RAM 2K byte
EGS
OPS
D/A Converter
Low Pass Filter
Volume
Timer
40 Letters X 2 Lines
LCD Port
Panel Switch
LED Port
CPL
Portamento
Data Entry
Expression
Balance
Volume
AD
AD Converter
Head Phone Amp.
Program Out Assigner
Balance Up
Balance Up
Balance Up
Mute Switch
SPC
Mutiplexer
After Touch
B.C
Vol.
Phones
HPBC
B A P
JK
B A P
XLR
Output
AC
Noise filter
FUSE
Power Supply Unit
Voltage Selector
Portamento Foot Switch
Sustain Foot Switch
Foot Controller
Expression Pedal

7 6 5 4 3 2 1

CPC

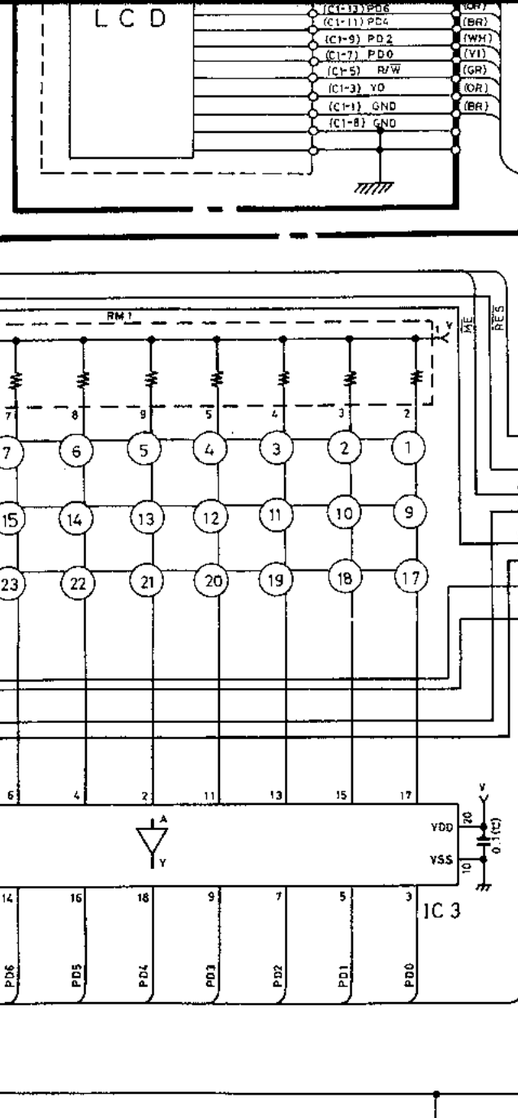
MPII CN3
DCT CN3
CPR C1
AD CN3

DC C4
CPR C2

LED . PUSH SWITCH TABLE

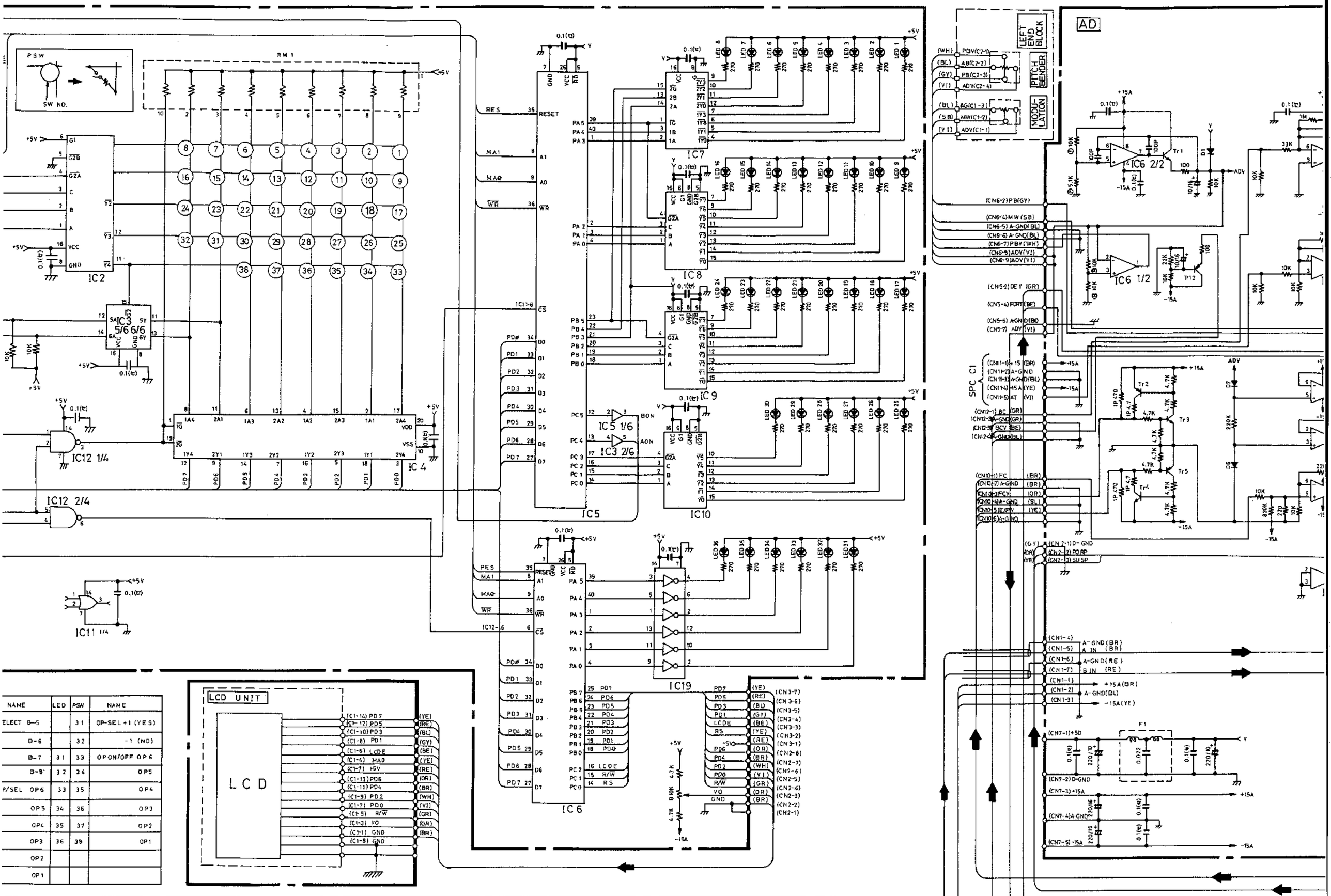
LED	PSW	NAME	LED	PSW	NAME	LED	PSW	NAME	LED	PSW	NAME
1	1	BANK A-1	11	11	SELECT A-3	21	21	SELECT B-5		31	OP-SEL +1 (YES)
2	2	A-2	12	12	A-4	22	22	B-6		32	-1 (NO)
3	3	A-3	13	13	A-5	23	23	B-7	31	33	OP ON/OFF OP 6
4	4	A-4	14	14	A-6	24	24	B-8	32	34	OP5
5	5	BANK B-1	15	15	A-7	25	25	OP/SEL OP6	33	35	OP4
6	6	B-2	16	16	A-8	26	26	OP5	34	36	OP3
7	7	B-3	17	17	SELECT B-1	27	27	OP4	35	37	OP2
8	8	B-4	18	18	B-2	28	28	OP3	36	38	OP1
9	9	SELECT A-1	19	19	B-3	29	29	OP2			
10	10	A-2	20	20	B-4	30	30	OP1			

5	5	BANK B-1	15	15	A-7	25	25	OP/SEL OP6	33	35	OP4
6	6	B-2	16	16	A-8	26	26	OP5	34	36	OP3
7	7	B-3	17	17	SELECT B-1	27	27	OP4	35	37	OP2
8	8	B-4	18	18	B-2	28	28	OP3	36	38	OP1
9	9	SELECT A-1	19	19	B-3	29	29	OP2			
10	10	A-2	20	20	B-4	30	30	OP1			



LED. PUSH SWICH TABLE

LED/PSW	NAME	LED/PSW	NAME	LED/PSW	NAME
1	FUNCTION F9	9	FUNCTION F1	17	SINGLE
2	F10	10	F2	18	DUAL
3	F11	11	F3	19	SPLIT
4	F12	12	F4	20	EDIT
5	F13	13	F5	21	FUNCTION
6	F14	14	F6	22	STORE
7	F15	15	F7	23	CARTRIDGE-A
8	F16	16	F8	24	-B



NAME	LED	PSW	NAME
ELECT B-5		31	OP-SEL +1 (YES)
B-6		32	-1 (NO)
B-7	31	33	OPON/OFF OP6
B-8	32	34	OP5
P/SEL OP6	33	35	OP4
OP5	34	36	OP3
OP4	35	37	OP2
OP3	36	38	OP1
OP2			
OP1			

OP5	34	36	OP3
OP4	35	37	OP2
OP3	36	38	OP1
OP2			
OP1			

(C1-9) PD2
(C1-7) PD0
(C1-5) R/W
(C1-3) VO
(C1-1) GND
(C1-8) GND
(WH)
(VI)
(GR)
(OR)
(BR)

IC 6

4.7K
-15A
GND
(BR)
(CN2-3)
(CN2-2)
(CN2-1)

(CN7-4)A-GND
220/16
0.1(t)
(CN7-5) -15A
+15A
-15A

RM1
RES
IC8 4/6
IC7 1/4
IC7 2/4
IC8 1/6
IC2
IC7 3/4
IC7 4/4
IC 3
IC 5
IC 6
IC7
IC8 3/6
IC8 2/6
IC4
+5V
0.1(t)
PD0
PD1
PD2
PD3
PD4
PD5
PD6
PD7
DPRTB
DINSB
DPRTA
DINSA
10K
+5V

(GR) (CN2-1) EXP
(GR) (CN2-2) A-GND
(CN2-3) A- GND
(BR) (CN2-4)
(CN2-5) A- GND
(RE) (CN2-6)
(CN2-7) A- GND
(BR)(CN2-8) +15A
(BU)(CN2-9) A-GND
(CN2-10)
(YE)(CN2-11) -15A
Tr1
10K
1K
2.2K
100K
100
PC
22K
PVR 2
BALANCE
BH 10K×2
IC2 2/2
IC1 2/2
-15A+15A
2.7K
PVR 3
PORTAMENT
B 10K

HPBC2/2
(BE) BCV
(BE) A-GND
(GR) BC
(BL) A-GND
(CN1-3)
(CN1-2)
(CN1-1)
(CN2-4)
68μ
0.1(t)
1K
JK 15
BREATH
CONTROL

TGC4

LED. PUSH SWICH TABLE

LED/PSW	NAME	LED/PSW	NAME	LED/PSW	NAME
1	FUNCTION F9	9	FUNCTION F1	17	SINGLE
2	F10	10	F2	18	DUAL
3	F11	11	F3	19	SPLIT
4	F12	12	F4	20	EDIT
5	F13	13	F5	21	FUNCTION
6	F14	14	F6	22	STORE
7	F15	15	F7	23	CARTRIDGE-A
8	F16	16	F8	24	-B

D | E | F | G | H | I | J | K

AD

LEFT END BLOCK

PITCH BENDER

MODU-LATION

(WH) PBV(C2-1)
(BL) AB(C2-2)
(GY) PB(C2-3)
(VI) ADV(C2-4)
(BL) AG(C1-3)
(SB) MW(C1-2)
(VI) ADV(C1-1)

Analog to Digital Convertor

IC1
IC6 2/2
IC6 1/2
IC7 2/2
IC7 1/2

Buffer

IC2
IC3
IC4
IC5

MPU CN3
DCT CN3
CPR C1
CPC CN1

(CN3-1) MD0
(CN3-3) MD1
(CN3-5) MD2
(CN3-7) MD3
(CN3-9) MD4
(CN3-11) MD5
(CN3-13) MD6
(CN3-15) MD7
(CN3-20) MA3
(CN3-37) PNLE
(CN3-21) MA6
(CN3-22) R/W
(CN3-39) E
(CN3-17) MA0
(CN3-18) MA1
(CN3-19) MA2
(CN3-24) PORP
(CN3-26) SUSP
(CN3-33) BAT
(CN3-2,4,6,8,10,12,14,16,32,34,36,38,40)
(CN3-28) AON
(CN3-30) BON

(CN5-2) DEY (GR)
(CN5-4) PORP (BE)
(CN5-6) A-GND (BL)
(CN5-7) ADV (VI)

(CN6-2) PB (GY)
(CN6-4) MW (SB)
(CN6-5) A-GND (BL)
(CN6-6) A-GND (BL)
(CN6-7) PBV (WH)
(CN6-8) ADV (VI)
(CN6-9) ADV (VI)

SPC C1
(CN11-1) +15 (BR)
(CN11-2) A-GND
(CN11-3) A-GND (BL)
(CN11-4) -15A (YE)
(CN11-5) AT (VI)

(CN12-1) BC (GR)
(CN12-2) A-GND (GR)
(CN12-3) BCV (BE)
(CN12-4) A-GND (BL)

(CN10-1) EC (BR)
(CN10-2) A-GND (BR)
(CN10-3) ECV (OR)
(CN10-4) A-GND (BL)
(CN10-5) EXPV (YE)
(CN10-6) A-GND

(CN2-1) D-GND
(CN2-2) PO RP
(CN2-3) SU SP

IC8 2/2
IC8 1/2
IC9 2/2
IC7 1/2

Electronic Balancer

IC11 1/2
IC11 2/2
IC12
IC13
IC14
IC15
IC16

RY1
RY2
RY3
RY4
RY5

(CN1-4) A-GND (BR)
(CN1-5) A IN (BR)
(CN1-6) A-GND (RE)
(CN1-7) B IN (RE)
(CN1-1) +15A (BR)
(CN1-2) A-GND (BL)
(CN1-3) -15A (YE)

(CN7-1) +5D
(CN7-2) D-GND
(CN7-3) +15A
(CN7-4) A-GND
(CN7-5) -15A

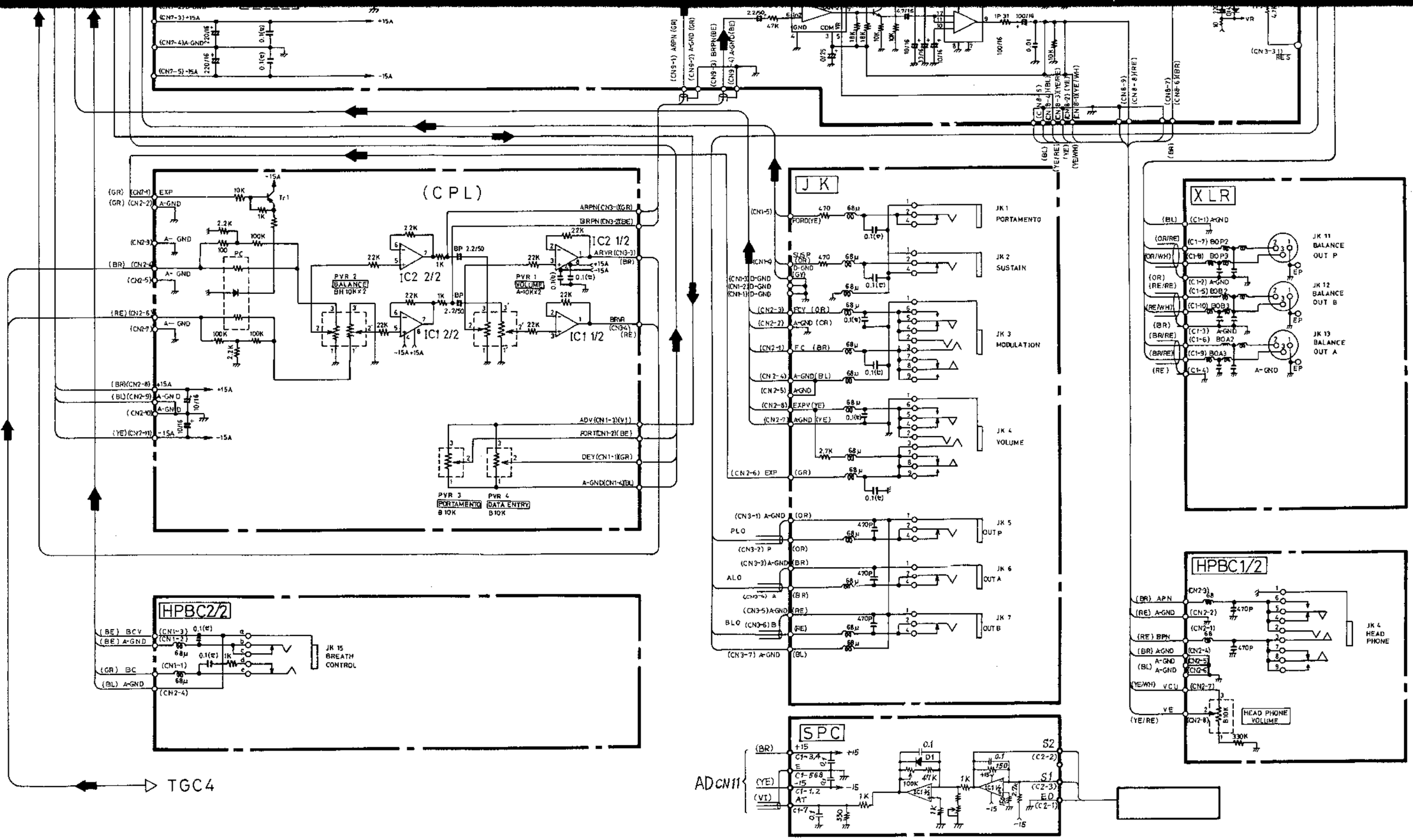
(CN4-1) ALO (BR)
(CN4-2) (BR/RE) A BO2
(CN4-3) A BO3 (ER/WH)
(CN4-4) BLO (RE)
(CN4-5) BBO2 (RE)
(CN4-6) BBO3 (RE/WH)
(CN4-7) PLO (OR)
(CN4-8) PBO2 (OR/RE)
(CN4-9) PBO3 (OR/WH)
(CN4-10) A-GND (BL)
(CN4-11) A-GND (BL)

(CN9-1) ARPN (GR)
(CN9-2) A-GND (GR)
(CN9-3) BRPN (BE)
(CN9-4) A-GND (BE)

(CN8-1) (BL)
(CN8-2) (YE)
(CN8-3) (RE)
(CN8-4) (YE/WH)
(CN8-5) (RE)
(CN8-6) (BR)
(CN8-7)

(CN3-31) RES

BAT
ADV
BON
AON
VR



AD

Note)

1. IC
   - IC 1 : M58990P-1
   - IC 2 : LS244
   - IC 3 : LS32
   - IC 4 : LS02
   - IC 5 : LS74
   - IC 6 ~ 9, 11 : NJM4558DV
   - IC 12 ~ 14 : NJM4558DV
   - IC 15 : M5222L
   - IC 16 : LA4170
2. Transistor
   - Tr 1, 3, 8 ~ 11 : 2SC1815 (O,Y)
   - Tr 2 : 2SA608 (O,Y)
   - Tr 4, 7 : 2SC2120 (Y)
   - Tr 5, 12 : 2SA1015 (O,Y)
3. Diode
   - D 1 ~ 11, 14 : ISS133
4. Capacitor
   - ( ) marked : Ceramic Cap.
   - 0.1( ) marked : Ceramic Cap.
5. Relay
   - RY 1, 2 : SY-5
   - RY 3 ~ 5 : RY-5W
6. Resistor
   - 1P 4.7 : Meta. Oxide Film Resistor
   - 1P 39 : Meta. Oxide Film Resistor
   - 1P 470 : Meta. Oxide Film Resistor

CPL

Note)

1. IC
   - IC 1, 2 : NJM4558DV
2. Transistor
   - Tr 1 : 2SA1015 (O,Y)
3. Photo Conductor
   - PC : PB73-13

CPC

Note)

1. IC
   - IC 1 : 74LS245
   - IC 2, 8 ~ 10 : 74LS138
   - IC 3 : 74LS367
   - IC 4 : TC40H244
   - IC 5, 6 : UPD8255AC-5
   - IC 7 : 74LS139
   - IC 11 : 74LS32
   - IC 12 : 74LS00
   - IC 13 : 74LS04
2. Diode
   - D1 ~ 36 : ISS133
3. LED
   - LED 1 ~ 36 : GL8HD24
4. Module Resistor
   - RM 1 : RM9-472J

CPR

Note)

1. IC
   - IC 1 : 74LS245
   - IC 2 : 74LS139
   - IC 3 : TC40H244
   - IC4 : UPD8255A-5
   - IC 5, 6 : 74LS138
   - IC 7 : 74LS32
   - IC 8, 9 : 74LS04
2. Diode
   - D 1 ~ 24 : ISS133
3. LED
   - LED 1 ~ 24 : GL8HD24
4. Module Resistor
   - RM 1 : RM9-472J
5. FI : EMI Filter

TGII

MPII C5

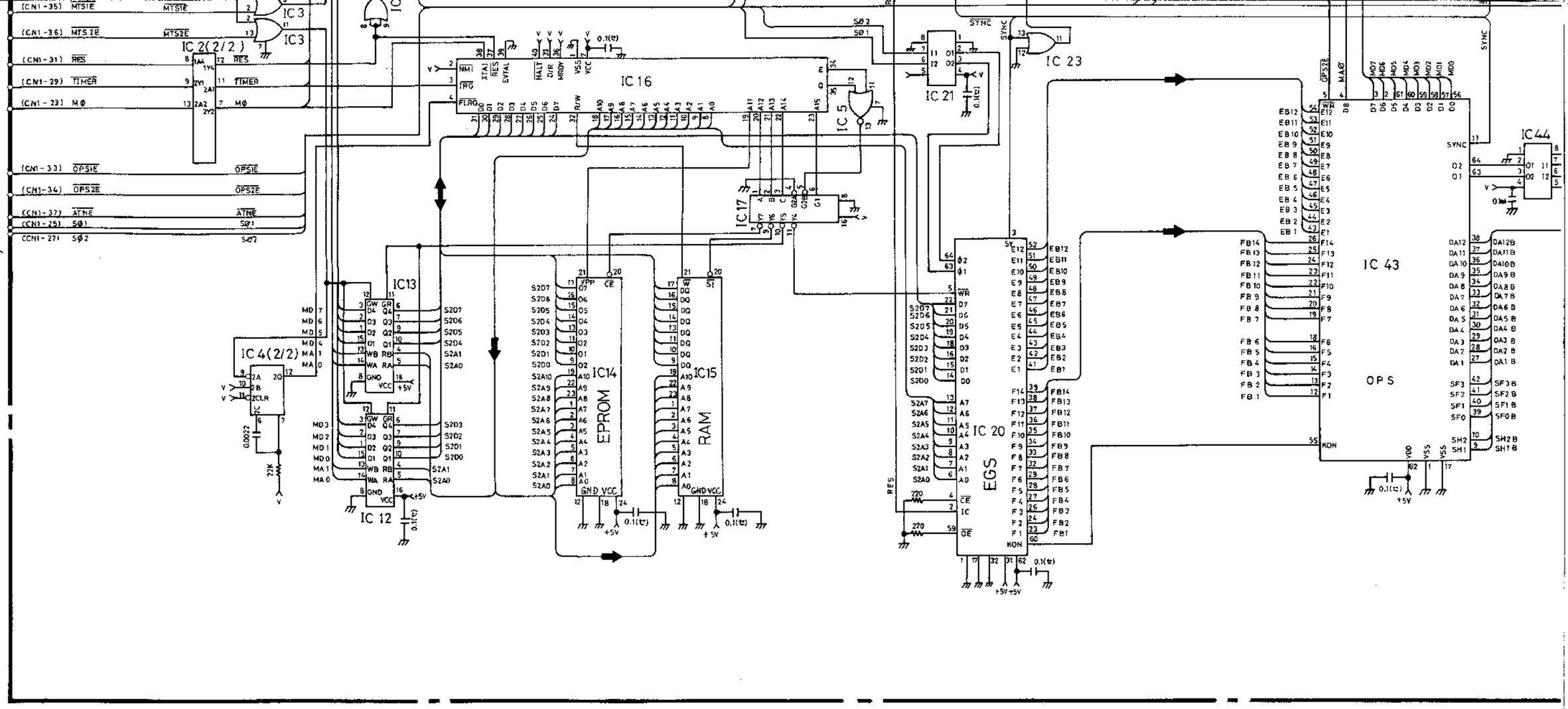
IC 1 IC 2(1/2) IC 2(2/2) IC 3 IC 4(1/2) IC 4(2/2) IC 5 IC 6 IC 7 IC 8 EPROM IC 9 RAM IC 10 IC 11 IC 13 IC 14 EPROM IC 15 RAM IC 16 IC 17 IC 18 EGS IC 19 IC 21 IC 22 IC 23 IC 33 OPS IC 34 IC 43 OPS IC 44

(CN1-1) MD0 (CN1-3) MD1 (CN1-5) MD2 (CN1-7) MD3 (CN1-9) MD4 (CN1-11) MD5 (CN1-13) MD6 (CN1-15) MD7

(CN1-19) MA1 (CN1-17) MA0 (CN1-21) $\overline{ME}$

(CN1-35) $\overline{MTSIE}$ (CN1-36) $\overline{MTS2E}$ (CN1-31) $\overline{RES}$ (CN1-29) TIMER (CN1-23) MΦ

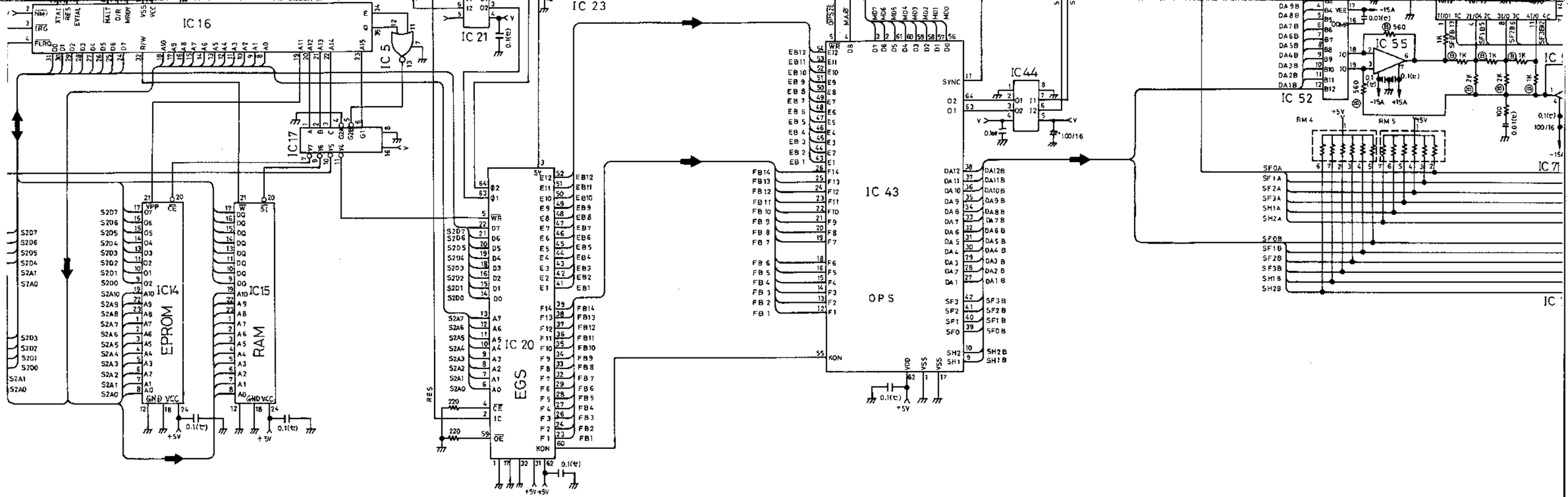
(CN1-33) $\overline{OPS1E}$ (CN1-34) $\overline{OPS2E}$ (CN1-37) $\overline{ATNE}$ (CN1-25) SΦ1 (CN1-27) SΦ2


(CN1-35) MTS1E
(CN1-36) MTS2E
(CN1-31) RES
(CN1-29) TIMER
(CN1-23) MΦ
(CN1-33) OPS1E
(CN1-34) OPS2E
(CN1-37) ATNE
(CN1-25) SΦ1
(CN1-27) SΦ2
IC 3
IC 2(2/2)
IC 16
IC 5
IC 17
IC 21
IC 23
IC 44
IC 4(2/2)
IC13
IC 12
IC14
EPROM
IC15
RAM
IC 20
EGS
IC 43
OPS
SYNC
RES
+5V
0.1(t)
22K
0.0022

Level Controller

Digital to Analog Convertor

IC 3
IC 5
IC 10
IC 22
IC 11
IC 18
IC 8
EPROM
IC 9
RAM
IC 46
IC 23
IC 19
IC 16
IC 17
IC 14
IC 15
IC 21
IC 33
IC 34
IC 43
IC 44
IC 48
IC 49
IC 50
IC 51
IC 52
IC 53(1/2)
IC 53(2/2)
IC 54
IC 55
IC 56
IC 57
IC 71



Note)
1. IC
IC 1, 2
IC 3, 2
IC 4
IC 5
IC 6, 7,
IC 9, 1
IC 10,
IC 11,
IC 18,
IC 19,

IC 22
IC 33,
IC 46
IC 8, 1

Level Controller

Digital to Analog Convertor

Low Pass Filter

Attenueter

Mixer

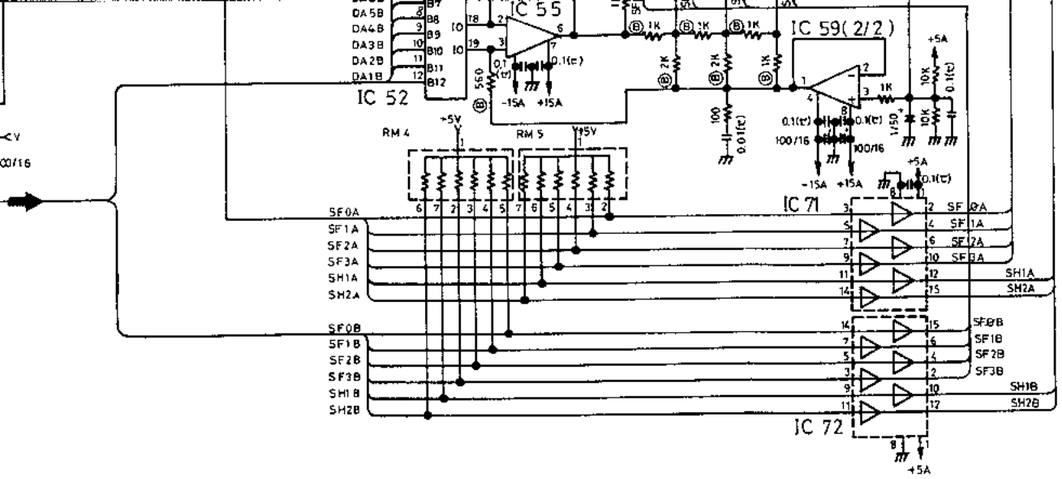
IC 48
IC 49
IC 50
IC 51
IC 52
IC 53(1/2)
IC 53(2/2)
IC 54
IC 55
IC 56
IC 57
IC 58
IC 59(1/2)
IC 59(2/2)
IC 60
IC 61
IC 62-1/2
IC 62-2/2
IC 63-1/2
IC 63-2/2
IC 64-1/2
IC 64-2/2
IC 65-1/2
IC 65-2/2
IC 66-1/2
IC 66-2/2
IC 67
IC 68
IC 69-1/2
IC 69-2/2
IC 70-1/2
IC 70-2/2
IC 71
IC 72
TR1
TR2

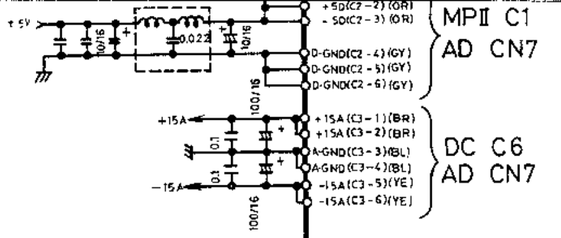
CPL CN2
(BR) GND(C4-1)
AD (C4-2)
(RE) GND(C4-3)
BO(C4-4)
GND(C4-5)

MPII C1
AD CN7
+5D(C2-1)(OR)
+5D(C2-2)(OR)
+5D(C2-3)(OR)
D-GND(C2-4)(GY)
D-GND(C2-5)(GY)
D-GND(C2-6)(GY)

DC C6
AD CN7
+15A(C3-1)(BR)
+15A(C3-2)(BR)
A-GND(C3-3)(BL)
A-GND(C3-4)(BL)
-15A(C3-5)(YE)
-15A(C3-6)(YE)

SF0A
SF1A
SF2A
SF3A
SH1A
SH2A
SF0B
SF1B
SF2B
SF3B
SH1B
SH2B





Note)

1. IC

IC 1, 2	: 74LS244
IC 3, 23	: 74LS32
IC 4	: 74LS123
IC 5	: 74LS02
IC 6, 7, 12, 13	: 74LS670
IC 9, 15	: M5M5118P-15
IC 10, 16	: HD68B09P
IC 11, 17	: 74LS138
IC 18, 20	: YM2129
IC 19, 21, 34, 44	: IG07951
IC 22	: 74LS74
IC 33, 43	: YM2128
IC 46	: 74LS393
IC 8, 14	: ROM 2732
IC 48	: 74LS138
IC 49, 50	: TC40H174
IC 51, 52	: BA9221 (HA17012)
IC 53, 59, 65, 66, 69, 70	: NJM4558DV
IC 54, 55, 58, 60	: LF356
IC 56, 57, 61	: TC74HC4066
IC 62, 63, 64	: NJM072
IC 67, 68	: UPC1252H2
IC 71, 72	: 74HC4050

2. Transistor

Tr 1, 2	: 2SC1815 (O.Y, GR)

3. Diode

D1 ~6	: ISS133

4. Resistor

B marked	: Metal Film Resistor (0.1%)

5. Module Resistor

RM 1	: RM8-103
RM 2, 3	: RKC5L103
RM 4, 5	: RM6-103

MPⅡ

Velocity Counter

IC50 IC48 IC45 IC55

IC49 IC47 IC46 IC56

IC40 IC41 IC42 IC43

IC26 IC28 IC38 IC39 IC37 IC44

IC53 IC52 IC51

94265MHZ CSA754MT

Buffer IC24

CPU IC1

IC25 IC27 IC29 IC54

CN4 30P

MK2

MK1

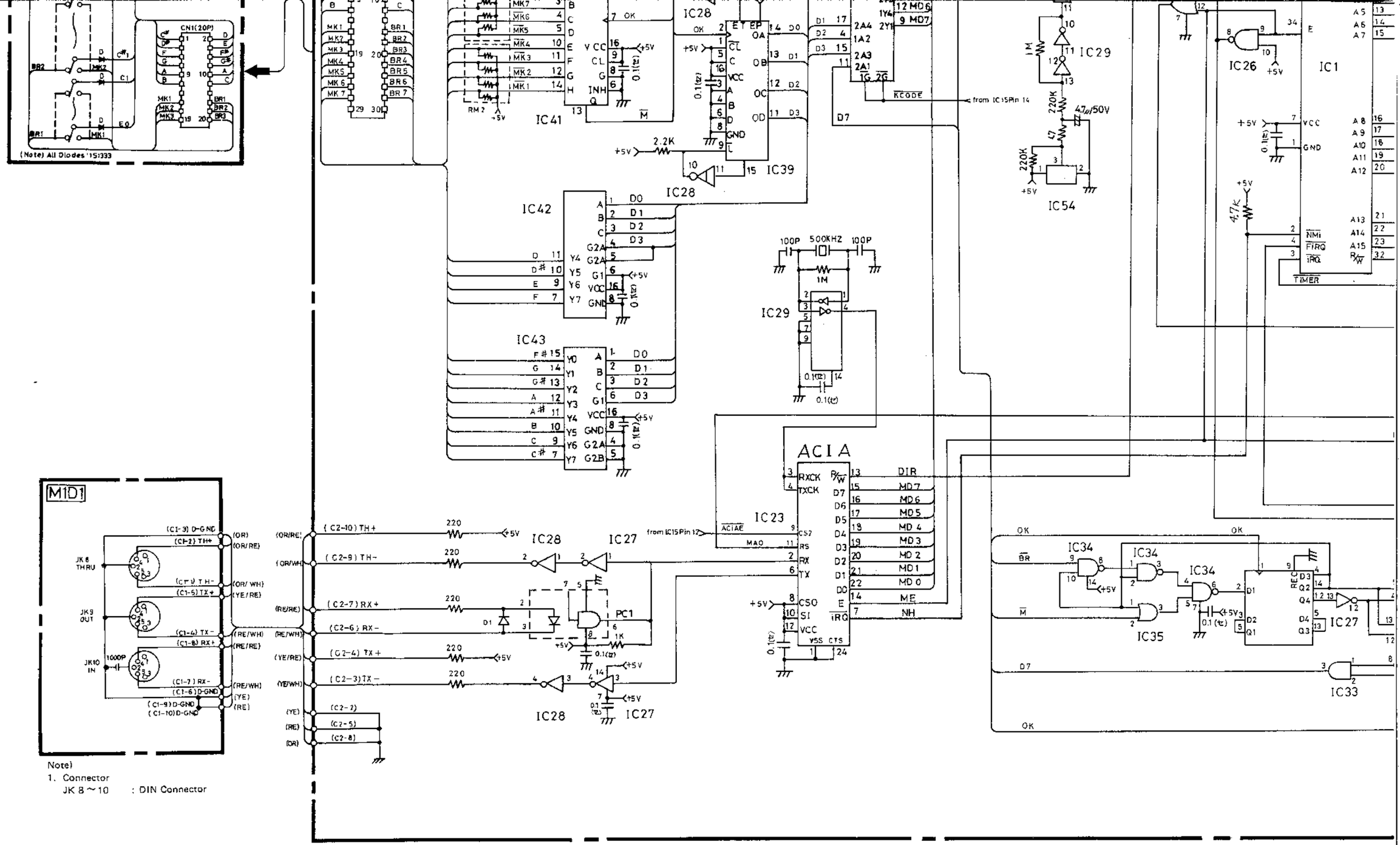
(Note) All Diodes 1S1333

CN1(30P)

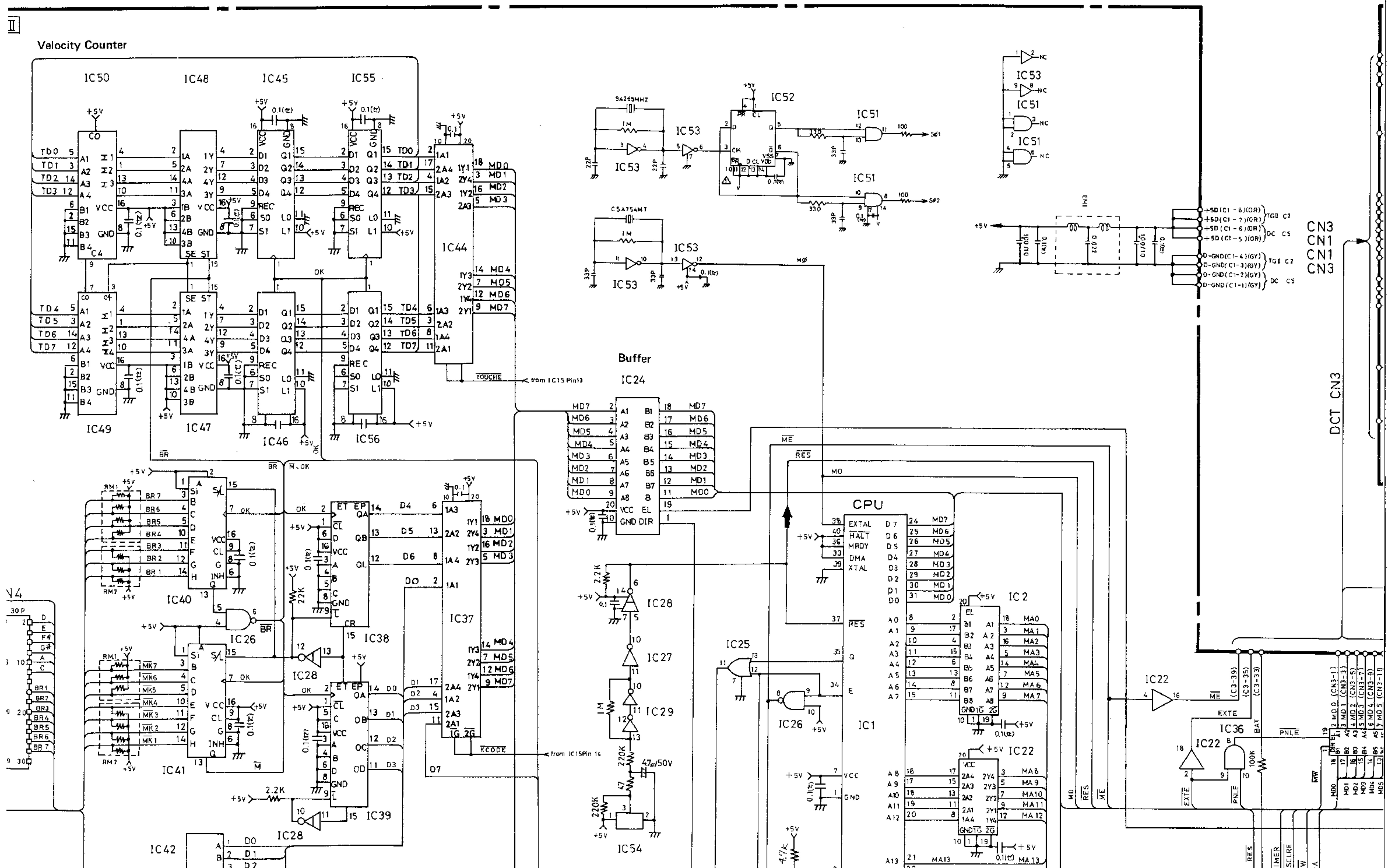
TOUCHE < from IC15 Pin13

KCODE < from IC15Pin 14

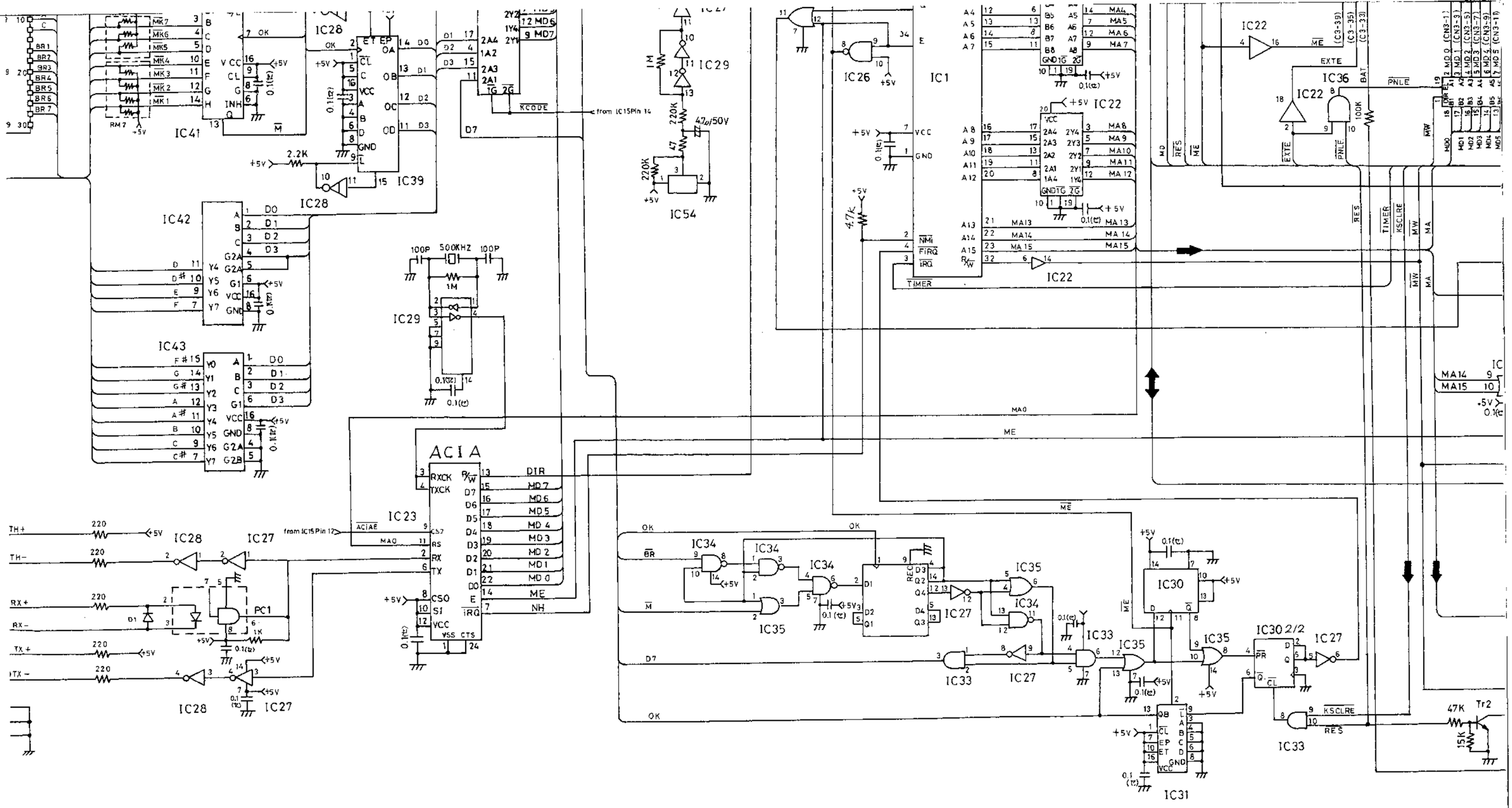
100P 500KHZ 100P



Note)
1. Connector
   JK 8 ~ 10 : DIN Connector



II
Velocity Counter
IC50
IC48
IC45
IC55
IC49
IC47
IC46
IC56
IC44
Buffer
IC24
IC53
IC52
IC51
IC40
IC41
IC26
IC28
IC38
IC39
IC37
IC42
IC27
IC29
IC54
IC25
CPU
IC1
IC2
IC22
IC36
CN3
CN1
CN1
CN3
DCT CN3
from IC15 Pin13
from IC15Pin 14
TOUCHE
KCODE
94265MHZ
CSA754MT



MP II

Note)

1. Transistor
   - Tr 1 : 2SA 1015 (O.
   - Tr 2 : 2SC 1815 (O.
   - Tr 3. 4 : 2SC 752 (Y)

2 IC
- IC 1 : HD68B09P
- IC 2, 19 ~ 22, 37, 44 : 74LS244
- IC 3, 18, 24 : 74LS245
- IC 4 ~ 11 : M5M5118P
- IC 14 ~ 16, 42, 43 : 74LS138
- IC 17 : 74LS139
- IC 23 : MC68B50P
- IC 25, 35 : 74LS32

DCT

(CN3-29) DPRTB
(CN3-27) DINSB
(CN3-25) DPRTA
(CN3-23) DINSA
(CN3-2,4,6,8,10 12,14,16,32,34 36,38,40)

(CN3-15) MD7
(CN3-13) MD6
(CN3-11) MD5
(CN3-9) MD4
(CN3-7) MD3
(CN3-5) MD2
(CN3-3) MD1
(CN3-1) MD0

(CN3-22) R/W
(CN3-17) MA0
(CN3-18)
(CN3-35) EXTE

(CN3-31) RES
(CN3-39) ME

IC1 LS245
IC2 1/2 LS139
IC3 PD8255
IC2 2/2

Tr1 2SC1815 (O,Y)
Tr2 2SC1815 (O,Y)

(CN1)
(CN4)

DCT CN3

CN3
CN1
CN1
CN3

CPC CN1
CPR CN1
AD CN3

(CN2-1)0 GND(GY)
(CN2-2)0 GND
(CN2-3)+5D (OR)
CPR CN2

IC53
IC51
IC51

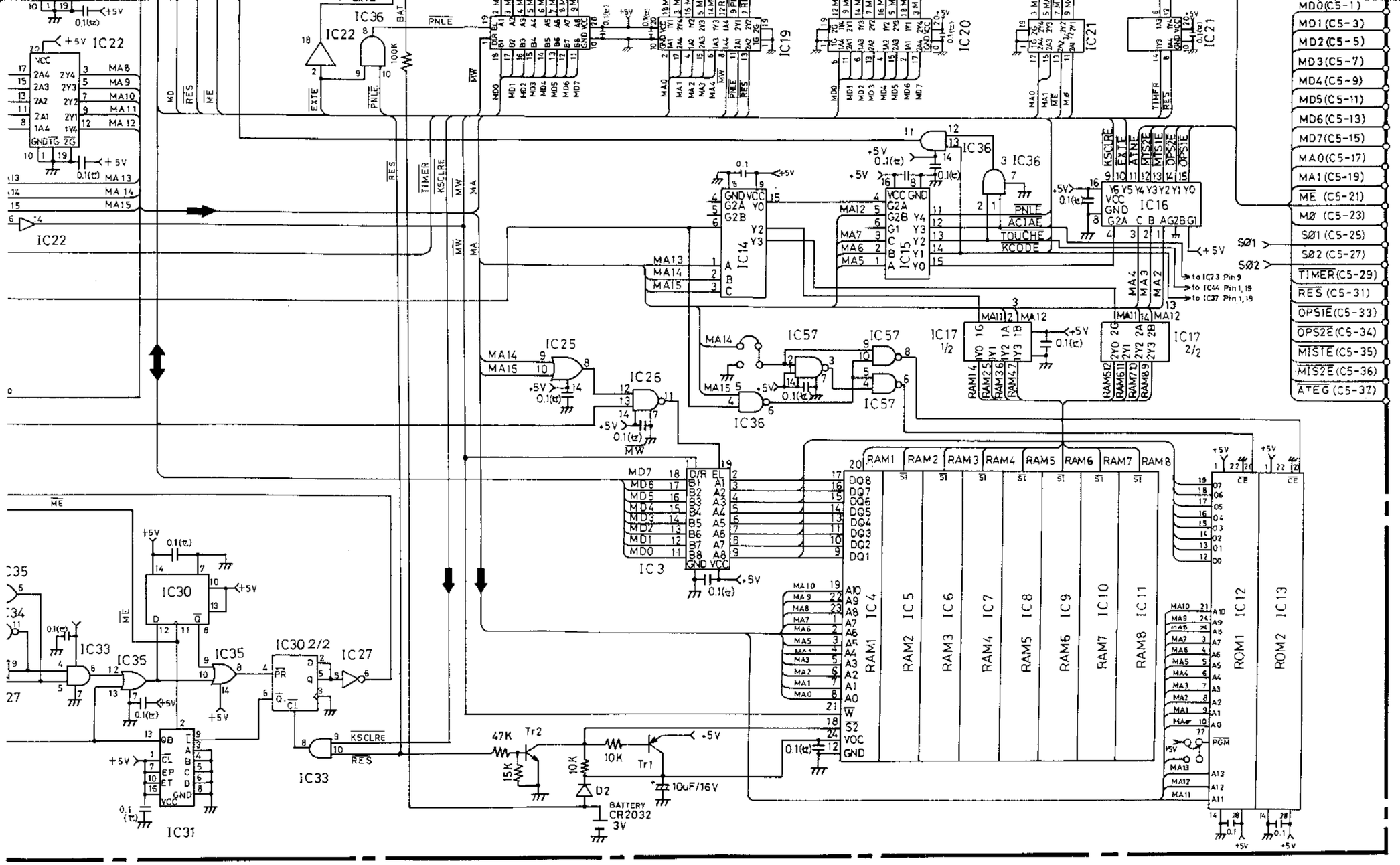
EH1
+5V
+5D(C1-8)(OR) TGE C2
+5D(C1-7)(OR)
+5D(C1-6)(OR) DC C5
+5D(C1-5)(OR)
0-GND(C1-4)(GY) TGE C2
0-GND(C1-3)(GY)
0-GND(C1-2)(GY) DC C5
0-GND(C1-1)(GY)

IC2
IC22
IC22
IC36
IC18
IC19
IC20
IC21
IC16
IC36

MA0
MA1
MA2
MA3
MA4
MA5
MA6
MA7
MA8
MA9
MA10
MA11
MA12
MA13
MA14

MD0(C5-1)
MD1(C5-3)
MD2(C5-5)
MD3(C5-7)
MD4(C5-9)
MD5(C5-11)
MD6(C5-13)
MD7(C5-15)
MA0(C5-17)
MA1(C5-19)
ME (C5-21)

IC16 C1



MP II

Note)

1. Transistor
   - Tr 1 : 2SA 1015 (O,Y)
   - Tr 2 : 2SC 1815 (O,Y, GR)
   - Tr 3. 4 : 2SC 752 (Y)

2. IC
   - IC 1 : HD68B09P
   - IC 2, 19 ~ 22, 37, 44 : 74LS244
   - IC 3, 18, 24 : 74LS245
   - IC 4 ~ 11 : M5M5118P
   - IC 14 ~ 16, 42, 43 : 74LS138
   - IC 17 : 74LS139
   - IC 23 : MC68B50P
   - IC 25, 35 : 74LS32
   - IC 26, 34, 57 : 74LS00
   - IC 27 : 74LS14
   - IC 28 : 74LS05
   - IC 29 : TC4069UBP
   - IC 30 : 74LS74
   - IC 31, 38, 39 : 74LS161
   - IC 32, 45, 96 55, 56 : IG13751
   - IC 33, 36 : 74LS08
   - IC 40, 41 : TC40H166
   - IC 47, 48 : 74LS157
   - IC 49, 50 : 74LS283
   - IC 51 : 74HC008
   - IC 52 : TC40H074P
   - IC 53 : TC74HC04P
   - IC 54 : PST518

3. Diode
   - D1 : ISS133
   - D2 : 0A95

4. Capacitor
   - 0.1( ) marked : Ceramic Cap.
   - △ marked : Tantalum Cap.

5. Lithium Battery
   - : CR 2032

6. Photo Conductor
   - PC 1 : TLP552

7. Module Resistor
   - RM 1, 2 : 10K x 7

8. ROM
   - IC 12 : IND123
   - IC 13 : INO124

9. Connector
   - C 1 : VH Connector 3.95 T.E. (8P)
   - C 2 : XH Connector T.E. (7P)
   - C3 : Flat Cable Connector T.E. (40P)
   - C4 : (30P)
   - C5 : (40P)

TEST PROGRAM
DX-5

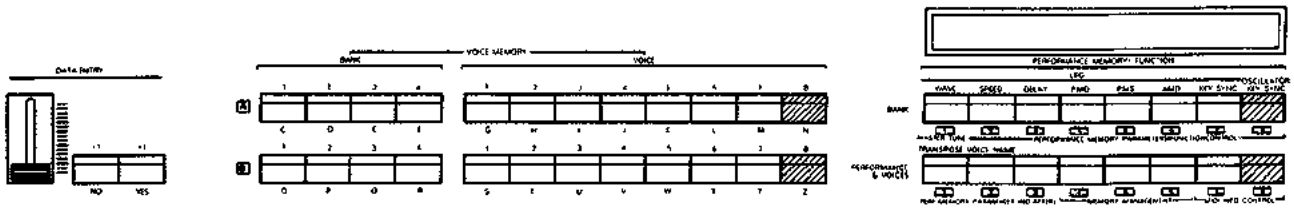
TEST PROGRAM OPERATION AND TROUBLE SHOOTING GUIDE

006680

SINCE 1887 YAMAHA
NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN
1.75K-202 Printed in Japan '85.9

CONTENTS

TEST PROGRAM DRIVE METHOD



Press [A8] button and [B8] button one over the other on the right-hand side the [A] and [B] line of the VOICE MEMORY array. Next while holding down [A8] and [B8] buttons, press [8] button on the right-hand side of the BANK line of the PERFORMANCE MEMORY/FUNCTION array and keep holding these three buttons down. Then if [8] button on the right-hand side of the PERFORMANCE & VOICES line of the PERFORMANCE MEMORY/FUNCTION array is pressed, the following will be appear on the LCD.

**** DX-5 TEST PROGRAM V2.0 Mar. 85 ****
NO = QUIT, YES = EXECUTE

If the [YES] button of the DATA ENTRY array is pressed, the following will appear on the [LCD] and TEST 1 will begin.

TEST 1	UNBALANCED OUTPUT
STEP 1	Out-A level adjust (VR 1 on TG)

- **To modify the test number and step number of the TEST program:**
  - Press the [YES] button of the DATA ENTRY array to advance the test number and the step number.
  - Press the [NO] button of the DATA ENTRY array to reverse the test number and the step number.

- **Returning to SYSTEM PROGRAM:**
  1) Turn on the power once again.
  2) Advance the test number by pressing the [YES] button during TEST 15, and then press the [YES] button once again.

TEST 1 UNBALANCED LINE OUTPUT LEVEL ADJUSTMENT, PITCH CHECK

Since sine waveform signal will be output from the unbalanced output Ach, Bch and Pch, the volume can be adjusted and the pitch can be checked for each channel.

This test also enables the basic operation of the MP circuit board and TG circuit board to be checked. (0dB = 0.775V)

TEST 1	UNBALANCED OUTPUT
STEP 1	Out-B level adjust (VR2 on TG)

Check to see that a 440 Hz ±1 Hz sine wave output is being emitted from the unbalanced line out terminal (OUTPUT A). Adjust VR1 of the PLL circuit board so that the level is adjusted to −10 ±1 dB.

TEST 1	UNBALANCED OUTPUT
STEP 2	Out-B level adjust (VR2 on TG)

Check to see that a 440 Hz ±1 Hz sine wave output is being emitted from the unbalanced line out terminal (OUTPUT B). Adjust VR2 of the PLL circuit board so that the level is adjusted to −10 ±1 dB.

TEST 1	UNBALANCED OUTPUT
STEP 3	Check VOLUME (Max > Min > Max)

Operate the OUTPUT VOLUME control from MAX — MIN — MAX, and confirm that the volume from the line output A and B channels changes smoothly.

Connect foot controller FC-7 with VOLUME terminal on the rear panel and carry out the same operation check as above.

TEST 1	UNBALANCED OUTPUT
STEP 4	Check BALANCE (A > B > Center)

If the BALANCE VOLUME control is adjusted as shown below, the changes in the OUTPUT level of channels A and B can be checked.

Volume position	CENTER → ACH → BCH → CENTER
Line out A	MAX → MAX → ZERO → MAX
Line out B	MAX → ZERO → MAX → MAX

TEST 1	UNBALANCED OUTPUT
STEP 5	Check attenuate level (−21 dBm)

Check to see a −21 dBm sine wave output is emitted from the unbalanced line out terminals (OUTPUT A and B)

TEST 1	UNBALANCED OUTPUT
STEP 6	Check Single Mode A on B off

In each STEP6～ STEP9, check to see that each line output level is −10±2dBm at the ON channel and is −50dBm or less at the OFF channel.

TEST 1	UNBALANCED OUTPUT
STEP 10	Out-P off

Check to see that the output level of the unbalanced line out terminal P (OUTPUT P) is −50 dBm or less in STEP 10 and −10 ±2dBm in STEP 11 and STEP 12.

TEST 1	UNBALANCED OUTPUT
STEP 13	Check HEADPHONE level (−15 dBm)

Set the HEADPHONE VOLUME to MAX, and check to see that a −15 ± 3 dB level output will be emitted from the HEADPHONE jack the load is 8 ohms X 2.

[TEST contents]

1) Main-CPU, ROM, RAM, buffer IC on MP circuit board
2) Tone generator circuit on TG circuit board
3) Pre- Amp circuit on CPL circuit board

[Check points]

STEP 1 checks the basic circuit of the MP circuit board and also checks the A channel tone generator of the TG circuit board and the pre-amplifier section of the CPL circuit board.
STEP 2 checks the B channel generator. Although the pitch and amplitude envelopes of these tests will not change over time, an oscilloscope can be used to check the waveform of EGS, OPS IC, as well as the DAC IC and the pre-amplifier circuit.

[Checking procedure]

1) Are the connectors of each circuit board secure?
2) Is each circuit board being supplied with the proper voltage?
3) Is the clock frequency correct?
4) Is the voltage of the data bus fluctuating randomly?
5) Is the voltage of the data bus fluctuating randomly?
   When a program is operating, the voltage of the address bus and data bus will change repeatedly from "H" (+5 V) to " L" (0 V).
6) Is a CHIP ENABLE signal being input to the ROM and RAM?
7) Is the waveform at each point of the TG circuit board correct?
(Refer to the WAVEFORM list.)

Check to see that each IC of the MP circuit board is operating.
The following table shows the voltage fluctuation and the frequency when each IC and connector is operating correctly.

CPU (IC1)

	Test point	Reading	Tool
DATA BUS	IC1 – 24 ~ 31	Pulse	Digital probe
ADDRESS BUS	IC1 – 8 ~ 23	"	"
E	IC1 – 34	"	"
Q	IC1 – 35	"	"
R/W	IC1 – 32	"	"
IRQ	IC1 – 3	"	"
Vcc	IC1 – 7	+5V	Tester
XTAL	IC1 – 38	7.54 MHz	Oscilloscope

ROM

ROM1 CS	IC12 – 20	Pulse	Digital probe
ROM2 CS	IC13 – 20	"	"
ROM3 CS	IC60 – 20	"	"
ROM4 CS	IC61 – 20	"	"

RAM

RAM1 CE	IC4 – 18	"L"	Digital probe
RAM2 CE	IC5 – 18	"L"	"
RAM3 CE	IC6 – 18	"L"	"
RAM4 CE	IC7 – 18	"L"	"
RAM5 CE	IC8 – 18	"L"	"
RAM6 CE	IC9 – 18	"L"	"
RAM7 CE	IC10 – 18	Pulse	"
RAM8 CE	IC11 – 18	Pulse	"

CONNECTOR C5

MD0 ~ 7	C5 – 1, 3, 5, 7, 9, 11, 13, 15	Pulse	Digital probe
MA0 ~ 1	C5 – 17,19	"	"
ME	C5 – 21	"	"
Md	C5 – 23	6.54 MHz	Oscilloscope
Sφ1	C5 – 25	4.71 MHz	"
Sφ2	C5 – 27	4.71 MHz	"
RES	C5 – 31	+5V	Tester

Pulse: Repeatedly switching back and forth between "H" (+5V) and "L" (0V).

Check to see that each IC of the TG circuit board is operating. The following table shows the voltage fluctuation and the frequency when each IC is operating correctly.

Sub-CPU

	Test point	Reading	Tool
Data bus	IC10 – 24 ~ 31	Fig-23	Oscilloscope
Address bus	IC10 – 8 ~ 23	Fig-24	"
Reset	IC10 – 37	+5V	Tester
Mϕ	IC10 – 38	7.54 MHz	Oscilloscope
IRQ	IC10 – 3	Fig-22	"
E	IC10 – 34	Fig-20	"
Q	IC10 – 35	Fig-19	"
Vcc	IC10 – 7	+5V	Tester

EGS

KON	IC18 – 60	Fig-42	Oscilloscope
IC	IC18 – 2	+5V	Tester
Sϕ1	IC18 – 63	4.71 MHz	Oscilloscope
Sϕ2	IC18 – 64	"	"
SY	IC18 – 3	Fig-26	"
Frequency data	IC18 – 23 ~ 39	Fig-1 ~ 14	"
Envelop data	IC18 – 41 ~ 52	Fig-35 ~ 41	"
Vcc		+5V	Tester

OPS

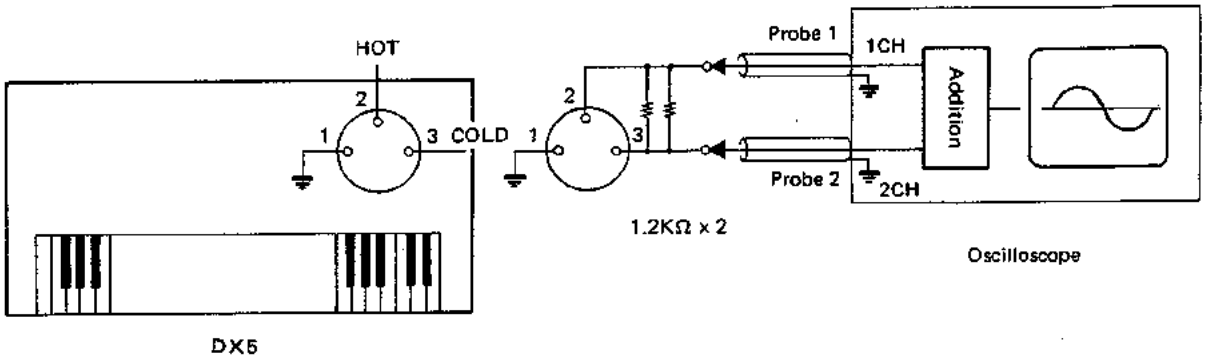
KON	IC33 – 55	Fig-42	Oscilloscope
ϕ1	IC33 – 63	4.71 MHz	"
ϕ2	IC33 – 64	"	"
Frequency data	IC33 – 2 ~ 26	Fig-1 ~ 14	"
Envelop data	IC33 – 43 ~ 54	Fig-35 ~ 41	"
DA1 ~ 12	IC33 – 27 ~ 38	Fig-15	"
Vcc	IC33 – 62	+5V	Tester

DAC

DA1 ~ 12	IC51 – 1 ~ 12	Fig-15	Oscilloscope
IO	IC51 – 18	Fig-16	"
Analog		Fig-27 ~ 34	Oscilloscope

TEST 2 BALANCE CHECK OF BALANCED LINE OUT TERMINAL

Using an oscilloscope, adjust the volume balance of the balanced line out terminals Ach, Bch and Pch.



* Connect two 1.2KΩ resistors between the HOT and COLD terminals of the balanced cable.
* Setting the OSCILLOSCOPE to the additive mode (ADD or DUAL), set both 1ch and 2ch to the same gain.

TEST 2	BALANCED OUTPUT
STEP 1	Check Balance Out-A

In each STEP1~STEP3, check to see that the amplitude value of the ripple wave at each balanced line out terminal (OUTPUT A, B and P) is 300 m Vp-p and that their output level is −10 ± 2dBm.

MEMO

TEST 3 DISPLAY CHECK

Since the LEDs and LCD will light up in turn, the condition of the LEDs and the LCD can be visually confirmed.

[Test Contents]

1) LEDs and driver IC on CPC circuit board.
2) LEDs and driver IC on CPR circuit board.
3) Wiring between MP circuit board and each panel circuit board.

TEST 3	DISPLAY CHECK
STEP 1	Check LEDs

Each upper and lower LED will light up from left to right in turn.

STEP 2 LCD Check

Every dot of the LCD should flicker.

Additionally, check to see that the illumination of the LCD unit is lit up.

TEST 4 PUSH SW CONTACT CHECK

```
TEST 4 PUSH SWITCH (up-left > down-right)
Push !
```

Carry out a contact check of every push-switch except the [+1] and [−1] switches. Start from the left-hand switch (OPERATOR SELECT 1) of the upper most row and continue pressing the switches progressing towards the right.
If the switch contact points are operating correctly, the switch name will be displayed on the LCD.

```
TEST 4 PUSH SWITCH (up-left > down-right)
<OK>
```

When the contact points of every switch are operating properly.

```
TEST 4 PUSH SWITCH (up-left > down-right)
** All switch OK ! ***
```

If a switch is pressed in the wrong order.

```
TEST 4 PUSH SWITCH (up-left > down-right)
ERROR
```

If a contact point of a switch is malfunctioning, the data from the previous switch will remain displayed on the LCD.

[Test Contents]

1) Each switch, driver IC on CPC circuit board
2) Each switch, driver IC on CPR circuit board
3) Wiring between CPC, CPR circuit board and MP circuit board.

[Check Points]

If the display of the LCD has not changed due to a malfunction of the switch circuit, check to see if test 1 can be carried out correctly.
If test 1 is operating correctly, this indicates that the MP circuit board is operating normally, and therefore it should be a malfunction of either the CPC circuit board or the CPR circuit board.
Additionally, according to the position of the malfunctioning switch, it can be determined whether it is the CPC circuit board or the CPR circuit board that is at fault.

TEST 5 FOOT SWITCH OPERATIONAL TEST

Connect a foot switch to the foot switch jack on the rear panel. Step on the foot switch and check to see that the foot switch circuit is operating correctly.

[Test Contents]

1) Driver IC on CPC circuit board
2) Shift IC on CPC circuit board
3) Foot switch contact

TEST 5	FOOT SWITCHES
STEP 1	Sustain switch

Connect a foot switch to the SUSTAIN terminal on the rear panel. If the circuit is operating correctly, the following should appear on the LCD when the foot switch is stepped on.

TEST 5	FOOT SWITCHES	
STEP 1	Sustain switch	** OK **

When malfunctioning, the ** OK ** message will not appear.

TEST 5	FOOT SWITCHES
STEP 2	Portamento switch

Connect a foot switch to the PORTAMENTO terminal on the rear panel. If the circuit is operating correctly, the following should appear on the LCD when the foot switch is stepped on.

TEST 5	FOOT SWITCHES	
STEP 2	Portamento switch	** OK **

When malfunctioning, the **OK** message will not appear.

[Check Point]

When the foot switch is malfunctioning, check the switch operation by using test 4.

If test 4 is operating correctly, indicating that the gate ICs 4 and 1 of the CPC circuit board are operating correctly, check the following points.

1) Are pulses being emitted to IC2 – 11 ($\overline{Y4}$) ?

2)

Foot SW	OFF	ON
IC3 – 12, 14	"L"	"H"
IC3 – 11, 13	Pulse	"H"

Turn the foot switch on and off and check to see if the IC changes as shown above.

Pulse: Repeatedly switching back and forth between "H" (+5V) and "L" (0V)

TEST 6 INITIAL TOUCH TEST

Beginning from the lowest note B0, press the keys in order and check the INITIAL TOUCH RESPONSE circuit.
Press each key with three different touch stages: weak, medium and strong.
Check to see if the volume changes as shown below for all 76 keys.

* Weak touch . . . . . very quiet sound, tone close to sine wave.
* Medium touch . . . . . medium volume level.
* Strong touch . . . . . high volume level, tone close to distortion.

Press each key with three different touch stages as shown above, and check to see that the volume and tone are changing properly.

When the proper key has been pressed.

TEST 6 INITIAL TOUCH RESPONCE	
(Slow/medium/fast touch)	[OK] E0

When a key has been pressed in the wrong order.

TEST 6 INITIAL TOUCH RESPONCE	
(Slow/medium/fast touch)	ERROR E0

When two keys or more have been pressed at the same time.

TEST 6 INITIAL TOUCH RESPONCE	
(Slow/medium/fast touch)	ERROR MTPL

After all keys have been pressed.

TEST 6 INITIAL TOUCH RESPONCE	
(Slow/medium/fast touch)	[OK] G6

[Test Contents]

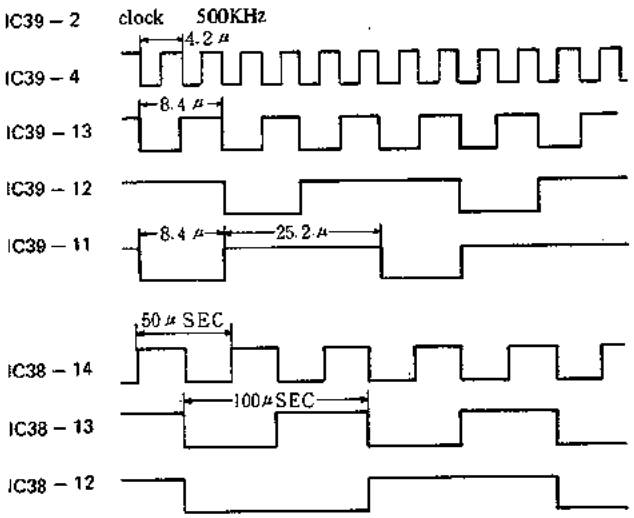
1) Keyboard switch contact
2) Parallel/serial convert IC on MP circuit board
3) Full adder circuit on MP circuit board
4) Gate IC on MP circuit board

[Check point]

If no sound is produced even when the keys are pressed, check the operation by using test 1.

If test 1 is operating correctly, since this indicates that the CPU, ROM and RAM of the MP circuit board are operating correctly, check the correctly, check the counter IC, Decorder IC and KEY contact points.

(1)



(2) Decoder IC

IC42 – 7,9 ~ 11	Y4 ~ Y7	Block data	Refer to Fig-51
IC43 – 7,9~ 15	Y0 ~ Y7	"	

(3) Keyboard Scan Control

IC40 – 15	S/L	Shift/Load signal	Refer to Fig-54
IC40 – 13	SO	Break signal	Refer to Fig-55
IC41 – 13	SO	Make signal	Refer to Fig-55

(4) Note Data

C3 note OFF	Refer to Fig-52
C3 note ON	Refer to Fig-53

If Key board Scan is operating correctly, so check the Touch Count Control circuit.

The Touch Counter circuit will free-count from 00_H ~ FF_H.
If the keys are pressed now, the Break contact will go off, a "L" pulse will be emitted to the ST terminal of IC47 and 48, and the Counter will be set to 00_H.
This will pass through IC45, 46, 55 and 56, and return to IC49 and 50.
In the above case, first "1" will be added, then "1" more will be added on the next loop.
The count will continue to be incremented, until the Make contact point of the key goes on, the Gate IC44 will go on, and the data counted from the Break contact off will be output.
This data (00_H ~ FF_H) will function as the initial touch data.

(1) Does Key On cause a pulse to be emitted to the ST terminal of IC47 and 48 ?
(2) Does Key On cause the TOUCH COUNT data of IC45 ~ 50, 55, 56 to change over time ?
(3) Does Key On cause a pulse to be emitted to IC44 –1, 19 ?
(4) Is the 500KHz clock signal being emitted to IC45, 46, 55, 56 – 1 PIN ?

TEST 7 A/D CONVERTER CIRCUIT CHECK

Check the operation of the A/D converter of the AD circuit board. Operate the VOLUME controller. If the A/D circuit is operating correctly, the numbers shown on the LCD will change from 0 ~ 99.

TEST 7	A/D CONVERTER
STEP 1	Portamento time

1) Operate the portamento wheel and check to see that the numbers displayed on the LCD change from 0 ~ 99.
2) Set the portamento time to 0. Check to see that no portamento is applied no matter which key is pressed.
3) Set the PORTAMENTO time to 99. Press the lowest note (E0) and then press the highest note (G6) and confirm that the change in pitch requires approximately 20 seconds.

TEST 7	A/D CONVERTER
STEP 2	Data entry

Operate the DATA ENTRY control, and check to see that the numbers displayed on the LCD change from 0 ~ 99.

TEST 7	A/D CONVERTER
STEP 3	Pitch bender

Operate the PITCH BENDER wheel, and check to see that the numbers displayed on the LCD change from 0 ~ 99.
Additionally, check to see that the pitch is variable over a range of ±1 octave.
Also chech to see that the PICTH BENDER wheel is in the center position and that the numbers displayed on the LCD is 50.

TEST 7	A/D CONVERTER
STEP 4	Modulation wheel

1) Operate the MODULATION wheel, and check to see that the numbers displayed on the LCD change from 0 ~ 99.
2) Press the keys and check to see that
   When the number on the LCD is 0: volume 0
   When the number on the LCD is 50: medium volume, soft tone
   When the number on the LCD is 99: high volume, bright tone

TEST 7	A/D CONVERTER
STEP 5	Foot controller

1) Step on the foot controller, and check to see that the numbers on the LCD change from 0 ~ 99.
2) Press the keys and check to see that
   When the number on the LCD is 0: volume 0
   When the number on the LCD is 50: medium volume, soft tone
   When the number on the LCD is 99: high volume, bright tone

TEST 7	A/D CONVERTER
STEP 6	After touch 0

Check to see that the numbers on the LCD change from 0 ~ 99 by gradually applying pressure to the key.

TEST 7	A/D CONVERTER
STEP 7	Breath controller

1) Connect the BREATH controller, and check to see that the numbers on the LCD change from 0 ~ 99, according to how strongly breath is blown into it.
2) Press the keys and check to see that
   No breath: volume 0
   Weak breath: medium volume, soft tone
   Strong breath: high volume, bright tone

TEST 7	A/D CONVERTER
STEP 8	Battery

Check to see that the display shows over 2.7V. The battery should be replaced if the display shows 2.6V or less.

[Test Contents]

1) Each A/D sensor IC
2) Pre-amp circuit on AD circuit board
3) Analog/Digital convert IC
4) Wiring between MP circuit board and AD circuit board.

[Check Point]

The A/D converter is composed of the respective sensors, A/D pre-amplifier and ADC IC (M58990-1) of the AD circuit board.

The A/D inputs are as follows:

1) PORTAMENTO
2) DATA ENTRY
3) PITCH BENDER
4) MODULATION WHEEL
5) Foot Controller
6) After Touch
7) Breath Controller
8) Battery

These analog voltages are input to the ADC IC. The analog voltages will be A/D converted according to the clock frequency and will be stored as one byte ($00_H \sim FF_H$) data within the ADC IC buffer.

The ADC IC has $ADA^{(25)} \sim ADC^{(23)}$ and a 3 bit address line which enables it to access an 7 byte buffer.

Digital data from the each sensors are stored in this buffer.

The test program of the MP circuit board reads the digital data in order, compares it to the previous A/D data, and searches for the event initiation from the each sensors.

During Test 7, when the numbers do not change from 0 ~ 99, even if the controller is operated, check the following:

1) Operate the controller of the ADC IC (M58990), IC18 (AD circuit board) inputs IN0 ~ IN7 terminals, and measure the DC voltage.
2) Is the ADC IC chip enable pulse being entered into the ADCE terminal (IC18 – 6) ?
3) Is 4.9V being emitted to VCC (IC18 – 10), of the ADC IC ?
4) Is the clock signal (1MHz) being emitted to the clock (IC18 – 10) of the ADC IC ?
5) Is the gate IC – 2 operating correctly ?

	STEP 1 PORTAMENTO	STEP 2 DATA ENTRY	STEP 3 PITCH	STEP 4 MODULATION	STEP 5 FOOT	STEP 6 BREATH	STEP 7 BATTERY
A/D IC							
Input Min voltage	0 V	0 V	0.9V	0 V	0V	0V	3.48V
Input Max voltage	4.9V	4.9V	4.9V	4.9V	5V	5V	3.48V
ADC STA (IC18 –6)	Pulse	Pulse	Pulse	Pulse	Pulse	Pulse	"L"
Vcc	4.9V						
CLK (10 pin)	1MHz (Square wave)						
IC2 – 1 (DIRECT)	Pulse						

Pulse: Repeatedly switching back and forth between "H" (+5V) and "L" (0V)

TEST 8 CARTRIDGE TEST

Insert the check ROM cartridge into the slot designated by the LCD.
By checking whether the data on the cartridge has been read out correctly, the program can check whether the cartridge data read out is operating correctly.
Check the A slot cartridge circuit with step 1 and check the B slot cartridge circuit with step 2.

TEST 8	CARTRIDGE TEST
STEP 1	Unit-A Insert CTRG Ready ?

Insert a check cartridge (ROM) into the A slot, press the YES switch and commence the read check.

TEST 8	CARTRIDGE TEST
STEP 2	Unit-B Insert CTRG Ready ?

Insert a check cartridge (ROM) into the B slot, press the YES switch and commence the read check.

If a cartridge has not been inserted the LCD will show the following:

TEST 8	CARTRIDGE READ TEST
STEP 1	Unit-A ** ERROR ** NOT Ready !

When a error has occured in the data read-out.

TEST 8	CARTRIDGE READ TEST
STEP 1	Unit-A CTRG access ERROR

Normal operation.

TEST 8	CARTRIDGE READ TEST
STEP 1	Unit-A CTRG access OK

[Test Contents]

1) DCT circuit board
2) Wiring between DCT circuit and MP circuit board

[Check Point]

Both the A channel and B channel cartridges have each 4 kbytes of memory ($2000 ~ $2FFF/$3000 ~ $3FFF). The control signals for the cartridge memory are as follows:

1) $\overline{\text{EXTE}}$ (I) . . . . . External enable (cartridge enable)
2) Address (I) . . . . . MA0,1 (2 bit)
3) Data (I/O) . . . . . MD0 ~ 7 (8 bit)
4) R/$\overline{\text{W}}$ (I) . . . . . Read/write
5) DPRT A/B (O) . . . . . Write protect signal
6) DINS A/B (O) . . . . . Cartridge insert signal

The DCT circuit board consist of following IC:

IC2 . . . . . Decorder
IC3 . . . . . I/0 Port
IC1 . . . . . 3 status Gate IC

Use a digital probe to check the following points of the DCT circuit board.
Carry out step 1

	Test Point	Reading	Tool
EXTE	CN3 – 35	Pulse	Digital probe
MA0, 1	CN3 – 17, 18	Pulse	"
MD0 ~ 7	CN3 – 1 ~ 15	Pulse	"
R/$\overline{\text{W}}$	CN3 – 22	Pulse	"
DINSA	CN3 – 23	0V	Tester
DPRTA	CN3 – 25	–	
Vcc	CN2 – 3	+5V	Tester

Pulse: Repeatedly switching back and forth between "H" (+5V) and "L" (0V)

TEST 9 CARTRIDGE WRITE/READ TEST

Set the WRITE PROTECT of the RAM cartridge to OFF, and insert it into the designated slot. Press the [YES] switch and first write the standard data into the cartridge.
Next, read out the data from the cartridge and compare it to the original data, which will enable you to check the READ/WRITE operation of the cartridge.

```
TEST 9    CARTRIDGE READ/WRITE TEST
STEP 1    Unit-A Insert CTRG. Ready ?
```

Insert a check cartridge (RAM) into the A slot, press the [YES] switch and check the READ/WRITE function.

```
TEST 9    CARTRIDGE READ/WRITE TEST
STEP 2    Unit-B Insert CTRG. Ready ?
```

Insert a check cartridge (RAM) into the B slot, press the [YES] switch and check the READ/WRITE function.

```
TEST 9    CARTRIDGE READ/WRITE TEST
writing > ***
```

```
TEST 9    CARTRIDGE READ/WRITE TEST
STEP 1    Unit-A  CTRG. access OK
```

ERROR (WRITE PROTECT SW ON)

```
TEST 9    CARTRIDGE READ/WRITE TEST
STEP 1    Unit-A  CTRG. write protected
```

ERROR (READ/WRITE)

```
TEST 9    CARTRIDGE READ/WRITE TEST
STEP 1    Unit-A  CTRG. access ERROR
```

[Test Contents]

1) DCT circuit board
2) Wiring between DCT circuit and MP circuit board

[Check Points]

Check to see that test 8 cartridge read test is p operating correctly.
Next:

1) Is an R/$\overline{W}$ pulse (Read/Write signal) being emitted from the MP circuit board ?
2) Is DPRTA, B (write protect) terminal 0V ?
3) Is DPRA, B data (0V) being emitted to IC4 of the CPR circuit board ?

TEST 10 RAM READ/WRITE TEST

The standard data can be written into the RAM ICs (IC4 ~ 11) of the MP circuit board, by pressing the YES switch. Next, read out the data written into the RAM and compare it with the original data, which will enable you to check the operation of the RAM IC.
(The original data stored in the RAM will be protected.)

```
TEST 10   RAM READ/WRITE TEST
```

If all RAM ICs are operating correctly, the LCD will display the following.

```
TEST 10   RAM READ/WRITE TEST
                                  ** OK **
```

If there is a faulty RAM IC, the IC number will be displayed.

```
TEST 10   RAM READ/WRITE TEST
          ERROR ON IC4
```

[Test Contents]

1) All RAM on MP circuit board.

[Check Points]

1) Is +5V being emitted to the Vcc 24 PIN of each RAM IC ?
2) Are pulses being emitted to the Address Bus's A0 ~ A10 ?
3) Are pulses being emitted to the Data Bus' D0 ~ D7 ?
4) Are READ/WRITE pulses being emitted to the R/W 21 PIN of each RAM IC ?
5) Is the 18 PIN, S2 of each RAM set to 0V ?

If the above conditions (1 to 5) are fulfilled, then the RAM IC is malfunctioning.

TEST 11 ROM SUM CHECK

Press the [YES] switch to read the data of the IC12, 13, ROM ICs of the MP circuit board, and carry out a SUM check which enables the ROM ICs to be checked.

```
TEST 11    ROM SUM CHECK
```

If all ROM ICs are operating correctly, the LCD will display the following.

```
TEST 11    ROM SUM-CHECK
                          ** OK **
```

If there is a faulty ROM IC, the IC number will be displayed.

```
TEST 11    ROM SUM-CHECK
           ERROR ON ROM1
```

[Test Contents]

1) All ROM on MP circuit board

[Check Points]

1) Is +5V being emitted to the Vcc 28 PIN of each ROM IC ?
2) Are pulses being emitted to the Address Bus's A0 ~ A13 ?
3) Are pulses being emitted to the Data Bus' D0 ~ D7 ?
4) Are pulses being emitted to the $\overline{CS}$ 20 PIN of each ROM IC ?
   The pulse will change the instant the [YES] switch goes ON.

If the above conditions (1 to 4) are fulfilled, then the ROM IC is malfunctioning.

TEST 12 OPS TEST

The OPS IC is composed of 6 OPERATORs. Check the OPS by accessing each OPERATOR separately, applying feed-back and changing the output level.

TEST 12	OPS TEST
STEP 1	Operator-1 ON

Only the sound from OPERATOR 1 will be produced.
A sine wave will be produced at the same volume from both A channel and B channel.

TEST 12	OPS TEST
STEP 2	Operator-2 ON

Only the sound from OPERATOR 2 will be produced.
A sine wave will be produced at the same volume from both A channel and B channel.

TEST 12	OPS TEST
STEP 3	Operator-3 ON

Only the sound from OPERATOR 3 will be produced.
A sine wave will be produced at the same volume from both A channel and B channel.

TEST 12	OPS TEST
STEP 4	Operator-4 ON

Only the sound from OPERATOR 4 will be produced.
A sine wave will be produced at the same volume from both A channel and B channel.

TEST 12	OPS TEST
STEP 5	Operator-5 ON

Only the sound from OPERATOR 5 will be produced.
A sine wave will be produced at the same volume from both A channel and B channel.

TEST 12	OPS TEST
STEP 6	Operator-6 ON

Only the sound from OPERATOR 6 will be produced.
A sine wave will be produced at the same volume from both A channel and B channel.

TEST 12	OPS TEST
STEP 7	All Operators OFF

Check to see that none of the OPERATORs 1 ~ 6 are producing sound.

TEST 12	OPS TEST
STEP 8	Feedback (Max)

Check to see that noise is being produced.

TEST12	OPS TEST
STEP 9	Output level attenuator

Check to see that the volume of the A and B channels is changing alternately from the maximum to 0 setting over a range of 32 steps. Also check that the volume is changing evenly.

[Test Contents]

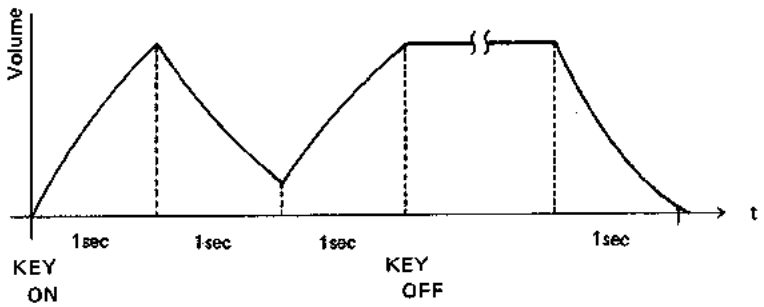
1) Ach, Bch OPS IC on TG circuit board

TEST 13 EGS TEST

The pitch and amplitude envelope data sent from the MP circuit board to the EGS (IC) of the TG circuit board will change over time. By checking to see whether the pitch and amplitude change when the key is pressed, the EGS IC can be checked.

TEST 13	EGS TEST
STEP 1	Envelope

When the key is pressed on, both the A and B channels will sound with an envelope as shown below, the sound of which can be checked.



TEST 13	EGS TEST
STEP 2	Keyboard scaling for rate

Listen to the sound and check the following when the key goes on:

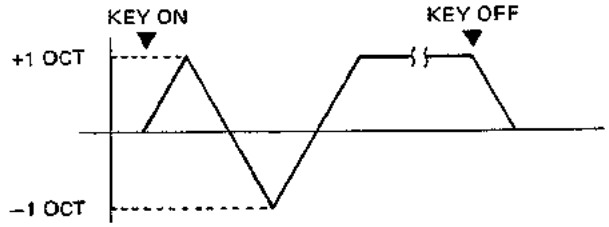
Low frequency range: approx. 4 second decay time
Mid-range: approx. 1 second decay time
High frequency range: approx. 0.2 second time decay time

Reference:

R1 = 99	R2 = 30	R3 = 99	R4 = 99
L1 = 99	L2 = 0	L3 = 0	L4 = 0
RS = 7			

TEST 13	EGS TEST
STEP 3	Pitch envelope

Listen to the sound and check to see that the pitch changes as shown below from the time that the key goes on until it goes off.



Reference:

PR1 = 50	PR2 = 75	PR3 = 75	PR4 = 50
PL1 = 87	PL2 = 13	PL3 = 87	PL4 = 50
R1 = R2 = R3 = 99	R4 = 45		
L1 = L2 = L3 = 99	L4 = 0		

TEST 13	EGS TEST
STEP 4	Fixed frequency

Check to see that every note is approximately 1,000Hz when the key goes on.

TEST 13	EGS TEST
STEP 5	Detune

Check the "beat" when the key goes on as shown below:

Low frequency range:	approx. 0.2Hz
Mid-range:	approx. 1.5Hz
High frequency range:	approx. 3Hz

[Test Contents]

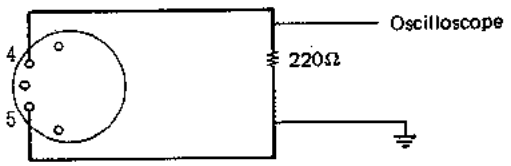
1) Ach, Bch EGS IC on TG circuit board

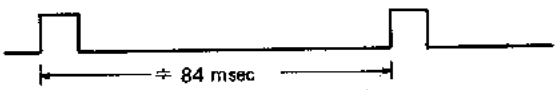
TEST 14 MIDI CHECK

Connect the MIDI IN jack to the MIDI OUT jack on the rear panel using the MIDI cable.
Key data will be output in order from the MIDI OUT terminal.
When the MIDI OUT and IN terminals have been connect by the MIDI cable, the key data will be input to the microprocessor section by way of the MIDI IN terminal. If the MIDI circuit is operating correctly, AUTO SCALING will be carried out beginning from the lowest notes, progressing to the highest.

TEST 14 MIDI LINE CHECK STEP

As shown below, connect a dummy load to the MIDI THRU terminal. If both ends of the 220Ω resistor are connected to an oscilloscope, a pulse wave will appear on the oscilloscope screen.





[Test Contents]

1) ACIA IC on MP circuit board
2) Pre-Amp for MIDI
3) Connector for MIDI

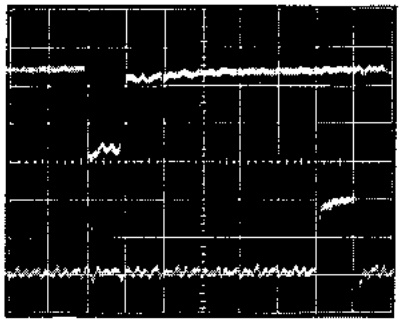
TEST 15 AUTO SCALING

This function automatically scales the notes beginning from the lowest notes and progressing to the highest. This test is used to break in the DX5.

TEST 15 AUTO SCALING
STEP

WAVE FORMS

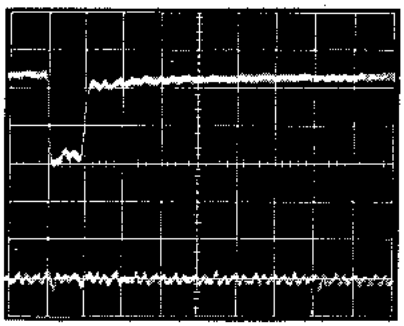
1 IC 33 – 11 $\overline{\text{SYNC}}$
IC 33 – 12 F1



- Check Point
  TG board
- Condition

CH.1	CH.2
0.2 /DIV	0.2/DIV
0.2 μs /DIV	
AC • DC	AC • DC

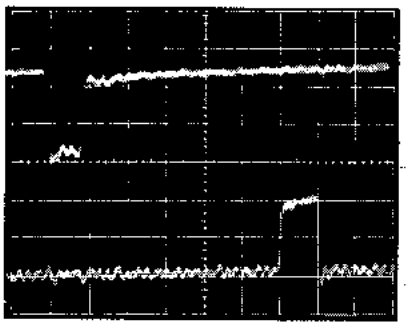
2 IC 33 – 11 $\overline{\text{SYNC}}$
IC 33 – 13 F2



- Check Point
  TG board
- Condition

CH.1	CH.2
0.2 /DIV	0.2/DIV
0.2 μs /DIV	
AC • DC	AC • DC

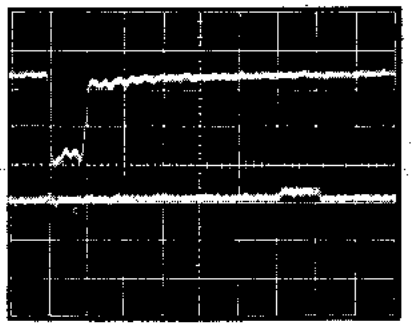
3 IC 33 – 11 $\overline{\text{SYNC}}$
IC 33 – 14 F3



- Check Point
  TG board
- Condition

CH.1	CH.2
0.2 /DIV	0.2 /DIV
0.2 μs /DIV	
AC • DC	AC • DC

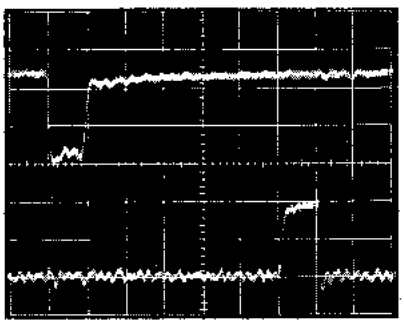
4 IC 33 – 11 $\overline{\text{SYNC}}$
IC 33 – 15 F4



- Check Point
  TG board
- Condition

CH.1	CH.2
0.2/DIV	0.2/DIV
0.2 μs /DIV	
AC • DC	AC • DC

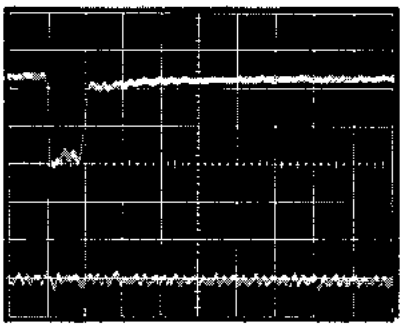
5 IC 33 – 11 $\overline{\text{SYNC}}$
IC 33 – 16 F5



- Check Point
  TG board
- Condition

CH.1	CH.2
0.2 /DIV	0.2 /DIV
0.2 μs /DIV	
AC • DC	AC • DC

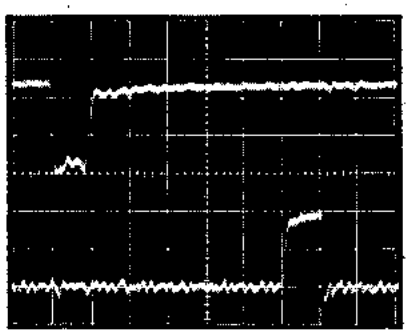
6 IC 33 – 11 $\overline{\text{SYNC}}$
IC 33 – 18 F6



- Check Point
  TG board
- Condition

CH.1	CH.2
0.2 /DIV	0.2 /DIV
0.2 μs /DIV	
AC • DC	AC • DC

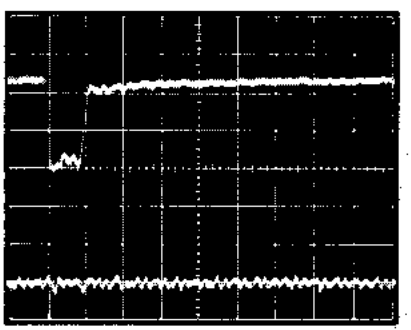
7 IC 33 – 11 $\overline{\text{SYNC}}$
IC 33 – 19 F7



- Check Point
  TG board
- Condition

CH.1	CH.2
0.2 /DIV	0.2/DIV
0.2 μs /DIV	
AC • DC	AC • DC

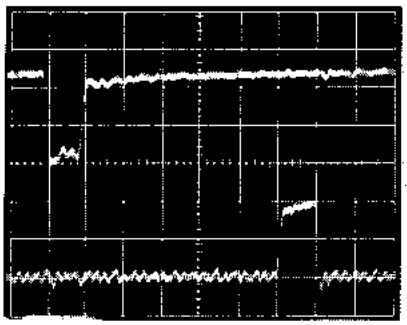
8 IC 33 – 11 $\overline{\text{SYNC}}$
IC 33 – 20 F8



- Check Point
  TG board
- Condition

CH.1	CH.2
0.2/DIV	0.2 /DIV
0.2 μs /DIV	
AC • DC	AC • DC

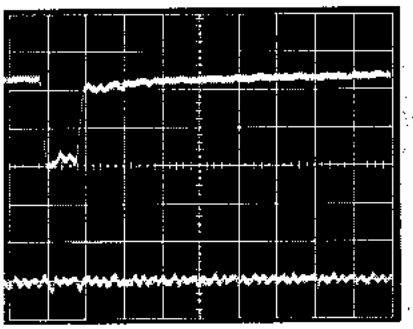
9 IC 33 – 11 $\overline{\text{SYNC}}$
IC 33 – 21 F9



- Check Point
  TG board
- Condition

CH.1	CH.2
0.2/DIV	0.2/DIV
0.2 μs /DIV	
AC・DC	AC・DC

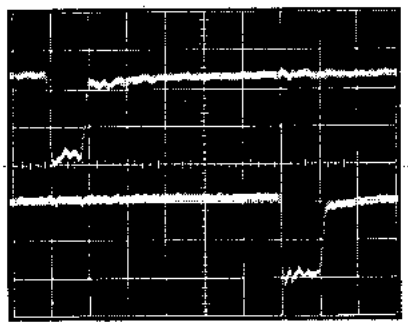
10 IC 22 – 14 $\overline{\text{SYNC}}$
IC 33 – 22 F10



- Check Point
  TG board
- Condition

CH.1	CH.2
0.2/DIV	0.2/DIV
0.2 μs /DIV	
AC・DC	AC・DC

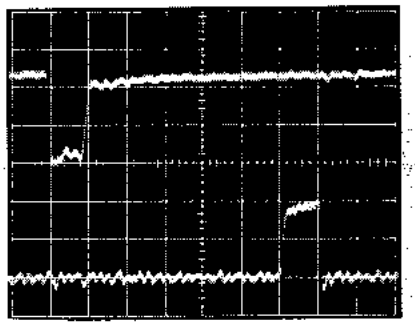
11 IC 33 – 11 $\overline{\text{SYNC}}$
IC 33 – 23 F11



- Check Point
  TG board
- Condition

CH.1	CH.2
0.2/DIV	0.2/DIV
0.2 μs /DIV	
AC・DC	AC・DC

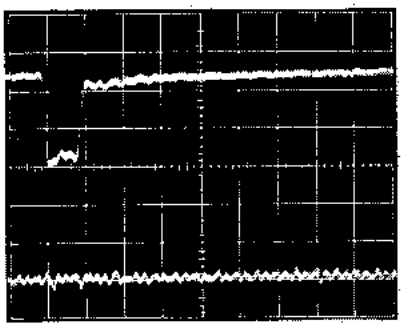
12 IC 33 – 11 $\overline{\text{SYNC}}$
IC 33 – 24 F12



- Check Point
  TG board
- Condition

CH.1	CH.2
0.2/DIV	0.2/DIV
0.2 μs /DIV	
AC・DC	AC・DC

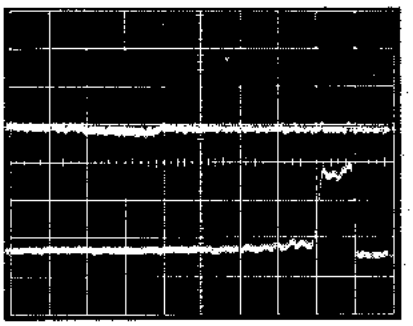
13 IC 33 – 11 $\overline{\text{SYNC}}$
IC 33 – 25 F13



- Check Point
  TG board
- Condition

CH.1	CH.2
0.2/DIV	0.2/DIV
0.2 μs /DIV	
AC・DC	AC・DC

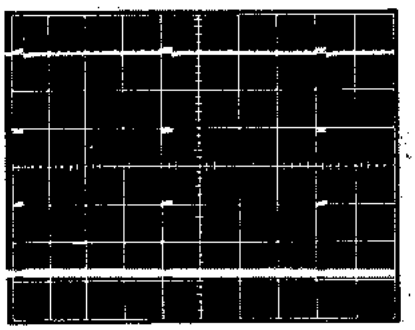
14 IC 33 – 11 $\overline{\text{SYNC}}$
IC 33 – 26 F14



- Check Point
  TG board
- Condition

CH.1	CH.2
0.2/DIV	0.2/DIV
0.2 μs /DIV	
AC・DC	AC・DC

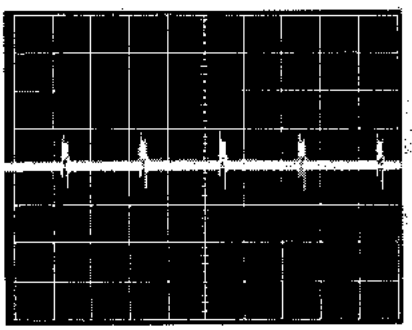
15 IC 51 – 1 DAC in
IC 51 – 2 ~ 12



- Check Point
  TG board
- Condition

CH.1	CH.2
0.2/DIV	0.2/DIV
5 μs /DIV	
AC・DC	AC・DC

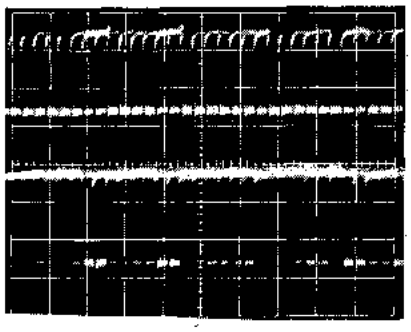
16 IC 51 – 18 DAC out



- Check Point
  TG board
- Condition

CH.1	CH.2
0.1/DIV	/DIV
10 μs /DIV	
AC・DC	AC・DC

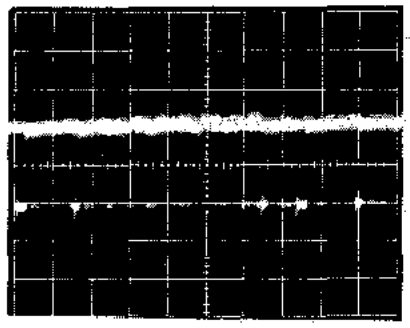
17 IC 8 – 20 ROM OE
IC 9 – 20 RAM OE



• Check Point
TG board
• Condition

CH.1	CH.2
0.2/DIV	0.2/DIV
2 μs/DIV	
AC • DC	AC • DC

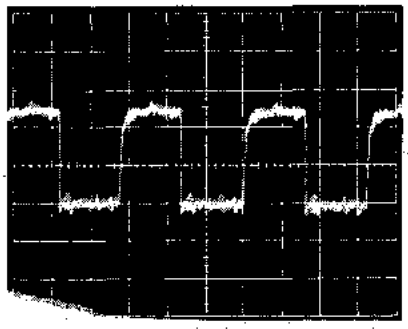
18 IC 10 – 32 R/$\overline{W}$



• Check Point
TG board
• Condition

CH.1	CH.2
0.2/DIV	/DIV
0.5 μs/DIV	
AC • DC	AC • DC

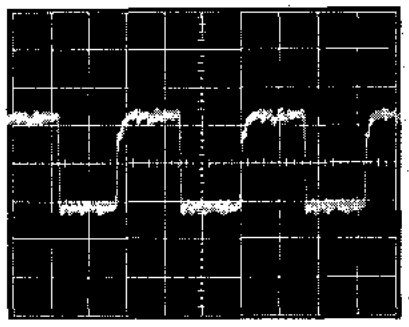
19 IC 10 – 35 Q



• Check Point
TG board
• Condition

CH.1	CH.2
0.2/DIV	/DIV
0.2 μs/DIV	
AC • DC	AC • DC

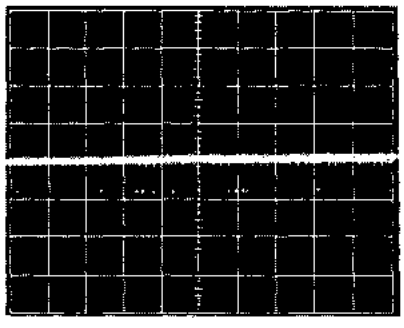
20 IC 10 – 34 E



• Check Point
TG board
• Condition

CH.1	CH.2
0.2/DIV	/DIV
0.2 μs/DIV	
AC • DC	AC • DC

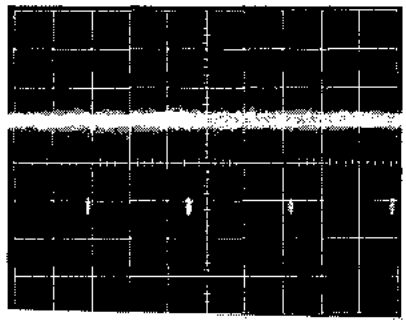
21 IC 10 – 4 FIRQ



• Check Point
TG board
• Condition
Key on

CH.1	CH.2
0.5/DIV	/DIV
0.5 ms/DIV	
AC • DC	AC • DC

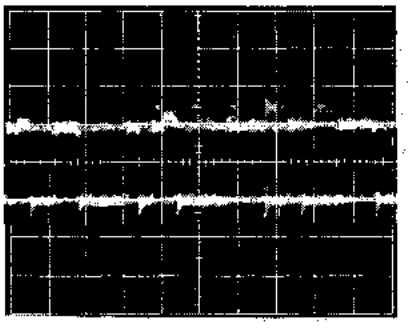
22 IC 10 – 3 IRQ



• Check Point
TG board
• Condition

CH.1	CH.2
0.2/DIV	/DIV
1 ms/DIV	
AC • DC	AC • DC

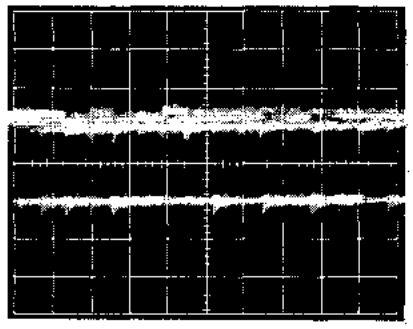
23 IC 10 – 30 D1



• Check Point
TG board
• Condition

CH.1	CH.2
0.2/DIV	/DIV
2 μs/DIV	
AC • DC	AC • DC

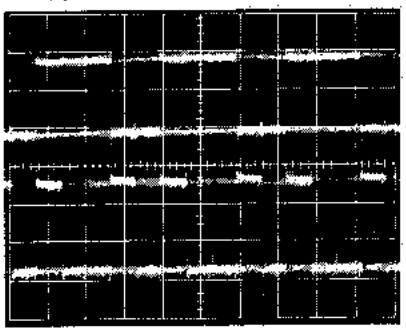
24 IC 10 – 9 A1



• Check Point
TG board
• Condition

CH.1	CH.2
0.2/DIV	/DIV
2 μs/DIV	
AC • DC	AC • DC

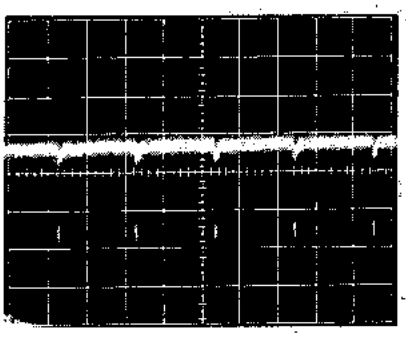
25 IC 1 – 30 D1
IC 1 – 29 D2



• Check Point
MP board
• Condition

CH.1	CH.2
0.2 /DIV	0.2 /DIV
1 μs /DIV	
AC • DC	AC • DC

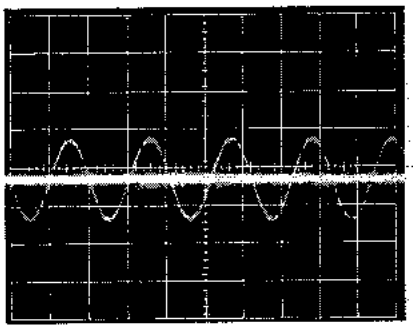
26 IC 18 – 3 SY



• Check Point
TG board
• Condition

CH.1	CH.2
0.2 /DIV	/DIV
10 μs /DIV	
AC • DC	AC • DC

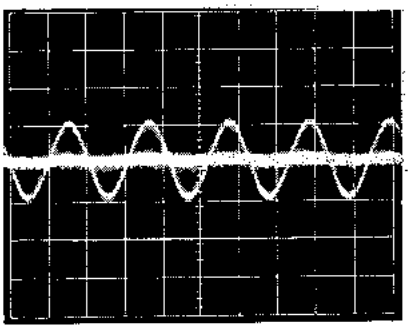
27 IC 58 – 6 Expander output



• Check Point
TG board
• Condition

CH.1	CH.2
0.1 /DIV	/DIV
1 ms /DIV	
AC • DC	AC • DC

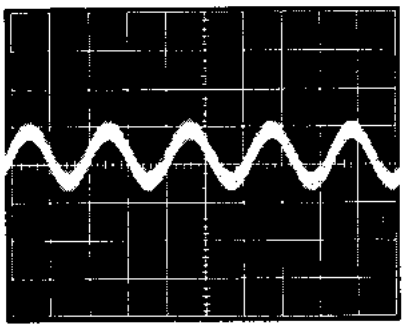
28 IC 64 – 1 Mixing output



• Check Point
TG board
• Condition

CH.1	CH.2
0.1/DIV	/DIV
1 ms /DIV	
AC • DC	AC • DC

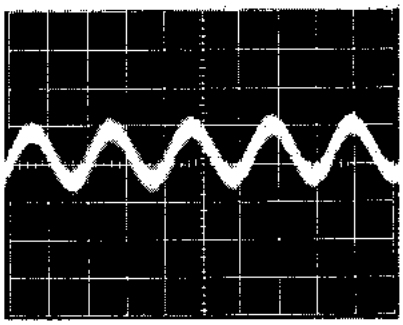
29 IC 65 – 1 LPF output



• Check Point
TG board
• Condition

CH.1	CH.2
20m/DIV	/DIV
1 ms /DIV	
AC • DC	AC • DC

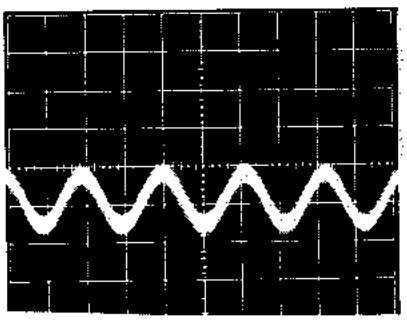
30 IC66 – 1 LPF output



• Check Point
TG board
• Condition

CH.1	CH.2
20m/DIV	/DIV
1 ms /DIV	
AC • DC	AC • DC

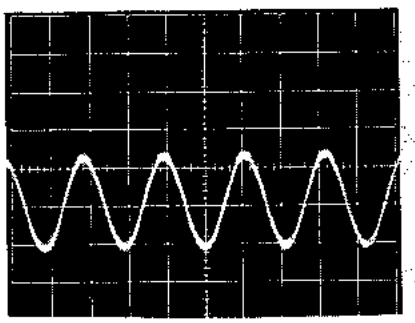
31 CN2 – 4 Ain



• Check Point
CPL board
• Condition

CH.1	CH.2
20m/DIV	/DIV
1 ms /DIV	
AC • DC	AC • DC

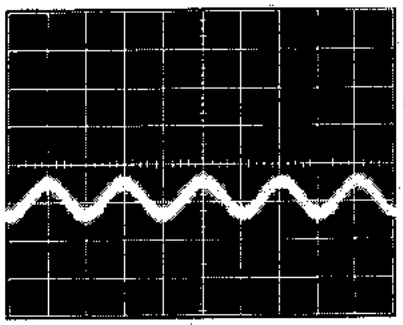
32 IC 2 – 3



• Check Point
CPL board
• Condition
Master VR Max
balance A

CH.1	CH.2
20m/DIV	/DIV
1 ms /DIV	
AC • DC	AC • DC

33 IC 2 – 1



- **Check Point**

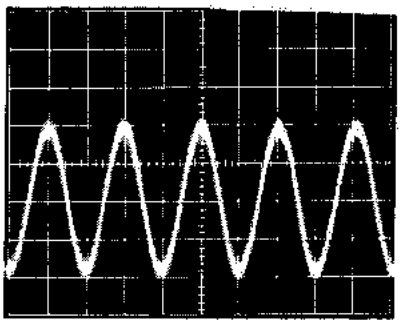
  CPL board

- **Condition**

  Master VR MAX
  balance A

CH.1	CH.2
20m/DIV	/DIV
1 ms /DIV	
AC • DC	AC • DC

34 CN4 – 3 ALO



- **Check Point**

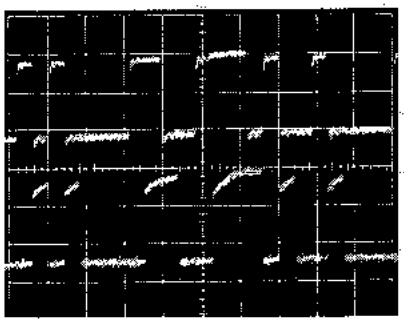
  CPL board

- **Condition**

  Master VR Max
  balance A

CH.1	CH.2
20m/DIV	/DIV
1 ms /DIV	
AC • DC	AC • DC

35 IC 18 – 41 EC1
IC 33 – 43 EC1



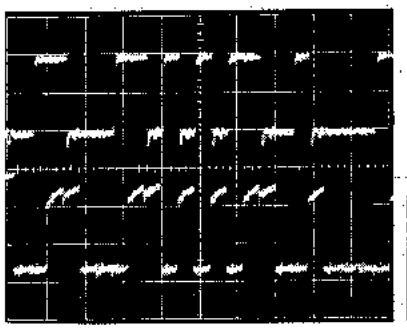
- **Check Point**

  TG board

- **Condition**

CH.1	CH.2
0.2 /DIV	0.2 /DIV
0.5 μs /DIV	
AC • DC	AC • DC

36 IC 18 – 42 EC2
IC 33 – 44 EC2



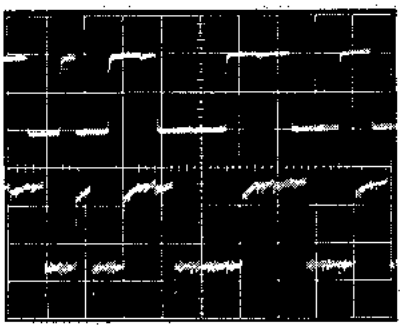
- **Check Point**

  TG board

- **Condition**

CH.1	CH.2
0.2 /DIV	0.2 /DIV
0.5 μ /DIV	
AC • DC	AC • DC

37 IC 18 – 43 EC3
IC 33 – 45 EC3



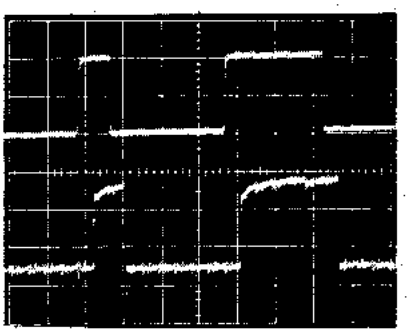
- **Check Point**

  TG board

- **Condition**

CH.1	CH.2
0.2 /DIV	0.2 /DIV
0.5 μs /DIV	
AC • DC	AC • DC

38 IC 18 – 44 EC4
IC 33 – 46 EC4



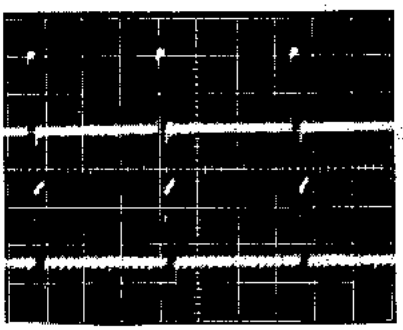
- **Check Point**

  TG board

- **Condition**

CH.1	CH.2
0.2 /DIV	0.2 /DIV
0.5 μs /DIV	
AC • DC	AC • DC

39 IC 18 – 45 EC5
IC 33 – 47 EC5



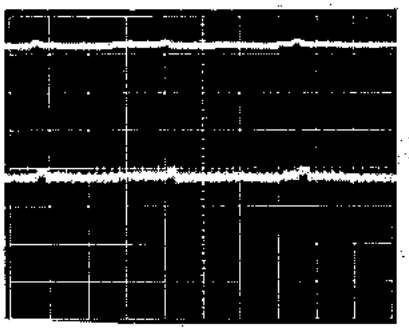
- **Check Point**

  TG board

- **Condition**

CH.1	CH.2
0.2/DIV	0.2 /DIV
0.1 μ /DIV	
AC • DC	AC • DC

40 IC 18 – 46, 47, 48, 49, 51, 52
IC 33 – 48, 49, 50, 51, 53, 54



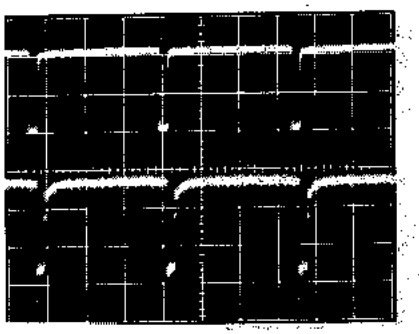
- **Check Point**

  TG board

- **Condition**

CH.1	CH.2
0.2/DIV	0.2 /DIV
0.1 μ /DIV	
AC • DC	AC • DC

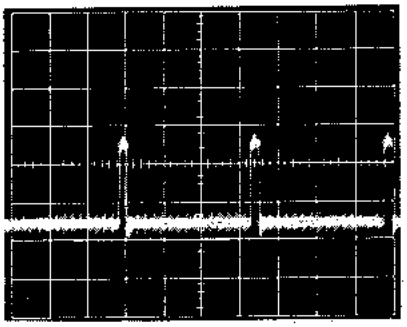
41 IC 18 – 50 EC10
IC 33 – 52 EC10



• Check Point
TG board
• Condition

CH.1	CH.2
0.2 /DIV	0.2 /DIV
0.1 μs /DIV	
AC • DC	AC • DC

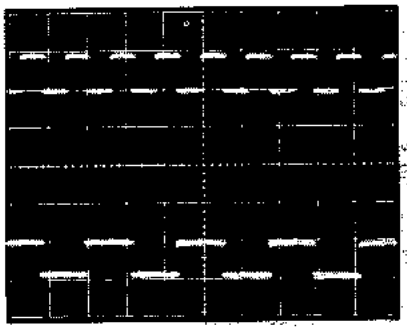
42 IC 18 – 60 KON



• Check Point
TG board
• Condition

CH.1	CH.2
0.2/DIV	/DIV
1 μs /DIV	
AC • DC	AC • DC

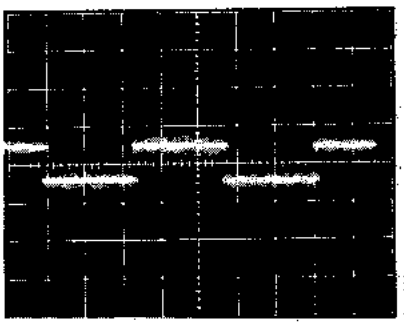
49 IC 42 – 1 DO
IC 42 – 2 D1



• Check Point
MP board
• Condition

CH.1	CH.2
0,5/DIV	0.5 /DIV
50 μs /DIV	
AC • DC	AC • DC

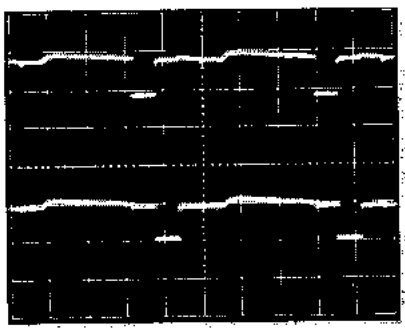
50 IC 42 – 3 D2



• Check Point
MP board
• Condition

CH.1	CH.2
0.5/DIV	/DIV
50 μs /DIV	
AC • DC	AC • DC

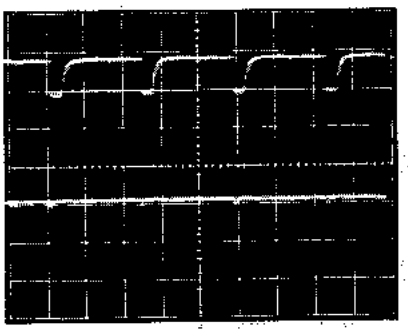
51 IC 42 – 11 Y4
IC 42 – 10 Y5



• Check Point
MP board
• Condition

CH.1	CH.2
0.5/DIV	0.5 /DIV
50 μs /DIV	
AC • DC	AC • DC

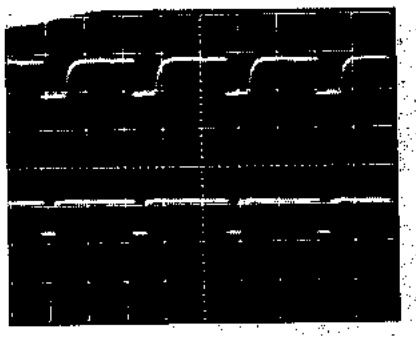
52 IC 40 – 11
IC 41 – 11



• Check Point
MP board
• Condition
C3 Key off

CH.1	CH.2
0.5 /DIV	0.5 /DIV
0.1 ms /DIV	
AC • DC	AC • DC

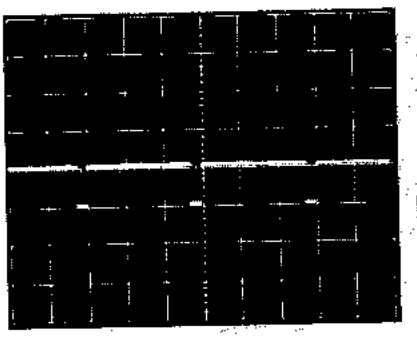
53 IC 40 – 11
IC 41 – 11



• Check Point
MP board
• Condition
C3 key ON

CH.1	CH.2
0.5/DIV	0.5/DIV
0.1 ms /DIV	
AC • DC	AC • DC

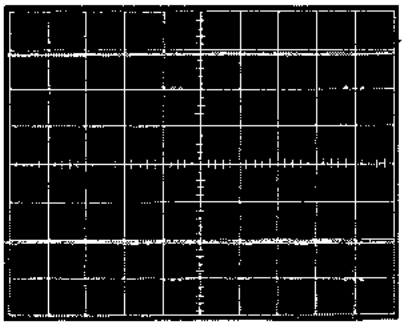
54 IC 40 – 15 S/L



• Check Point
MP board
• Condition

CH.1	CH.2
0.5/DIV	/DIV
10 μs /DIV	
AC • DC	AC • DC

55 IC 40 – 13 SO
IC 41 – 13 SO



• **Check Point**

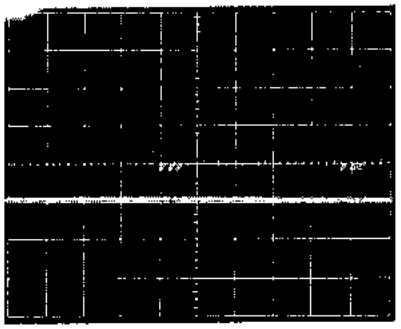
MP board

• **Condition**

Key on

CH.1	CH.2
0.5 /DIV	0.5 /DIV
50 μs /DIV	
AC • DC	AC • DC

56 IC 37 – 11



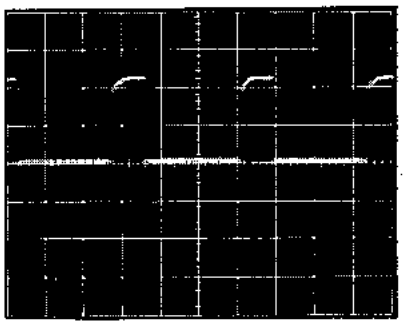
• **Check Point**

MP board

• **Condition**

CH.1	CH.2
0.5 /DIV	/DIV
50 μs /DIV	
AC • DC	AC • DC

57 IC 43 – 12 F1



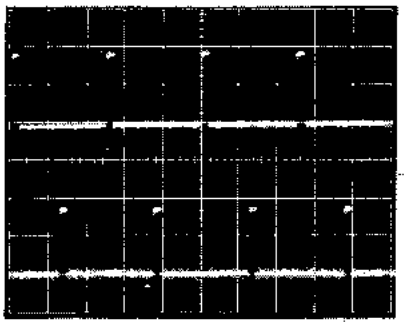
• **Check Point**

TG board

• **Condition**

CH.1	CH.2
0.2 /DIV	/DIV
1 μs /DIV	
AC • DC	AC • DC

58 IC 43 – 9 SH1
IC 43 – 10 SH2



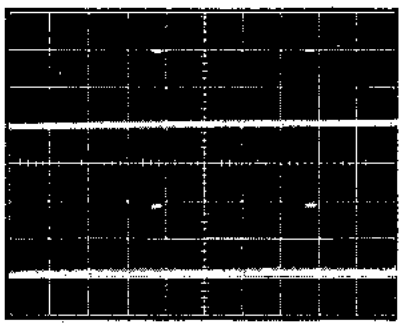
• **Check Point**

TG board

• **Condition**

CH.1	CH.2
0.2 /DIV	0.2 /DIV
1 μs /DIV	
AC • DC	AC • DC

59 IC 43 – 39 SFO
IC 43 – 40 SFI



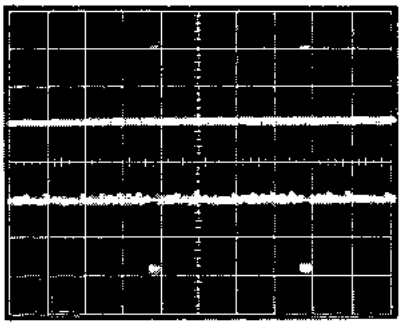
• **Check Point**

TG board

• **Condition**

CH.1	CH.2
0.2 /DIV	0.2 /DIV
5 μs /DIV	
AC • DC	AC • DC

60 IC 43 – 41 SF2
IC 43 – 42 SF3



• **Check Point**

TG board

• **Condition**

CH.1	CH.2
0.2 /DIV	0.2 /DIV
5 μs /DIV	
AC • DC	AC • DC

[Checking when the System Program will not Operate.]

Checking each points on MP circuit board when system program will not operate.

1) Are the connectors of each circuit board secure ?
2) Is each circuit board being supplied with proper voltage ?
3) Is the clock frequency correct ?

MP circuit board

	Test point	Readings	Power SW	Tool
Vcc	C1 – 5 ~ 8	+5V	ON	TESTER
RES	IC1 – 37	+5V	ON	"
SO1	IC51 – 11	4.71 MHz	ON	Oscilloscope
SO2	IC51 – 8	4.71 MHz	ON	"
MO	IC53 – 12	7.54 MHz	ON	"
Address	IC1 – 8 ~ 23	Pulse	ON	Digital probe
Data	IC1 – 24 ~ 31	Pulse	ON	"
Address	Positive GND	∞Ω	OFF	TESTER
"	Negative GND	3.5KΩ	OFF	"
"	Positive +5V	∞Ω	OFF	"
"	Negative +5V	3.5KΩ	OFF	"
"	between each line	∞Ω	OFF	"
Data	Positive GND	7.0KΩ	OFF	"
"	Negative GND	3.0KΩ	OFF	"
"	Positive +5V	7.0KΩ	OFF	"
"	Negative +5V	3.0KΩ	OFF	"
"	between each line	15KΩ	OFF	"

Positive : resistance value between the positive ground.
Negative: resistance value between the negative ground.

		RAM1	RAM2	RAM3	RAM4	RAM5	RAM6	RAM7	RAM8
18 pin	$\overline{S2}$	0V	0V	0V	0V	0V	0V	0V	0V
20 pin	output	Pulse	Pulse	5V	5V	5V	5V	5V	5V
21 pin	R/W	Pulse	Pulse	Pulse	Pulse	Pulse	Pulse	Pulse	Pulse

The output pin-20 changes momentarily "H" (+5V) to "L" (0V) when panel switch turn on.

ROM IC12, 13	20 pin	Pulse

Pulse: repeatedly switching back and forth between "H" (+5V) and "L" (0V).