

SERVICE MANUAL

WAVESTATION

CONTENTS

1. SPECIFICATIONS	1
2. STRUCTURAL DIAGRAM	2
3. HOW TO DISASSEMBLE	5
4. HOW TO CHANGE VR OF CONTROL WHEEL	8
5. BLOCK DIAGRAM	9
6. CIRCUIT DIAGRAM	10
7. P.C. BOARDS	23
8. DIAGNOSTIC TEST	31
9. IC CHECK POINT	40
10. REFERENCE DATA	45
11. PARTS LIST	56

KORG

VAROITUS

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

ADVARSEL!

Lithiumbatteri – Eksplosionsfare ved fejlagtig
handtering.

Udskiftning må kun ske med batteri
af samme fabrikat og type.

ADVERSEL

Lithiumbatteri – Eksplosjonsfare.

Ved utskifting benyttes kun batteri som
anbefalt av apparatfabrikanten.

Brukt batteri returneres apparatleverand ø ren.

VARNING

Explosionsfara vid felaktigt batteribyte.

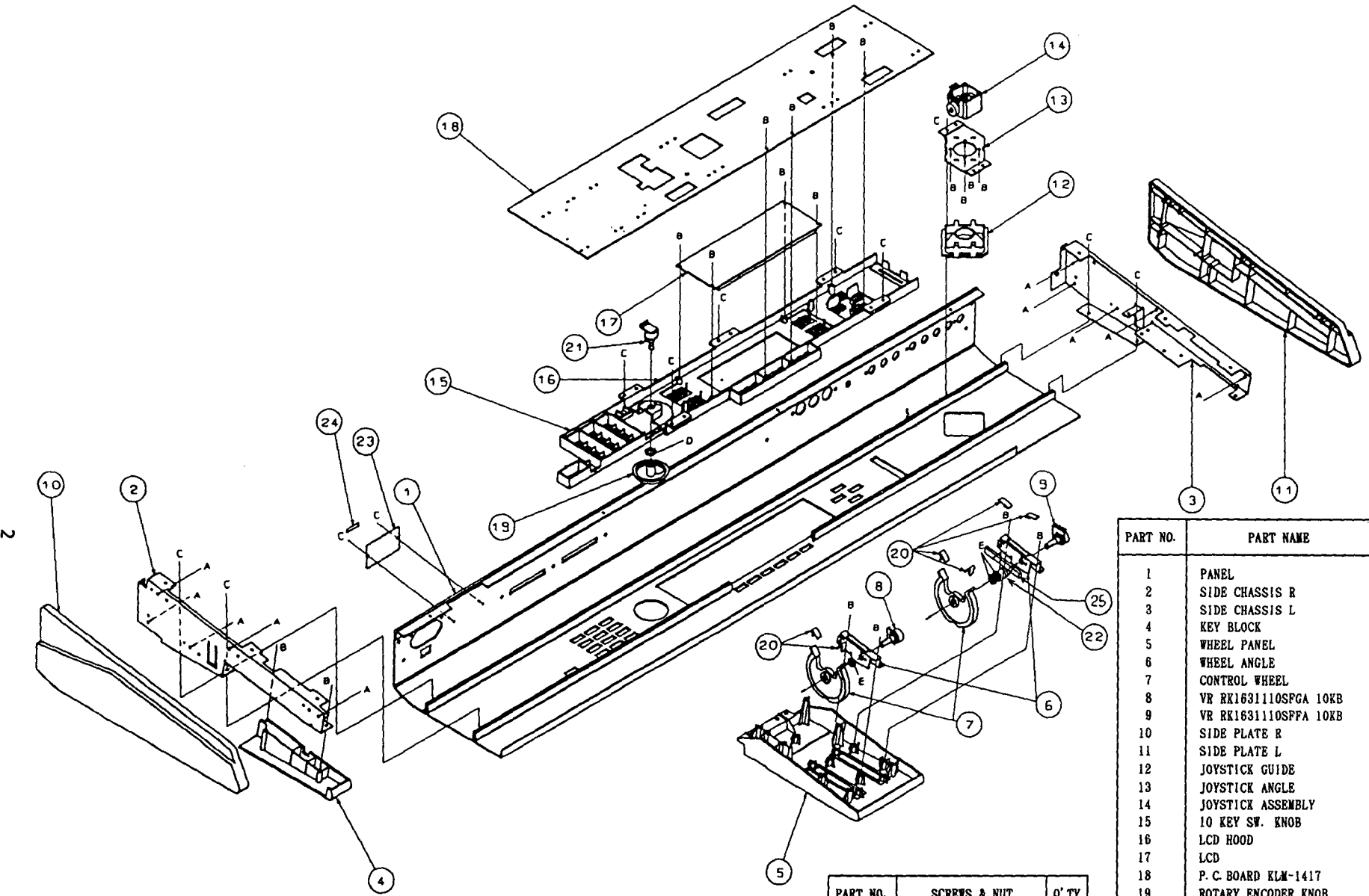
Använd samma batterityp eller en ekvivalent typ som
rekommenderas av apparattillverkaren.

Kassera använt batteri enligt fabrikantens instruktion.

1. SPECIFICATIONS

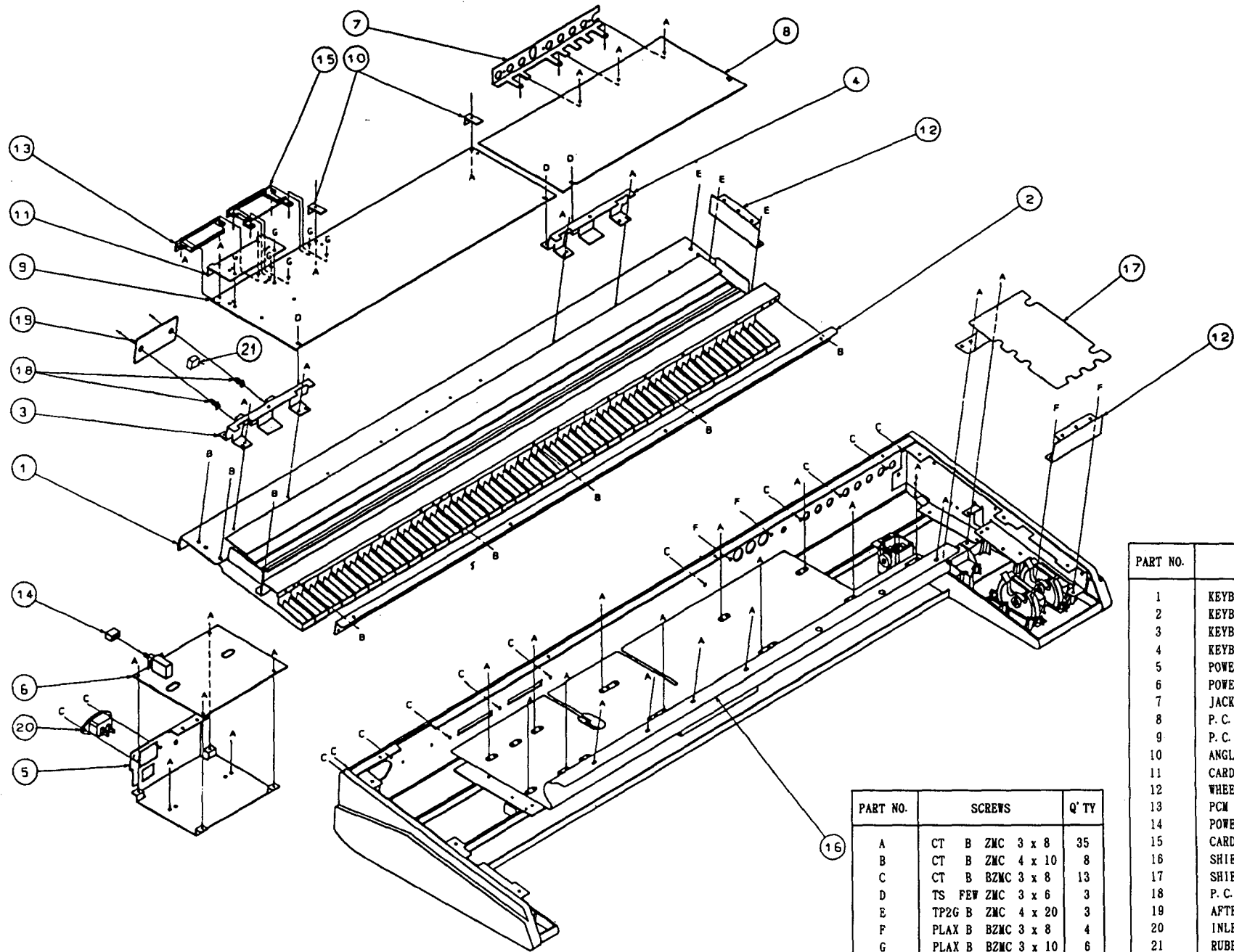
System	: Advanced Vector Synthesis 24-bit digital processing, 19-bit DAC
Wave Memory	: 365 sampled and single-cycle waveforms.
Program Memory	: 1 ROM Bank, 2 RAM Banks, and 1 Card Bank
Tone Generator	: 20 bits 32 voices including individual filters, amps, LFOs, and envelopes.
Macros	: Voicing templates for Pitch, Filter, Amp, Pan, Envl and Keyboard Modes
Effects	: 46 effects programs. Up to 6 simultaneous digital effects, with dynamic modulation.
Performances	: 150 internal, 50 in card
Patches	: 105 internal, 35 in card
Wave Sequences	: 96 internal, 32 in card
Wave Sequence Steps	: 1500 internal, 500 in card
Multi-Mode Setups	: 16 configurations of multi-timbral, 16-channel MIDI reception
Keyboard	: 61 notes, with velocity and aftertouch
Performance Controllers	: Joystick, Pitch wheel, Modulation wheel, and Master Volume
Control inputs	: Damper pedal, assignable footswitch / pedal 1 and 2
Card slots	: PCM data, PROG data
MIDI	: IN, OUT, THRU Extensive Multi-timbral and Master Controller capability
Display	: 64 x 240 pixel back-lit LCD with soft-key menu system
Outputs	: 1/L, 2/R, 3, 4, headphone
Dimensions	: 100 (W) x 35 (D) x 11 (H) cm
Weight	: 12.5 kg

2. STRUCTURAL DIAGRAM



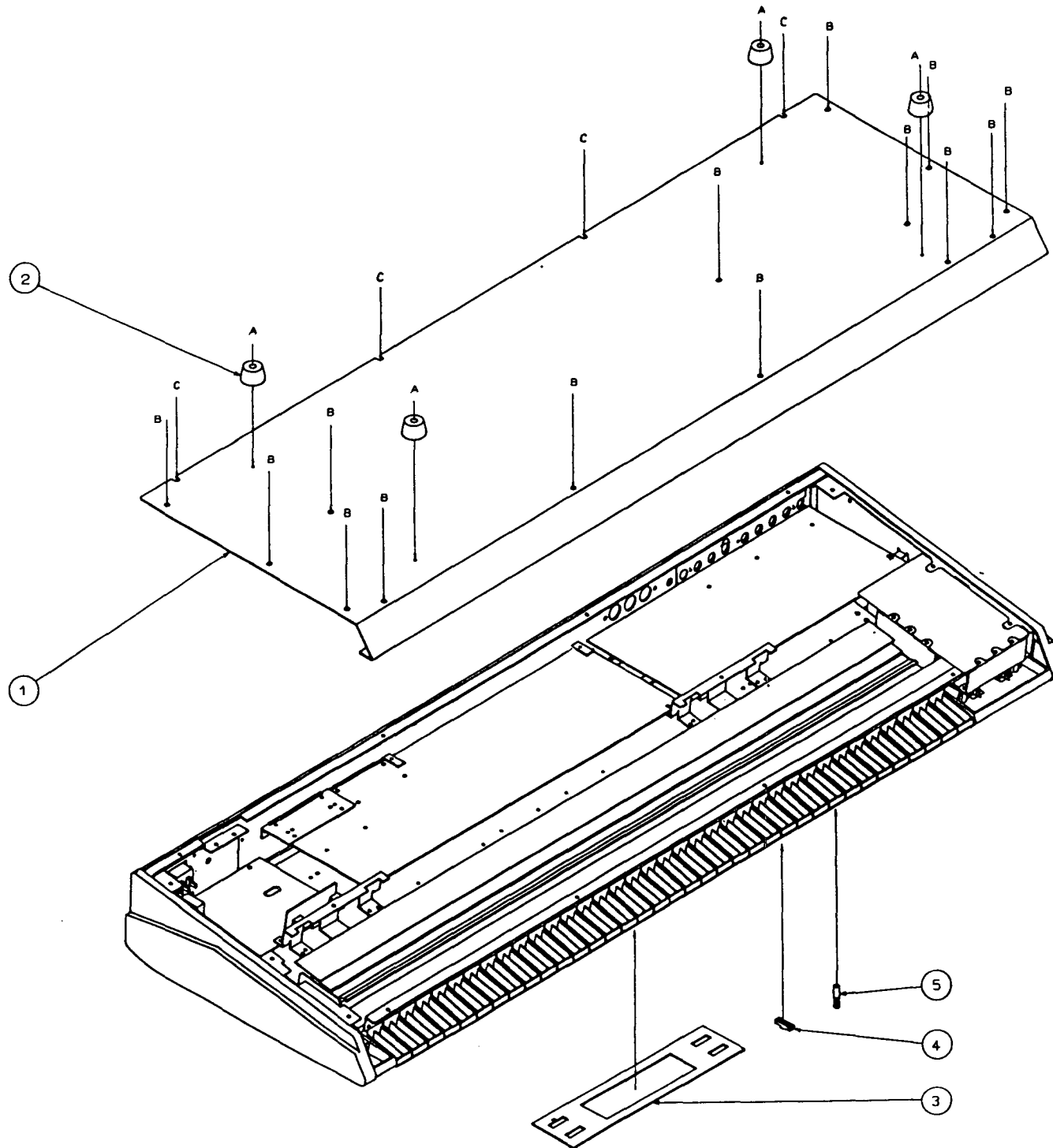
PART NO.	PART NAME	PART CODE
1	PANEL	641011000
2	SIDE CHASSIS R	641011301
3	SIDE CHASSIS L	641011300
4	KEY BLOCK	646034400
5	WHEEL PANEL	646034200
6	WHEEL ANGLE	641011400
7	CONTROL WHEEL	646034100
8	VR RK1631110SFGA 10KB	362006000
9	VR RK1631110SFFA 10KB	362005900
10	SIDE PLATE R	646036101
11	SIDE PLATE L	646036100
12	JOYSTICK GUIDE	646034300
13	JOYSTICK ANGLE	641011700
14	JOYSTICK ASSEMBLY	362006100
15	10 KEY SW. KNOB	620022100
16	LCD HOOD	646034500
17	LCD	313002200
18	P. C. BOARD ELM-1417	001141700
19	ROTARY ENCODER KNOB	620018400
20	WHEEL CUSHION	-----
21	ROTARY ENCODER	370003700
22	WHEEL SPRING	644005200
23	NAME PLATE	-----
24	SERIAL NO. SEAL	-----
25	RUBBER SPACER	-----

PART NO.	SCREWS & NUT	Q' TV
A	PLAX B ZNC 3 x 6	10
B	PLAX B BZNC 3 x 8	18
C	CT B ZNC 3 x 8	12
D	VN ZNC 9	1
E	VN ZNC 7	3



PART NO.	SCREWS	Q' TY
A	CT B ZMC 3 x 8	35
B	CT B ZMC 4 x 10	8
C	CT B BZMC 3 x 8	13
D	TS FEW ZMC 3 x 6	3
E	TP2G B ZMC 4 x 20	3
F	PLAX B BZMC 3 x 8	4
G	PLAX B BZMC 3 x 10	6

PART NO.	PART NAME	PART CODE
1	KEYBOARD FS-61	420004000
2	KEYBOARD FRONT ANGLE	641011200
3	KEYBOARD REAR ANGLE A	641011600
4	KEYBOARD REAR ANGLE B	641011601
5	POWER UNIT CHASSIS	641011500
6	POWER SUPPLY BOARD	-----
7	JACK PLATE	641007800
8	P. C. BOARD KLM-1416	001141600
9	P. C. BOARD KLM-1415	001141500
10	ANGLE TYPE L	641008100
11	CARD ANGLE	640092000
12	WHEEL PANEL SUPPORT	641013300
13	PCM CARD SLOT	646028300
14	POWER SW. KNOB	620021600
15	CARD GUIDE	640088500
16	SHIELD SHEET	630013800
17	SHIELD PLATE FOR WHEEL	641016900
18	P. C. BOARD SPACER	540016800
19	AFTERTOUCH BOARD	-----
20	INLET SOCKET	-----
21	RUBBER SPACER	-----

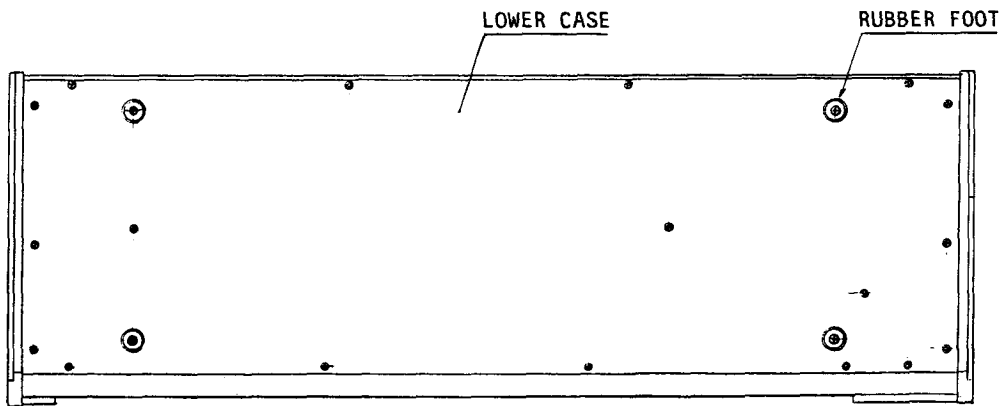


PART NO.	SCREWS	Q' TY
A	TS B BZMC 3 x 12	4
B	CT B BZMC 4 x 10	14
C	TS SSE BZMC 4 x 10	4

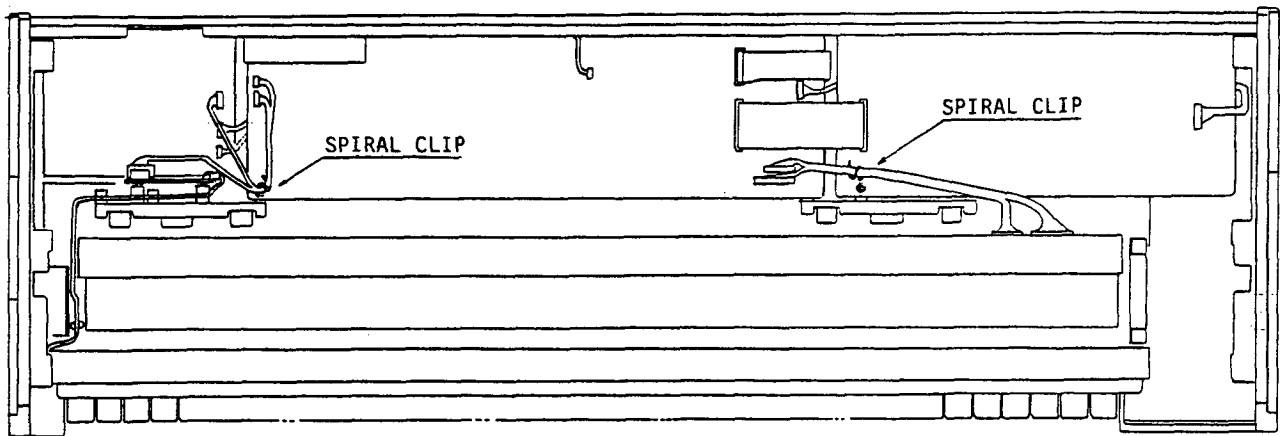
PART NO.	PART NAME	PART CODE
1	LOWER CASE	641011100
2	RUBBER FOOT	-----
3	LCD WINDOW	630012600
4	SLIDE VR KNOB	620019700
5	JOYSTICK KNOB	620022200

3. HOW TO DISASSEMBLE

1. Remove all the screws (CT B BZMC 4 x 10) x 18 but the screws for rubber feet from the lower case.

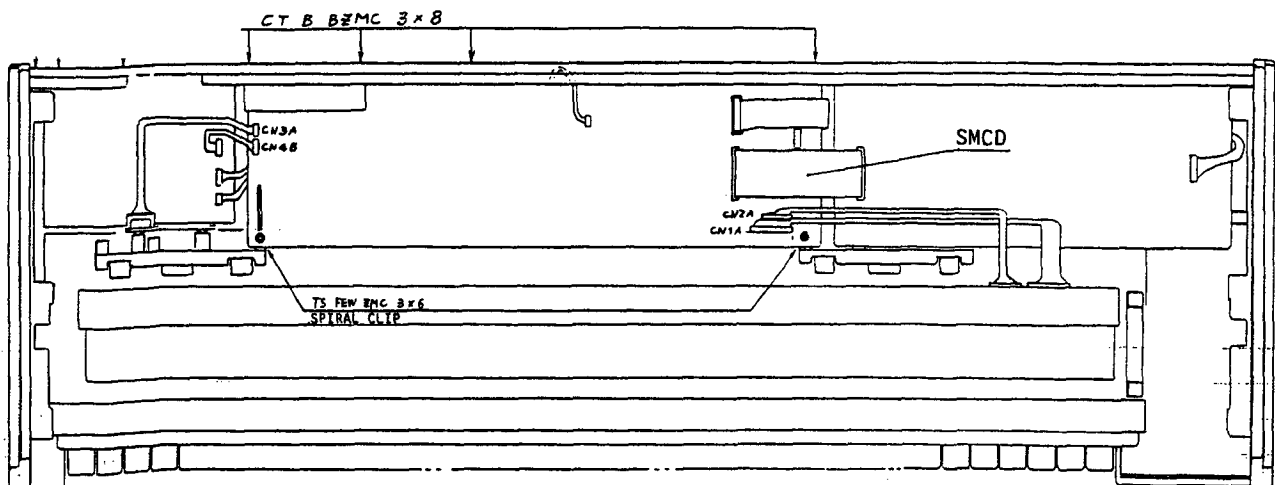


2. Remove the lower case.



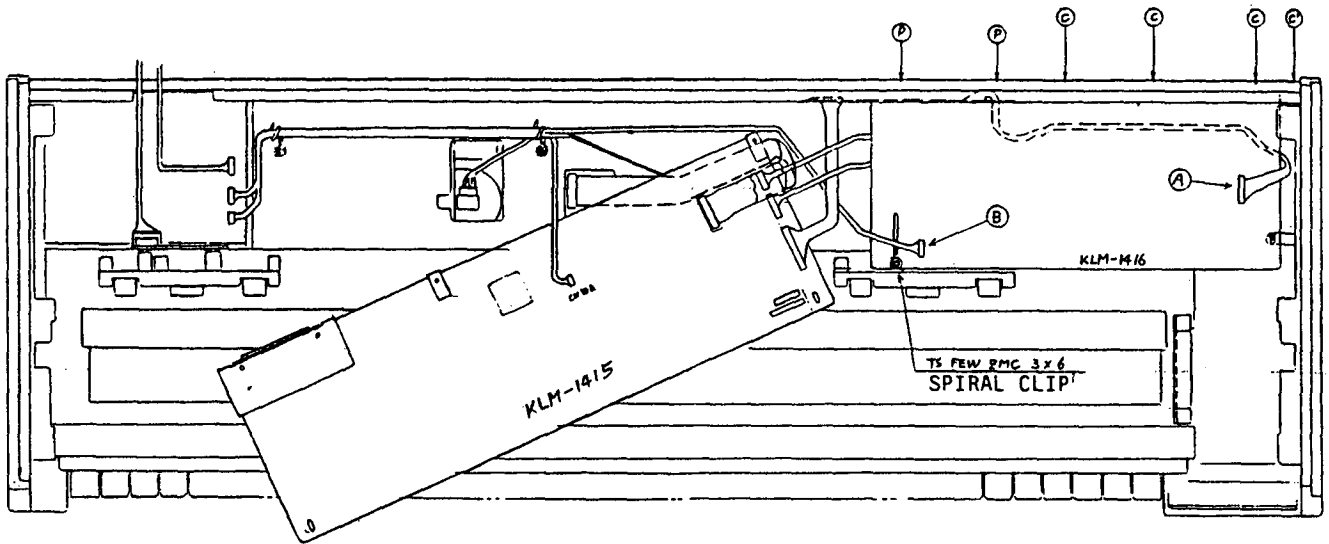
3. To remove KLM-1415 P. C. BOARD.

- 1) Remove the screws (CT B BZMC 3 x 8) x 4 from the rear panel.
- 2) Remove the screws (TS FEW ZMC 3 x 6) x 2 from the keyboard rear angle.
- 3) Remove the harness.



4. To remove KLM-1416 P. C. BOARD,

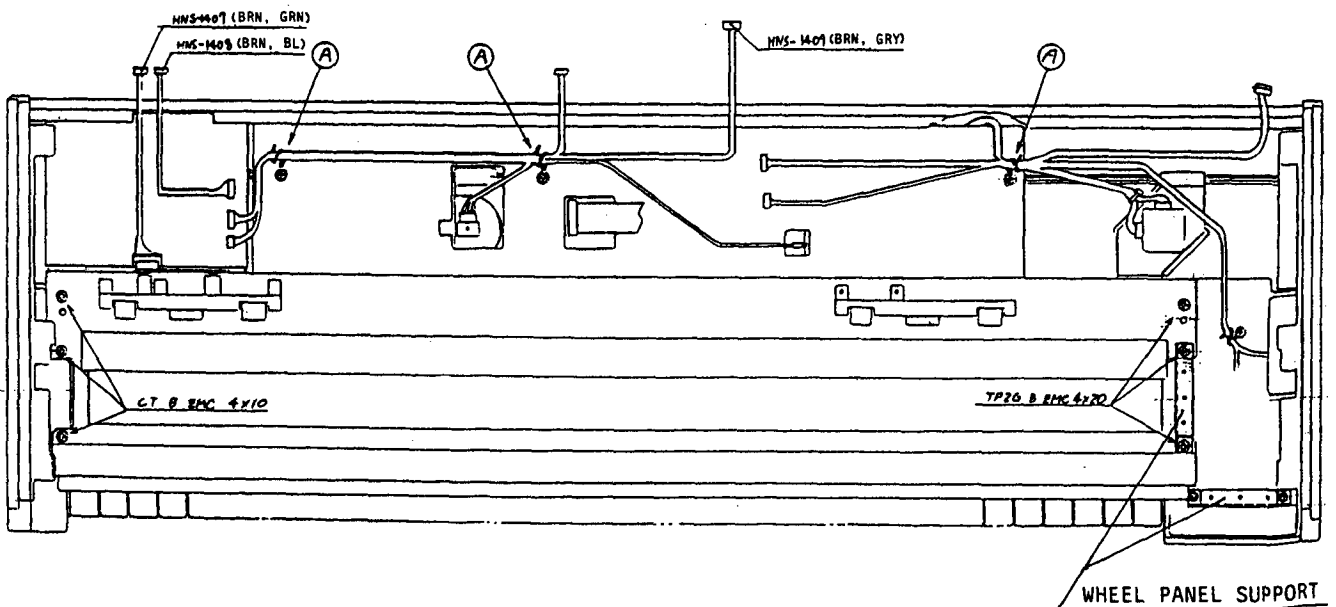
- 1) Remove the screws C (CT B BZMC 3 x 8) x 3 and the screws P (PLAX B BZMC 3 x 8) x 12 from the rear panel.
- 2) Remove the screw (TS FEW ZMC 3 x 6) x 1 from the keyboard rear angle.
- 3) Remove the harnesses A and B.



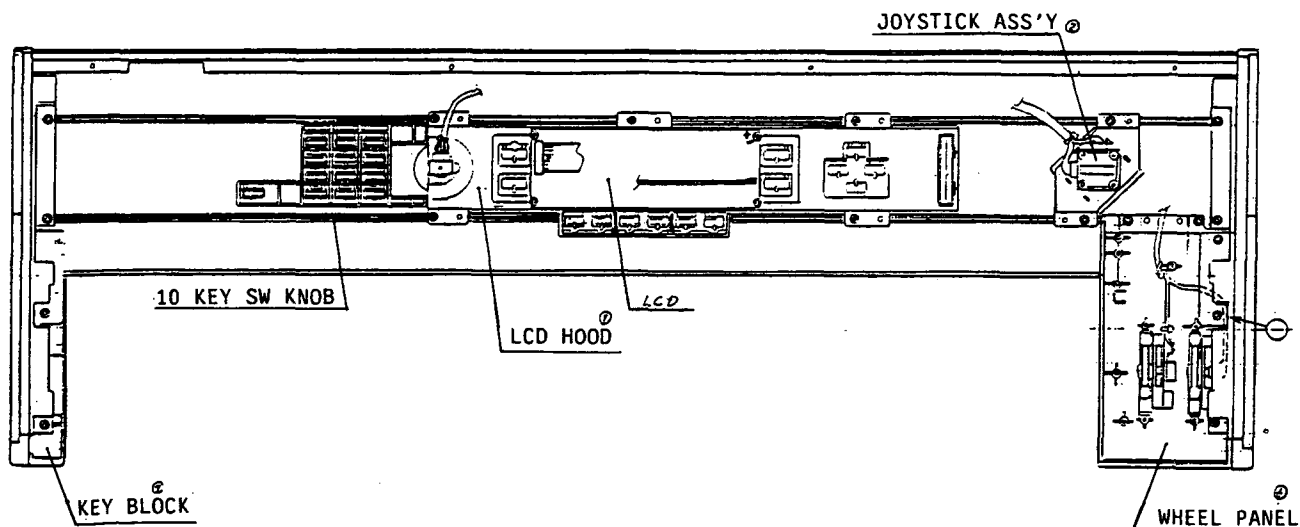
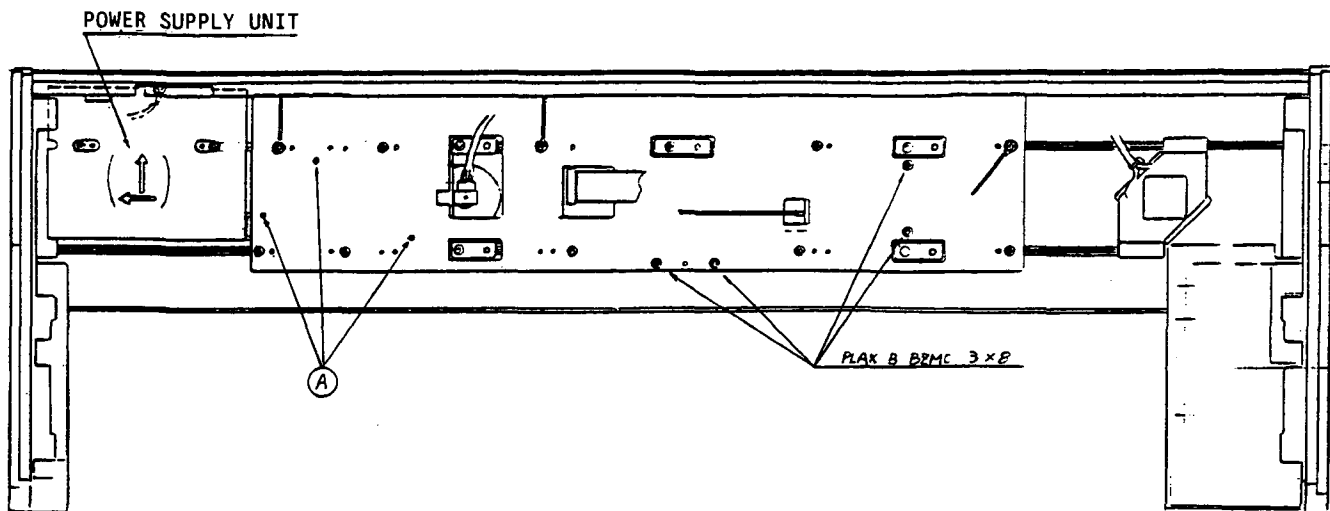
5. To remove the keyboard,

- 1) Remove the screws (CT B ZMC 4 x 10) x 3 and the screws (TP2G B ZMC 4 x 20) x 3 from the keyboard.
- 2) Remove the harness HNS-1407 from the aftertouch P. C. BOARD.

6. Remove the wheel panel support after removing the screws (PLAX B BZMC 3 x 10) x 2.

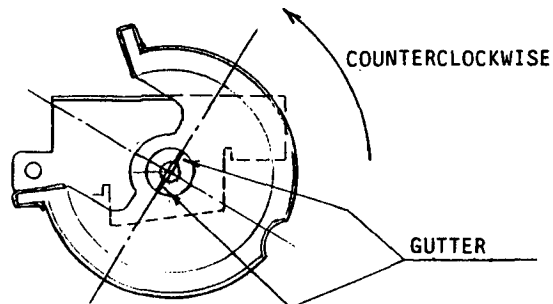


7. Remove the panel P.C. BOARD after removing the screws (CT B ZMC 3 x 8) x 10 and the screws (PLAX B BZMC 3 x 8) x 4.
8. Remove the harnesses of LCD (HNS-1408 and HNS-1409).
9. Remove the power unit after removing the screws (CT B ZMC 3 x 8) x 2 and the screws (CT B BZMC 3 x 8) x 3.



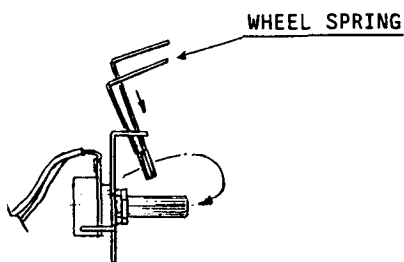
4. HOW TO CHANGE VR OF CONTROL WHEEL

< for MG Wheel >

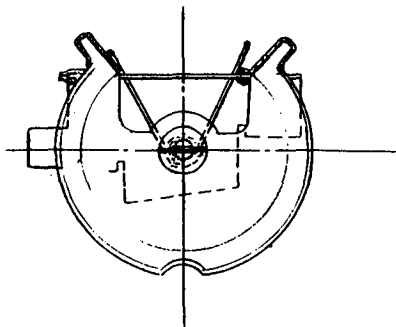


Turn the VR shaft to the left fully, align the gutter of the shaft with the line on the wheel and insert the wheel to the shaft.

< for Pitch Wheel >

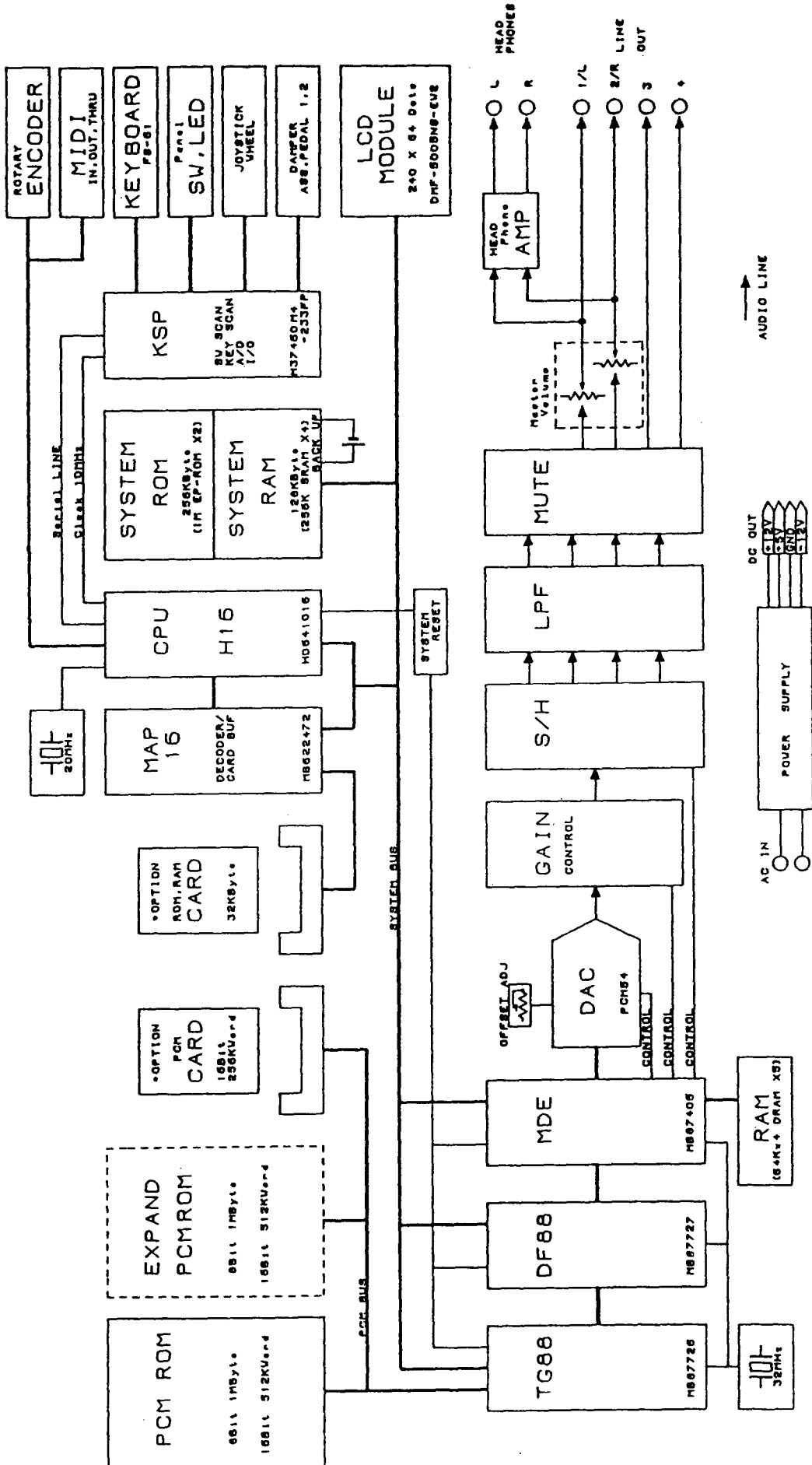


- 1) Attach the wheel spring to the VR shaft after inserting it to the wheel angle.
- 2) Keep the gutter of the VR shaft horizontally, align it with the line on the wheel and insert the wheel to the shaft.

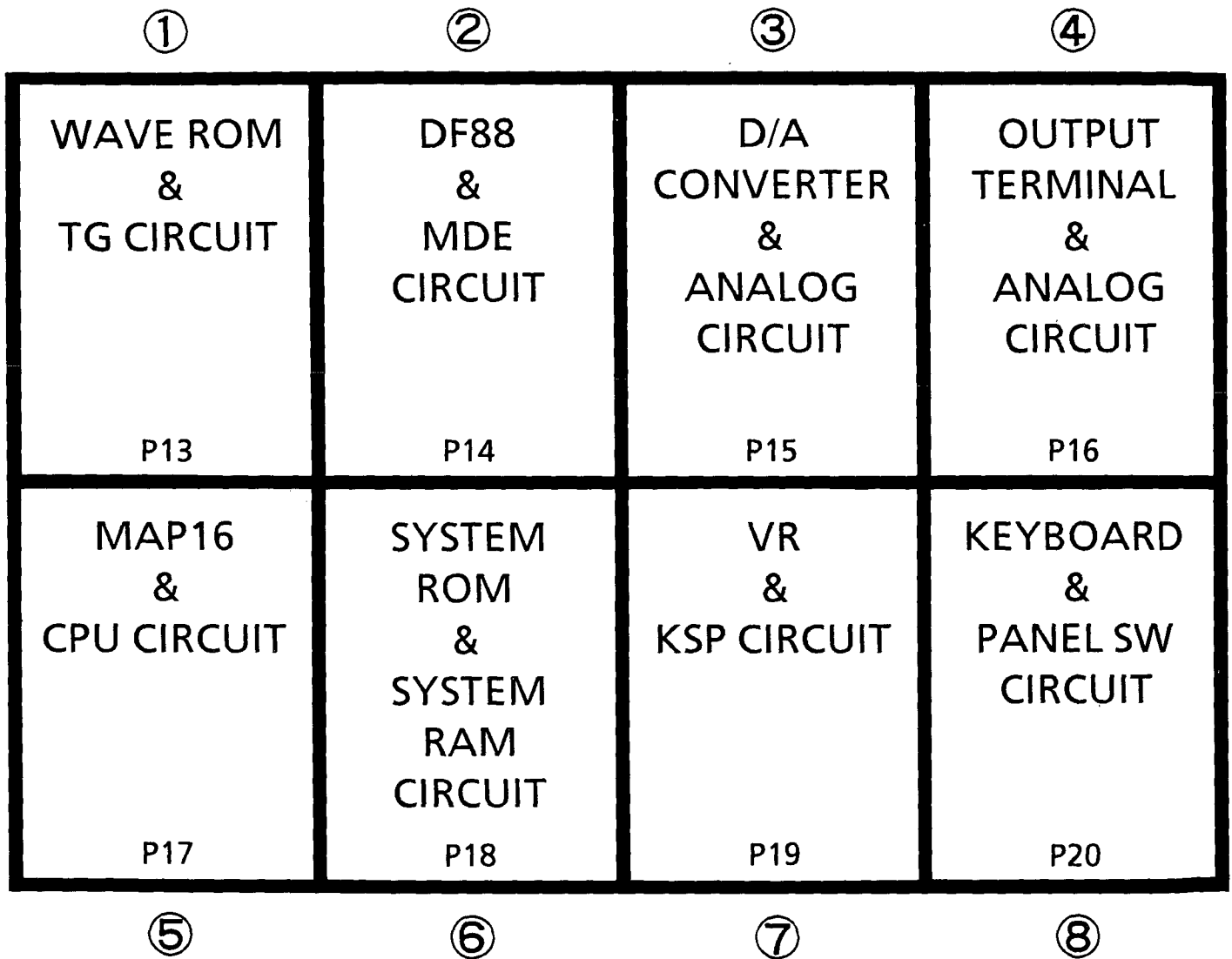


* The wheel should be used as the side which has the line is the front for both MG Wheel and Pitch Wheel.

5. BLOCK DIAGRAM



6. CIRCUIT DIAGRAM

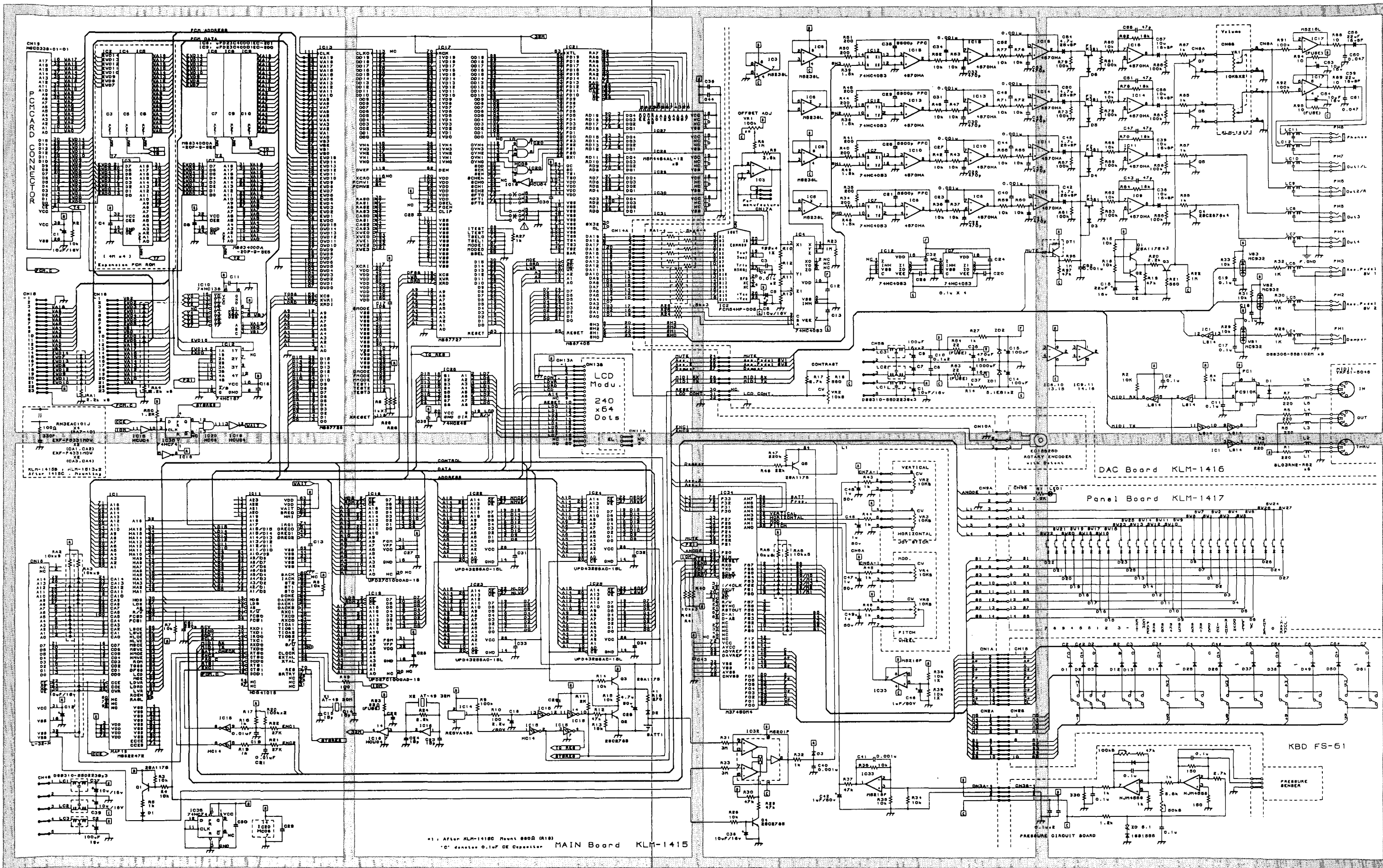


1

2

3

4



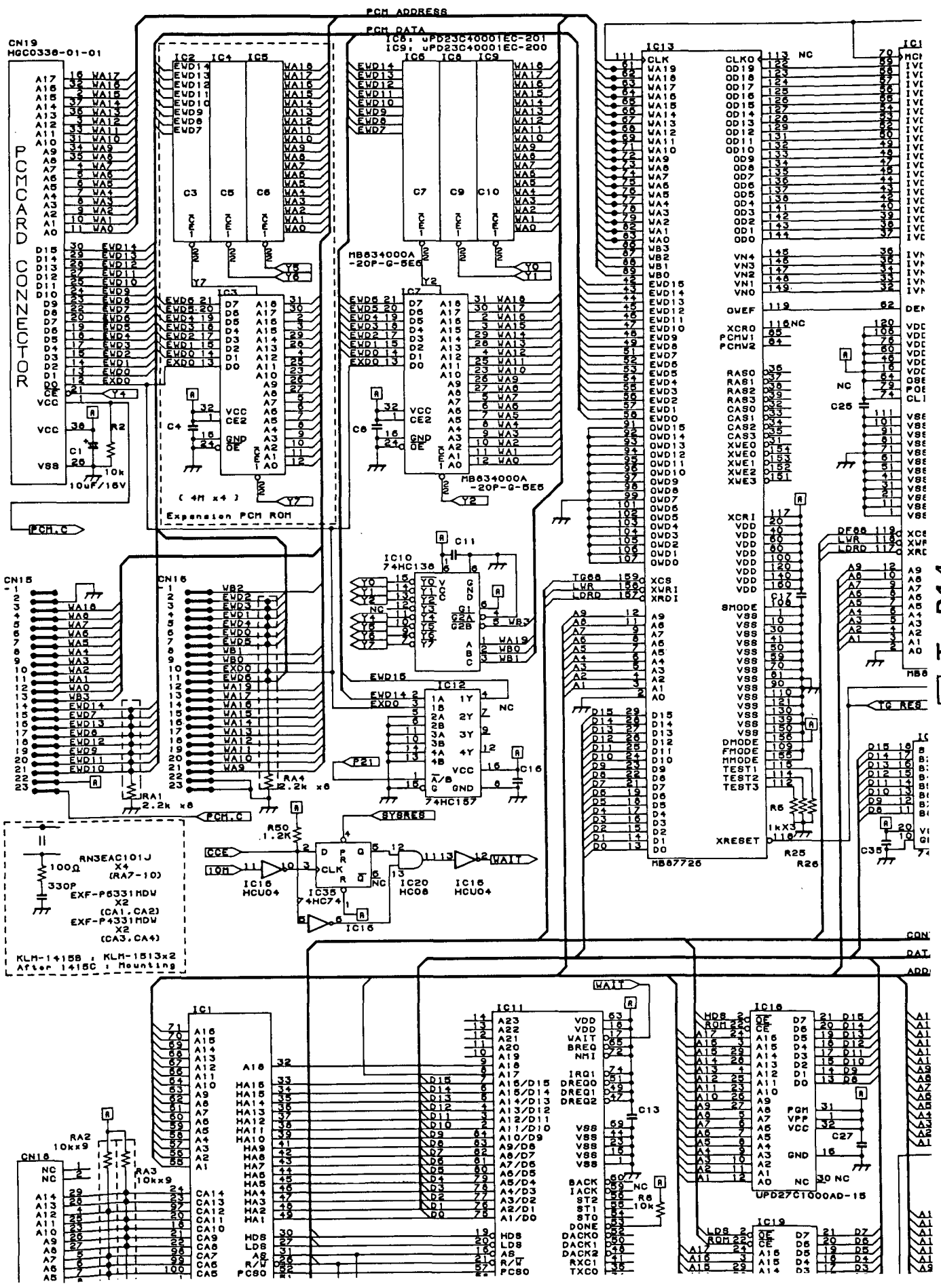
5

6

7

8

1

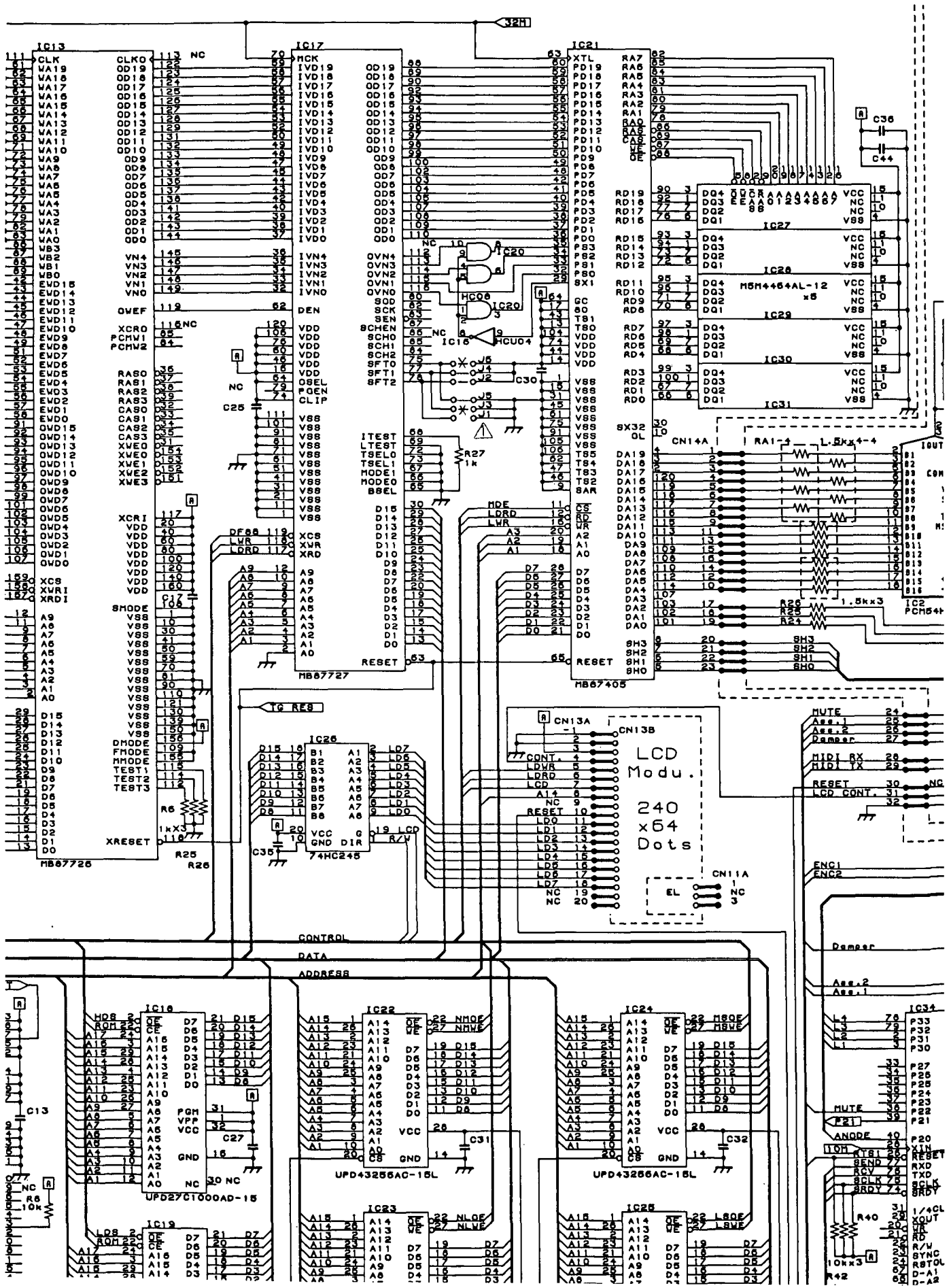


TOP14

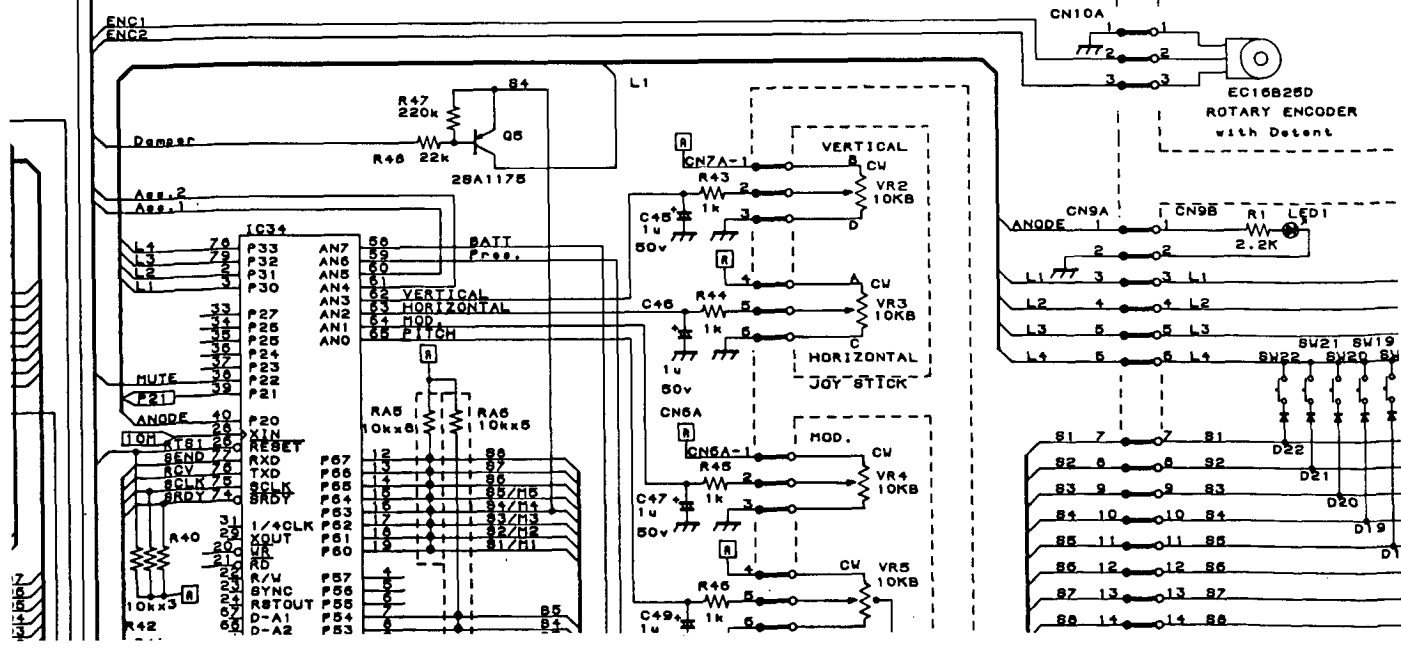
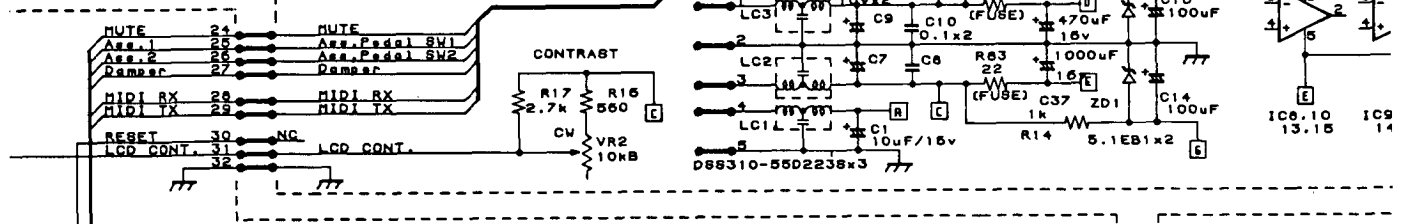
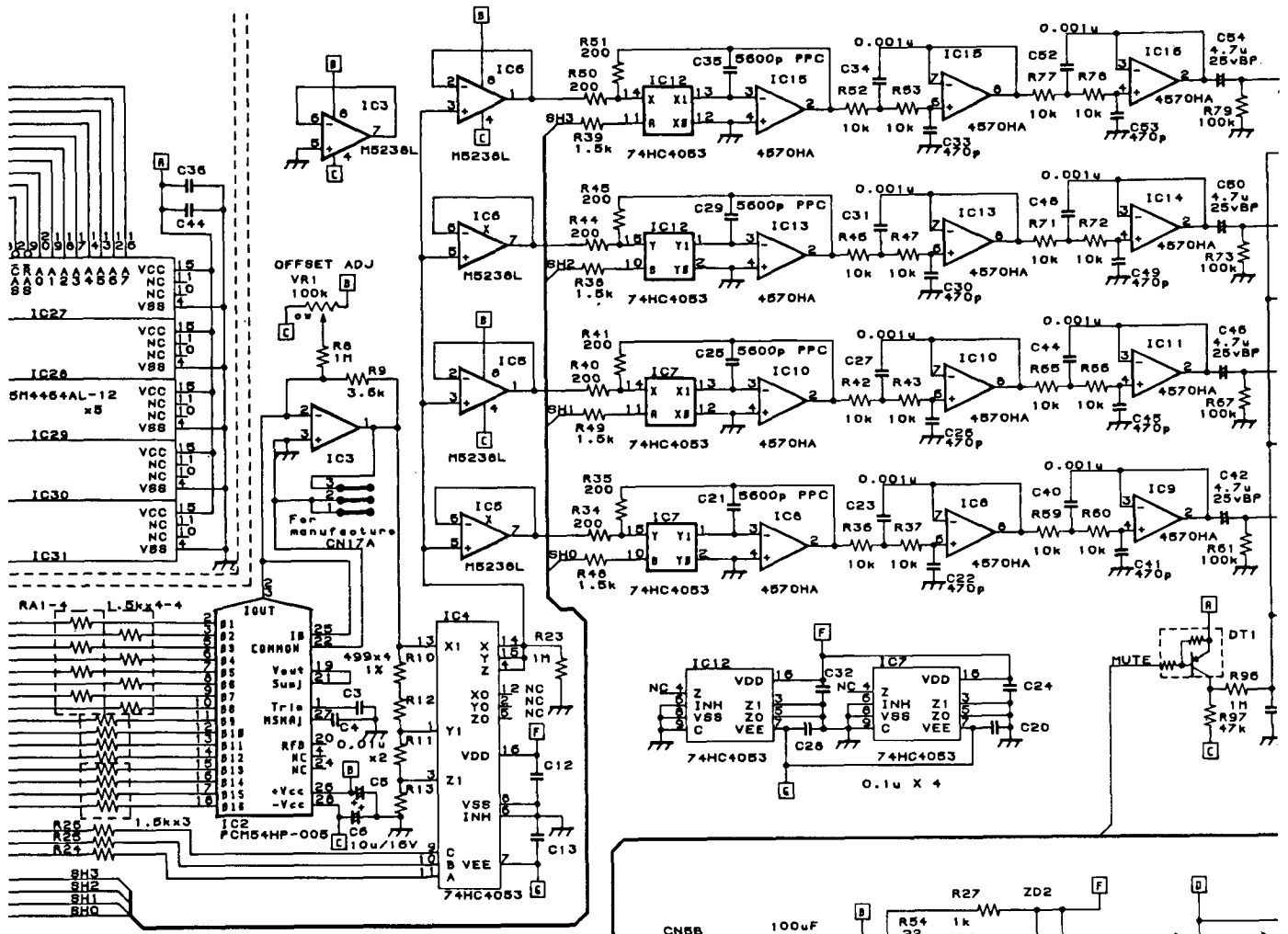
To P17

TO P13

TO P15

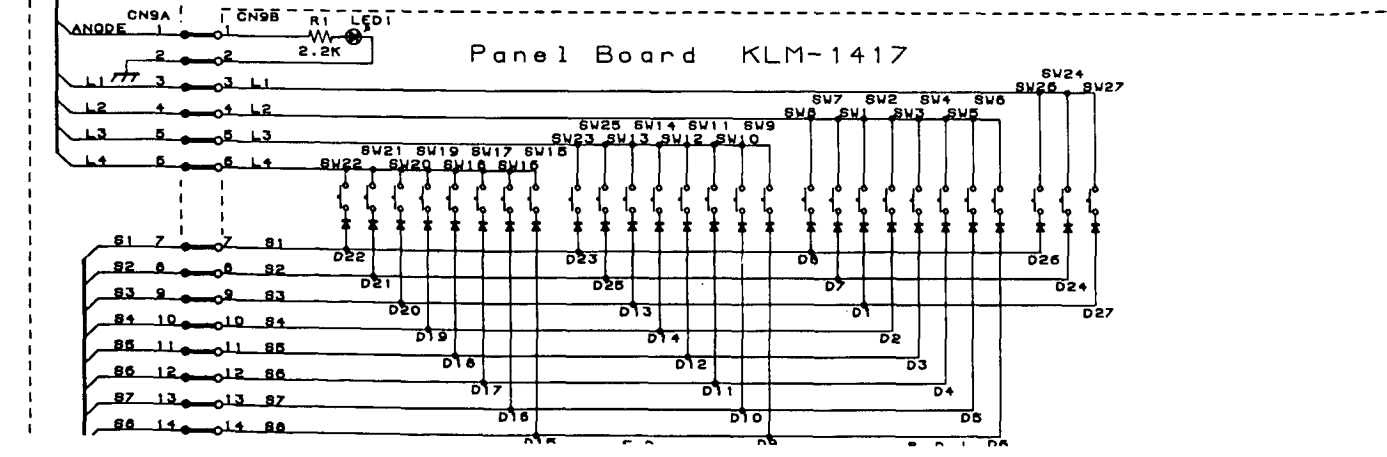
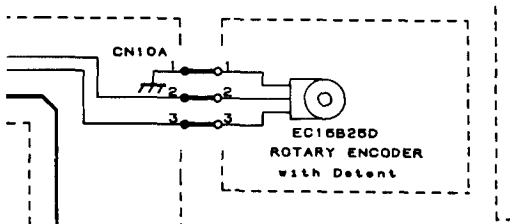
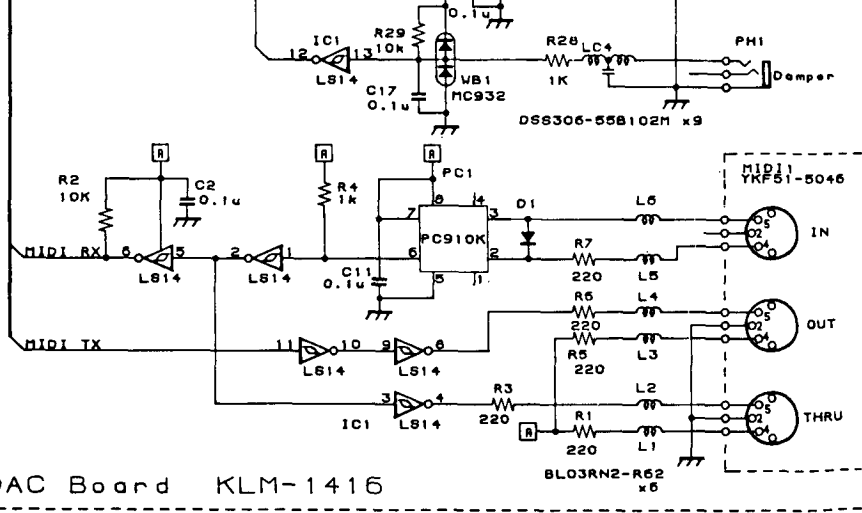
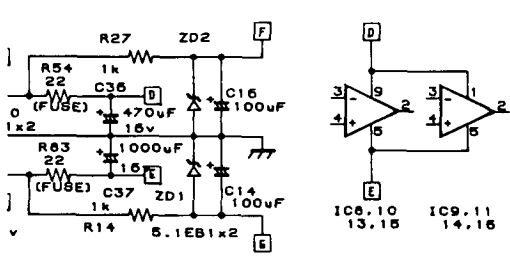
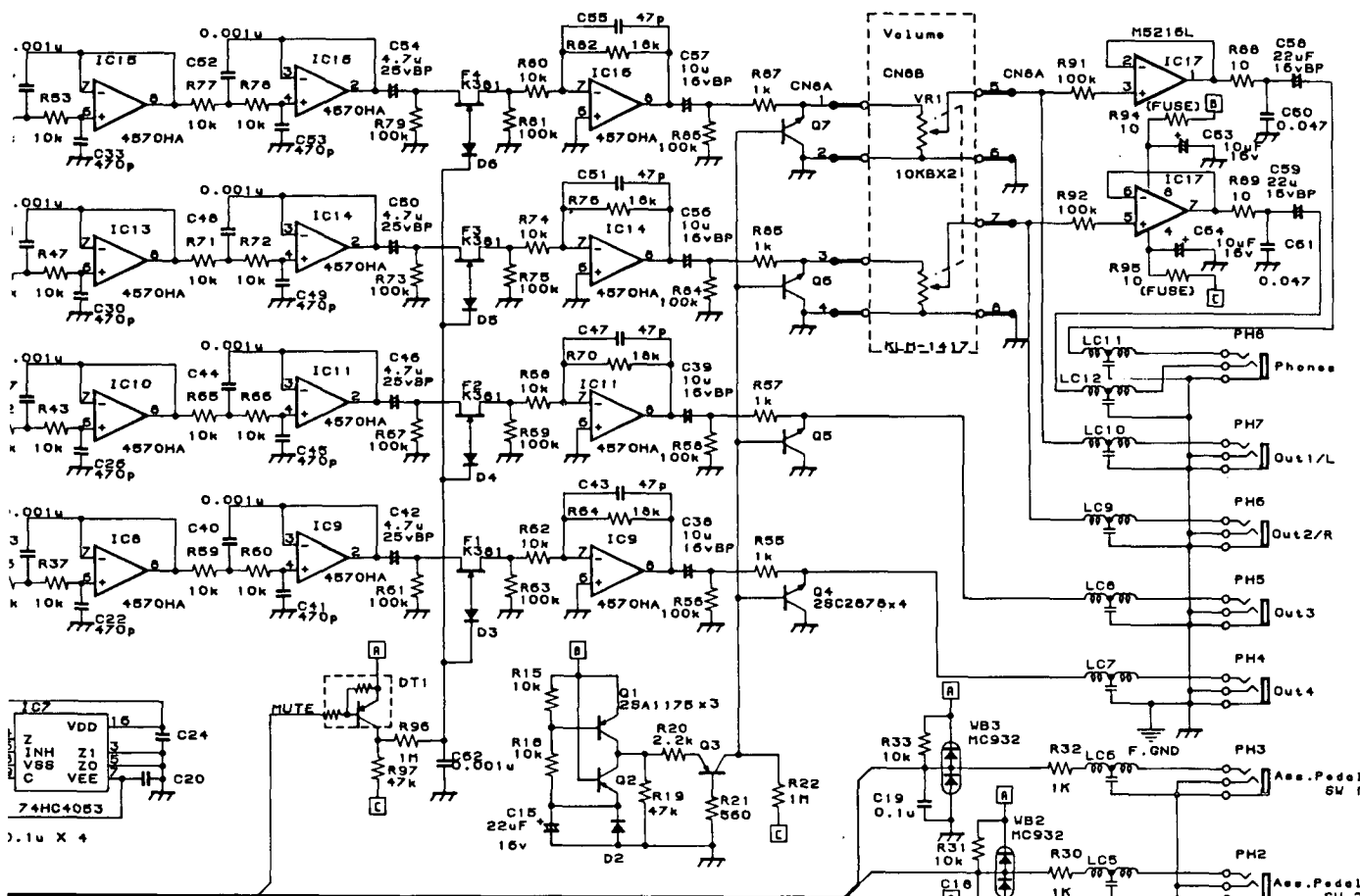


TO P18



To P19

4

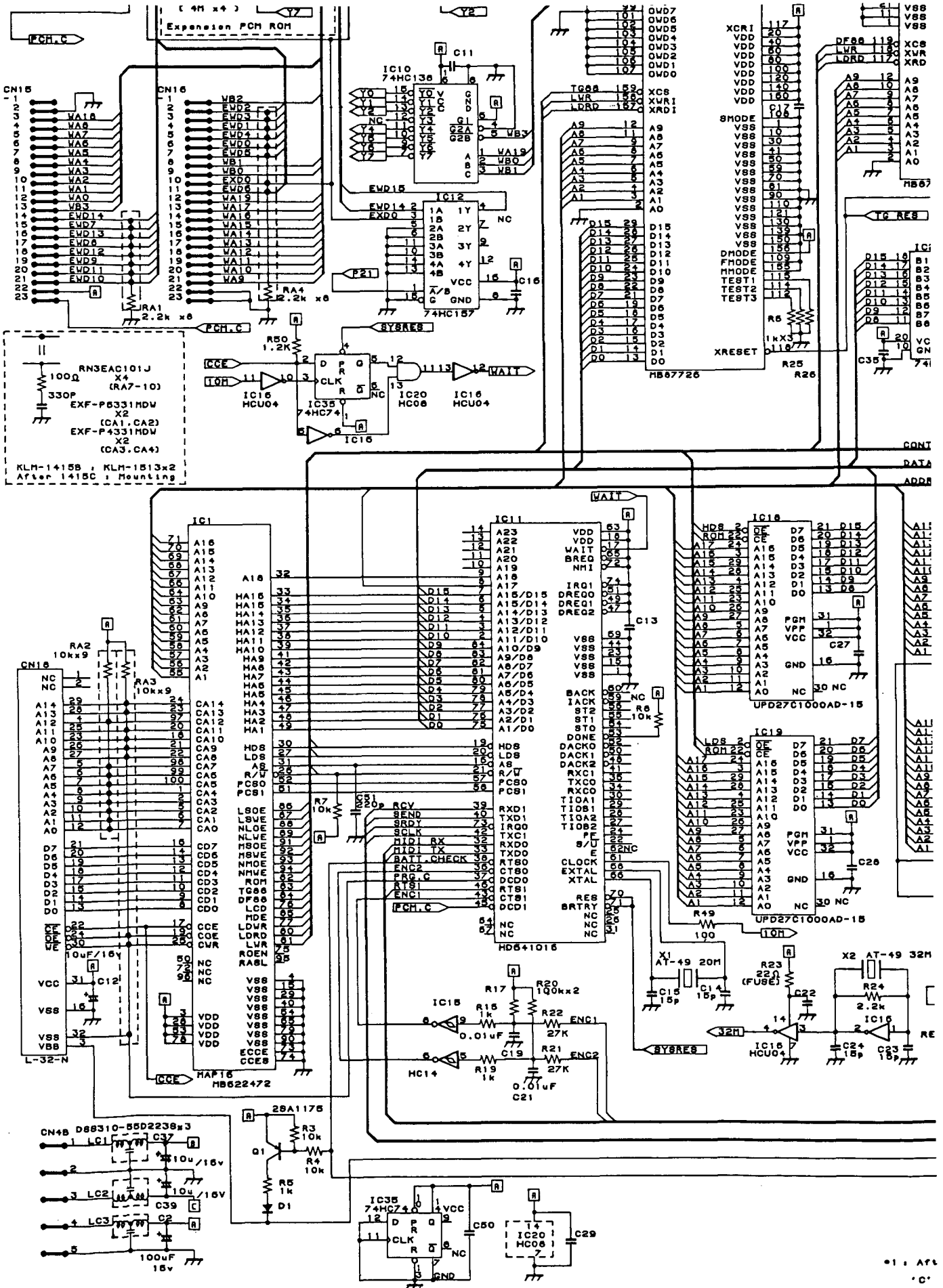


TO P15

To P20

5

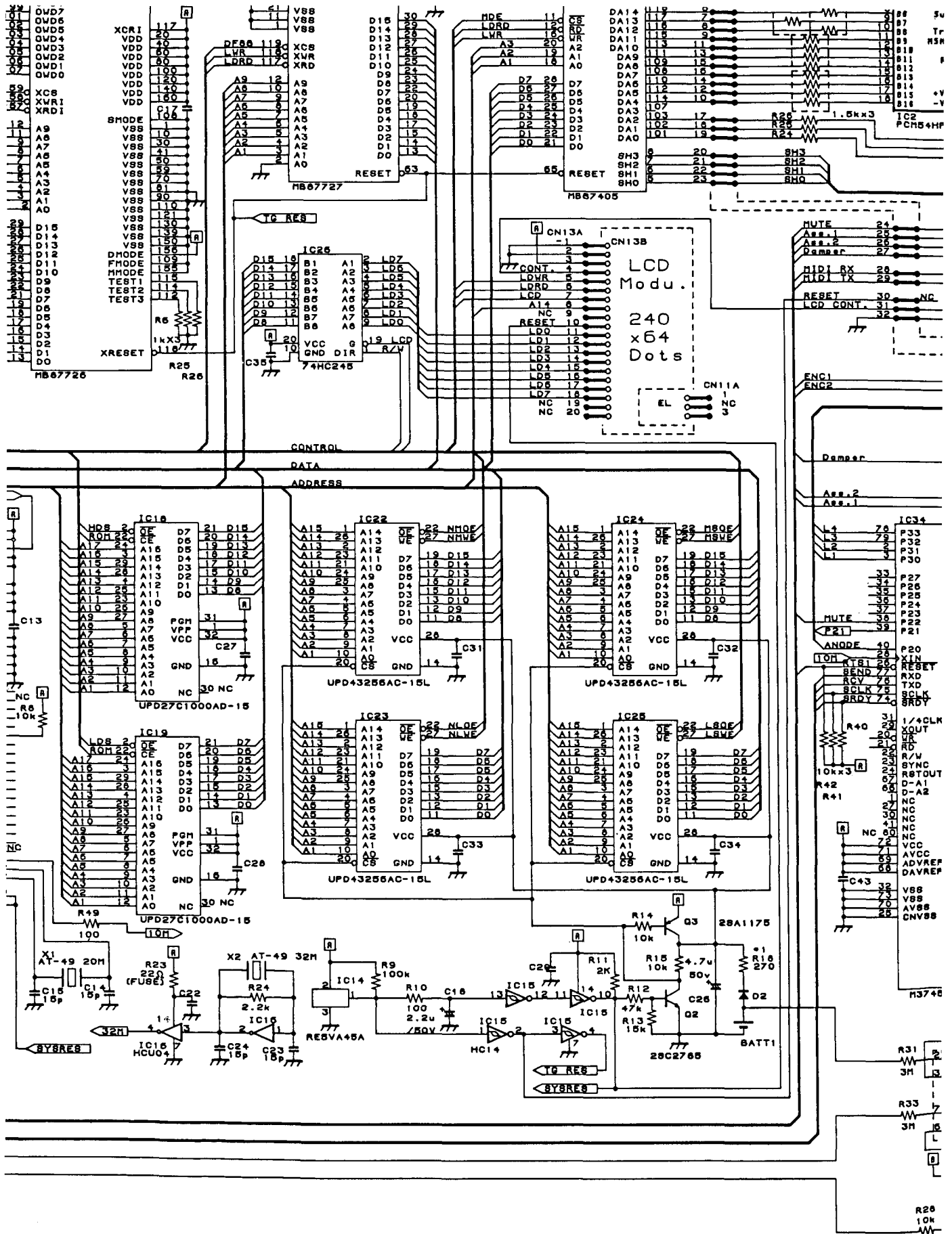
To P13



TO P18

6

To P14



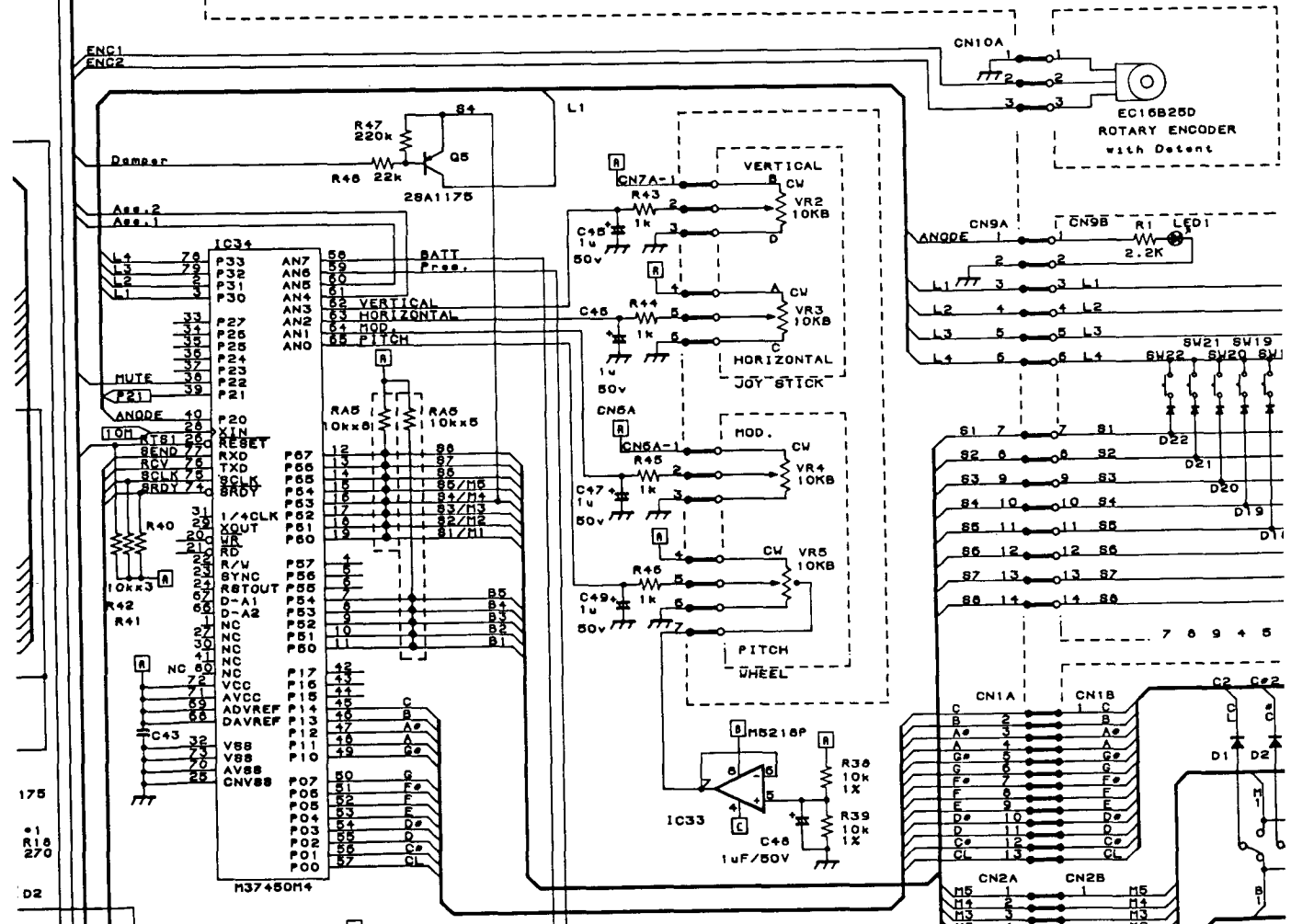
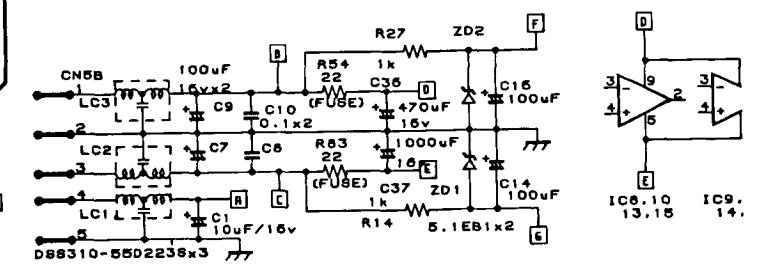
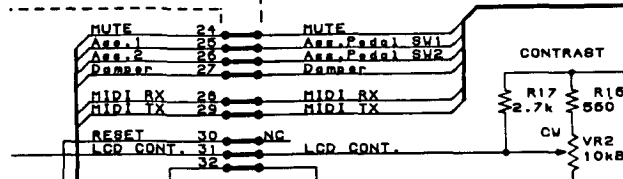
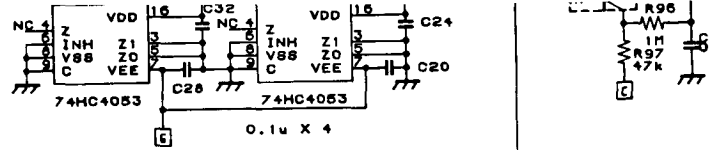
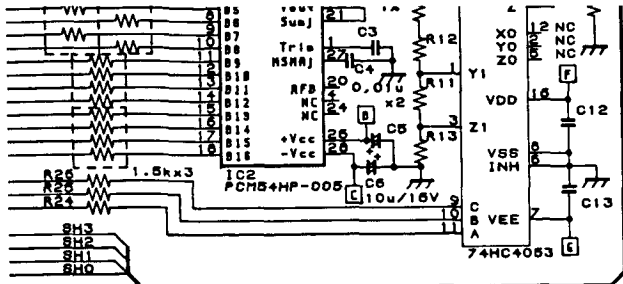
*1 : After KLM-1415C Mount 680Ω (R16)

*C' denotes 0.1uF CE Capacitor

MAIN Board KLM-1415

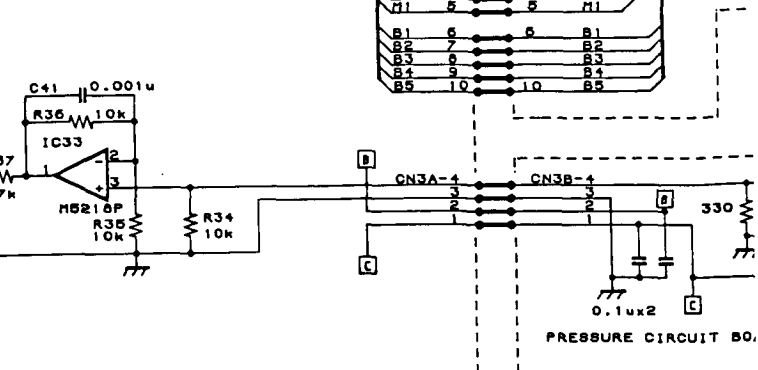
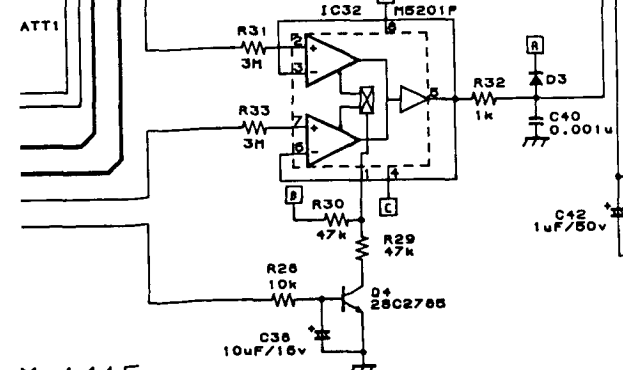
7

To P15

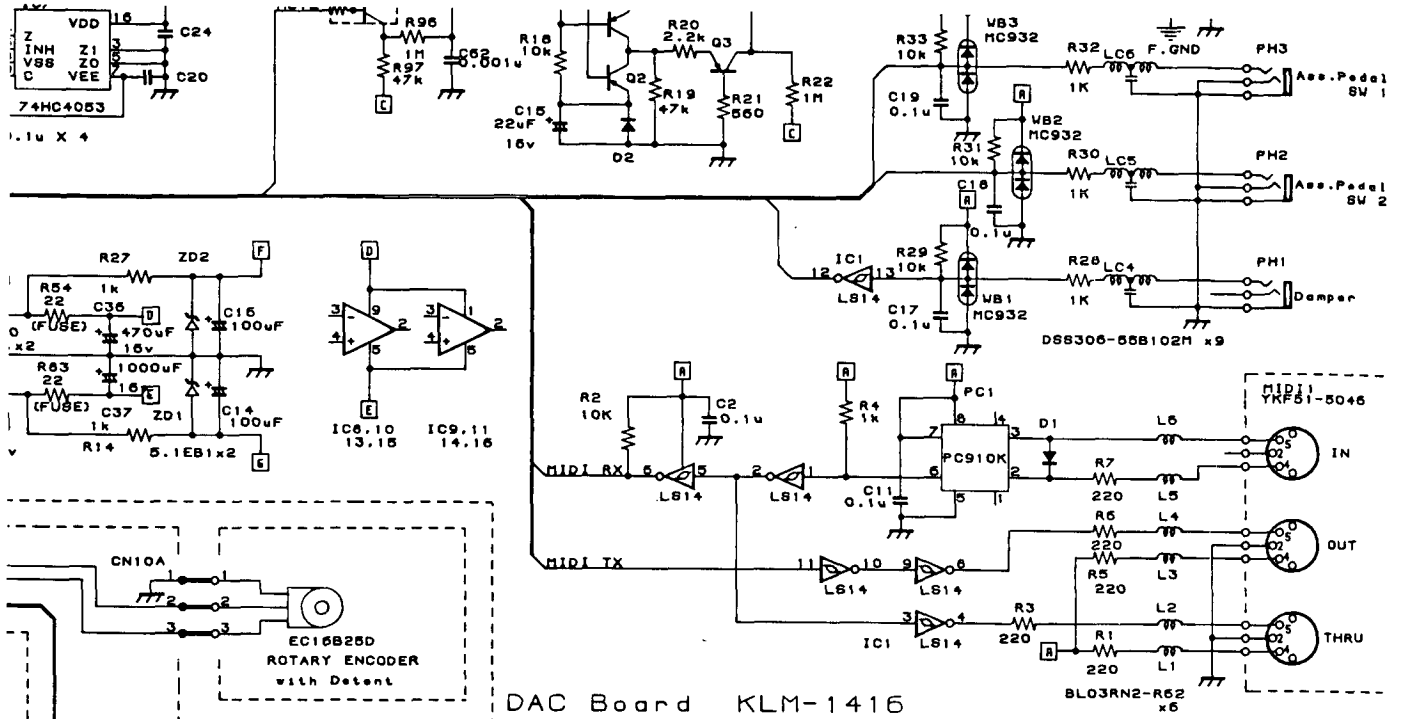


TO P18

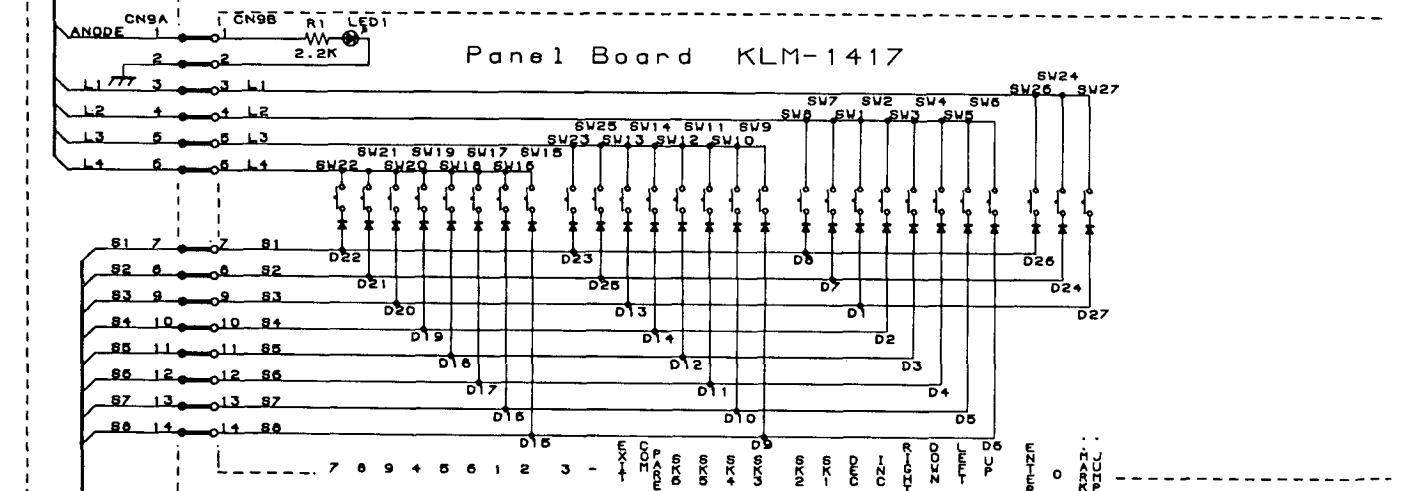
TO P20



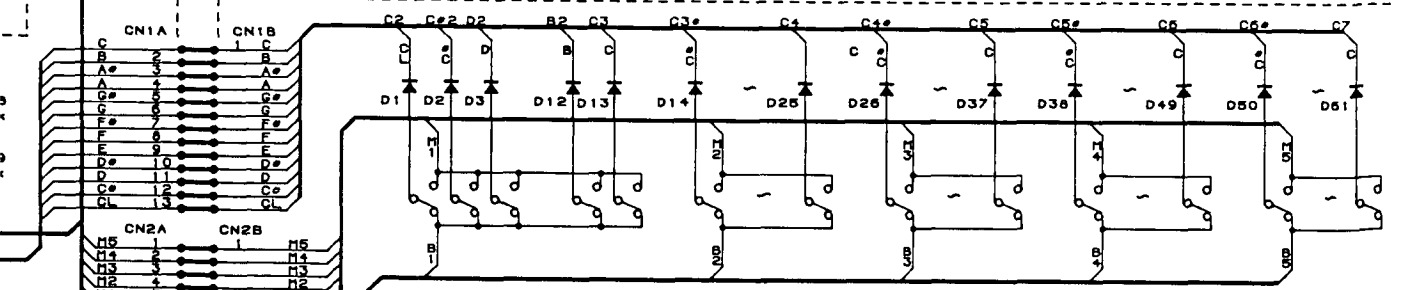
To P16



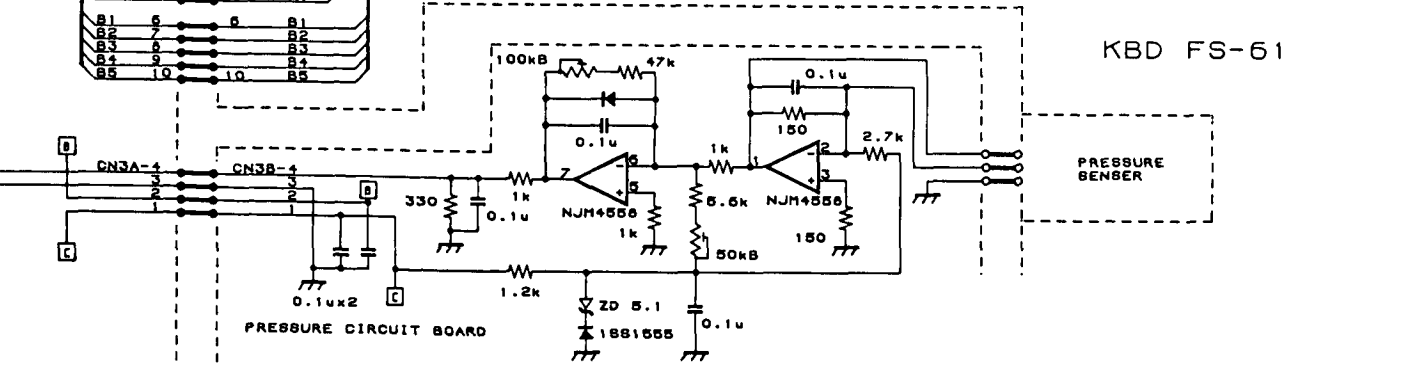
DAC Board KLM-1416



Panel Board KLM-1417



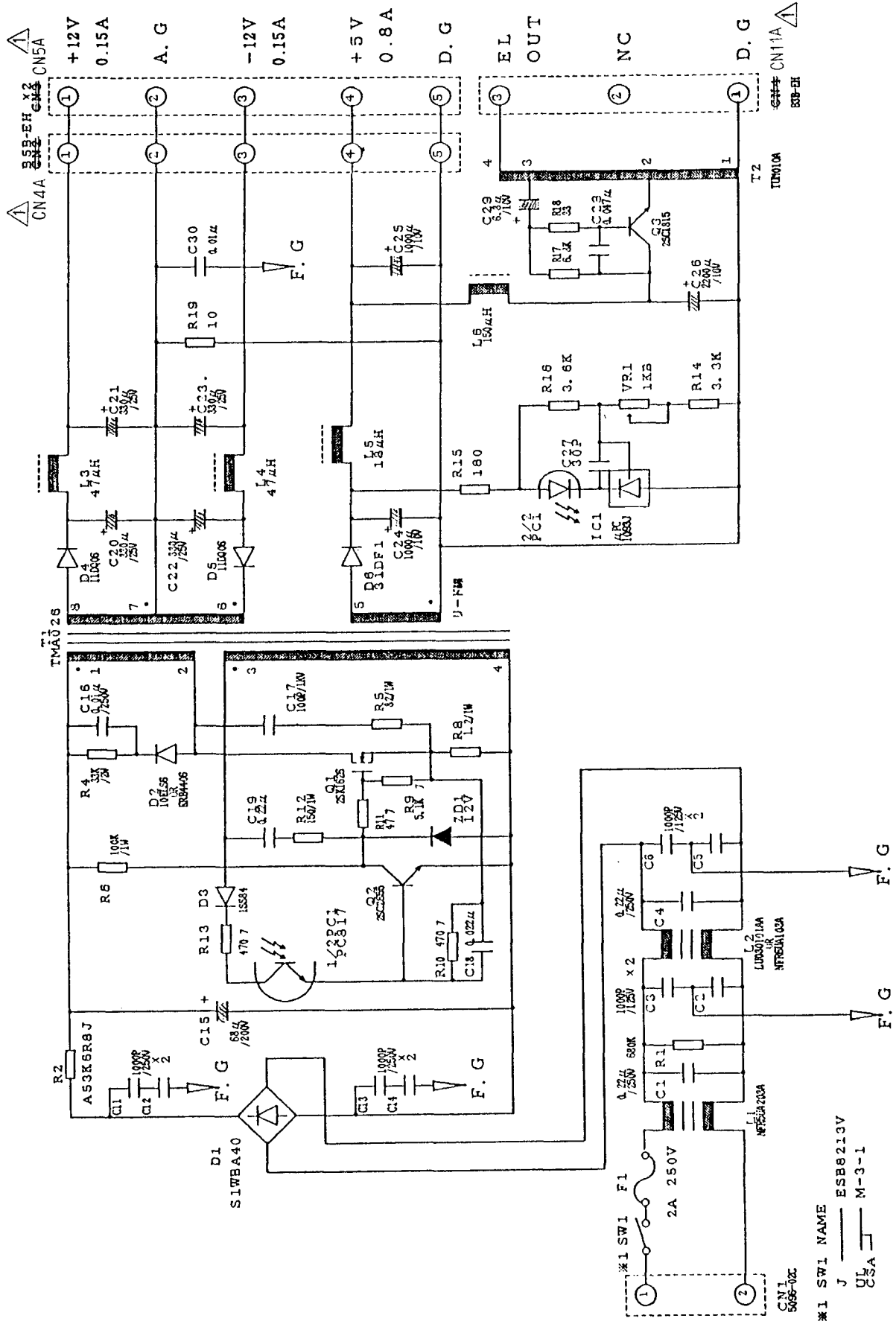
KBD FS-61



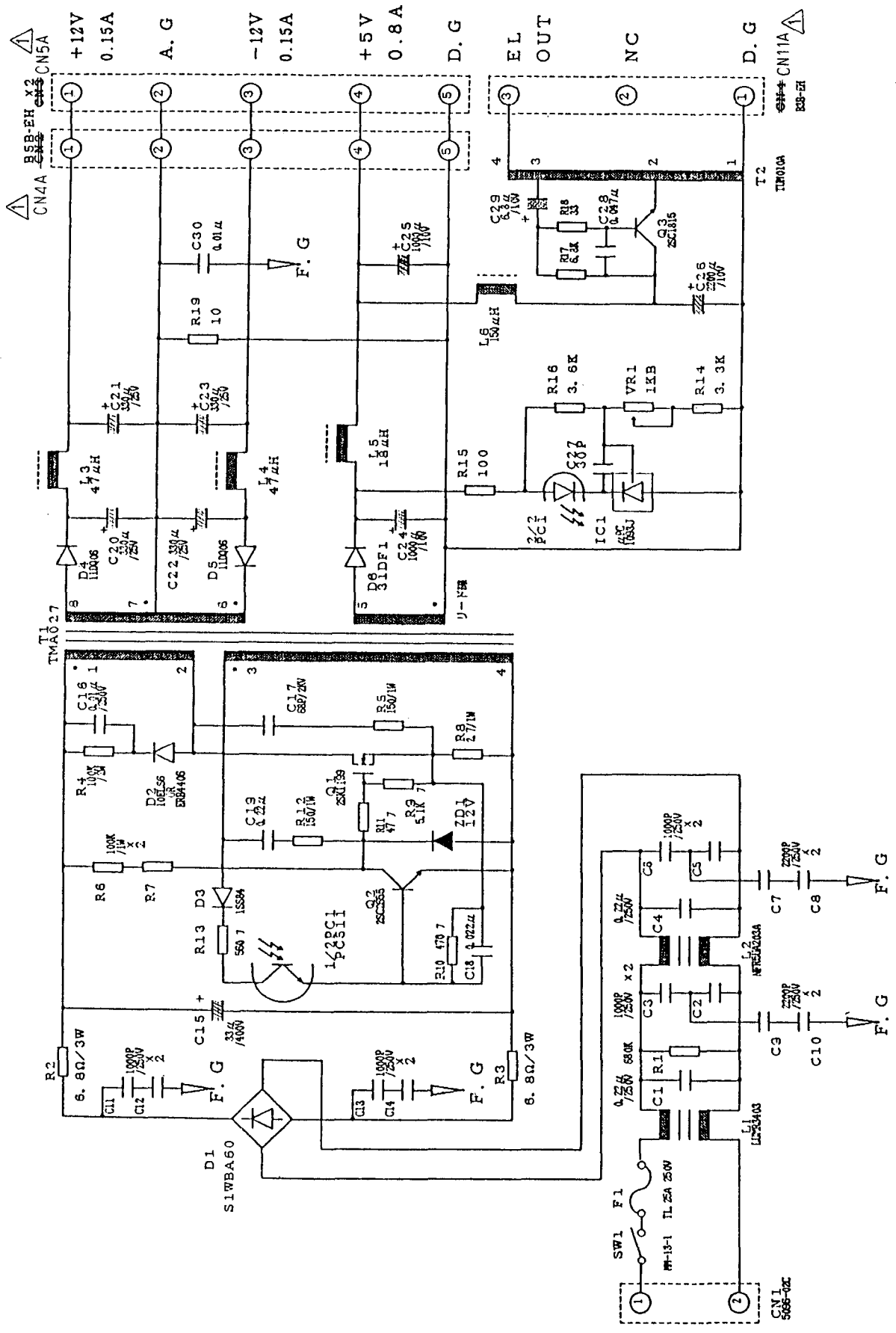
PRESSURE CIRCUIT BOARD

To P19

KLM-1421 (FOR 100V/117V)



KLM-1422 (FOR 220V/240V)

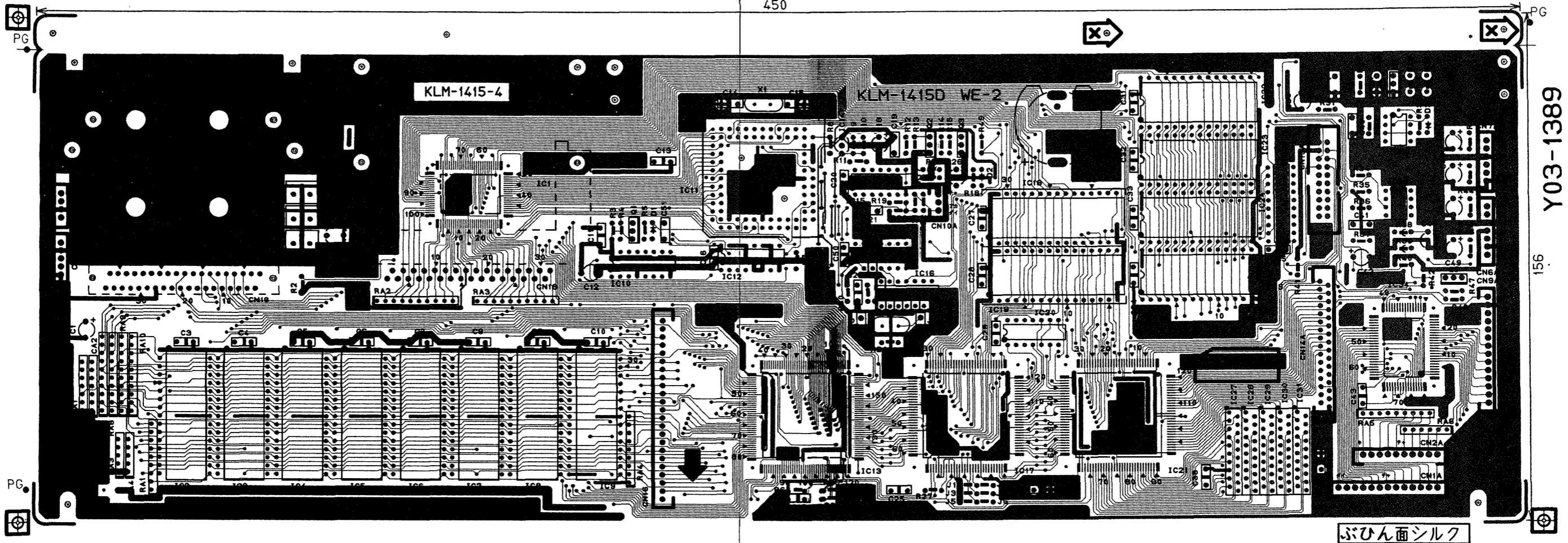


7. P.C. BOARDS

KLM-1415

MOUNT PARTS SIDE

450

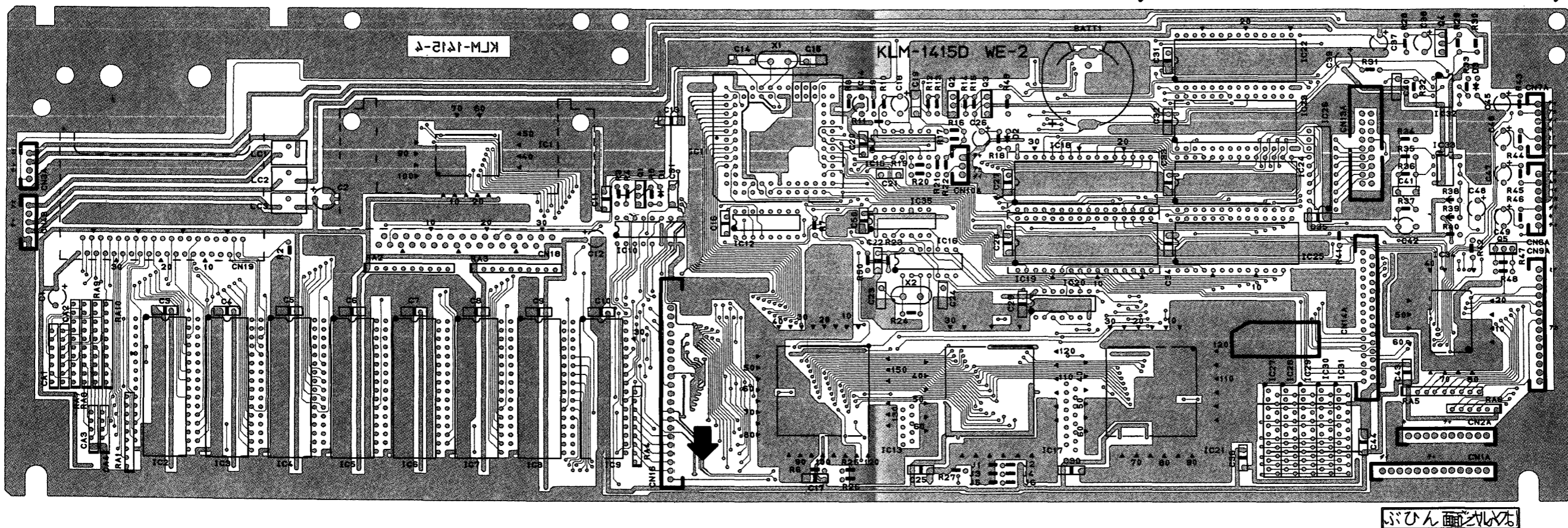


Y03-1389

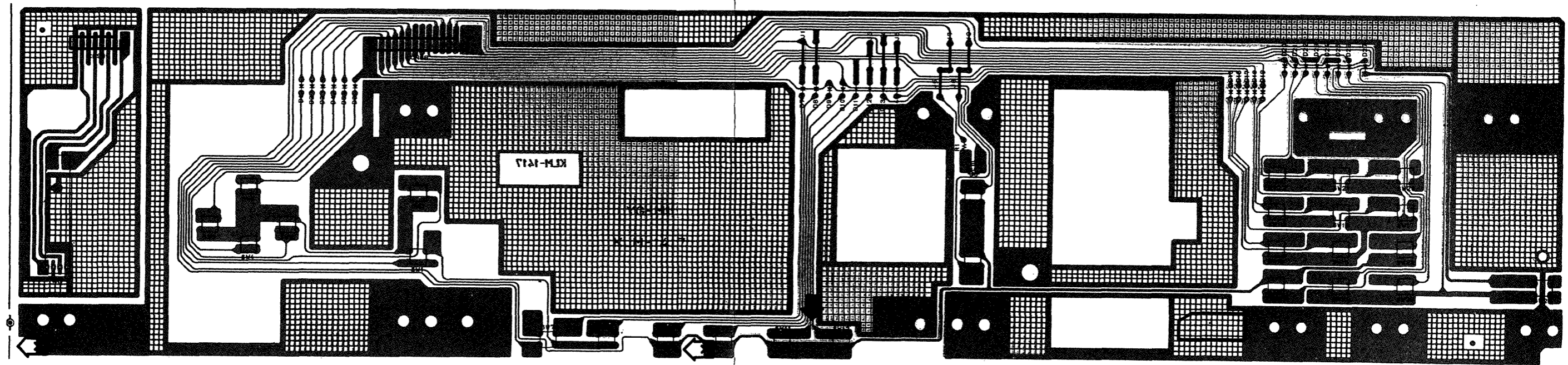
156

KLM-1415

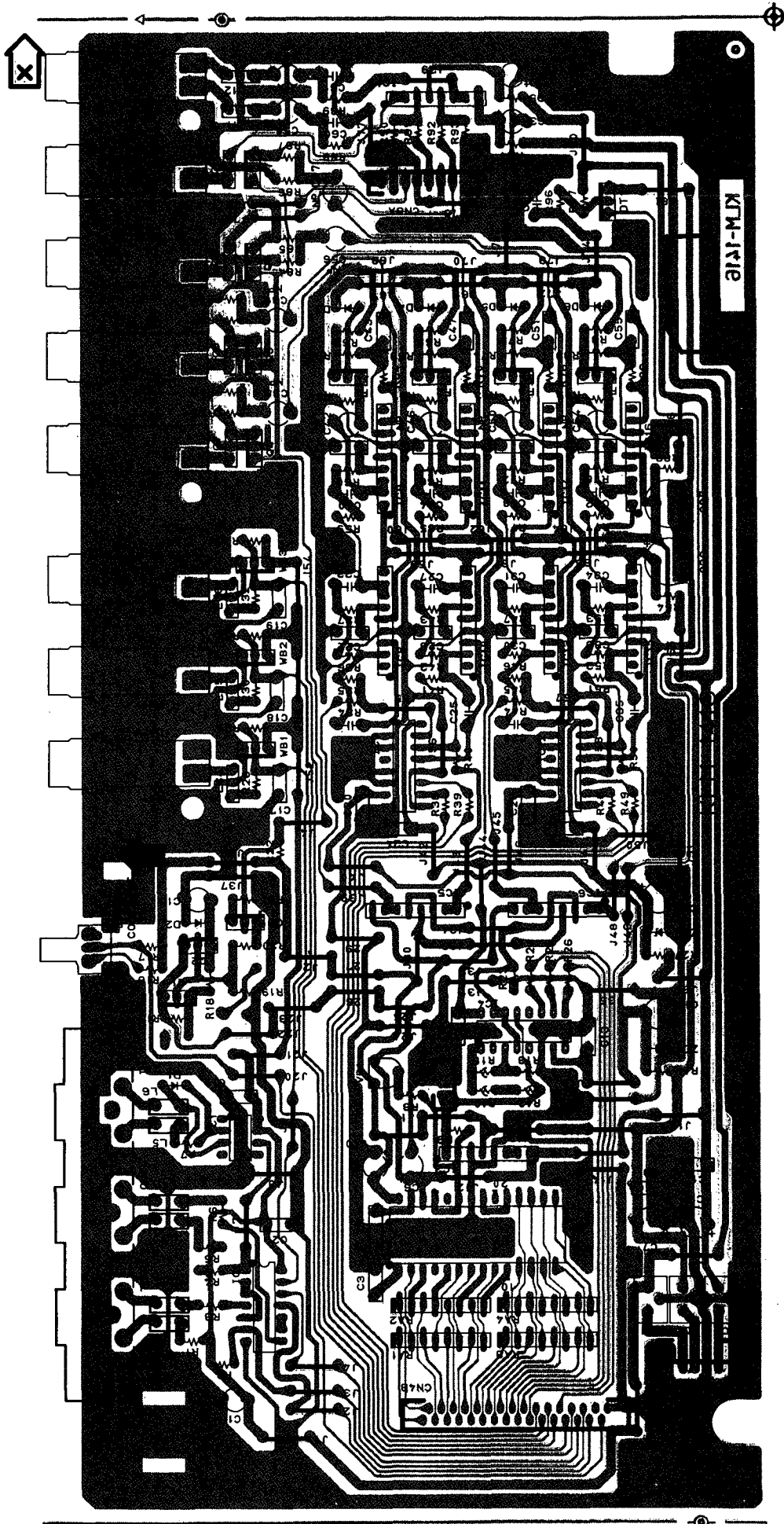
NO MOUNT PARTS SIDE



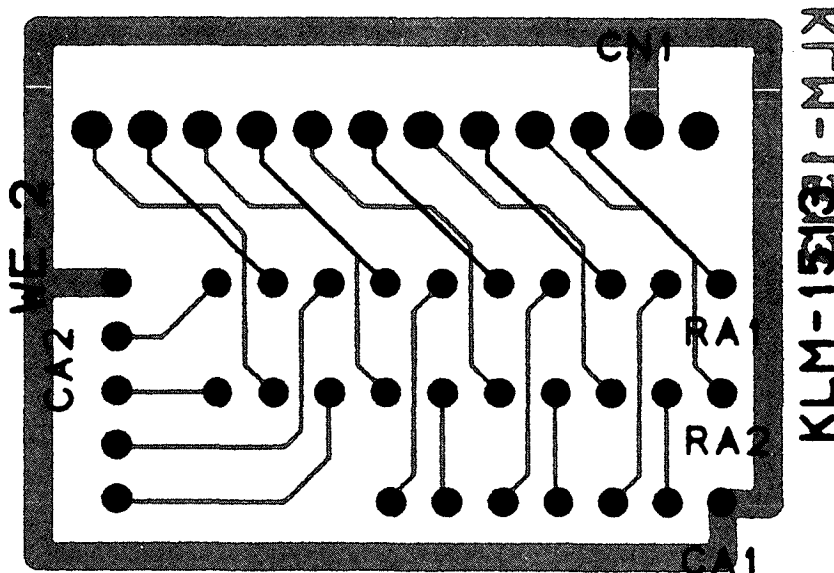
KLM-1417



KLM-1416



KLM-1513



KLM-1415 (MAIN BOARD)

CLASSIFICATION	PART NO.	PART NAME
CPU	IC11	HD641016
MAP16	IC1	MB622472
TG88	IC13	MB87726
DF88	IC17	MB87727
MDE	IC21	MB87405
KSP	IC34	M37450M4-233FP
PCM ROM	IC6~IC9	MB834000A-20P-G-5E6 MB834000A-20P-G-5E5 UPD23C4001EC-201 UPD23C4001EC-200
SYSTEM ROM	IC18, IC19	UPD27C1000AD-15
SYSTEM RAM	IC22~IC25	UPD43256AC-15L
RAM (FOR MDE)	IC27~IC31	M5M4464AL-12
SYSTEM CLOCK	X1 X2 IC16	AT-49 20MHz AT-49 32MHz 74HCU04
SYSTEM RESET	IC14 IC15	M51951 74HC14

KLM-1416 (DAC BOARD)

CLASSIFICATION	PART NO.	PART NAME
DAC	IC2	PCM54HP-005
GAIN CONTROL	IC4 IC5, IC6	74HC4053 M5238L
S/H	IC7, IC12 IC8, 10, 13, 15	74HC4053 UPC4570HA
LPF	IC8~IC11 IC13~IC16	UPC4570HA UPC4570HA
MUTE	DT1 F1~F4	BN1A4M-T 2SK381
HEAD PHONE AMP	IC17	M5216L
MIDI	IC1 PC1	74LS14 PC910K

KLM-1417 ***** PANEL BOARD

KLM-1421/1422

*** POWER SUPPLY BOARD

8. DIAGNOSTIC TEST

《 Before you start the diagnostic test 》

Once this diagnostic test is started, the data in WS1 is initialized. If necessary data are memorized in it, please save the data before starting the test. At this time please use MIDI SYSTEM EXCLUSIVE (DF1, SQD-8 etc.) to save GLOBAL DATA, etc.. (GLOBAL DATA, etc. cannot be saved into the RAM card.)

- * the data which can be saved as EXCLUSIVE DATA : ALL DATA, Patch, Performance, Wave Sequence, Global, Scales, Multi-Mode Setups.
- * the data which can be saved into a RAM card : Patch of RAM1 (or RAM2), Performance of RAM1 (or RAM2), Wave Sequence of RAM1 (or RAM2).

《 Starting the test program 》

1. Connect MIDI IN and OUT of WS1 with a MIDI cable.
2. Insert a PCM card (MSC-01) and this test card into the WS1 and turn the power ON. At this time the protect switch of the test card must be OFF.
3. After the following are checked automatically in the WS1, the program proceeds to TEST 1 PANEL SW & LED CHECK.

Checks which are carried out in the WS1

- 1) Check of writing into SRAM
- 2) Check of writing in the RAM card
- 3) Check of writing into LCD & MDE
- 4) Check of the battery of SRAM
- 5) Check of the battery of the RAM card
- 6) Check of the MIDI LOOP
- 7) Check of the PCM card (MSC-01) Interface
- 8) Check of the PCM ROM (WAVE ROM) Interface

Among these checks the effects of the check of 1), 2), 3) are transmitted only with the MIDI EXCLUSIVE DATA. Then, if you want to see the effects of these, start the test program with the following operation.

《 Starting the test program 》 (in case of using the MIDI Checker.)

1. Connect MIDI IN and OUT with a MIDI cable and connect a MIDI Checker (a computer which can monitor the MIDI data, etc.) to THRU.
2. Insert a PCM card (MSC-01) and a test card into the WS1 and turn the power ON. At this time the protect switch of the test card must be OFF.

※ At this time the test program works but the checks of 1), 2), 3) are not carried out.

3. Once the program proceeds to TEST 1 PANEL SW & LED CHECK, turn the power OFF.
4. Set WS1 as the MIDI Checker can be monitored, turn the power ON again and start the test program.

※ At this time the effects of the checks of 1), 2), 3) can be monitored with the MIDI Checker.

As for transmitted MIDI message, refer to " the content of MIDI message for test "

In case something is wrong with the checks of 4) ~ 8), the content is indicated in the LCD display. The following are the examples.

- | | | | |
|----------------------------------|----------|-------|--|
| 5) Card Battery Voltage Low | | | |
| Value = *** | | | → Check the battery of the RAM card. |
| 5) Card Battery not inserted | | | |
| Value = 255 | | | → Check the battery of the RAM card. |
| 6) Testing MIDI. Please Wait ... | | | |
| ERROR : MIDI Not Connected ! | | | → Check the MIDI cable and the MIDI circuit. |
| 7) TG I/F & PCM Verify Failure | | | |
| MSC-01 Card ROM | | | |
| Address | Expected | Read | |
| ***** | ***** | ***** | → Check the WAVE ROM and the TG circuit. |

《 TEST 1 : PANEL SW & LED CHECK 》

1. Remove the MIDI cable which connects MIDI IN and OUT.
2. Confirm COMPARE LED is lighting.
3. According to the turn which is indicated in the LCD, check the switches. The turn to press the switches is as follows.

▲, ◀, ▼, ▶, INC, DEC,
 SKEY1, SKEY2, SKEY3, SKEY4, SKEY5, SKEY6,
 COMPARE, EXIT, 7, 4, 1, -, 8, 5, 2, 0
 9, 6, 3, ENTER, MARK/JUMP
4. Once the check of all the switches is finished, COMPARE LED goes out and the program proceeds to the Encoder Test.
5. Check the Encoder Test by turning as indicated in the LCD. After " ENCDR + " is indicated in the LCD, turn the Encoder clockwise by more than 20 ticks. Then, the indication changes to " ENCDR - " After confirming the indication, turn the Encoder counterclockwise by more than 20 ticks.

Then, the indication changes to " MARK/JUMP TO NEXT ".

After the Encoder Test is finished normally, press MARK/JUMP SW to proceed to TEST 2 LCD PIXEL TEST.

《 TEST2 : LCD PIXEL TEST 》

1. Confirm that all the dots in the LCD light.
At this time check that there is no patches, etc. in the LCD and that the contrast changes according as the contrast VR is turned.
If nothing is wrong with the LCD, press MARK/JUMP SW to proceed to the next.
2. Confirm that all the dots in the LCD go out.
If nothing is wrong with the LCD, press MARK/JUMP SW to proceed to TEST 3 MDE/DF88/TG88 TEST.

《 TEST 3 : MDE/DF88/TG88 TEST 》

Connect an oscilloscope with OUTPUT 1 and turn the master VR of WS1 to the MAX.

1. MDE TEST
Press SKEY1 and carry out the MDE TEST.
(Once TEST 3 starts, this condition appears automatically.)
Confirm that the waveform like fig.1 is transmitted.
If this test is N.G., check MDE (MB87405), D/A Converter (PCM54HP) and the analog circuit.
If this test is O.K., press MARK/JUMP SW or SKEY 2 to proceed to DF88 (VDA) TEST.
2. DF88 (VDA) TEST
Confirm that the waveform like fig.2 is transmitted, its level changes according to the passing of the time by dint of DF88 (VDA) and that the minimum becomes 0.
If this test is N.G., check DF88 (MB87727) and the circuit between DF88 and MDE.
If this test is O.K., press MARK/JUMP SW or SKEY 3 to proceed to TG88 TEST.
3. TG88 TEST
Confirm the waveform like fig.2 is transmitted and its level, pitch, etc. do not change.
If this test is N.G., check TG88 (MB87726), WAVE ROM and the circuit between TG88 and DF88.
If this test is O.K., press MARK/JUMP SW or SKEY4 to proceed to DF88 (VDF) TEST.

4. DF88 (VDF) TEST

Confirm the waveform like fig.2 is transmitted and it changes according to the passing of the time by dint of DF88.

It repeats the movement as it changes from Sin Wave to Saw Wave and becomes the level 0.

If this test is N. G. , check DF88 (MB87727) and the circuit between DF88 and MDE.

If this test is O. K. , press MARK/JUMP SW to proceed to TEST 4 OUTPUT NOISE TEST.

《 TEST 4 : OUTPUT NOISE TEST 》

1. Select the output with SKEY1 ~ SKEY6 and measure the noise level with a noise meter.

The following is the correspondnce of each SKEY to each output.

SKEY1 : Output-1 SKEY2 : Output-2
SKEY3 : Output-3 SKEY4 : Output-4
SKEY5 : Phone-L SKEY6 : Phone-R

2. Confirm the noise level of each output is less than the regulation.
If this test is O. K. , press MARK/JUMP SW to proceed to TEST 5 OUTPUT DISTORTION TEST.

OUT-1	less than -87.0dBm
OUT-2	less than -87.0dBm
OUT-3	less than -86.0dBm
OUT-4	less than -86.0dBm
PH-L	less than -87.0dBm
PH-R	less than -87.0dBm

《 TEST 5 : OUTPUT DISTORTION TEST 》

1. Select the output signal as well as TEST 4 and measure the level and the distortion of signal.

The way to select the signal is the same as TEST 4.

2. Confirm that the signal level of each output is within the regulation, there is no distortion and that the frequency of each output signal is normal.

If this test is O. K. , press MARK/JUMP SW to proceed to TEST 6 KEYBOARD & AFTERTOUCH TEST.

OUT-1	8.5 ~ 15.0V	494Hz
OUT-2	8.5 ~ 15.0V	415Hz
OUT-3	9.5 ~ 16.0V	311Hz
OUT-4	9.5 ~ 16.0V	247Hz
PH-L	8.5 ~ 15.0V	554Hz
PH-R	8.5 ~ 15.0V	622Hz

《 TEST 6 : KEYBOARD & AFTERTOUCH TEST 》

1. Press the key indicated in the LCD with appropriate pressure one by one.
 (Between 20 and 100 of the velocity value is the appropriate pressure.)
 Once the designated key is pressed with appropriate pressure, the key to be pressed next is indicated in the LCD.
 When the other key is pressed or the pressure is not appropriate, this test does not proceed to the next key. (In this case there is no sound, either.)
2. After the test of all the keys is finished, the test proceeds to the AFTERTOUCH TEST.
 Confirm that the value of after touch changes smoothly when a key is pressed and that the value becomes 127 when it is pressed strongly.
 If this test is N.G., check the key contact P.C.B. and the circuit of SCAN (M37450M4)
 If this test is O.K., press MARK/JUMP SW to proceed to TEST 7 A/D CONVERTER TEST.

《 TEST 7 : A/D CONVERTER TEST 》

1. Confirm that the value of Vector Position is indicated in the LCD and that the value changes smoothly by the operation of the Vector Position.
 Also, confirm that X Value = 0 when the Vector Position is pushed down to the A side, X Value = 255 when it is pushed down to the B side, Y Value = 0 when it is pushed down to the C side and that Y Value = 255 when it is pushed down to the D side.
 If this test is O.K., press MARK/JUMP SW to proceed to the next.
2. Confirm that the values of Wheels are indicated in the LCD and that each value changes smoothly when Mod. and Pitch are operated. Also, confirm the value of pitch Wheel changes within the range of 0 ~ 225, it becomes 128 at the middle point and that the value of Mod. Wheel changes within the range of 0 ~ 127.
 If this test is O.K., press MARK/JUMP SW to proceed to the next.

3. Confirm the values of ASS-1, ASS-2, and DAMPER are indicated in the LCD. Then, connect EXP-2 to ASS-1 and ASS-2, DS-1 or PS-1 to DAMPER. Confirm that each value changes smoothly when ASS-1 and ASS-2 are operated, the value becomes 127 when each pedal is pressed fully and that it becomes 0 when each pedal is released. Confirm that the value becomes 127 when DAMPER is ON and that it becomes 0 when DAMPER is OFF. If this test is N.G., check the VRs (Vector Position and Wheels) and the circuit of SCAN (M37450M4). If this test is O.K., proceed to the next. If you need to check again, press MARK/JUMP SW and select any test with 10 KEY SWs.

《 FINISHING THE DIAGNOSTIC TEST 》

1. Pull out the PCM card (MSC-01) and the test card (DIAG. CARD).
2. Press EXIT SW.
With these operations, the product's memory is initialized and the program returns to the normal mode.
After finishing this test, load the data which was saved first.

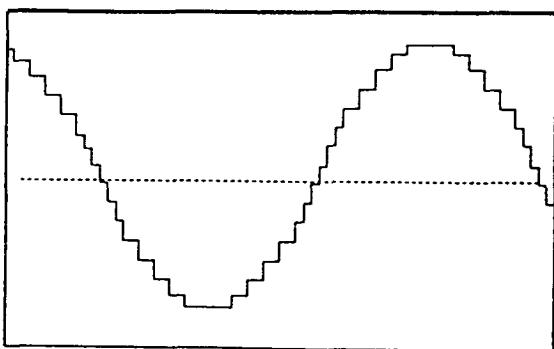


Fig. 1 MDE Test Waveform

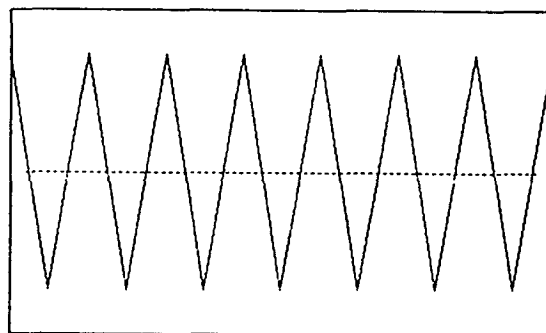


Fig. 2 TG88/DF88 Test Waveform

《 THE CONTENT OF THE MIDI MESSAGE FOR THE TEST 》

The MIDI message for the test is defined as one of the MIDI SYSTEM EXCLUSIVE MESSAGE.

- " F0h " to point out EXCLUSIVE
- " 42h " to point out KORG ID
- " 22h " to point out JIG ID for KORG's factory test
- " **h " to point out the product's ID (" 28h " in case of WS1)

After these 4 byte data are transmitted, 1 byte data which points out the status for the test is transmitted. If the status has the data, n byte data are transmitted. Finally, " F7h " which points out EOX is transmitted and one MIDI MESSAGE for the test consists.

MIDI EXCLUSIVE MESSAGE FOR THE TEST

F0 42 22 28 7F F7 → RESET OF JIG. FOR FACTORY

F0 42 22 28 6E 00 F7
 F0 42 22 28 6C 01 00 F7

INTERNAL RAM CHECK

F0 42 22 28 6E 04 F7
 F0 42 22 28 6C 01 00 F7

RAM CARD CHECK

F0 42 22 28 6E 01 F7
 F0 42 22 28 6C 01 00 F7

LSI INTERFACE (LCD)
 CHECK

F0 42 22 28 7F F7

F0 42 22 28 6E 01 F7
 F0 42 22 28 6C 02 00 F7

LSI INTERFACE (MDE)
 CHECK

F0 42 22 28 ** ** ** **

※ The data except the above are omitted here since their messages are indicated in LCD of WS1.

F0	42	22	28	6E	00	F7
EXCLUSIVE	↑	FACTORY	↑	INTERNAL	↑	EOX
	KORG ID	ID	WS1	CHECK	CHECK NO.	

00 : INTERNAL RAM CHECK
 04 : RAM CARD CHECK
 01 : LSI INTERFACE (LCD & MDE) CHECK

F0	42	22	28	6C	01	00	F7
EXCLUSIVE	↑	FACTORY	↑	CHECK	↑	RESULT	↑
	KORG ID	ID	WS1	STEP	STEP NO.		EOX

※ Refer to the results of the checks of each item.

RESULT OF CHECK

《 00 : INTERNAL RAM CHECK 》

STEP 1

RESULT NO.	RESULT	RAM NO.	RAM PATTERN
00	PASS		
01	FAIL	RAM 1 (IC24)	RAMP1 (00)
02	FAIL	RAM 2 (IC25)	RAMP1 (00)
03	FAIL	RAM 3 (IC22)	RAMP1 (00)
04	FAIL	RAM 4 (IC23)	RAMP1 (00)
11	FAIL	RAM 1 (IC24)	RAMP2 (55)
12	FAIL	RAM 2 (IC25)	RAMP2 (55)
13	FAIL	RAM 3 (IC22)	RAMP2 (55)
14	FAIL	RAM 4 (IC23)	RAMP2 (55)
21	FAIL	RAM 1 (IC24)	RAMP3 (AA)
22	FAIL	RAM 2 (IC25)	RAMP3 (AA)
23	FAIL	RAM 3 (IC22)	RAMP3 (AA)
24	FAIL	RAM 4 (IC23)	RAMP3 (AA)
31	FAIL	RAM 1 (IC24)	RAMP4 (FF)
32	FAIL	RAM 2 (IC25)	RAMP4 (FF)
33	FAIL	RAM 3 (IC22)	RAMP4 (FF)
34	FAIL	RAM 4 (IC23)	RAMP4 (FF)

《 04 : RAM CARD CHECK 》

STEP 1

RESULT NO.	RESULT	RAM PATTERN
00	PASS	
01	FAIL	RAMP1 (00)
11	FAIL	RAMP2 (55)
21	FAIL	RAMP3 (AA)
31	FAIL	RAMP4 (FF)

《 01 : LSI INTERFACE CHECK 》

STEP 1 (LCD)

RESULT NO.	RESULT
00	PASS
01	FAIL (Time Out)
02	FAIL (Verify)

STEP 2 (MDE)

RESULT NO.	RESULT
00	PASS
01	FAIL (Time Out)
02	FAIL (Verify)

※ RAMP : This points out the writing pattern to RAM.
 At INTERNAL RAM & RAM CARD CHECK 4 kinds of patterns are written into RAM and these checks are carried out.

SPECIAL SCREEN

(With regard to the SPECIAL SCREEN and the copy of the test card)

《 CAUTION 》

This mode is for the development so do not operate the other keys except the following. Otherwise, the memory will crash or run recklessly.
Also, start this mode after saving the data as well as the diagnostic test.

《 STARTING THE SPECIAL SCREEN 》

1. Turn the power ON.
2. As soon as the letter " KORG " is indicated in the LCD, press CURSOR KEY ▼ (DOWN) and TEN KEY 4 at the same time.
3. After 4 ~ 5 seconds pass, the SPECIAL SCREEN starts.

《 THE CONTENT OF THIS MENU 》

SPECIAL SCREEN					
Version : *.* Date Time					
↑					
System Version NO.					
CONT	INIT RAM	D-IN	D-OUT	SHOW	KSD

INIT RAM : This initializes the data of internal RAM1 and RAM2.
D-IN : This loads the data of the test card into the product.
D-OUT : This saves the data of the product into the RAM card.

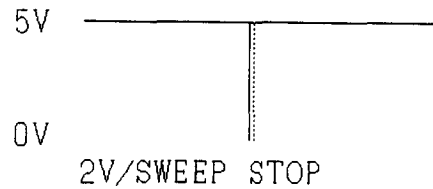
《 COPYING 》

1. While the SPECIAL SCREEN is indicated, insert the test card into the program data slot.
2. Press D-IN SW to load the data into the product.
3. Insert the new RAM card into the program data slot.
4. Press D-OUT SW to save the data into the RAM card.
5. After these operations are finished, press INIT RAM SW to proceed from the SPECIAL SCREEN to the normal mode.

9. IC CHECK POINT

MB622472 (MAP16)

1. Are Control Data Signals from CPU received into AS, R/W, HDS and LDS ?
2. Are Chip Select Signals transmitted from ROM, TG88, DF88, LCD and MDE ?



When the power is turned on, Low Pulse is transmitted.

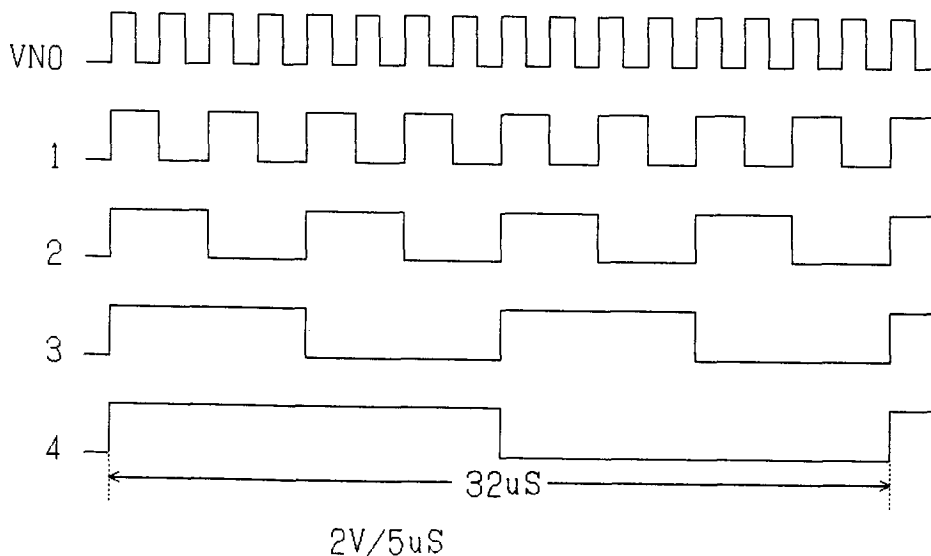
When the key is pressed, Low Pulses are transmitted from ROM and TG88.

When the indicatoin of LCD is changed, Low Pulse is transmitted from LCD.

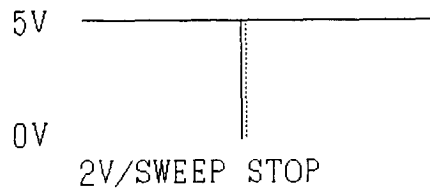
3. Are Read/Write Signals transmitted from RD, LDWR, LWR ?
4. Are Control Signals to SRAM transmitted from LSOE, LSWE NLOE, NLWE, MSOE, MSWE, NMOE, NMWE ?

MB87726 (TG88)

1. Is Reset Signal received into XREST ?
2. Is Master Clock 32MHz received into CLK ?
3. Are Chip Select Signals to Wave ROM transmitted from WB0~3 ?
4. Are Voice Number Signals to DF88 transmitted from VNO~4 ?



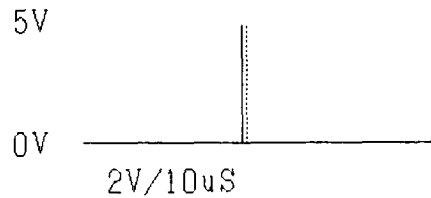
5. Are address Signals to Wave ROM transmitted from WA0~19 ?



When the key is pressed, Low Pulse is transmitted from WA0-18.
 ※Only from WA19 High Pulse is transmitted.

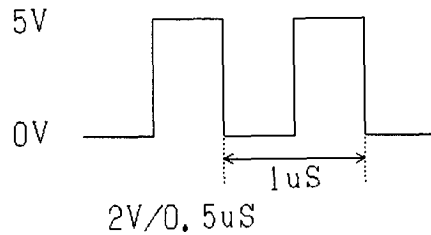
6. Are PCM Data from Wave ROM received into EWDO~15 ?

7. Are Voice Data transmitted from OD0~19 ?



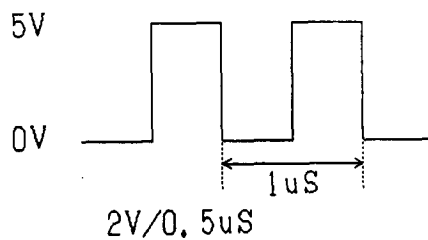
When the key is pressed, High Pulse is transmitted from OD0-18.
 The pulse is sometimes held.
 ※Only from OD19 Low Pulse is transmitted.

8. Is Write Enable Signal to DF88 transmitted from OWEF ?

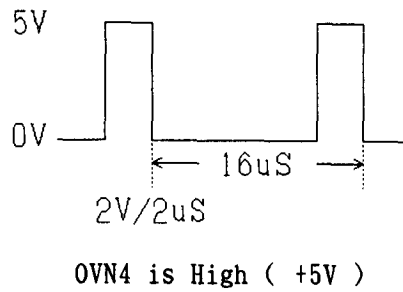


MB87727 (DF88)

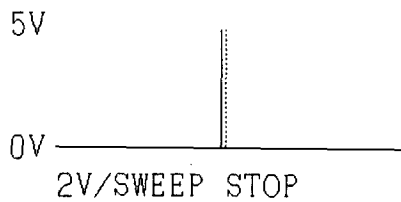
1. Is Reset Signal received into RESET ?
2. Is Master Clock 32MHz received into MCK ?
3. Is Write Enable Signal from TG88 received into DEN ?



4. Are Voice Number Signals transmitted from OVNO-4 ?



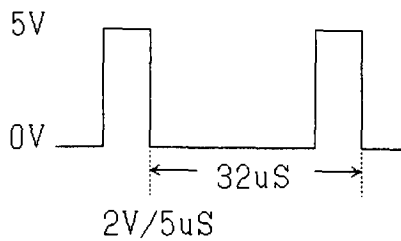
5. Are Voice Data transmitted from OD0-19 ?



When key is pressed. High Pulse is transmitted.
 ※Only from OD19 Low Pulse is transmitted.

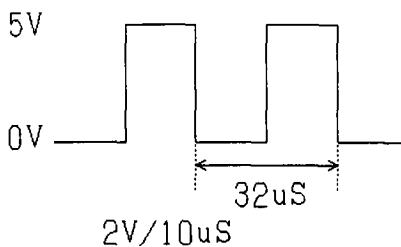
MB87405 (MDE)

1. Is Reset Signal received into RESET ?
2. Is Master Clock 32MHz received into XTL ?
3. Are Voice Numbers from DF88 received into PS0-3 ?

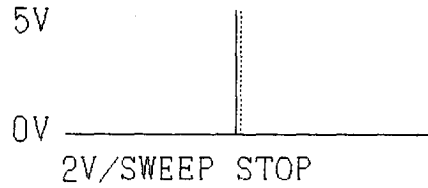


Only PS1 is 16 μ s.

4. Are Parallel Data from DF88 received into PD0-19 ?
5. Is Timing Clock to DF88 transmitted from SX1 ?

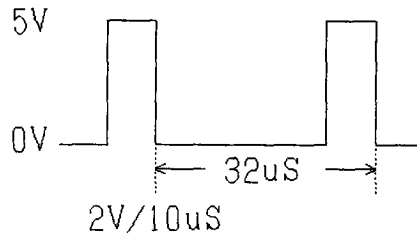


- 6. Are Control Signals to DRAM transmitted from RAS, CAS, WE and OE ?
- 7. Are Parallel Data to DA Converter transmitted from DA4-19 ?



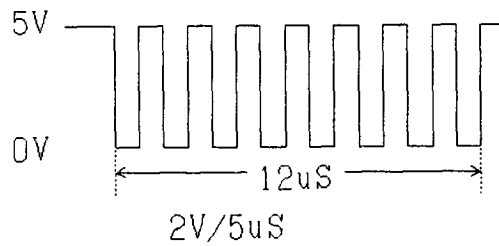
When the key is pressed, High Pulse is transmitted.
 ※Only from DA19 Low Pulse is transmitted.

- 8. Are Control Signals of SAMPLE/HOLD transmitted from SH0-3 ?



M3750M4-233FP (KSP)

- 1. Is Reset Signal received into RESET ?
- 2. Is Master Clock 10MHz received into XIN ?
- 3. Is Serial Data transmitted from TXD ?
- 4. Is Serial Clock transmitted from SCLK ?



THE FUNCTIONS OF MAIN ICs

CPU (H16)	: HD641016CP10
TG88 (TONE GENERATOR)	: MB87726
DF88 (DIGITAL FILTER)	: MB87727
MAP16 (DECORDER / CARD BUFFER)	: MB622472
KSP (KEY SCAN PROCESSOR)	: M37450M4-233FP

TG88 *** TG88(MB87726) is the IC which is developed for the sound source of the electronic instruments.

DF88 *** DF88(Digital Filter 88) is DSP-LSI which works for VDF (Variable Digital Filter), VDA (Variable Digital Amplifier), MIXER of PCM synthesizer and PCM piano.

The following are the main functions of DF88.

- (1) It receives Voice Data. (Parallel in Block)
- (2) It exchanges the data which CPU. (CPU Interface Block)
- (3) It operates Filter, EQ, Exiter and EG. (DSP Block)
- (4) It mixes the filtered voice output. (Mixer Block)
- (5) It sends the data to MDE1. (Parallel Out Block)
- (6) It sends the data to MDE2. (Serial Out Block)

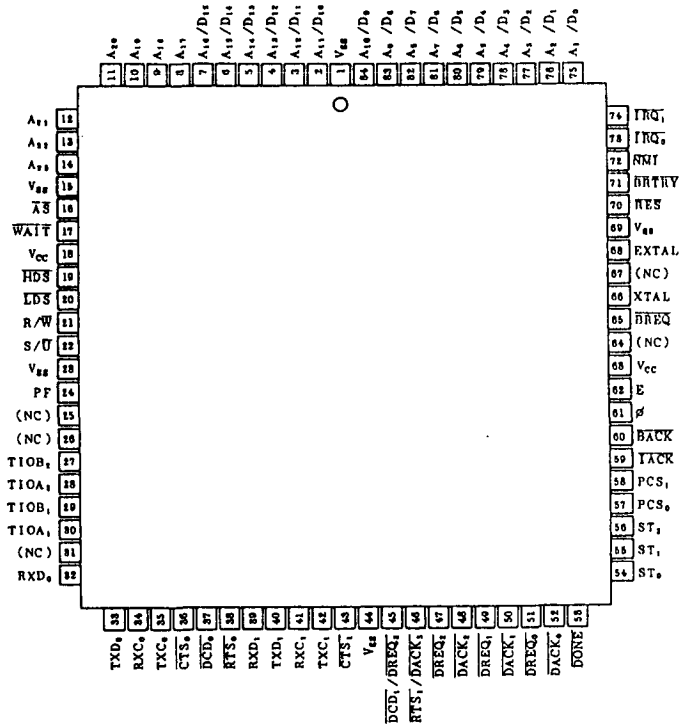
MAP16 ** MAP16(MB622472) is CPU Gate Array only for WAVE STATION. The main functions are the Gate Array function connected which CPU such as Address Latch, Address Decoder, Read/Write Pulse Occurrence Circuit, and the interface with the IC card.

KSP **** KSP(M37450M4-233FP) scans the data of the keys, the panel switches, the wheel, the joystick and the pedals, converts those data to serial and transmits them to CPU.

10. REFERENCE DATA

HD641016CP10

PIN ASSIGNMENT



HD641016CP10

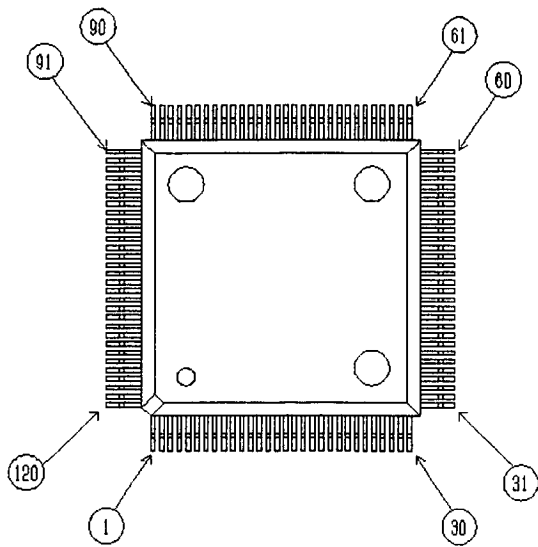
PIN FUNCTION

CLASSIFICATION	PIN MARK	I/O	FUNCTION
POWER SUPPLY	VCC	I	POWER SUPPLY
	VSS	I	GND
CLOCK	XTAL	I	CRYSTAL
	EXTAL	I	EXTERNAL CLOCK
	ϕ	0	SYSTEM CLOCK
	E	0	ENABLE CLOCK
SYSTEM CONTROL	RES	I/O	RESET
	BRTRY	I	BUS CYCLE RETRY
	BREQ	I	BUS REQUEST
	BACK	0	BUS ACKNOWLEDGE
MEMORY INTERFACE	AS	I/O	ADDRESS STROBE
	HDS	0	HIGH ORDER DATA STROBE
	LDS	0	LOW ORDER DATA STROBE
	R / W	0	READ / WRITE STROBE
	WAIT	I/O	WAIT
STATUS	ST0 ~ ST2	0	STATUS
	S / U	0	SUPERVISOR / USER
	PF	0	PROGRAM FETCH
ADDRESS / DATA BUS	A1/DO ~ A16/D15	I/O	ADDRESS / DATA BUS
	A17 ~ A23	I/O	ADDRESS BUS

CLASSIFICATION	PIN MARK	I/O	FUNCTION
SERIAL INTERFACE	RXD0 RXD1	I	RECEIVE DATA (CHANNEL 0. 1)
	TXD0 TXD1	0	TRANSMIT DATA (CHANNEL 0. 1)
	RXC0 RXC1	I/O	RECEIVE CLOCK (CHANNEL 0. 1)
	TXC0 TXC1	I/O	TRANSMIT CLOCK (CHANNEL 0. 1)
	RTS0 RTS1	0	MODEM CONTROL (CHANNEL 0. 1)
	CTS0 CTS1	I	
	DCD0 DCD1	I	
	INTERRUPT CONTROL	NMI	I
IRQ0, IRQ1		I	INTERRUPT REQUEST
IACK		0	INTERRUPT ACKNOWLEDGE
DMA	DREQ0~ DREQ3	I	DMA REQUEST (CHANNEL 0 ~ 3)
	DACK0~ DACK3	0	DMA ACKNOWLEDGE (CHANNEL 0 ~ 3)
	DONE	I/O	DONE
TIMER	TIOA1, TIOB1 TIOA2, TIOB2	I/O	TIMER I/O A, B (CHANNEL 1, 2)
CHIP SELECT	PCS0, PCS1	0	PROGRAMMABLE CHIP SELECT

MB87727 (DF88)

PIN ASSIGNMENT



CLASSIFICATION OF TERMINALS FOR DF88

CLASSIFICATION	TERMINALS
CPU INTERFACE	BSEL, XCS, XRD, XWR A0~A9, D0~D15
PARALLEL OUT (MDE1 INTERFACE)	OSEL, ODO~OD19 OVNO~OVN4, POEN
SERIAL OUT (MDE2 INTERFACE)	SOD, SCK, SEN SCH0~SCH2, SCHEN
MIXER	SFT0~SFT2, CLIP
PARALLEL IN (TG, DF INTERFACE)	IVDO~IVD19 IVNO~IVN4, DEN
MASTER CLOCK	MCK
RESET	XRES
FILTER MODE	MODE0~MODE1
TEST MODE	TEST, TSEL
POWER SUPPLY	VDD1~VDD6 VSS1~VSS2

DF88 (MB87727)

PIN FUNCTION

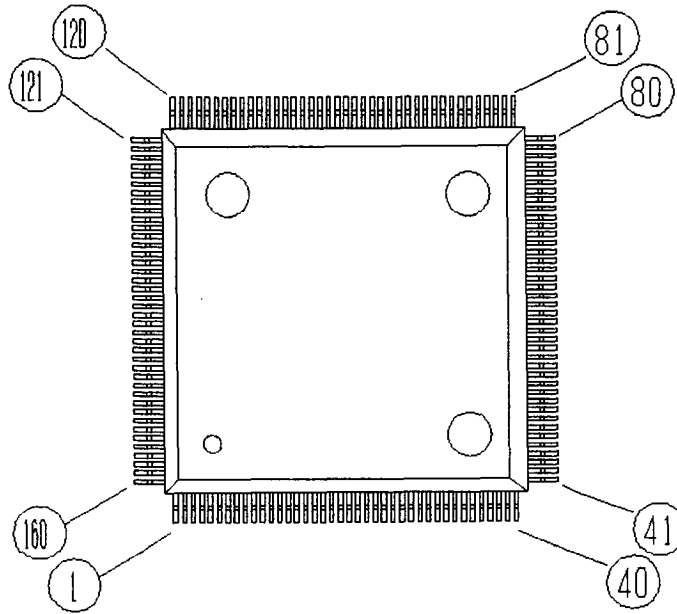
NO.	I/O	PIN NAME	GROUP	NOTE
1	-	VSS	-	
2	I	A0	A	CPU ADDRESS
3	I	A1		
4	I	A2		
5	I	A3		
6	I	A4		
7	I	A5		
8	I	A6		
9	I	A7		
10	I	A8		
11	-	VSS	-	
12	I	A9	B	CPU ADDRESS
13	I/O	D0		CPU DATA BUS
14	I/O	D1		
15	I/O	D2		
16	-	VDD	-	
17	I/O	D3	B	CPU DATA BUS
18	I/O	D4		
19	I/O	D5		
20	I/O	D6		
21	-	VSS	-	
22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

NO.	I/O	PIN NAME	GROUP	NOTE
31	-	VSS	-	
32	I	IVN0	D	TG VOICE NO.
33	I	IVN1		
34	I	IVN2		
35	I	IVN3		
36	I	IVN4		TG VOICE DATA
37	I	IVD0		
38	I	IVD1		
39	I	IVD2		
40	I	IVD3		
41	-	VSS	-	
42	I	IVD4	E	TG VOICE DATA
43	I	IVD5		
44	I	IVD6		
45	I	IVD7		
46	-	VDD	-	
47	I	IVD8	E	TG VOICE DATA
48	I	IVD9		
49	I	IVD10		
50	I	IVD11		
51	-	VSS	-	
52	I	IVD12	F	TG VOICE DATA
53	I	IVD13		
54	I	IVD14		
55	I	IVD15		
56	I	IVD16		
57	I	IVD17		
58	I	IVD18		
59	I	IVD19		
60	-	VDD	-	
61	-	VSS	-	
62	I	DEN	G	TG VOICE DATA ENABLE
63	I	XRES		SYSTEM RESET
64	I	OSEL		PARALLEL OUT FORMAT SELECT
65	I	BSEL		CPU DBUS BIT LENGTH SELECT
66	I	MODE0		FILTER MODE SELECT
67	I	MODE1		INCIRCUIT TESTER MODE SELECT
68	I	ITEST		LSI TESTER MODE SELECT
69	I	LTEST		MASTER CLOCK
70	I	MCK		
71	-	VSS	-	
72	I	TSELO	H	NOT USE
73	I	TSEL1		OUTPUT DATA CLIPER ON/OFF
74	I	CLIP		DATA SHIFT SELECT BIT0
75	I	SFT0		
76	-	VDD	-	
77	I	SFT1	H	DATA SHIFT SELECT BIT1
78	I	SFT2		DATA SHIFT SELECT BIT2
79	0	POEN		PARALLEL OUT VOICE DATA ENABLE
80	0	SOD		SERIAL OUT DATA

NO.	I/O	PIN NAME	GROUP	NOTE
81	-	VSS	-	
82	0	SCK	I	SERIAL OUT BIT CLOCK
83	0	SEN		SERIAL OUT DATA ENABLE
84	0	SCH2		SERIAL OUT CH NO. BIT2
85	0	SCH1		SERIAL OUT CH NO. BIT1
86	0	SCH0		SERIAL OUT CH NO. BIT0
87	0	SCHEM		SERIAL OUT CH DATA ENABLE
88	0	OD19		VOICE/MIX
89	0	OD18		PARALLEL
90	0	OD17		OUTPUT
91	-	VSS		-
92	0	OD16	J	OUTPUT
93	0	OD15		
94	0	OD14		
95	0	OD13		
96	0	OD12		
97	0	OD11		
98	0	OD10		
99	0	OD9		
100	0	OD8		
101	-	VSS	-	
102	0	OD7	K	OUTPUT
103	0	OD6		
104	0	OD5		
105	0	OD4		
106	-	VDD	-	
107	0	OD3	K	OUTPUT
108	0	OD2		
109	0	OD1		
110	0	OD0		
111	-	VSS	-	
112	0	OVN4	L	PARALLEL OUT
113	0	OVN3		VOICE NO.
114	0	OVN2		
115	0	OVN1		
116	0	OVN0		
117	I	XRD		
118	I	XWR		CPU WR ENABLE
119	I	XCS		CHIP SELECT
120	-	VDD		-

MB87726 (TG88)

PIN ASSIGNMENT



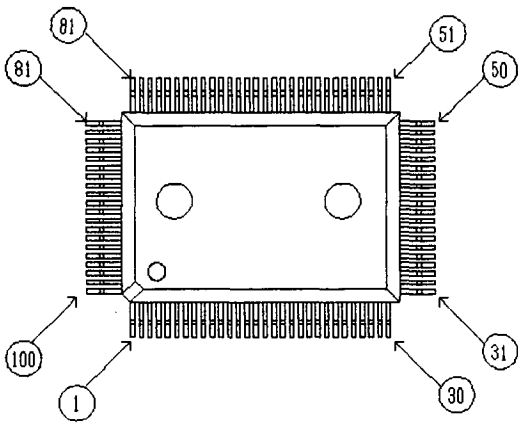
TG88 (MB87726)

PIN FUNCTION

PIN NAME	I/O	FUNCTION
VDD	-	+5V
VSS	-	GND
SMODE	I	Sub TG Mode (H:Sub TG L:Master TG)
FMODE	I	Sampling Rate Switch (H:48KHz L:30KHz)
XRESET	I	Low Active Initial Clear
CLK	I	Master clock
XCRO	O	System Counter Reset for Sub TG Chip
XCRI	I	System Counter Reset from Master TG Chip
TEST0-3	I	Test Mode Selector
XCSI	I	Chip Select
XWRI	I	Write Pulse Input from CPU
XRDI	I	Read Pulse Input from CPU
A0-9	I	Address Input from CPU
D0-7	I/O	Data Input from CPU
D8-15	I/O	Data Input for 16bit Data Bus
DMODE	I	CPU I/F Data Bus Syze Select (L:8bit H:16bit)
EWDO-15	I	Even-address Wave Data in (from Wave ROM)
OWDO-15	I	Odd-address Wave Data in (from Wave ROM)
WAO-19	O	Address Bus for Wave ROM or RAM
WBO-3	O	Bank Number out for Wave ROM (16 Banks)
ODO-19	O	Voice Data out for External Filters or MDE
VNO-4	O	Voice Number out
RAS0-3	O	for D-RAM
CAS0-3	O	for D-RAM
OWE0-3	O	Write Enable for MDE
OWEF	O	Write Enable for New Filter Chip (MB87727)

MB622472 (MAP16)

PIN ASSIGNMENT



CLASSIFICATION OF TERMINALS FOR MAP16

CLASSIFICATION	TERMINALS
CPU ADDRESS	A18, PCS1, PCS0
CPU MPX BUS	HA16~HA1
CPU CONTROL	AS, R/W, HDS, LDS
SYSTEM ADDRESS	A16~A1
SYSTEM CONTROL	RD, LDWR, LWR
CHIP SELECT	ROM, RASL, TG88, DF88, LCD, MDE
SRAM CONTROL	LSOE, LSWE NLOE, NLWE MSOE, MSWE NMOE, NMWE
IC CARD ADDRESS	CA14~CA0
IC CARD DATA BUS	CD7~CD0
IC CARD CONTROL	CCE, COE, CWR
IC CARD SELECT	CCES, ECCE
FOR DEVELOPMENT	ROEN
POWER SUPPLY	VDD1~VDD4, VSS1~VSS8

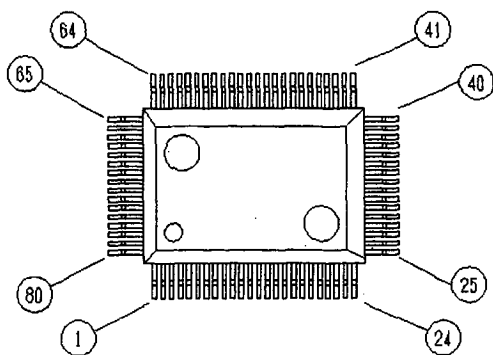
MAP16 (MB622472)

PIN FUNCTION

NO.	I/O	PIN NAME	NO.	I/O	PIN NAME	NO.	I/O	PIN NAME	NO.	I/O	PIN NAME
1	0	CA4	26	I	RW	51	I	PCS1	76	0	LCD
2	0	CA3	27	I	LDS	52	I	PCS0	77	0	LDWR
3	-	VDD	28	-	VDD	53	-	VDD	78	-	VDD
4	-	VSS	29	-	VSS	54	-	VSS	79	-	VSS
5	0	CA2	30	I	HDS	55	0	A1	80	0	RD
6	0	CA1	31	I	AS	56	0	A2	81	0	LWR
7	0	CA0	32	I	A18	57	0	A3	82	0	ROM
8	I/O	CD0	33	I	HA16	58	0	A4	83	0	TG88
9	I/O	CD1	34	I	HA15	59	0	A5	84	0	DF88
10	I/O	CD2	35	I	HA14	60	0	A6	85	0	MDE
11	I/O	CD3	36	I	HA13	61	0	A7	86	0	LSOE
12	I/O	CD4	37	I	HA12	62	0	A8	87	0	LSWE
13	I/O	CD5	38	I	HA11	63	0	A9	88	0	NLOE
14	I/O	CD6	39	I	HA10	64	0	A10	89	0	NLWE
15	-	VSS	40	-	VSS	65	-	VSS	90	-	VSS
16	I/O	CD7	41	I	HA9	66	0	A11	91	0	MSOE
17	0	CCE	42	I/O	HA8	67	0	A12	92	0	MSWE
18	0	CA10	43	I/O	HA7	68	0	A13	93	0	NMOE
19	0	COE	44	I/O	HA6	69	0	A14	94	0	NMWE
20	0	CA11	45	I/O	HA5	70	0	A15	95	0	RASL
21	0	CA9	46	I/O	HA4	71	0	A16	96	-	NC
22	0	CA8	47	I/O	HA3	72	-	NC	97	0	CA12
23	0	CA13	48	I/O	HA2	73	I	ECCE	98	0	CA7
24	0	CA14	49	I/O	HA1	74	I	CCES	99	0	CA6
25	0	CWR	50	-	NC	75	0	ROEN	100	0	CA5

M37450M-4-233FP (KSP)

PIN ASSIGNMENT



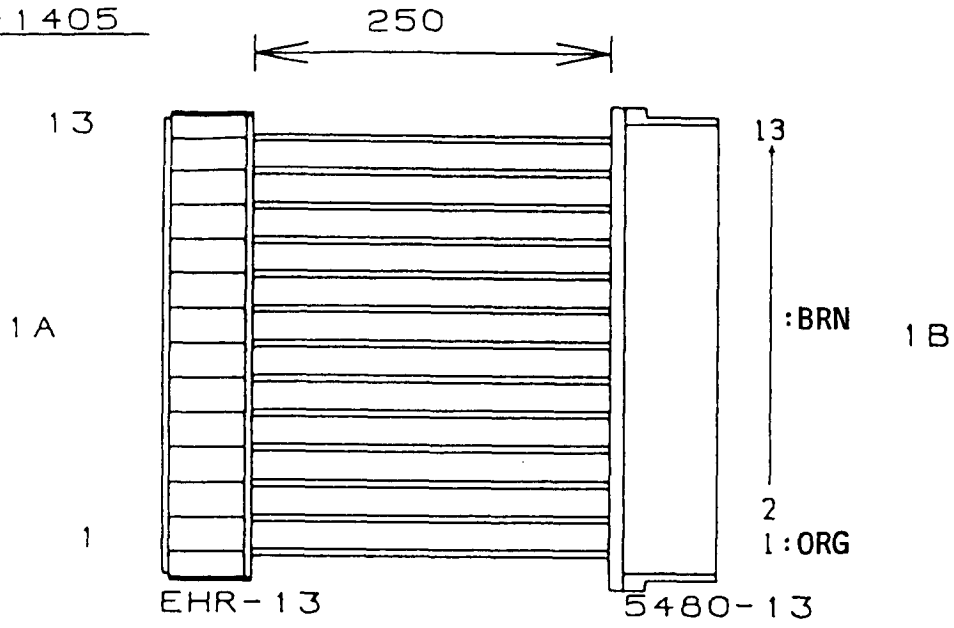
M37450M-4-233FP

PIN FUNCTION

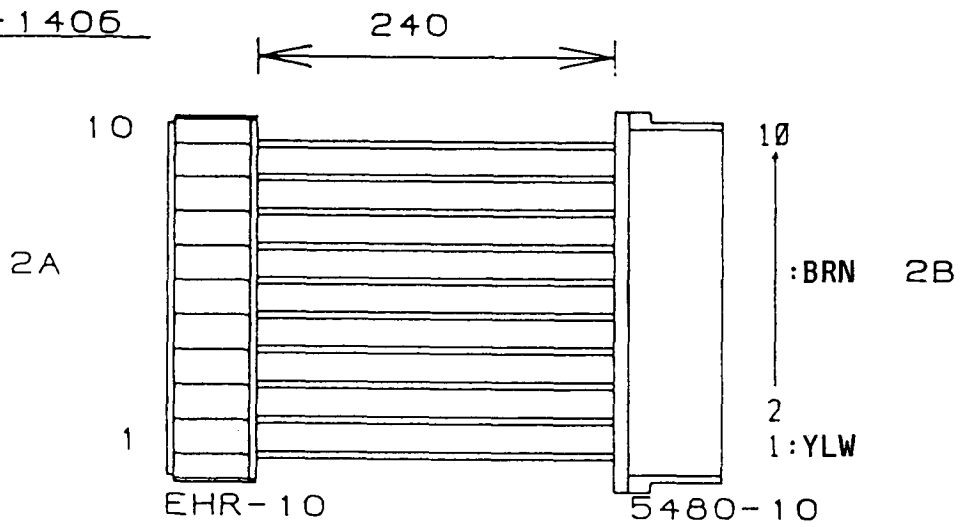
PIN MARK	PIN NAME	I/O	PIN MARK	PIN NAME	I/O
VCC, VSS	POWER SUPPLY	-	P50~P57	I/O PORT 5	I/O
CNVSS	CNVSS	I	P60~P67	I/O PORT 6	I/O
RESET	RESET IN	I	VREF	REFERENCE VOLT.	I
XIN	CLOCK IN	I	ADVREF	A-D REF. VOLTAGE	I
XOUT	CLOCK OUT	O	DAVREF	D-A REF. VOLTAGE	I
∅	TIMMING OUT	O	AVSS	ANALOG VSS	-
SYNC	SYNC. SIGNAL OUT	O	AVCC	ANALOG VCC	-
R/W	READ/WRITE STATUS OUT	O	D-A1 D-A2	ANALOG OUT	O O
P00~P07	I/O PORT 0	I/O	RD	READ SIG. OUT	O
P10~P17	I/O PORT 1	I/O	WR	WRITE SIG. OUT	O
P20~P27	I/O PORT 2	I/O	RESETOUT	RESET SIG. OUT	O
P30~P37	I/O PORT 3	I/O	RXD	SERIAL DATA IN	I
P40~P42	I/O PORT 4	I	TXD	SERIAL DATA OUT	O

FOR HARNESES

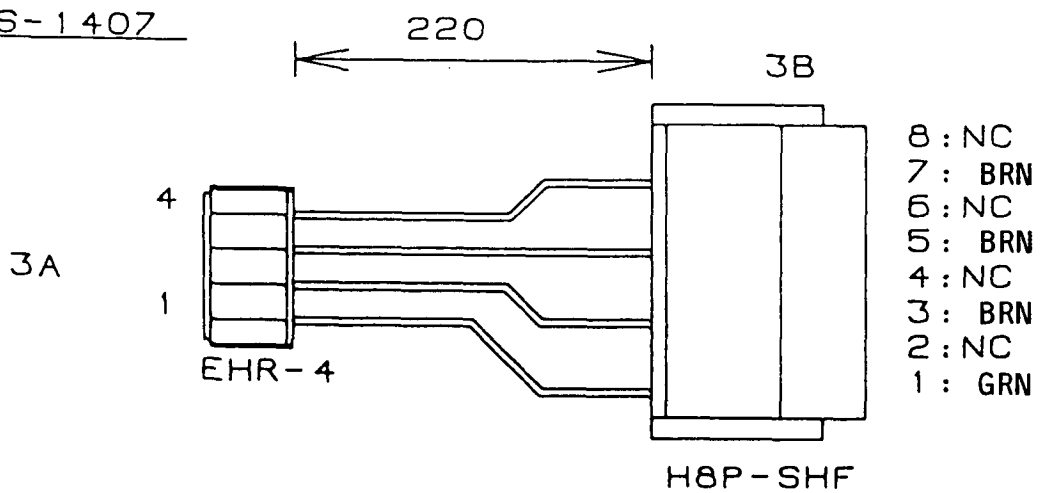
HNS-1405

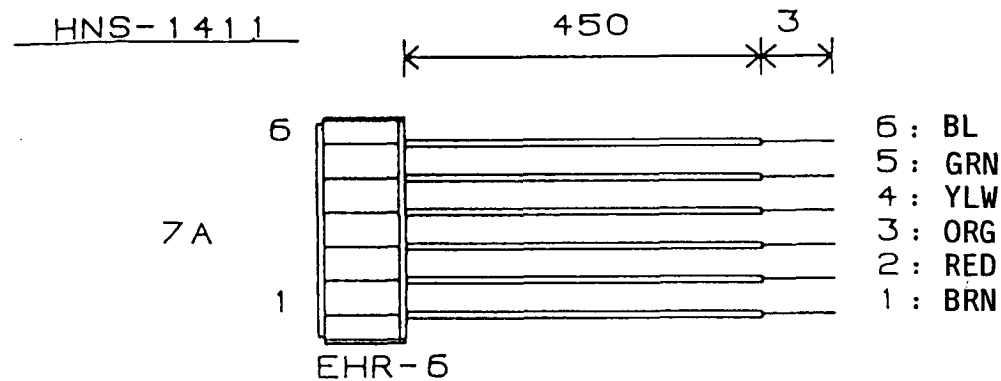
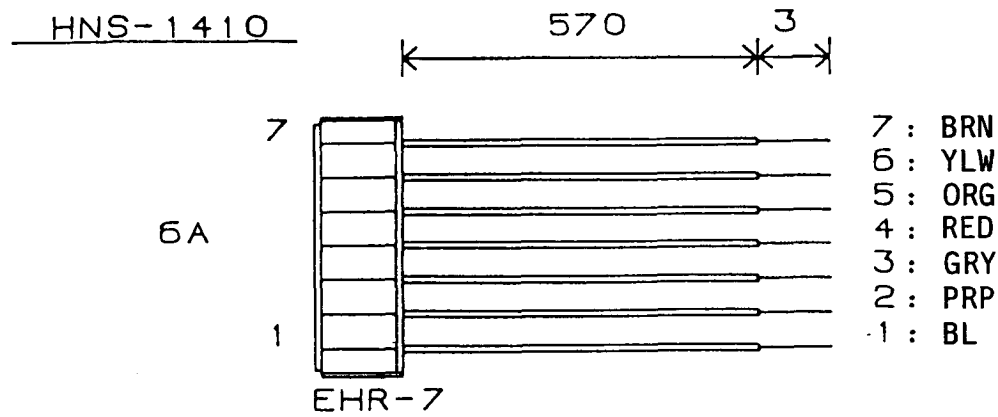
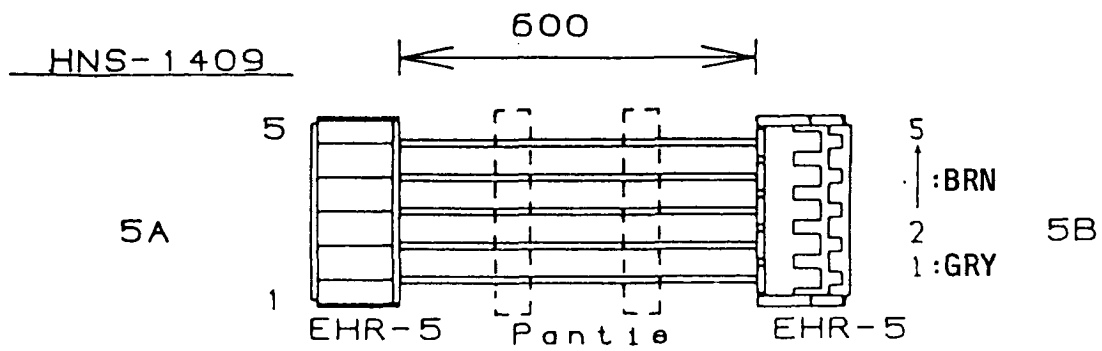
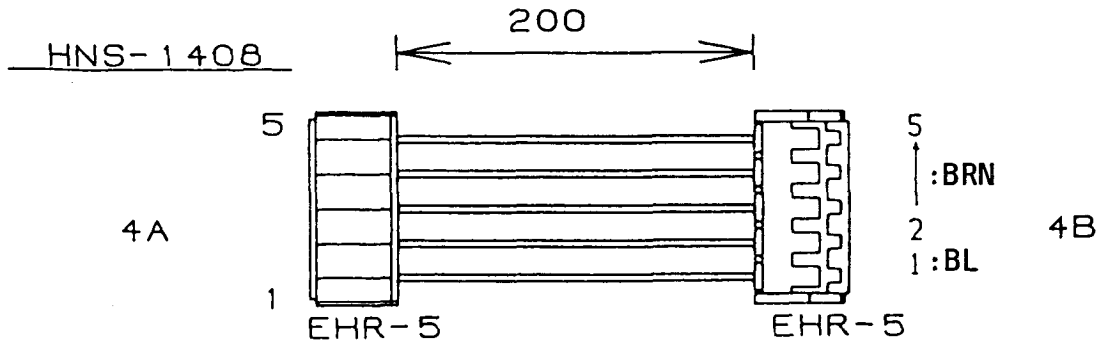


HNS-1406

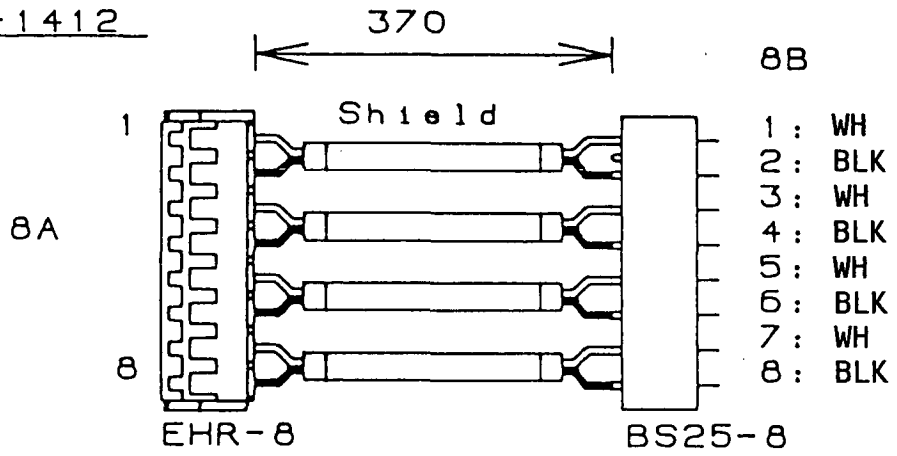


HNS-1407

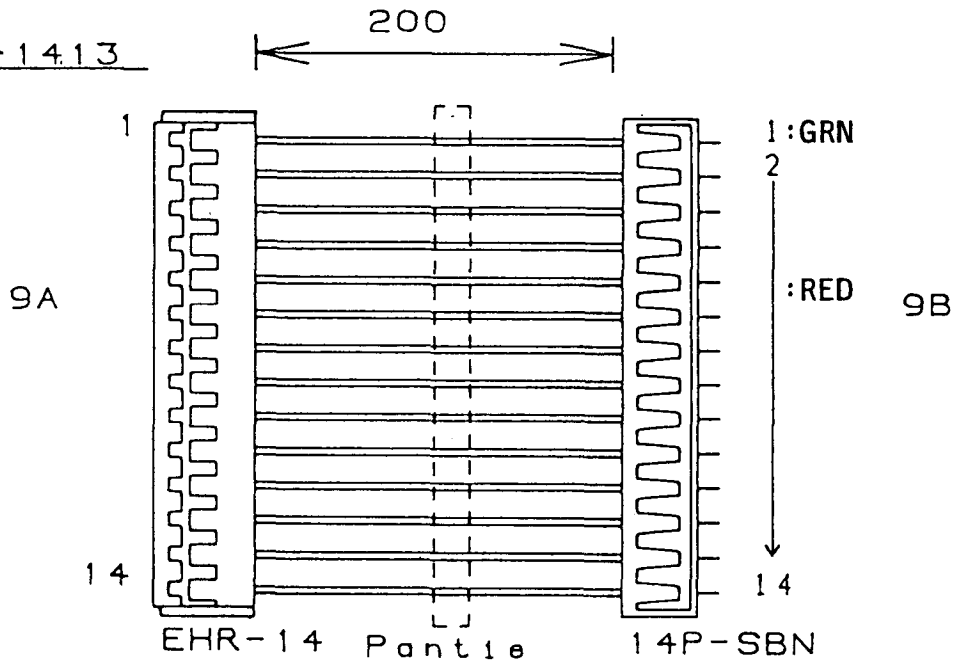




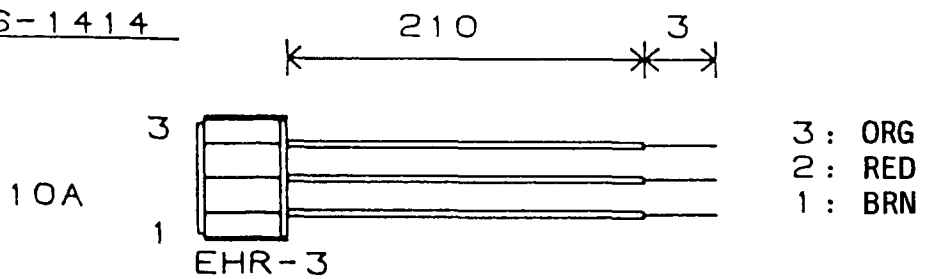
HNS-1412

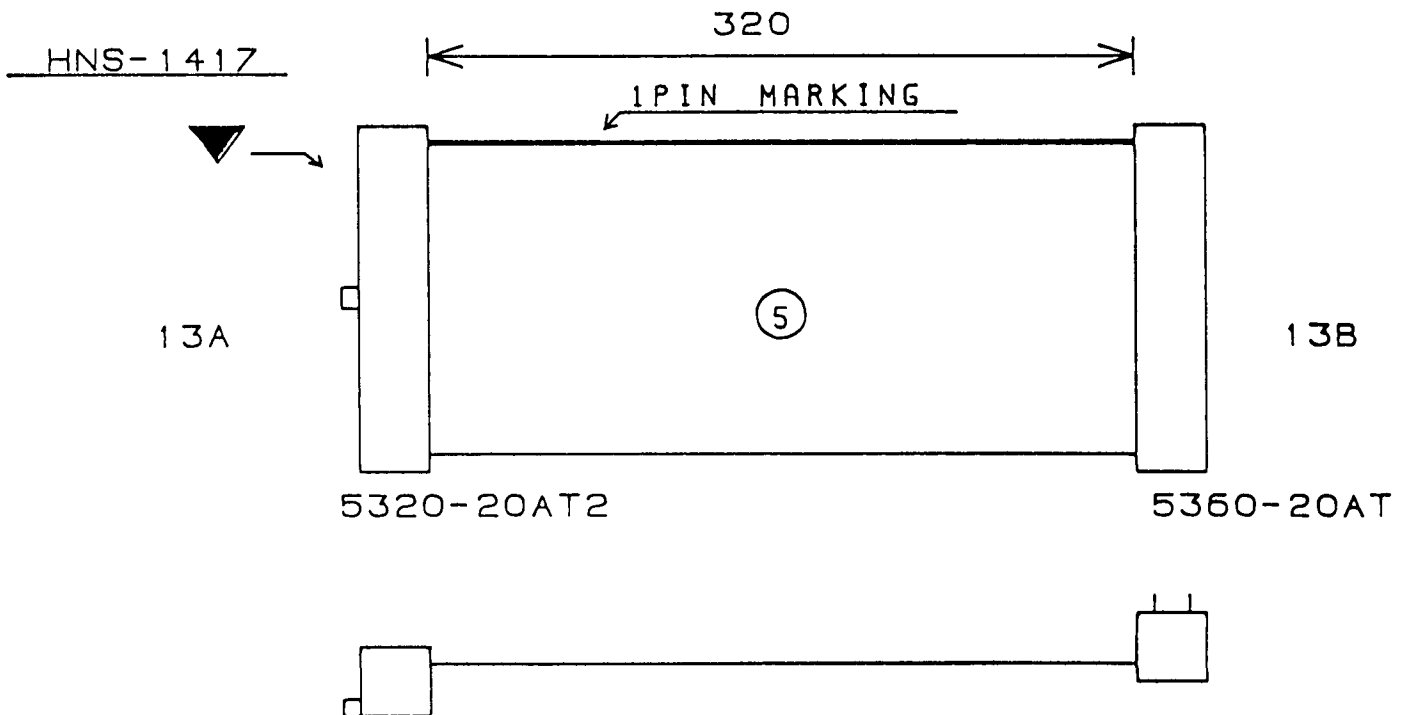
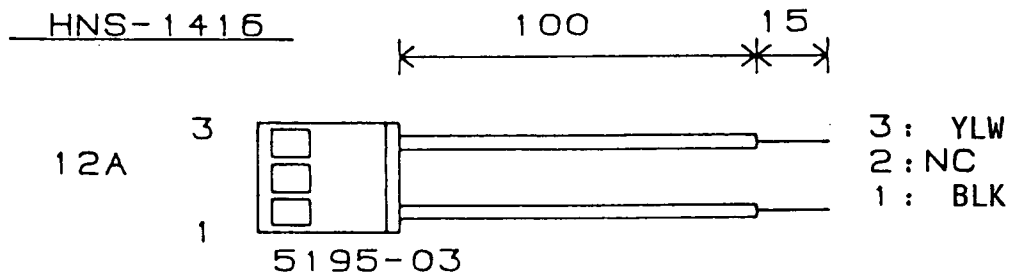
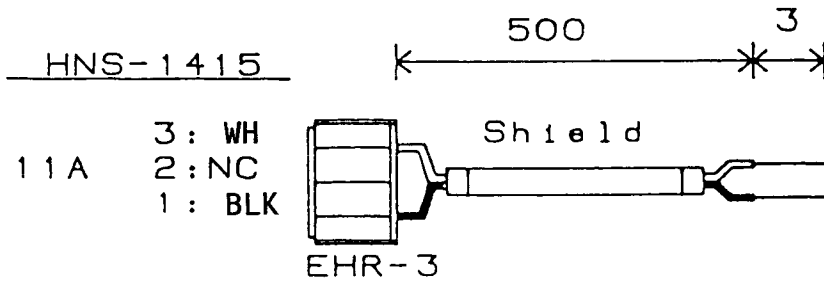


HNS-1413



HNS-1414





11. PARTS LIST

PARTS CODE	PARTS NAME SPECIFICATIONS	P. C. BOARD	IDENTIFICATION NO. FUNCTION	Q' TY
LED				
312009500	HLMP-D101	1417		1
LCD				
313002200	DMF5005NS-EW2	M. PRT		1
DIODE				
314001300	1SS-133 T-77	1415 1417 1416		3 27 6
ZENER DIODE				
314023900	RD5. 1ESB1-T	1416		2
DOUBLE DIODE				
315000400	MC932-T12	1416		3
ICs				
320001068	UPD74HC04C	1415		1
320001070	UPD74HC74C	1415		1
320001071	UPD74HC138C	1415		1
320001089	UPD74HC14C	1415		1
320001101	UPD74HC08C	1415		1
320001128	UPD43256AC-15L	1415	SRAM	4
320001138	UPD27C1000AD-15	1415	EPR0M	2
320001150	UPD74HC157	1415		1
320001151	UPD74HC4053	1416		3
320001163	UPD74HC245	1415		1
320001242	UPC4570HA	1416		8
320001254	UPD23C4001EC-200	1415	MASK ROM	1
320001255	UPD23C4001EC-201	1415	MASK ROM	1
320004136	HD641016CP10	1415	CPU	1
320011026	M5216L	1416		1
320011047	M5218AP	1415		1
320011051	M74LS14P	1416		1
320011076	M5238L	1416		3
320011077	M5201P	1415		1
320011100	M5M4464AL-12	1415	DRAM	5
320011121	M37450M4-233FP	1415	KSP	1

PARTS CODE	PARTS NAME SPECIFICATIONS	P. C. BOARD	IDENTIFICATION NO. FUNCTION	Q' TY
P. C. BOARDS (ASSY)				
001141500	KLM-1415	1415		1
001141600	KLM-1416	1416		1
001141700	KLM-1417	1417		1
002142100	KLM-1421	1421	117CN	1
			117US	1
			100JP	1
			117EX	1
002142200	KLM-1422	1422	240AU	1
			220SE	1
			220GE	1
			240GE	1
			240AF	1
			220WC	1
			220SC	1
			240UK	1
			220FR	1
BLOCK RESISTORS				
135005510	RKCI/885J 10K	1415		1
135008422	RKCI/888J 2.2K	1415		2
135008510	RKCI/888J 10K	1415		3
135009510	RKCI/889J 10K	1415		1
137004415	RKCI/4B4SJ 1.5K	1416		4
138015020	RN3EAC101J 100 OHM	1415		4
EMI FILTERS				
219050100	DSS310-55D223S	1415		3
		1416		3
219051200	DSS306-55B102M	1416		9
TRANSISTORS				
304000020	2SA1175TK	1415		3
		1416		3
304020020	2SC2785TK	1415		2
304020110	BN1A4M-T	1416		1
304020180	2SC2878 A/B TPE2	1416		4
FET				
304060020	2SK381-T11-B	1416		4

PARTS CODE	PARTS NAME SPECIFICATIONS	P. C. BOARD	IDENTIFICATION NO. FUNCTION	Q' TY
320012052	MB87405PF	1415	MDE	1
320012084	MB87726PF	1415	TG88	1
320012085	MB87727PF	1415	DF88	1
320012086	MB622472PF	1415	MAP16	1
320012089	MB834000A-20P-G202	1415	MASK ROM	1
320012090	MB834000A-20P-G203	1415	MASK ROM	1
320036006	PCM54HP-005	1416	D/A CONVERTER	1
324017001	RE5VA45AA	1415		1
PHOTO COUPLER				
330001400	PC-910K	1416		1
CRYSTALS				
335006000	AT-49 20.00MHZ	1415		1
335006600	AT-49 32MHZ	1415		1
SEMI FIXED VR				
350002410	RH0615C-15 100K	1416		1
VRs				
360021200	RK09K1110AB2A 10KB	1416	FOR LCD CONTRAST	1
362005900	RK1631110SFFA 10KB	M. PRT	FOR PITCH WHEEL	1
362006000	RK1631110SFGA 10KB	M. PRT	FOR MG WHEEL	1
362006100	RKJXB 10KB x 2	M. PRT	JOYSTICK ASSEMBLY	1
SLIDE VR				
365008000	RS30112AC00JA 10KB	1417		1
ROTARY ENCODER VR				
370003700	EC16B25D	M. PRT		1
TOUCH SW.				
375010500	EVQ-PAC09K-A	1417		27
FERRITE BEAD				
402003600	BL03RN2-R62	1416		6

PARTS CODE	PARTS NAME SPECIFICATIONS	P. C. BOARD	IDENTIFICATION NO. FUNCTION	Q' TY
KEYBOARD				
420004000	FS-61	M. PRT		1
KEYS				
422006701	C/F	M. PRT		---
422006702	D	M. PRT		---
422006703	B/E	M. PRT		---
422006704	G	M. PRT		---
422006705	A	M. PRT		---
422006706	HI-C	M. PRT		---
422006707	BLK	M. PRT		---
KEY SPRING				
422006800	AA05543	M. PRT		---
KEY CONTACTS				
422007200	FOR 13 POINTS	M. PRT		---
422007201	FOR 12 POINTS	M. PRT		---
PHONE JACK				
454004400	YKB21-5010	1416		8
CONNECTOR TOPS				
471060300	B3B-EH	1415		1
		1416		1
471060400	B4B-EH	1415		1
471060500	B5B-EH	1415		1
		1416		1
471060600	B6B-EH	1415		1
471060700	B7B-EH	1415		1
471060800	B8B-EH	1416		1
471061000	B10B-EH	1415		1
471061300	B13B-EH	1415		1
471061400	B14B-EH	1415		1
CARD FIT CONNECTOR				
474004715	ZC-032	1415		1
		1416		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P. C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
BC CONNECTOR				
474009900	L-32	1415		1
CARD CONNECTOR				
474011300	HGC0338-01-010	1415		1
HEADER				
474014400	20P 5332-20T2	1415		1
HARNESSES				
475001405	HNS-1405	M. PRT	KBD (13P)	1
475001406	HNS-1406	M. PRT	KBD (10P)	1
475001407	HNS-1407	M. PRT	PRESSURE (4P)	1
475001408	HNS-1408	M. PRT	POWER (5P)	1
475001409	HNS-1409	M. PRT	POWER (5P)	1
475001410	HNS-1410	M. PRT	WHEEL (7P)	1
475001411	HNS-1411	M. PRT	JOYSTICK (6P)	1
475001412	HNS-1412 (BOARD IN)	1417	(8P)	1
475001413	HNS-1413 (BOARD IN)	1417	(14P)	1
475001414	HNS-1414	M. PRT	ENCODER (3P)	1
475001415	HNS-1415	M. PRT	LCD BACK LIGHT (3P)	1
475001416	HNS-1416	M. PRT	AC (3P)	1
475001417	HNS-1417	M. PRT	LCD (20P FLAT)	1
IC SOCKETS				
480001324	DICF-32CS-E 32P	1415		6
480010280	PLPS-N84B-T	1415		1
DIN SOCKET				
480010200	YKF51-5046	1416		1
LITHIC BATTERY				
520001700	CR2032	1415		1
SW. UNIT FOR KEYBOARD				
522000200	NB11620	M. PRT		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P. C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
INLET SOCKETS				
540012300	PA-125-BS	M. PRT	240UK	1
540012400	PA-125-CU	M. PRT	117EX	1
			117CN	1
			220SC	1
			100JP	1
			220FR	1
			220SE	1
			220GE	1
			117US	1
			220WG	1
			240AU	1
			240GE	1
			240AF	1
P. C. BOARD SPACER				
540016800	MSPLS-3	M. PRT		2
SMCD				
545020410	32X120BDX10Pl. 25S6	M. PRT		1
LED SPACER				
575014600	LS-15-4	M. PRT		1
ROTARY ENCODER KNOB				
620018400		M. PRT		1
SLIDE VR KNOB				
620019700		M. PRT	FOR X-631	1
POWER SW. KNOB				
620021600		M. PRT	FOR X-825M	1
SW. KNOB				
620022100		M. PRT		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P. C. BOARD	IDENTIFICATION NO. FUNCTION	Q' TY
JOYSTICK KNOB				
620022200		M. PRT		1
LCD WINDOW				
630012600		M. PRT		1
SHIELD SHEET				
630013800		M. PRT		1
CARD GUIDE				
640088500		M. PRT	FOR X-614	1
CARD ANGLE				
640092000		M. PRT	FOR X-631	1
JACK PLATE				
641007800		1416	FOR X-813A	1
ANGLE TYPE L				
641008100		M. PRT	FOR X-831A	2
PANEL				
641011000		M. PRT		1
LOWER CASE				
641011100		M. PRT		1
KEYBOARD FRONT ANGLE				
641011200		M. PRT		1
SIDE CHASSISES				
641011300	L	M. PRT		1
641011301	R	M. PRT		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P. C. BOARD	IDENTIFICATION NO. FUNCTION	Q' TY
WHEEL ANGLE				
641011400		M. PRT		2
POWER UNIT CHASSIS				
641011500		M. PRT		1
KEYBOARD REAR ANGLES				
641011600	A	M. PRT		1
641011601	B	M. PRT		1
JOYSTICK ANGLE				
641011700		M. PRT		1
WHEEL PANEL SUPPORT				
641013300		M. PRT		2
SHIELD PLATE				
641016900	FOR WHEEL	M. PRT		1
WHEEL SPRING				
644005200		M. PRT		1
PCM CARD SLOT				
646028300		M. PRT		1
CONTROL WHEEL				
646034100	BLK	M. PRT		2
WHEEL PANEL				
646034200		M. PRT		1
JOYSTICK GUIDE				
646034300		M. PRT		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P. C. BOARD	IDENTIFICATION NO. FUNCTION	Q' TY
KEY BLOCK				
646034400		M. PRT		1
LCD HOOD				
646034500		M. PRT		1
SIDE PLATES				
646036100	L	M. PRT		1
646036101	R	M. PRT		1
BATTERY HOLDER				
649007400		1415		1

MEMO

KORG

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

© KORG INC. 1990

0208 CEH. PRINTED IN JAPAN ①