

SERVICE MANUAL

WAVESTATION A/D

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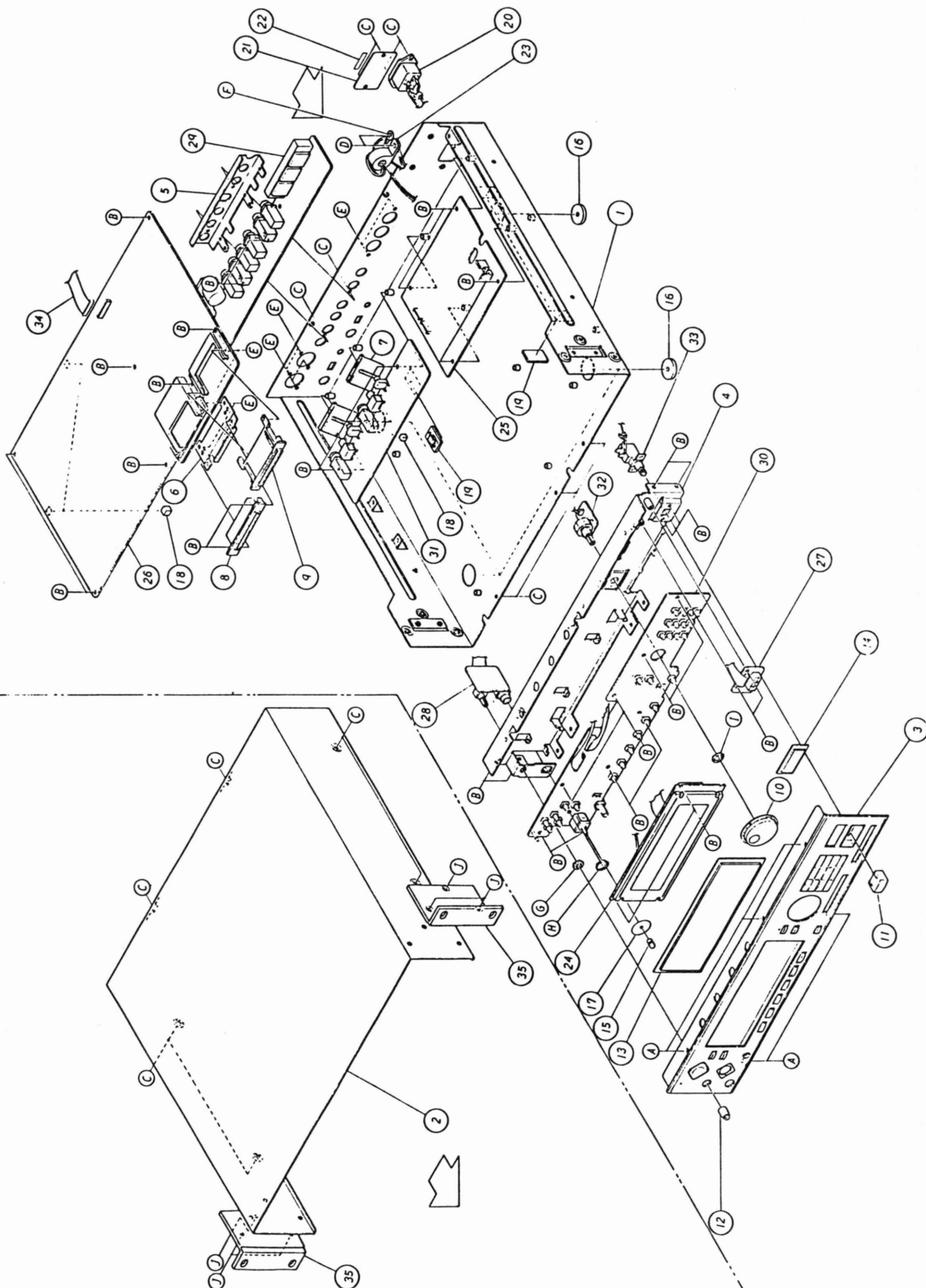
KORG

1. SPECIFICATIONS

System :	Advanced Vector Synthesis 24-bit digital processing, 19-bit DAC
Wave Memory :	484 sampled and single-cycle waveforms
Program Memory :	1 ROM Bank, 3 RAM Banks and 1 Card Bank
Tone generator :	20 bit resolution 32 voices including individual filters, amps, LFOs and envelopes
Macros :	Voicing templates for Pitch, Filter, Amp, Pan, Envl, Analog Inputs and Keyboard / Velocity Zoning
Effects :	55 effects programs Up to 6 simultaneous digital effects, with dynamic modulation
Performances :	200 internal, 50 in card
Patches :	140 internal, 35 in card
Wave Sequences :	128 internal, 32 in card
Wave Sequence Steps :	2000 internal, 500 in card
Multi-Mode Setups :	16 configurations of multi-timbral, 16-channel MIDI reception
Performance Controllers :	Joystick and Master Volume
Control inputs :	Assignable footswitch / pedal 1 and 2
Card slots :	PCM data, PROG data
MIDI :	IN, OUT, THRU Extensive Multi-timbral capability
Display :	64 x 240 pixel back-lit LCD with soft-key menu system
Inputs :	Analog Input 1 and 2 with 64 x oversampling ADC Sensitivity (referred to 0.775v RMS, high impedance) Mic -40 dBu, Line -10 dBu, Pro +4 dBu Input Impedance 47k Ω
Outputs :	1/L, 2/R, Balanced 1/L, 2/R, 3, 4 and headphone
Power consumption :	12W
Dimensions :	430(w) x 89(h) x 406(d) mm
Weight :	5.1kg

※ Specifications, operations and appearance are subject to change without notice.

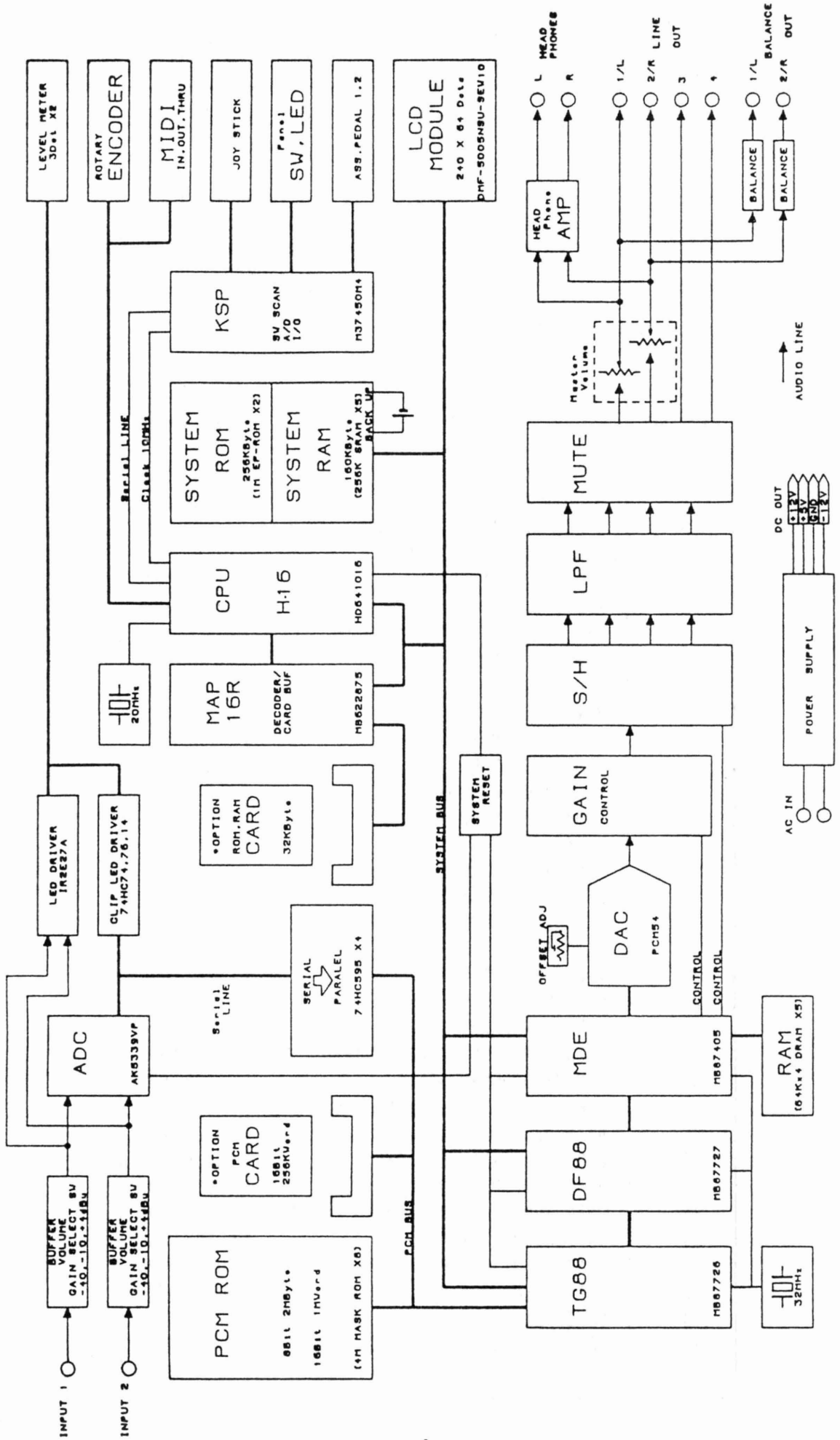
2. STRUCTURAL DIAGRAM



PART NO	SCREWS & NUTS	PART CODE
A	TS F ZMC 3 x 6	791030306
B	CT B ZMC 3 x 6	715230306
C	CT B BZMC 3 x 8	715260308
D	TS SSE ZMC 4 x 10	715130411
E	PLAX B BZMC 3 x 10	745060310
F	LUG ϕ 4 N-3	672001600
G	VN BZMC 7	773060700
H	VN BZMC 12	773061200
I	VN BZMC 9	773060902
J	FE F BZMC 4 x 10	701060410

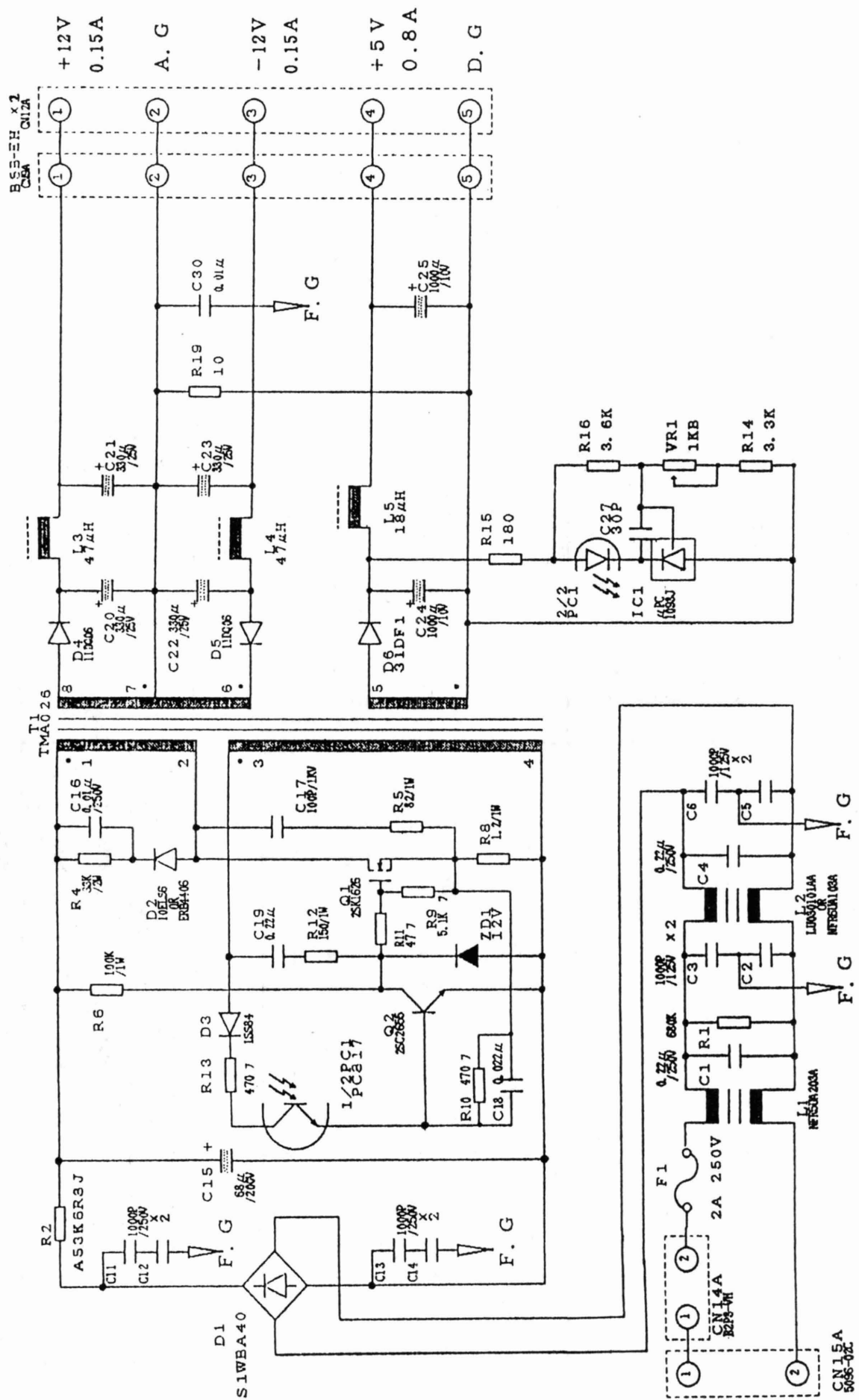
PART NO	PART NAME	PART CODE
1	X-943 LOWER CASE	641021600
2	X-631R UPPER CASE	640094800
3	X-943 FRONT PANEL ASSEMBLY	641022400
4	X-943 FRONT CHASSIS	641021700
5	X-943 JACK PLATE	641021900
6	X-943 CARD SLOT PLATE	641021800
7	GND SPRING PLATE SUS304CSP	644003000
8	PCM CARD SLOT	646028300
9	CARD GUIDE	640088500
10	ROTARY ENCODER KNOB	620018400
11	X-952 POWER SW KNOB	620023100
12	X-943 VR KNOB	620023600
13	X-943 LCD WINDOW	630016000
14	X-943 LED WINDOW	630016100
15	X-943 JOYSTICK KNOB	620024000
16	RUBBER FOOT ϕ 22 x 3	500018300
17	JOYSTICK VR MASK	630016200
18	RUBBER SPACER 10 x 10 t=6	500012900
19	CLIP A-2N	540018100
20	INLET SOCKET	-----
21	NAME PLATE	-----
22	SERIAL NO. SEAL	-----
23	DATA LINE FILTER ESD-R-19BD	525000700
24	LCD DMF5005NSU-SEW10	313002400
25	POWER SUPPLY UNIT KLM-891(or 892)	-----
26	MAIN P.C.BOARD KLM-893	001089300
27	LED P.C.BOARD KLM-894	001089400
28	HEADPHONE P.C.BOARD KLM-895	001089400
29	REAR AUDIO OUT P.C.BOARD KLM-896	001089400
30	SW P.C.BOARD KLM-897	001089400
31	REAR INPUT P.C.BOARD KLM-898	001089400
32	ROTARY ENCODER P.C.BOARD KLM-899	001089400
33	POWER SW SDL-1P	375006100
34	HARNESS HNS-941 (BOARD IN)	470194100
35	RACK MOUNT ADAPTER	641022500

3. BLOCK DIAGRAM



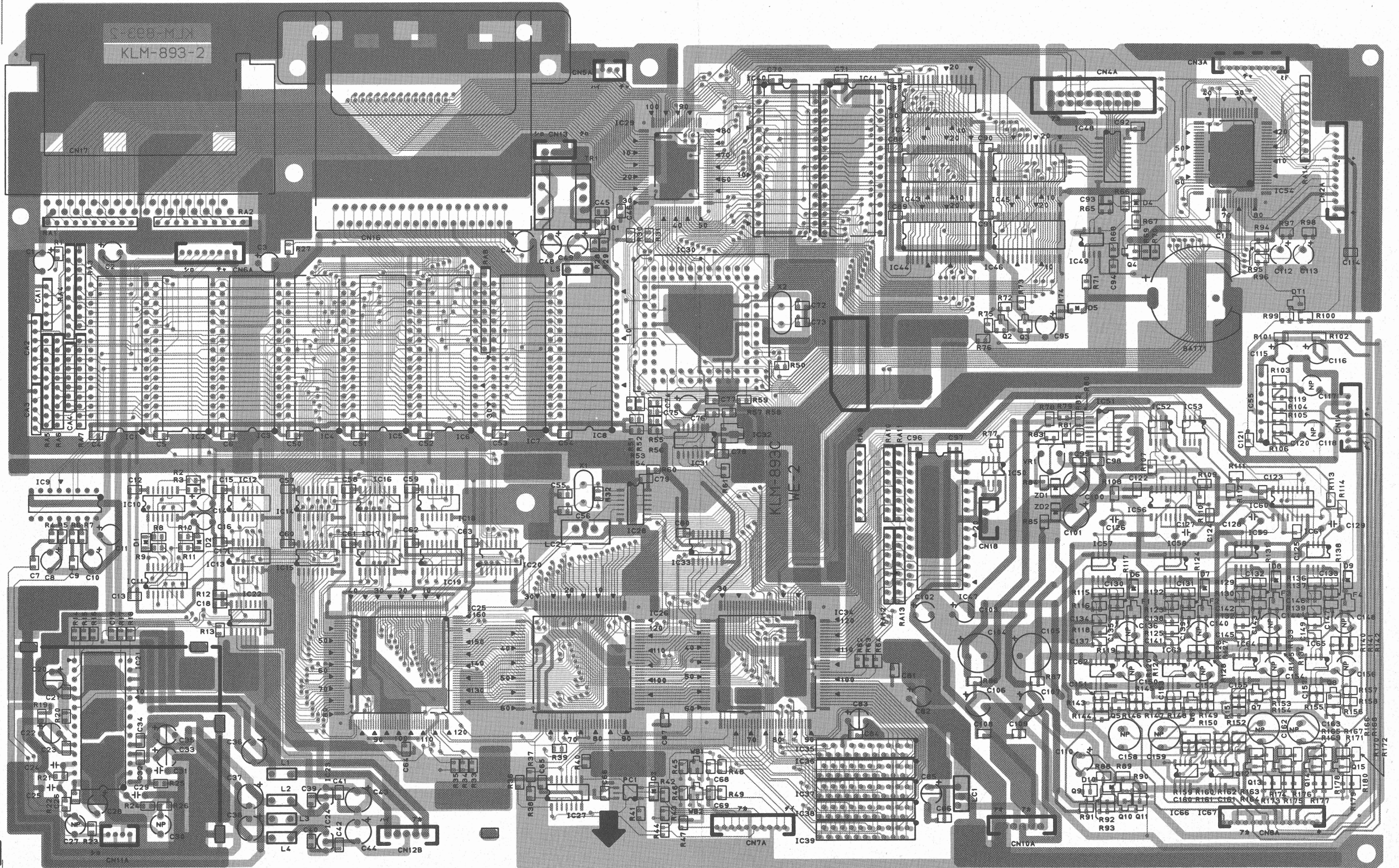
4. CIRCUIT DIAGRAM

KLM-891 (FOR 100V/117V)

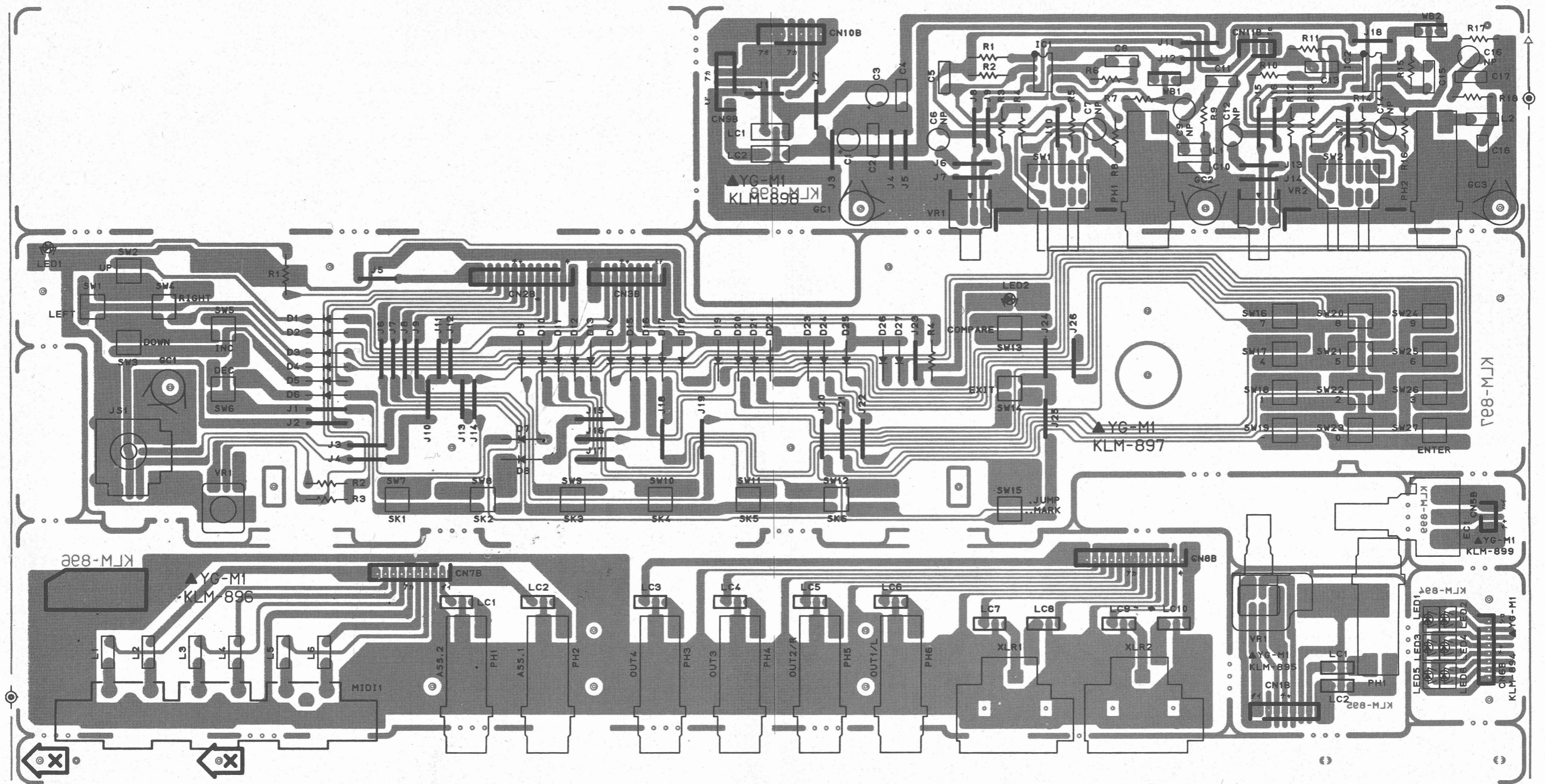


5. P.C. BOARDS

KLM-893C



KLM-894 ~ 899



6. DIAGNOSTIC TEST

《 Before you start the diagnostic test 》

Once this diagnostic test is started, the data in the WS-AD 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, Performance Map, Scales, Multi-Mode Setups.
- * the data which can be saved into a RAM card : Patch of RAM1 (or RAM2 or RAM3), Performance of RAM1 (or RAM2 or RAM3), Wave Sequence of RAM1 (or RAM2 or RAM3).

《 The function of each switch on the test mode 》

- INC...The test proceeds to the next test.
- DEC...The test returns to the previous test.
- SKEY 1~6...The check items in each test are selected.
- MARK/JUMP...The check item proceeds to the next.
- TEN KEYS 0~9...The test number is selected directly.
- EXIT...The internal memory is initialized and the test is finished.

《 Starting the test program 》

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 WS-AD 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 WS-AD, the program proceeds to TEST 1 : PANEL SW & LED CHECK.

Checks which are carried out in the WS-AD

- 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.

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

4. Once the program proceeds to TEST 1 : PANEL SW & LED CHECK, turn the power OFF.

5. Set the WS-AD 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 the 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.

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 the 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, MARK/JUMP, 7, 4, 1, -, 8,
5, 2, 0, 9, 6, 3, ENTER

4. Once the check of all the switches is finished, the 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 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 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 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 the WS-AD 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 or SKEY 2 to proceed to the 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 or SKEY 3 to proceed to the 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 or SKEY4 to proceed to the 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 the level 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 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 correspondence of each SKEY to each output.

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

※ BAL-L, R are selected with MARK/JUMP.

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

OUT-1	less than -84.0 dBm
OUT-2	less than -84.0 dBm
OUT-3	less than -83.0 dBm
OUT-4	less than -83.0 dBm
PH-L	less than -84.0 dBm
PH-R	less than -84.0 dBm
BAL-L	less than -81.5 dBm
BAL-R	less than -81.5 dBm

《 TEST 5 : OUTPUT DISTORTION TEST 》

1. Select the output signal as well as TEST 4 and measure the level and the distortion of the 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 to proceed to TEST 6 : ANALOG INPUT (Level) TEST.

OUT-1	12.0 ~ 16.4 dBm	494 Hz
OUT-2	12.0 ~ 16.4 dBm	415 Hz
OUT-3	13.0 ~ 17.4 dBm	311 Hz
OUT-4	13.0 ~ 17.4 dBm	247 Hz
PH-L	12.1 ~ 16.5 dBm	554 Hz
PH-R	12.1 ~ 16.5 dBm	622 Hz
BAL-L	17.6 ~ 22.0 dBm	554 Hz
BAL-R	17.6 ~ 22.0 dBm	622 Hz

《 TEST 6 : ANALOG INPUT (LEVEL) TEST 》

- ※ The test items from TEST 6 : ANALOG INPUT (LEVEL) TEST to TEST 8 : ANALOG INPUT (DIST/FREQ) TEST are for the inspection at the factory. If not necessary, press the ten key " 9 " and proceed to TEST 9 : A/D CONVERTER TEST.

Connect a noise meter to each output of the rear panel and connect an oscillator to the INPUT LEVEL 1,2. Then, measure the ANALOG INPUT level. Set the VRs of the INPUT LEVEL 1,2 to the center.

Input the sine wave of 1KHz regulation level.

For example, in case that the regulation range is +4dB, set the output level of the oscillator to +4dBm and input the sine wave.

1. Press SKEY1 to check +4dB range (2ch).
Confirm that the signal level which is output from the OUTPUT1 jack is the sine wave whose level is within the regulation when the INPUT LEVEL1 switch is changed to +4dB.
After checking is finished, press MARK/JUMP or SKEY2 to proceed to the next check.
2. Confirm that the signal level which is output from the OUTPUT2 jack is the sine wave whose level is within the regulation when the INPUT LEVEL2 switch is changed to +4dB.
After checking is finished, press MARK/JUMP or SKEY3 to proceed to the next check.

3. Check the range of -10, -40dB as well.
4. After all the checks are finished, press MARK/JUMP to proceed to the ANALOG INPUT (LED/NOISE) TEST.

+ 4 d B	6. 4 ~ 1 0. 8 d B m
- 1 0 d B	6. 3 ~ 1 0. 7 d B m
- 4 0 d B	7. 0 ~ 1 1. 4 d B m

each regulation range (common for 1 and 2 channels)

《 TEST 7 : ANALOG INPUT (LED/NOISE) TEST 》

Check the lighting and the noise of ANALOG INPUT.

Each INPUT LEVEL should be set to " -10 " and each INPUT LEVEL VR should be set to the center.

Input the sine wave of 1KHz 0dB μ into the INPUT1,2.

1. Press SKEY1 and check the INPUT1 LED.
Confirm that the LEDs of CLIP, 0, -10 of INPUT1 light.
2. Lower the signal level which is input into the INPUT1 and confirm the input signal level which appears shortly before the CLIP's LED goes out is within the regulation.
3. Lower the input signal level more and confirm the input signal levels which appear shortly before the LEDs of 0 and -10 go out is within the regulation as well.
4. Check the LEDs of INPUT2.
Confirm each input signal level which appears shortly before each LED goes out as well as the check of INPUT1.
After finishing this check, press SKEY3 to proceed to the next check.
5. Remove the oscillator from INPUT1,2 and keep the unit as nothing is input.
Connect a noise meter to OUTPUT1 and confirm that the noise level is within the regulation.
After checking is finished, press MARK/JUMP to proceed to the ANALOG INPUT (DIST/FREQ) TEST.

CLIP	-2.5 ~ -4.5 dBm
0	-9.5 ~ -11.5 dBm
-10	-19.5 ~ -21.5 dBm
NOISE LEVEL	less than -71.5 dBm

the signal level which appears shortly before each LED goes out and the Analog Input noise (common for 1 and 2 channels)

《 TEST 8 : ANALOG INPUT (DIST/FREQ) TEST 》

Set the INPUT LEVEL switch to " -10 ".

Input the sine wave of 1KHz (-10dBm) to INPUT1,2.

1. Press SKEY1 and confirm the distortion of INPUT1.
Connect an oscilloscope to OUTPUT1 and adjust the INPUT1 LEVEL VR as the output signal level becomes +10dBm.
Confirm that there is no distortion on the output waveform at the time.
After finishing this check, press SKEY2 to proceed to the next check.
2. Connect an oscilloscope to OUTPUT2 and adjust the INPUT2 LEVEL VR as the output signal level becomes +10dBm.
Confirm that there is no distortion on the output waveform at the time.
After finishing this check, press SKEY3 to proceed to the next check.
3. Input the sine wave of 24Hz (-10dBm) to INPUT1.
Confirm that the output signal level of OUTPUT1 is more than the regulation value.
After finishing this check, press SKEY4 to proceed to the next check.
4. Input the sine wave of 24Hz (-10dBm) to INPUT2.
Confirm that the output signal level of OUTPUT2 is more than the regulation value.
After finishing this check, press SKEY5 to proceed to the next check.
5. Input the sine wave of 13KHz (-10dBm) to INPUT1.
Confirm that the output signal level of OUTPUT1 is more than the regulation value.
After finishing this check, press SKEY6 to proceed to the next check.
6. Input the sine wave of 13KHz (-10dBm) to INPUT2.
Confirm that the output signal level of OUTPUT2 is more than the regulation value.
After finishing this check, press MARK/JUMP to proceed to the A/D CONVERTER TEST.

DISTORTION	less than 1.2 [%] (-38.4dBm)
FREQUENCY RESPONSE (24Hz)	more than +8.8 dBm
FREQUENCY RESPONSE (13KHz)	more than +6.0 dBm

the regulation value of the distortion and the frequency response
(common for 1 and 2 channels)

《 TEST 9 : 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 to proceed to the next.

2. Confirm the values of ASS-1 and ASS-2 are indicated in the LCD.
Then, connect the EXP-2 to ASS-1 and ASS-2.
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.

If this test is N.G., check the Vector Position 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 and select any test with 10 KEY SWs.

《 TEST 0 : AD MONITOR 》

In this test the A/D values of the battery voltage, the vector position, the pedals etc. can be monitored.

Also, the PCM check sum test of the WAVE ROM is included in this test.

Internal PCM check sum

1. The WAVE ROMs (IC5~IC8) on the main p.c.board are checked.
2. When SKEY1 is pressed, this check is automatically performed.
It takes about 4 minutes to check this.
The following is indicated in the LCD during the check.

Verifying PCM ROMs...
This takes about 4 min !

3. If this check is O.K., the following is indicated in the LCD.

PCM ROMs Verify OK

If it is N.G., check the IC5~IC8.

4. After finishing this check, press MARK/JUMP once and proceed to the A/D monitor screen.

Expansion PCM check sum

1. The WAVE ROMs (IC1~IC4) on the main p.c.board are checked.
2. When SKEY2 is pressed, this check is automatically performed.
It takes about 4 minutes to check this.
The following is indicated in the LCD during the check.

Verifying PCM ROMs...
This takes about 4 min !

3. If this check is O.K., the following is indicated in the LCD.

PCM ROMs Verify OK

If it is N.G., check the IC1~IC4.

4. After finishing this check, press MARK/JUMP once and proceed to the A/D monitor screen.

《 FINISHING THE DIAGNOSTIC TEST 》

1. Pull out the PCM card (MSC-01) and the test card (DIAG. CARD).
2. Press EXIT.
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.

《 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 (" 29h " in case of the WS-AD)

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 29 7F F7	→	RESET OF JIG. FOR FACTORY
F0 42 22 29 6E 00 F7]	INTERNAL RAM CHECK
F0 42 22 29 6C 01 00 F7		
F0 42 22 29 6E 04 F7]	RAM CARD CHECK
F0 42 22 29 6C 01 00 F7		
F0 42 22 29 6E 01 F7]	LSI INTERFACE (LCD) CHECK
F0 42 22 29 6C 01 00 F7		
F0 42 22 29 7F F7		
F0 42 22 29 6E 01 F7]	LSI INTERFACE (MDE) CHECK
F0 42 22 29 6C 02 00 F7		
F0 42 22 29 ** ** ** **		

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

FO 42 22 29 6E 00 F7
 EXCLUSIVE ↑ FACTORY ↑ INTERNAL ↑ EOX
 KORG ID ID WS-AD CHECK CHECK NO.

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

FO 42 22 29 6C 01 00 F7
 EXCLUSIVE ↑ FACTORY ↑ CHECK ↑ RESULT ↑
 KORG ID ID WS-AD 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 (IC46)	RAMP1 (00)
02	FAIL	RAM 2 (IC43)	RAMP1 (00)
03	FAIL	RAM 3 (IC45)	RAMP1 (00)
04	FAIL	RAM 4 (IC42)	RAMP1 (00)
05	FAIL	RAM 5 (IC44)	RAMP1 (00)
11	FAIL	RAM 1 (IC46)	RAMP2 (01)
12	FAIL	RAM 2 (IC43)	RAMP2 (01)
13	FAIL	RAM 3 (IC45)	RAMP2 (01)
14	FAIL	RAM 4 (IC42)	RAMP2 (01)
15	FAIL	RAM 5 (IC44)	RAMP2 (01)
51	FAIL	RAM 1 (IC46)	RAMP3 (55)
52	FAIL	RAM 2 (IC43)	RAMP3 (55)
53	FAIL	RAM 3 (IC45)	RAMP3 (55)
54	FAIL	RAM 4 (IC42)	RAMP3 (55)
55	FAIL	RAM 5 (IC44)	RAMP3 (55)
A1	FAIL	RAM 1 (IC46)	RAMP4 (AA)
A2	FAIL	RAM 2 (IC43)	RAMP4 (AA)
A3	FAIL	RAM 3 (IC45)	RAMP4 (AA)
A4	FAIL	RAM 4 (IC42)	RAMP4 (AA)
A5	FAIL	RAM 5 (IC44)	RAMP4 (AA)

《 04 : RAM CARD CHECK 》

STEP 1

RESULT NO.	RESULT	RAM PATTERN
00	PASS	
01	FAIL	RAMP1 (00)
11	FAIL	RAMP2 (01)
51	FAIL	RAMP3 (55)
A1	FAIL	RAMP4 (AA)

《 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.

7. 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, RAM2 and RAM3.
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 to load the data into the product.
3. Insert a new RAM card into the program data slot.
4. Press D-OUT 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 normal mode.

8. HARDWARE SPECIFICATIONS

The WS-A/D's hardware is composed of the following p.c.boards.

KLM-891 : POWER SUPPLY P.C.B. (FOR 100V / 117V)
KLM-892 : POWER SUPPLY P.C.B. (FOR 220V / 240V)
KLM-893 : MAIN P.C.B.
KLM-894 : LED P.C.B.
KLM-895 : HEADPHONE P.C.B.
KLM-896 : REAR AUDIO OUT P.C.B.
KLM-897 : PANEL SW P.C.B.
KLM-898 : REAR INPUT P.C.B.
KLM-899 : ROTARY ENCODER P.C.B.

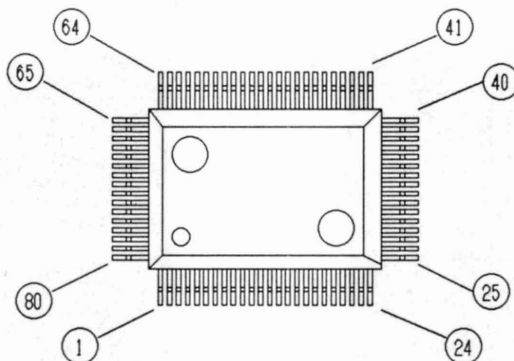
The main p.c.board is composed of the following ICs mainly.

HD641016CP10 : CPU IC30
MB622875 : MAP16R (ADDRESS DECODER, CARD BUFFER) IC29
MB87726 : TG88 (TONE GENERATOR) IC25
MB87727 : DF88 (DIGITAL FILTER) IC26
MB87405 : MDE (MULTI DIGITAL EFFECT) IC34
M37450M4 : KSP (SW SCAN, A/D, I/O) IC54
AK5339 : A/D CONVERTER IC21
UPD27C1000AD-15 : SYSTEM ROM IC40, IC41
UPD43256AC-15L : SYSTEM RAM IC42~IC46
M5M4464AL-12 : WORK RAM FOR MDE IC35~IC39
PCM54HP-005 : D/A CONVERTER IC47
MB834000A-20P-G-4P0 : WAVE ROM IC1
MB834000A-20P-G-3P8 : WAVE ROM IC2
MB834000A-20P-G-3P7 : WAVE ROM IC3
MB834000A-20P-G-3P9 : WAVE ROM IC4
MB834000A-20P-G-5E6 : WAVE ROM IC5
MB834000A-20P-G-5E5 : WAVE ROM IC6
UPD23C4001EC-201 : WAVE ROM IC7
UPD23C4001EC-200 : WAVE ROM IC8

9. REFERENCE DATA

M37450M4-616FP (KSP)

PIN ASSIGNMENT



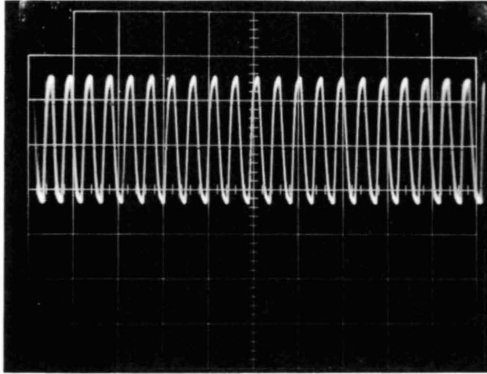
M37450M4-616FP (KSP)

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
Φ	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

CHECK POINT FOR M37450M4-616FP

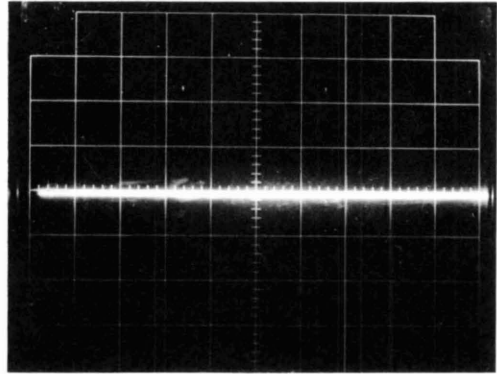
1. XIN



T=0.1μS

2V/0.2μS div

2. RXD



2V/5mS div

HD641016CP10

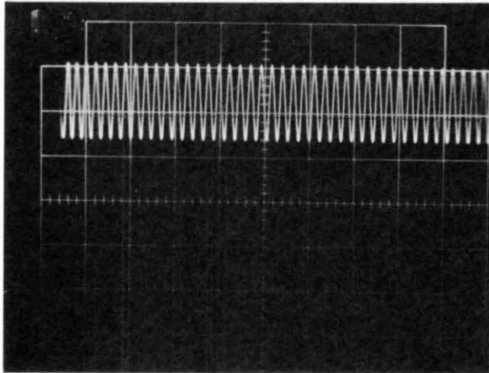
PIN FUNCTION

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	RXDO RXD1	I	RECEIVE DATA (CHANNEL 0, 1)
	TXDO TXD1	O	TRANSMIT DATA (CHANNEL 0, 1)
	RXCO RXC1	I/O	RECEIVE CLOCK (CHANNEL 0, 1)
	TXCO TXC1	I/O	TRANSMIT CLOCK (CHANNEL 0, 1)
	RTSO RTS1	O	MODEM CONTROL (CHANNEL 0, 1)
	CTSO CTS1	I	
	DCDO DCD1	I	
INTERRUPT CONTROL	NMI	I	NON MASKABLE INTERRUPT
	IRQ0, IRQ1	I	INTERRUPT REQUEST
	IACK	O	INTERRUPT ACKNOWLEDGE
DMA	DREQ0~ DREQ3	I	DMA REQUEST (CHANNEL 0 ~ 3)
	DACK0~ DACK3	O	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	PCSO, PCS1	O	PROGRAMMABLE CHIP SELECT

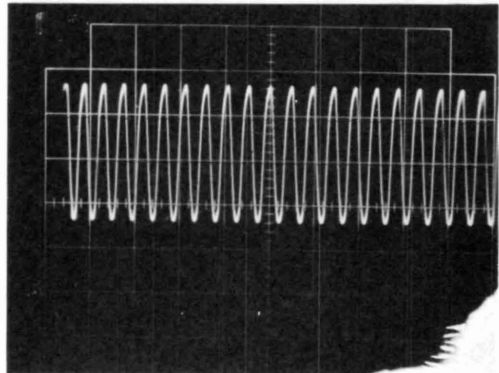
CHECK POINT FOR HD641016CP10

1. XTAL



1V/0.2uS div

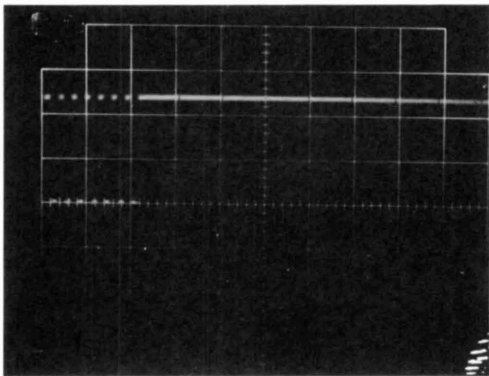
2. CLOCK



T=0.1uS

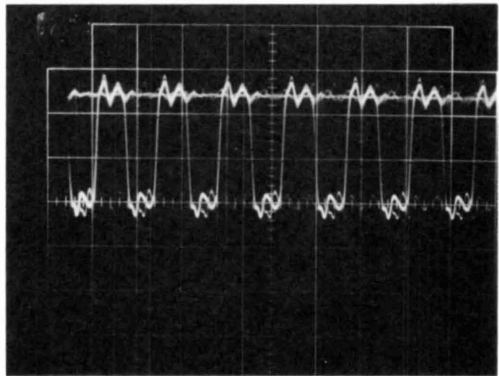
2/0.2uS div

3. SCLK



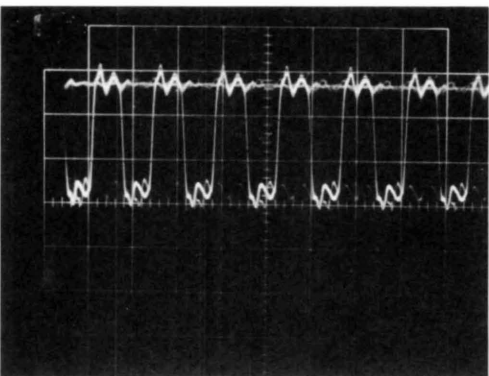
2V/5uS div

4. HDS



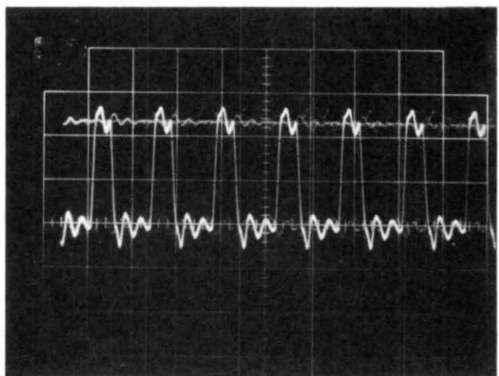
2V/0.2uS div

5. LDS



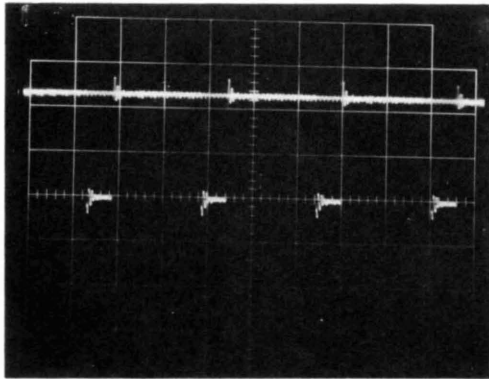
2V/0.2uS div

6. AS



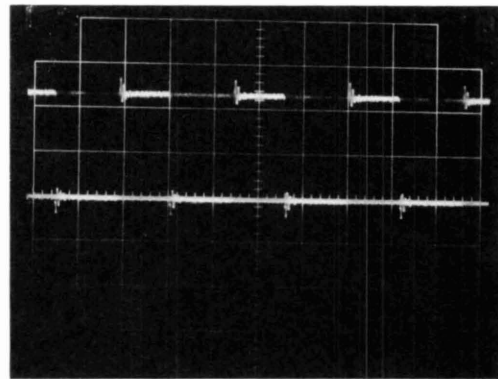
2V/0.2uS div

7. R/W



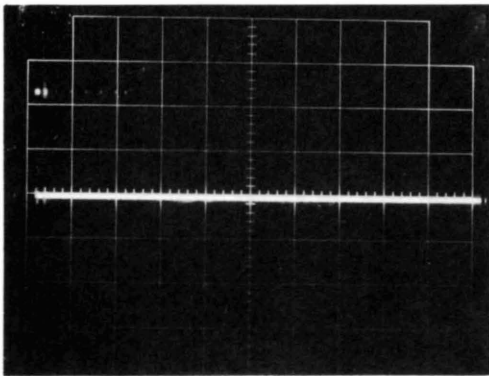
2V/1uS div

8. PCS0



2V/1uS div

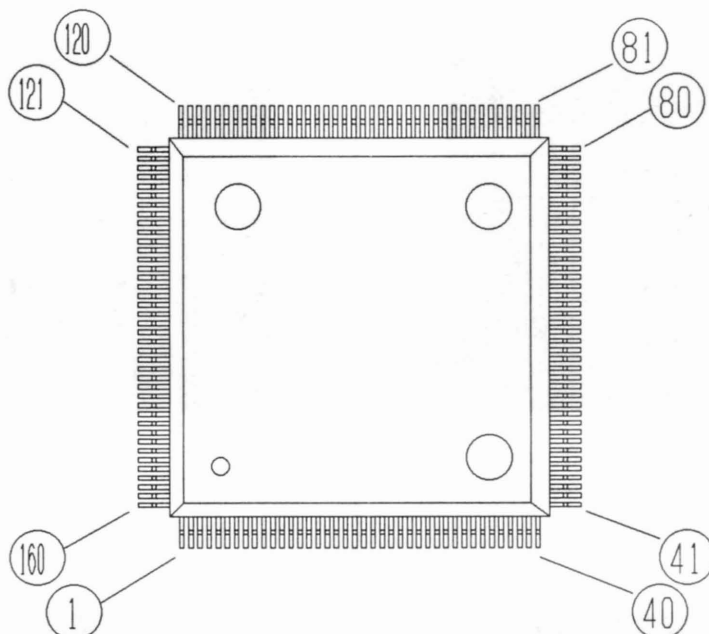
9. PCS1



2V/10uS div

MB87726 (TG88)

PIN ASSIGNMENT



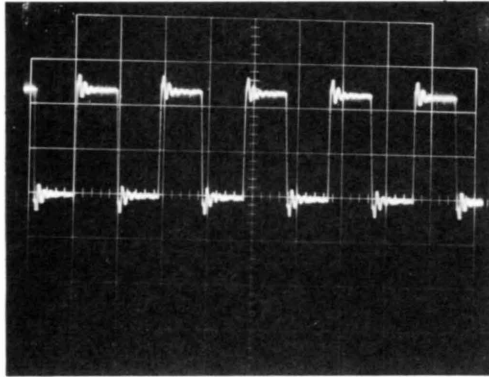
MB87726 (TG88)

PIN FUNCTION

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

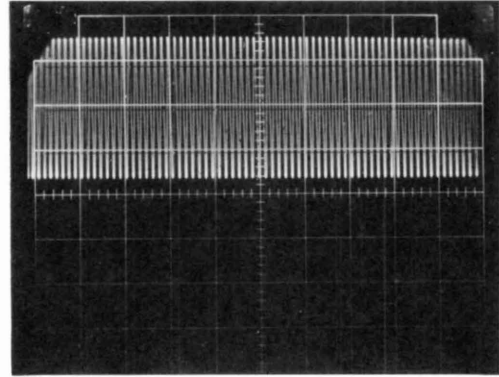
CHECK POINT FOR MB87726

1. OWEF



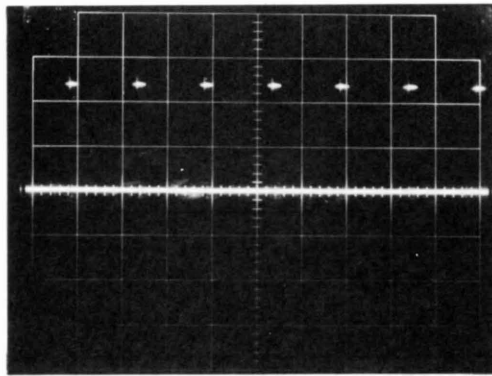
duty cycle of 50% $T=0.1\mu\text{S}$
2V/0.5 μS div

2. CLK



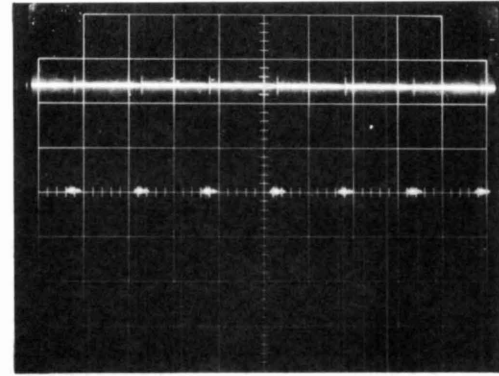
1V/0.2 μS div

3. 0D0~0D18

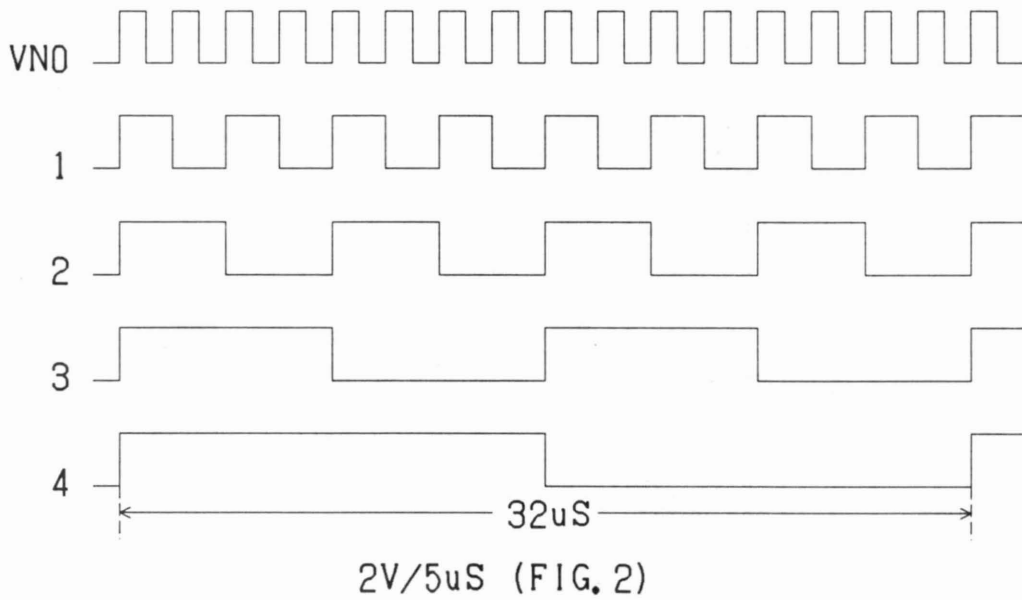


2V/20 μS div

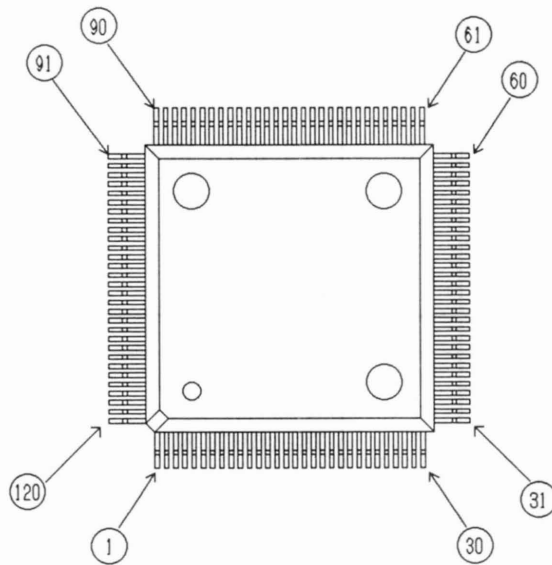
4. 0D19



2V/20 μS div



MB87727 (DF88)
PIN ASSIGNMENT



MB87727 (DF88)
PIN FUNCTION

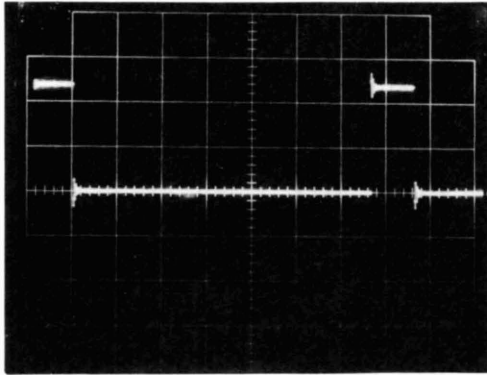
NO.	I/O	PIN NAME	GROUP	NOTE
1	-	VSS	-	
2	I	A0	A	CPU ADDRESS
3	I	A1		
4	I	A2		
5	I	A3		
6	I	A4		
7	I	A5		
8	I	A6		
9	I	A7		
10	I	A8		
11	-	VSS	-	
12	I	A9	B	CPU ADDRESS
13	I/O	D0		CPU DATA BUS
14	I/O	D1		
15	I/O	D2		
16	-	VDD	-	
17	I/O	D3	B	CPU DATA BUS
18	I/O	D4		
19	I/O	D5		
20	I/O	D6		

NO.	I/O	PIN NAME	GROUP	NOTE
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		
31	-	VSS	-	
32	I	IVNO	D	TG VOICE NO.
33	I	IVN1		
34	I	IVN2		
35	I	IVN3		
36	I	IVN4		TG VOICE DATA
37	I	IVDO		
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		
68	I	ITEST		INCIRCUIT TESTER MODE SELECT
69	I	LTEST		LSI TESTER MODE SELECT
70	I	MCK		MASTER CLOCK

NO.	I/O	PIN NAME	GROUP	NOTE
71	-	VSS	-	
72	I	TSELO	H	NOT USE
73	I	TSEL1		
74	I	CLIP		
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
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	SCHEN		SERIAL OUT CH DATA ENABLE
88	0	OD19		VOICE/MIX
89	0	OD18		PARALLEL
90	0	OD17		OUTPUT
91	-	VSS		-
92	0	OD16	J	OUTPUT
93	0	OD15		
94	0	OD14		
95	0	OD13		
96	0	OD12		
97	0	OD11		
98	0	OD10		
99	0	OD9		
100	0	OD8		
101	-	VSS	-	
102	0	OD7	K	OUTPUT
103	0	OD6		
104	0	OD5		
105	0	OD4		
106	-	VDD	-	
107	0	OD3	K	OUTPUT
108	0	OD2		
109	0	OD1		
110	0	OD0		
111	-	VSS	-	
112	0	OVN4	L	PARALLEL OUT
113	0	OVN3		VOICE NO.
114	0	OVN2		
115	0	OVN1		
116	0	OVNO		
117	I	XRD		CPU RD ENABLE
118	I	XWR		CPU WR ENABLE
119	I	XCS	CHIP SELECT	
120	-	VDD	-	

CHECK POINT FOR MB87727

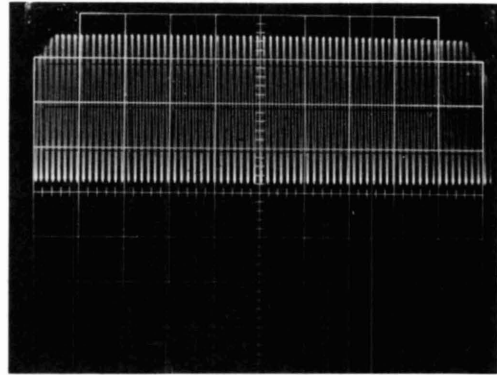
1. OVNO~OVN3



T=16uS

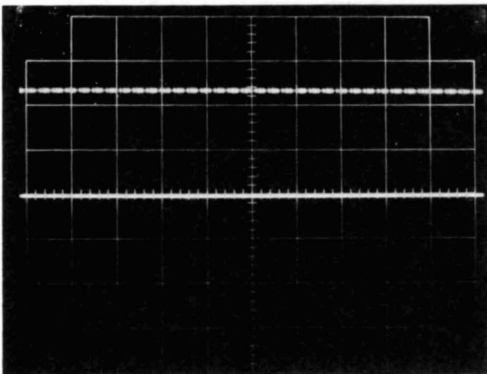
2V/2uS div

2. MCK



2V/0.2uS div

3. ODO~OD19



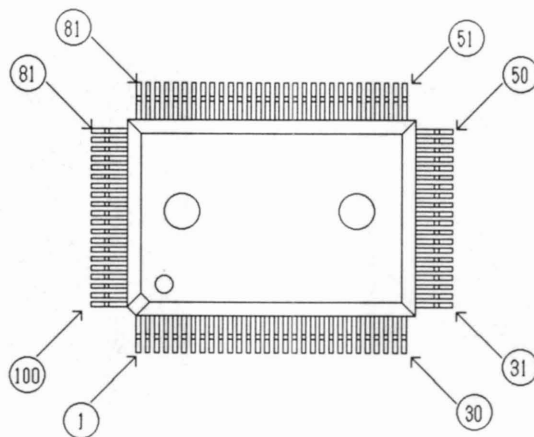
2V/0.1mS div

CLASSIFICATION OF
TERMINALS FOR DF88

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

MB622875 (MAP16R)

PIN ASSIGNMENT



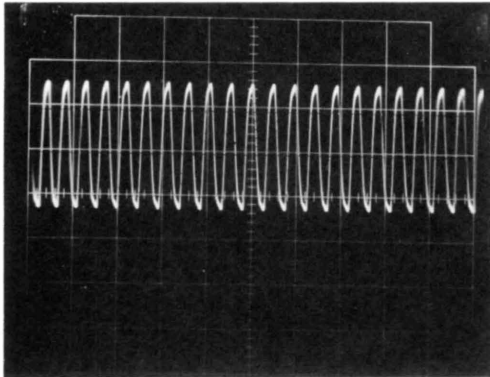
MB622875 (MAP16R)

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	PCSO	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	LDRD
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	CDO	33	I/O	HA16	58	0	A4	83	0	TG88
9	I/O	CD1	34	I/O	HA15	59	0	A5	84	0	DF88
10	I/O	CD2	35	I/O	HA14	60	0	A6	85	0	MDE
11	I/O	CD3	36	I/O	HA13	61	0	A7	86	0	LSOE
12	I/O	CD4	37	I/O	HA12	62	0	A8	87	0	LSWE
13	I/O	CD5	38	I/O	HA11	63	0	A9	88	0	NLOE
14	I/O	CD6	39	I/O	HA10	64	0	A10	89	0	NLWE
15	-	VSS	40	-	VSS	65	-	VSS	90	-	VSS
16	I/O	CD7	41	I/O	HA9	66	0	A11	91	0	MSOE
17	0	CCE	42	I	HA8	67	0	A12	92	0	MSWE
18	0	CA10	43	I	HA7	68	0	A13	93	0	NMOE
19	0	COE	44	I	HA6	69	0	A14	94	0	NMWE
20	0	CA11	45	I	HA5	70	0	A15	95	0	ADDWE
21	0	CA9	46	I	HA4	71	0	A16	96	0	WAIT
22	0	CA8	47	I	HA3	72	I	RESET	97	0	CA12
23	0	CA13	48	I	HA2	73	I	X943	98	0	CA7
24	0	CA14	49	I	HA1	74	0	LCDG	99	0	CA6
25	0	CWR	50	I	CLOCK	75	0	ADDOE	100	0	CA5

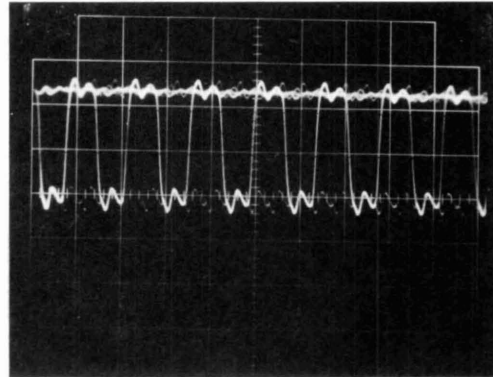
CHECK POINT FOR MB622875

1. CLK



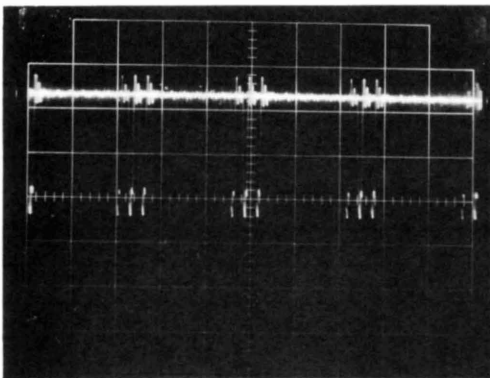
2V/0.2uS div

2. RD



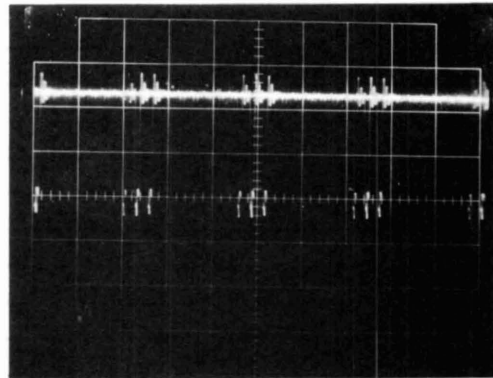
2V/0.2uS div

3. LWR



2V/1uS div

4. LDWR



2V/1uS div

CLASSIFICATION OF TERMINALS FOR MAP16R

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	LDRD, LDWR, LWR
CHIP SELECT	ROM, TG88, DF88, LCD, MDE
SRAM CONTROL	LSOE, LSWE, ADDOE, ADDWE NLOE, NLWE MSOE, MSWE NMOE, NMWE
IC CARD ADDRESS	CA14~CA0
IC CARD DATA BUS	CD7~CDO
IC CARD CONTROL	CCE, COE, CWR
CPU WAIT	WAIT, CLOCK, RESET
POWER SUPPLY	VDD1~VDD4, VSS1~VSS8

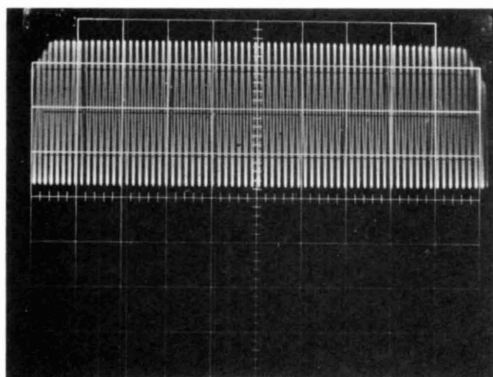
MB87405 (MDE)

PIN FUNCTION

PIN NAME	I/O	PIN NAME	I/O	PIN NAME	I/O
80	I	OE	0	SX1, SX32	0
CS	I	WE	0	PDO~PD19	I
RD	I	RA0~RA7	0	GC	I
WR	I	RDO~RD19	I/O	RESET	I
A0~A2	I	DA0~DA19	0	XTL	I
D0~D7	I/O	SH0~SH3	0	TS0~TS5	I
RAS	0	SAR	I	VDD0~VDD3	---
CAS	0	OL	0	VSS0~VSS7	---

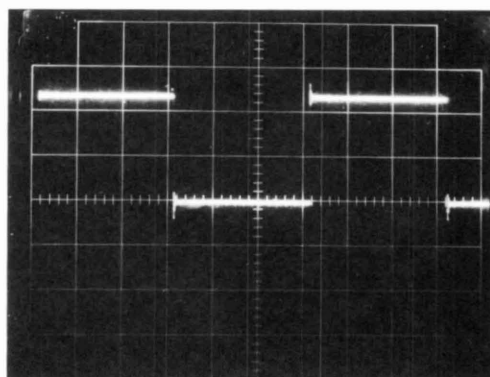
CHECK POINT FOR MB87405

1. XTL



1V/0.2μs div

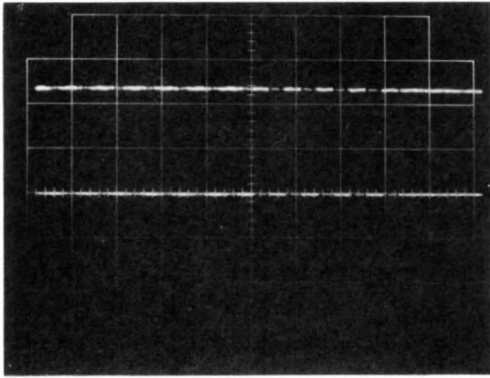
2. SX1



duty cycle of 50% T=32μs

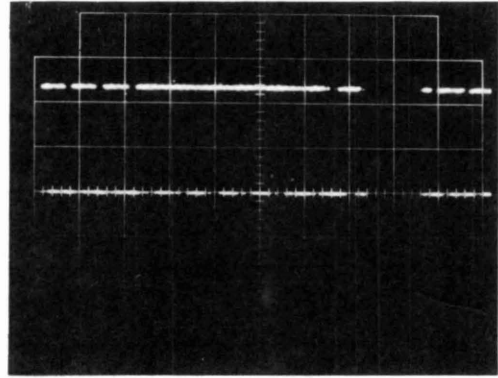
2V/5μs div

3. DA4~DA18



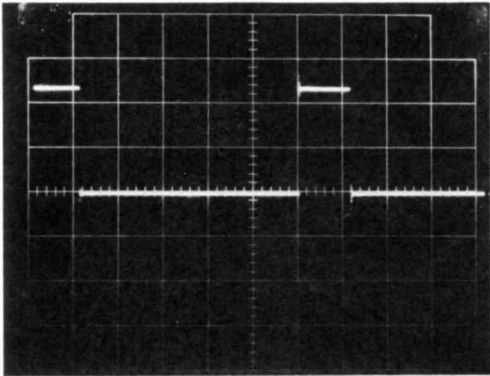
2V/2mS div

4. DA19



2V/10mS div

5. SH0~SH4



2V/5uS div

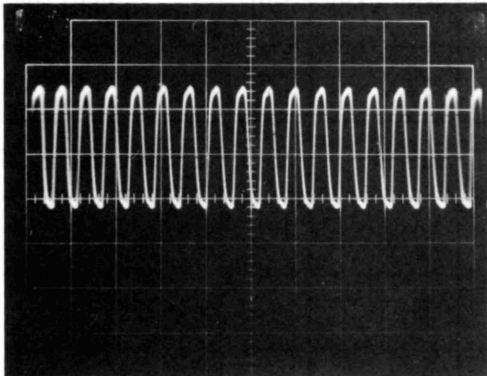
AK5339 (A/D CONVERTER)

PIN FUNCTION

PIN NO	PIN NAME	I/O	FUNCTION	PIN NO	PIN NAME	I/O	FUNCTION
1	AGND	---	ANALOG GROUND	15	SCLK	I/O	SERIAL DATA CLOCK
2	AINL	I	Lch ANALOG INPUT	16	SDATA	O	SERIAL DATA OUTPUT
3	ZEROL	I	Lch ZERO LEVEL IN	17	FSYNC	I/O	FRAME SYNC. CLOCK
4	VA+	---	ANALOG VDD	18	VD+	---	DIGITAL VDD
5	VA-	---	ANALOG VSS	19	DGND	---	DIGITAL GROUND
6	APD	I	ANALOG POWER DOWN	20	CLK	I	MASTER CLOCK INPUT
7	ACAL	I	A. CALIBRATION	21	OCLK	O	128fs CLOCK OUTPUT
8	NC	---	NO CONNECTION	22	NC	---	NO CONNECTION
9	DCAL	O	D. CALIBRATION	23	ICLK	I	128fs CLOCK INPUT
10	DPD	I	DIGITAL POWER DOWN	24	LGND	---	LOGIC GROUND
11	TST	I	TEST	25	VL+	---	LOGIC VDD
12	CMODE	I	MSTR CLOCK SELECT	26	ZEROR	I	Rch ZERO LEVEL IN
13	SMODE	I	I/F CLOCK SELECT	27	AINR	I	Rch ANALOG INPUT
14	L/R	I/O	INPUT CH SELECT	28	VREF	O	REFERENCE VOLTAGE

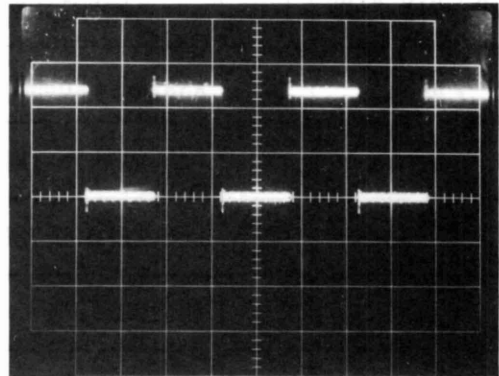
CHECK POINT FOR AK5339-VP

1. CLK



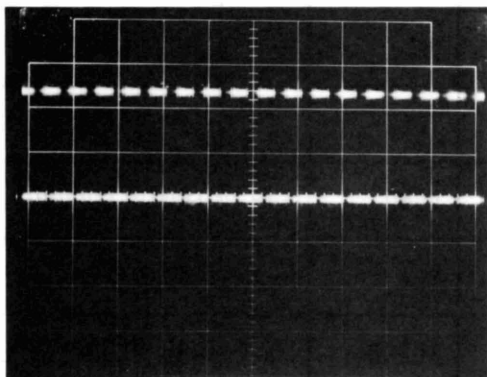
T=0.12uS
2V/0.2uS div

2. L/R



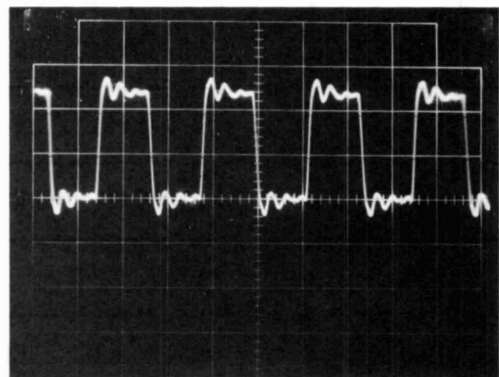
duty cycle of 50% T=32uS
2/10uS div

3. SDATA



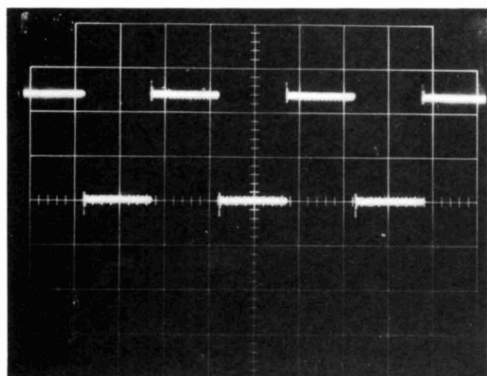
2V/50uS div

4. SCLK



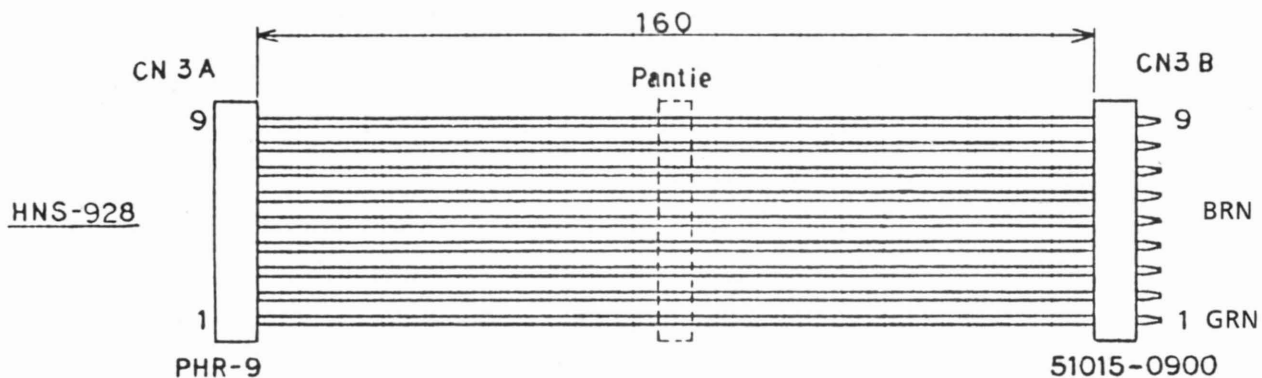
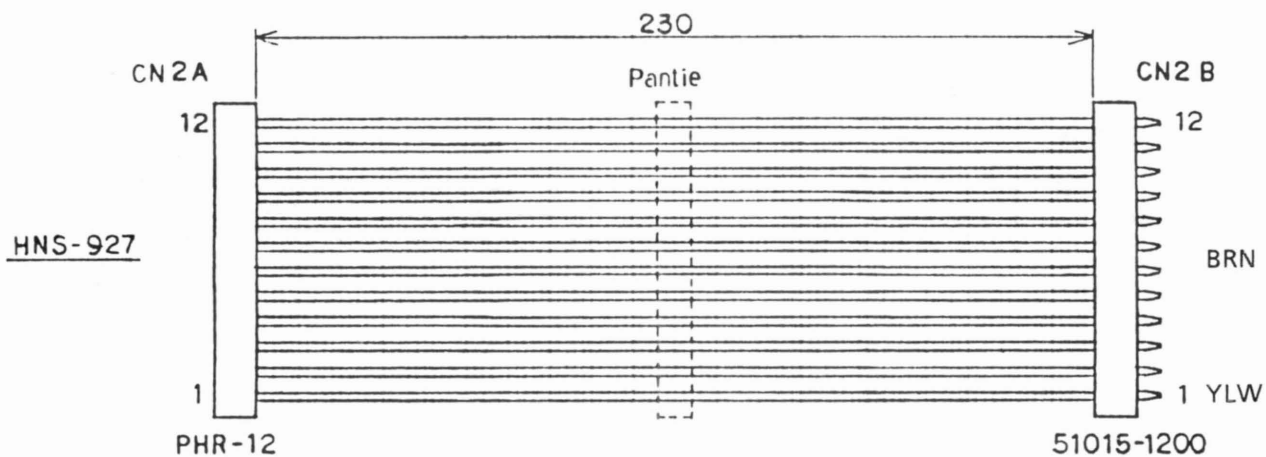
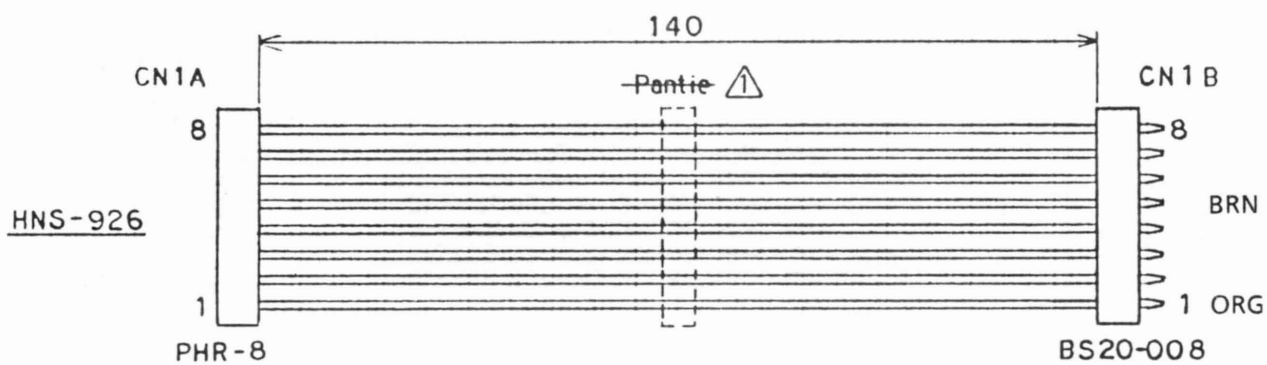
duty cycle of 50% T=4.8uS
2V/10uS div

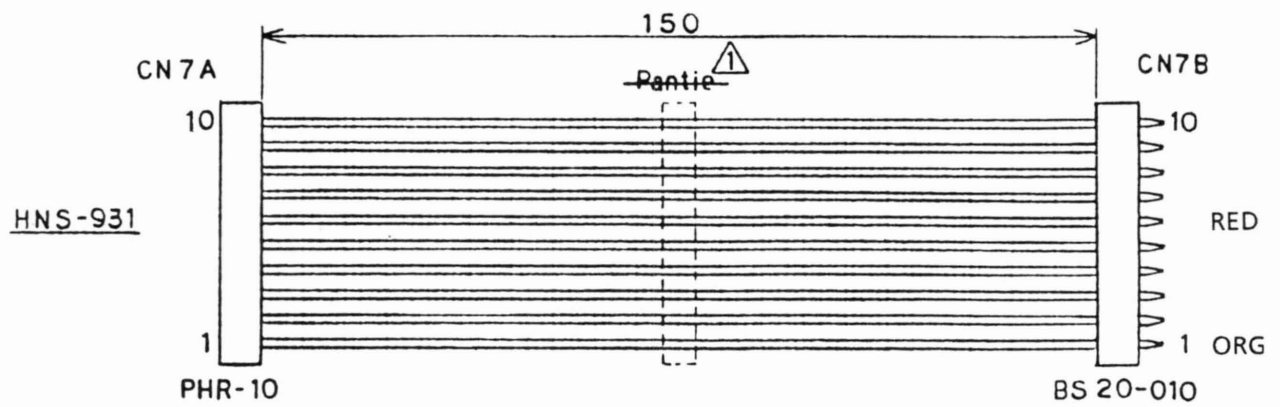
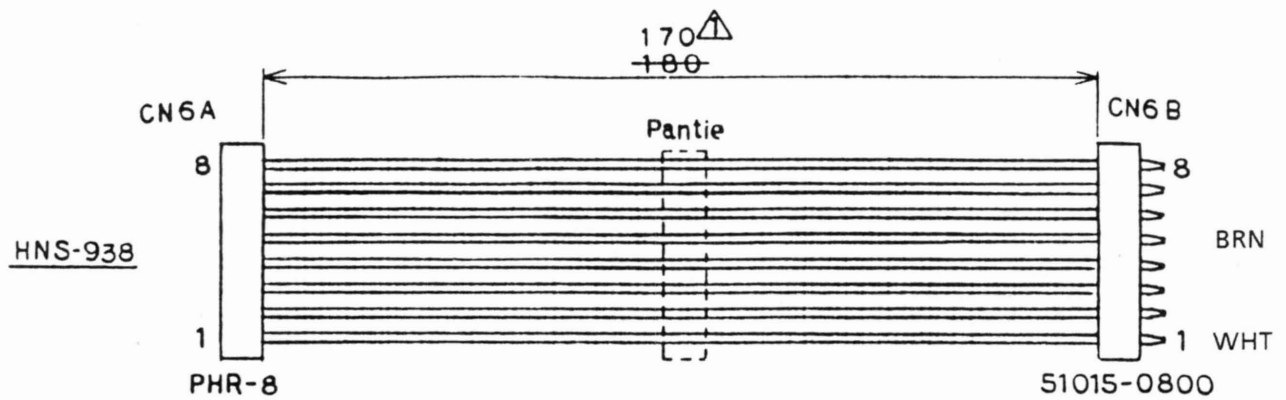
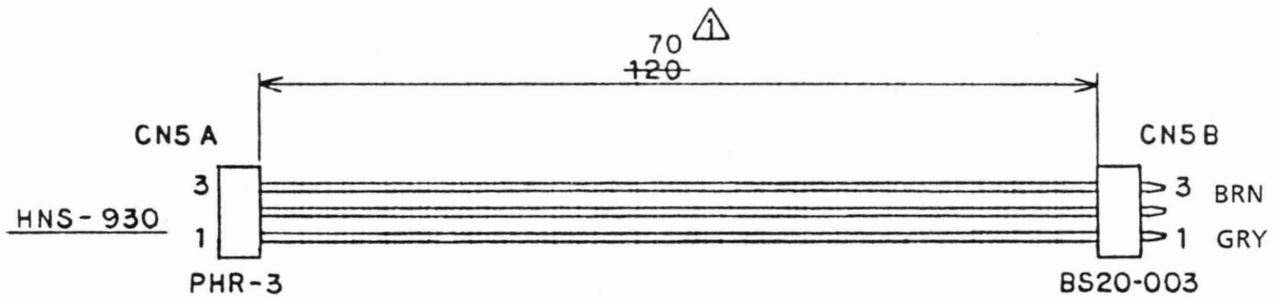
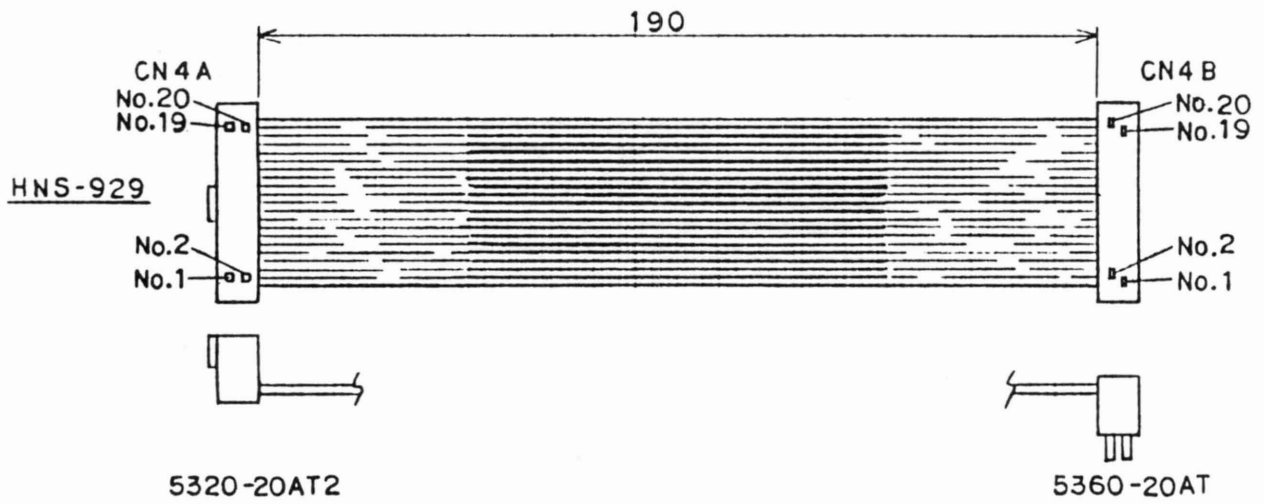
5. FSYNC

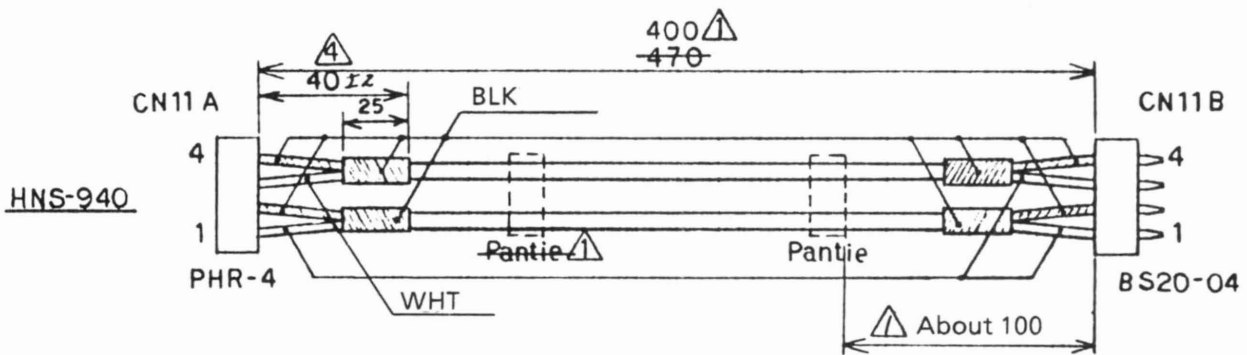
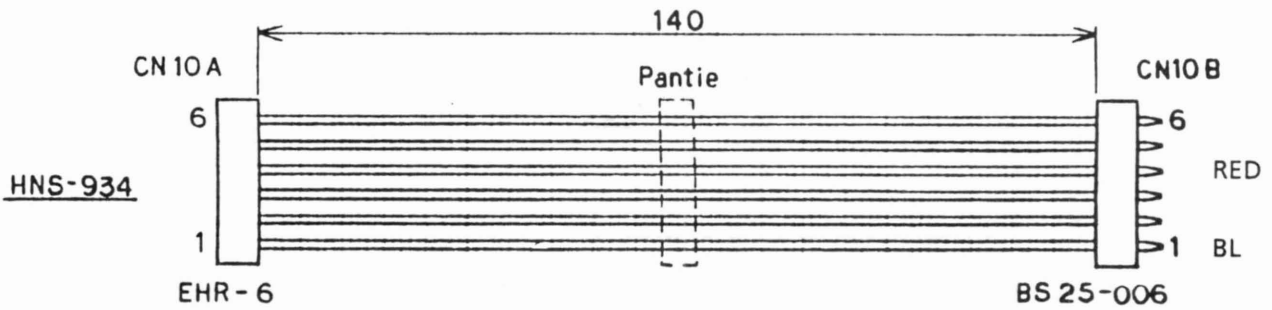
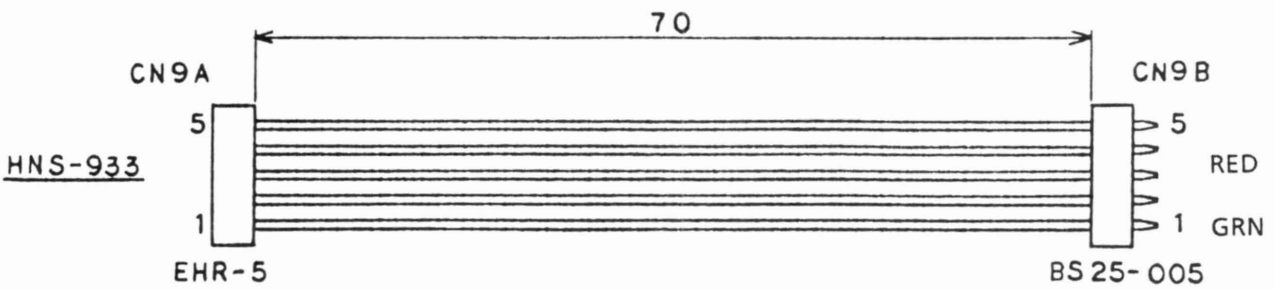
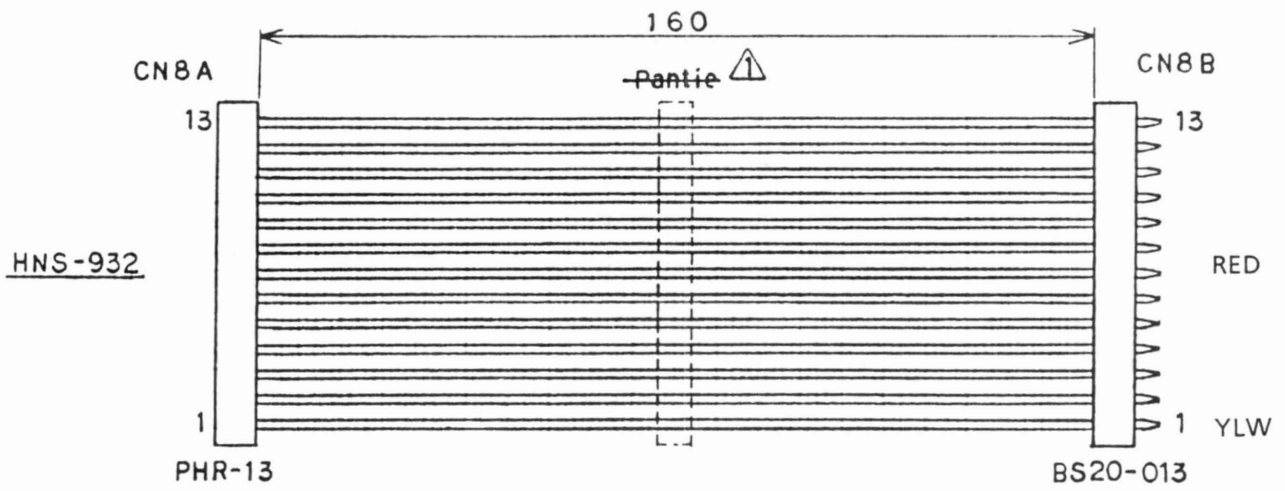


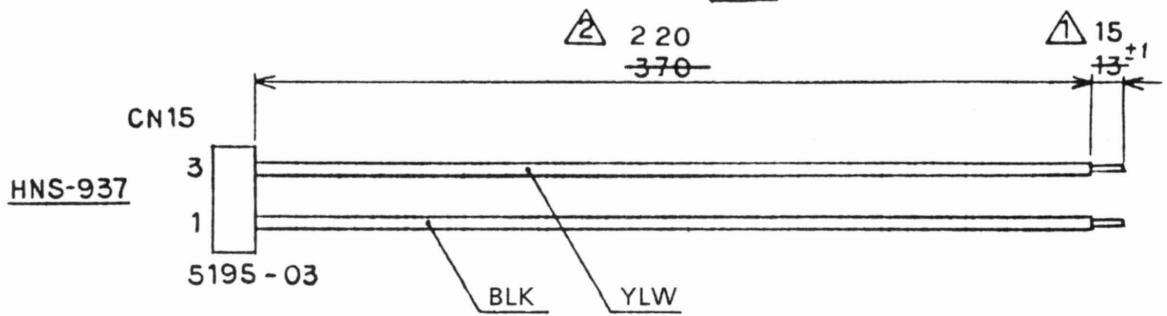
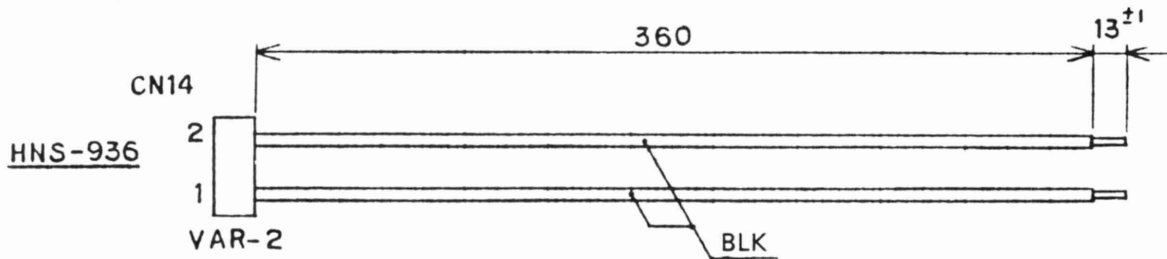
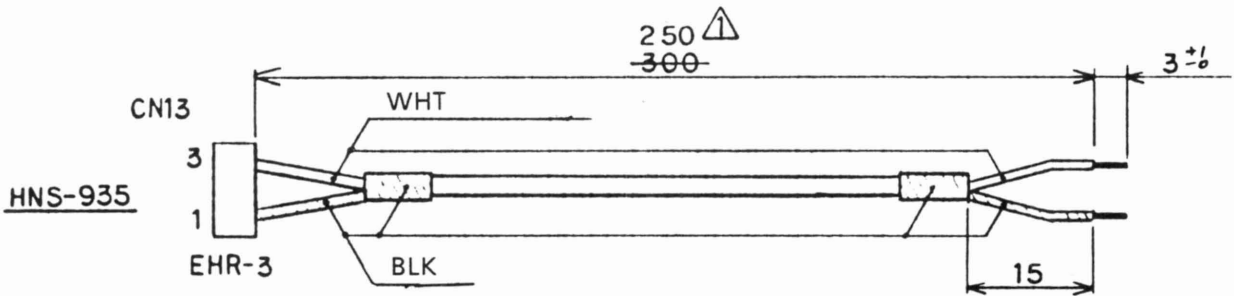
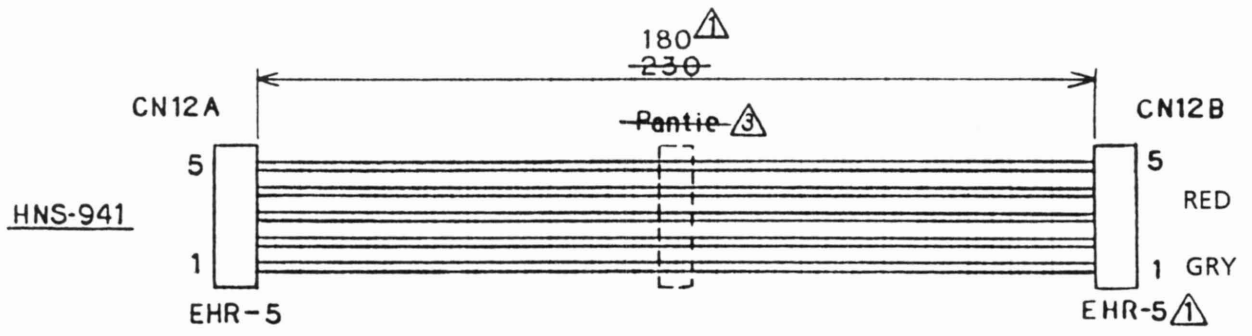
duty cycle of 50% T=16uS
2V/5uS div

FOR HARNESSSES









10. PARTS LIST

PART CODE	PART NAME / SPECIFICATION	P.C. BOARD	NOTE	Q'TY
001089300	P.C. BOARD ASSEMBLY KLM-893	893		1
001089400	P.C. BOARD ASSEMBLY KLM-894-9	894-9		1
002108910	POWER SUPPLY UNIT KLM-891 CSA/JU	M. PART	117US	1
		M. PART	117CN	1
		M. PART	117EX	1
		M. PART	100JP	1
002108920	POWER SUPPLY UNIT KLM-892 E	M. PART	220GE	1
		M. PART	220SE	1
		M. PART	240GE	1
		M. PART	240AU	1
		M. PART	240AF	1
		M. PART	220WG	1
		M. PART	220SC	1
		M. PART	220FR	1
		M. PART	240UK	1

138015020	BLOCK R RGLD5Y101J 100 OHM	893		4
139010013	BLOCK R RGLD8X103J 10K	893		1
139010020	BLOCK R RGLD8X222J 2.2K	893		2
139010021	BLOCK R RGLD9X103J 10K	893		2
139010022	BLOCK R RGLD4Y152J 1.5K	893		5

184050210	FUSE R RF73B2ATD 10 OHM J	893		2
184050222	FUSE R RF73B2ATD 22 OHM J	893		4

219050900	EMI FILTER NFV610-655 T2A 506	893		1
219401300	EMI FILTER DSS306-93B102M100	895		2
		896		10
219401400	EMI FILTER DST310-92D223S50	893		1
		898		2

248015333	BLOCK C 50V330PFX4 EXF-P4331MDW	893		2
248016333	BLOCK C 50V330PFX6 EXF-P6331MDW	893		2

264003456	PPC 100V 5600PF J APSV	893		4
264003510	PPC 100V 10000PF J APSV	893		4

304000070	TR 2SA812-T1 (M5-7)	893		5
304020150	TR 2SC1623-T1B (L7)	893		2
304020230	TR 2SC3661-TA/TB(3K)	893		8
304030140	TR FN1A4M-T1B	893		1

304060070	FET 2SK433-T12-C	893		4

312007800	LED GL3HD8	897		2
312010300	LED LD-105VR	894		2
312010400	LED LD-105MG	894		4

PART CODE	PART NAME / SPECIFICATION	P.C.BOARD	NOTE	Q'TY
313002400	LCD DMF5005NSU-SEW10	M.PART		1
314000300	DIODE 1S-2473 T-77	897		27
314001400	DIODE RLS-73 TE-11	893		10
314025100	ZENER DIODE RD5.1LB1-T1	893		2
315000400	DOUBLE DIODE MC932-T12	898		2
315000500	DOUBLE DIODE MC-2840-T12-1	893		2
320001254	IC UPD23C4001EC-200	893	WAVE ROM	1
320001255	IC UPD23C4001EC-201	893	WAVE ROM	1
320004136	IC HD641016CP10	893	CPU	1
320009004	IC NJM-78L05A	893	REGULATOR	1
320009018	IC NJM-79L05A	893	REGULATOR	1
320011026	IC M5216L	893	OP.AMP	1
320011100	IC M5M4464AL-12 (ZIP)	893	DRAM	5
320011152	IC M37450M4-616FP (QFP)	893	KSP	1
320011126	IC M5220P	898	OP.AMP	2
320012052	IC MB87405PF (QFP120)	893	MDE	1
320012084	IC MB87726PF (QFP160)	893	TG88	1
320012085	IC MB87727PF (QFP120)	893	DF88	1
320012089	IC MB834000A-20P-G-5E5	893	WAVE ROM	1
320012090	IC MB834000A-20P-G-5E6	893	WAVE ROM	1
320012097	IC MBM27C1000-15Z-G	893	EP ROM	2
320012102	IC MB622875PF-G-LBND (QFP100)	893	MAP16R	1
320012109	IC MB834200A-20P-G-3P7	893	WAVE ROM	1
320012110	IC MB834200A-20P-G-3P8	893	WAVE ROM	1
320012111	IC MB834200A-20P-G-3P9	893	WAVE ROM	1
320012112	IC MB834200A-20P-G-4P0	893	WAVE ROM	1
320013037	IC IR2E27A	893	LED DRIVER	1
320018002	IC AK5339	893	A/D CONVERTER	1
320036006	IC PCM54HP-005	893	D/A CONVERTER	1
324001006	IC UPD74HCU04GS-E2 (SOP)	893	HC-MOS	1
324001015	IC UPC4570G2-E2 (SOP)	893	OP.AMP	8
324001018	IC UPD74HC4053GS-E2 (SOP)	893	HC-MOS	2
324001031	IC UPD74HC163GS-E2 (SOP)	893	HC-MOS	1
324004002	IC HD74HC76FP-ER	893	HC-MOS	1
324004006	IC HD74HC00FP-ER	893	HC-MOS	2
324004012	IC HD74HC08FP-ER	893	HC-MOS	1
324004016	IC HD74HC14FP-ER	893	HC-MOS	2
324004024	IC HD74HC74FP-ER	893	HC-MOS	1
324004050	IC HD74HC138FP-ER	893	HC-MOS	1
324004059	IC HD74HC157FP-ER	893	HC-MOS	1
324004092	IC HD74HC245FP-ER	893	HC-MOS	1
324004146	IC HD74HC595FP-ER	893	HC-MOS	4
324009002	IC NJM5532M-T1	893	OP.AMP	2
324011002	IC M5223FP-600C (8P SOP)	893	OP.AMP	1
324011005	IC M5238FP-600C (8P SOP)	893	OP.AMP	3
324011015	IC M74HC05FP-31B (SOP)	893	HC-MOS	1

PART CODE	PART NAME / SPECIFICATION	P. C. BOARD	NOTE	Q'TY
324012006	IC MB84256A-10LPF-G-BND	893	SRAM	5
324017002	IC RH5VA45AA-T	893	RESET	1

334000500	SB COIL SBT-0260 TF	893		1
		896		6
		898		2

334000600	PHOTO COUPLER PC-410K-TP	893		1

335006000	CRYSTAL OSC. AT-49 20.00MHZ	893		1
335006600	CRYSTAL OSC. AT-49 32MHZ	893		1

350002347	SEMI FIXED VR RH0615C S4 47K	893		1
360023700	VR RK09K111(X-943) 1K	898		2
360023800	VR RK09K113(X-943) 10KB	897		1
362005300	VR RK0971220X45A 10KBX2	895		1
362006300	JOYSTICK VR RKJXG130 (10KBX2)	897		1

370004000	ROTARY ENCODER EC16B25D (N08)	899		1

373007700	SLIDE SW SLS-25-2023F	898		2
375006100	POWER SW SDL-1P	M. PART		1
375010500	CHIP SW EVQ-PAC09K-A	897		27

400012500	INVERTER TRANSFORMER TA-042	893		1

454007900	PHONE JACK YKB21-5176	898		2
454008000	PHONE JACK YKB21-5138	895		1
		896		6

470192600	HARNESS HNS-926 (BOARD IN)	895		1
470192700	HARNESS HNS-927 (BOARD IN)	897		1
470192800	HARNESS HNS-928 (BOARD IN)	897		1
470192900	HARNESS HNS-929	M. PART		1
470193000	HARNESS HNS-930	899		1
470193100	HARNESS HNS-931 (BOARD IN)	896		1
470193200	HARNESS HNS-932 (BOARD IN)	896		1
470193300	HARNESS HNS-933 (BOARD IN)	898		1
470193400	HARNESS HNS-934 (BOARD IN)	898		1
470193500	HARNESS HNS-935	M. PART		1
470193600	HARNESS HNS-936	M. PART		1
470193700	HARNESS HNS-937	M. PART		1
470193800	HARNESS HNS-938 (BOARD IN)	894		1
470194000	HARNESS HNS-940 (BOARD IN)	898		1
470194100	HARNESS HNS-941 (BOARD IN)	893		1

471060300	CONNECTOR TOP B3B-EH	893		2
471060500	CONNECTOR TOP B5B-EH	893		1

PART CODE	PART NAME / SPECIFICATION	P. C. BOARD	NOTE	Q'TY
471060600	CONNECTOR TOP B6B-EH	893		1
471070300	CONNECTOR TOP B3B-PH	893		1
471070400	CONNECTOR TOP B4B-PH	893		1
471070800	CONNECTOR TOP B8B-PH	893		2
471070900	CONNECTOR TOP B9B-PH	893		1
471071000	CONNECTOR TOP B10B-PH	893		1
471071200	CONNECTOR TOP B12B-PH	893		1
471071300	CONNECTOR TOP B13B-PH	893		1
474009900	BC CONNECTOR L-32	893		1
474011300	CARD CONNECTOR HGC0338-01-010	893		1
474014400	HEADER 20P 5332-20T2	893		1

480001324	IC SOCKET 32P DICF-32CS-E	893		2
480010200	3P DIN JACK SOCKET YKF51-5046	896		1
480010280	IC SOCKET PLPS-N84B-T	893		1

480010310	CONNECTOR YKF52-5003	896		2

520001700	LITHIC BATTERY CR2032	893		1

525000700	DATA LINE FILTER ESD-R-19BD	M. PART		1

540012300	INLET SOCKET PA-125-BS	M. PART	240UK	1
540012400	INLET SOCKET PA-125-CU	M. PART	220GE	1
		M. PART	220SE	1
		M. PART	240GE	1
		M. PART	240AU	1
		M. PART	240AF	1
		M. PART	220WG	1
		M. PART	117US	1
		M. PART	117CN	1
		M. PART	117EX	1
		M. PART	220SC	1
		M. PART	220FR	1
		M. PART	100JP	1

575016000	LED SPACER LS-15-9	M. PART		2

600003200	AC CORD UC-948-S01	M. PART	117US	1
		M. PART	117EX	1
600003300	AC CORD UC-953-S01	M. PART	117CN	1
600003400	AC CORD EC-423-S01	M. PART	230SE	1
600003500	AC CORD SC-304-S01	M. PART	240AU	1
600003600	AC CORD EC-606-E01	M. PART	230GE	1
		M. PART	230WG	1
		M. PART	230SC	1
		M. PART	230FR	1
600003700	AC CORD BH-309-S01	M. PART	240UK	1

PART CODE	PART NAME / SPECIFICATION	P.C. BOARD	NOTE	Q'TY
600003800	AC CORD DC-480-S01	M. PART	100JP	1
600004700	AC CORD EC-651-E05	M. PART	240AF	1
		M. PART	230WG	1
		M. PART	230FR	1
		M. PART	230GE	1
		M. PART	220GE	1
		M. PART	240GE	1
		M. PART	240AU	1
		M. PART	230SC	1
600004800	AC CORD EC-472-S01	M. PART	230SE	1

620018400	ROTARY ENCODER KNOB	M. PART		1
620023100	X-952 POWER SW KNOB	M. PART		1
620023600	X-943 VR KNOB	M. PART		1
620024000	X-943 JOYSTICK KNOB	M. PART		1

630016000	X-943 LCD WINDOW	M. PART		1
630016100	X-943 LED WINDOW	M. PART		1

630016200	JOYSTICK VR MASK	M. PART		1

640084600	GROUNDING CONTACT	897		1
		898		3

640088500	CARD GUIDE	M. PART		1

640094800	X-631R UPPER CASE	M. PART		1

641019900	VR SHIELD	895		1

641021600	X-943 LOWER CASE	M. PART		1

641021700	X-943 FRONT CHASSIS	M. PART		1

641021800	X-943 CARD SLOT PLATE	M. PART		1

641021900	X-943 JACK PLATE	M. PART		1

641022400	X-943 FRONT PANEL ASSEMBLY	M. PART		1

641022500	RACK MOUNT ADAPTER	M. PART		2

641023000	X-943 SHIELD PLATE	M. PART		1

644003000	SPRING PLATE	M. PART		2

644006300	CURSOR KEY SPRING	M. PART		1

PART CODE	PART NAME / SPECIFICATION	P.C. BOARD	NOTE	Q'TY
646028300	PCM CARD SLOT	M.PART		1
649007400	BATTERY HOLDER	893		1

MEMO

MEMO

VAROITUS

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

ADVARSEL!

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

ADVERSEL

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

VARNING

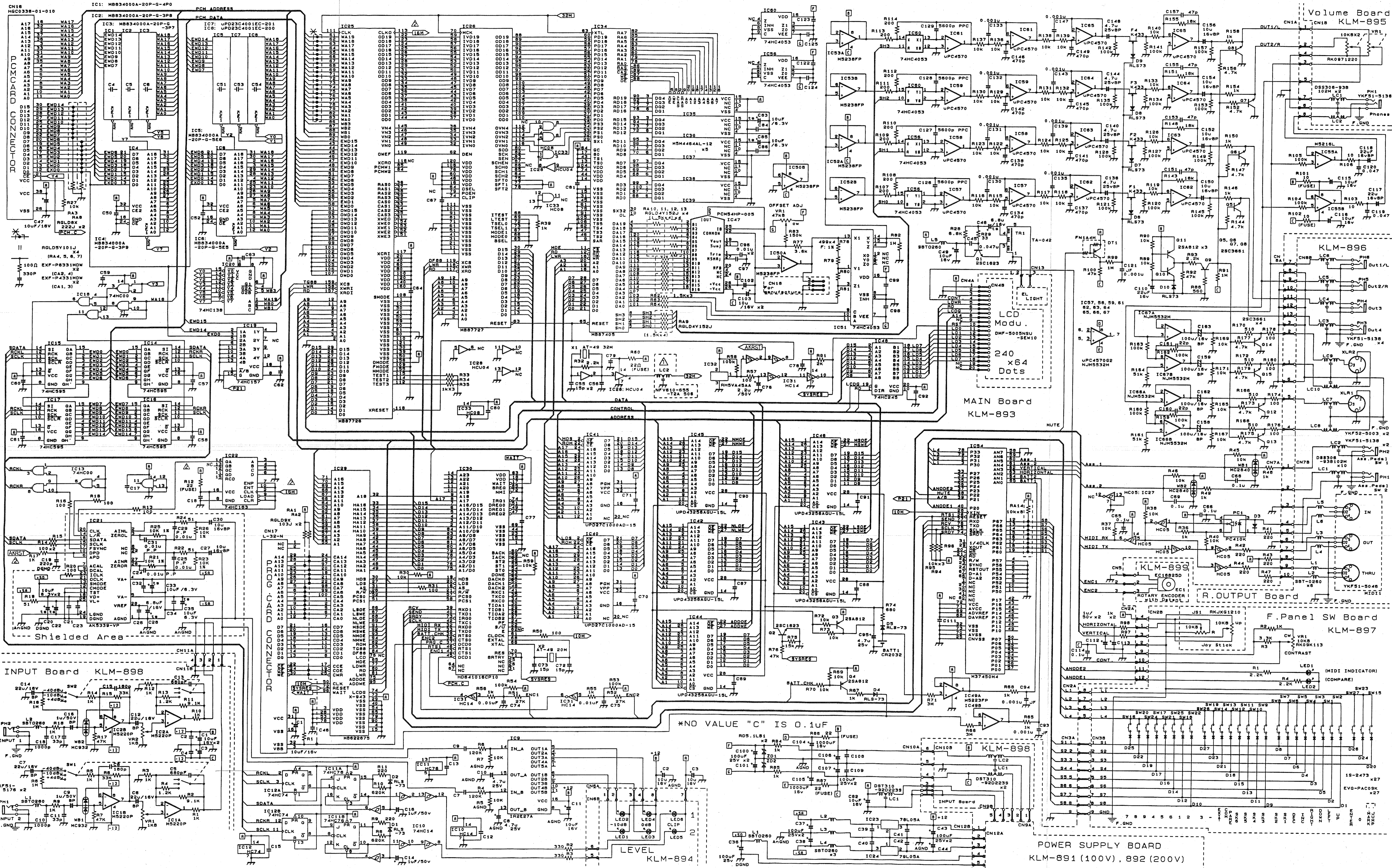
Explosionsfara vid felaktigt batteribyte.
Använd samma batterityp eller en ekvivalent typ som
rekommenderas av apparattillverkaren.
Kassera använt batteri enligt fabrikantens instruktion.

CAUTION

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

KORG

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



INPUT Board KLM-898

*NO VALUE "C" IS 0.1uF

POWER SUPPLY BOARD
KLM-891 (100V), 892 (200V)

Volume Board
KLM-895

KLM-896

F. Panel SW Board
KLM-897

R OUTPUT Board
KLM-899

LEVEL
KLM-894

MAIN Board
KLM-893