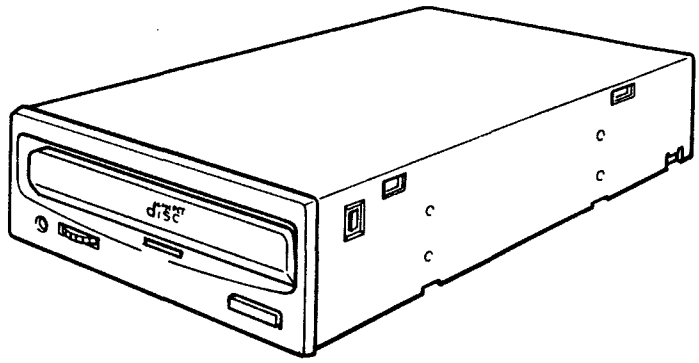
CD-ROM DRIVE UNIT

CDU31A

CDU31A-01
CDU31A-02
CDU-541-51
CDU-541-81
CDU31A-GW
CDU31A-LL



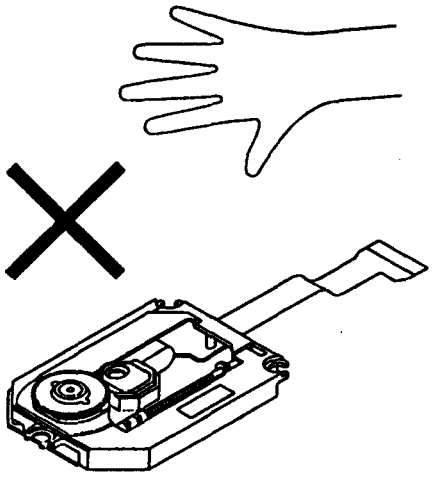
SONY®

SERVICE MANUAL

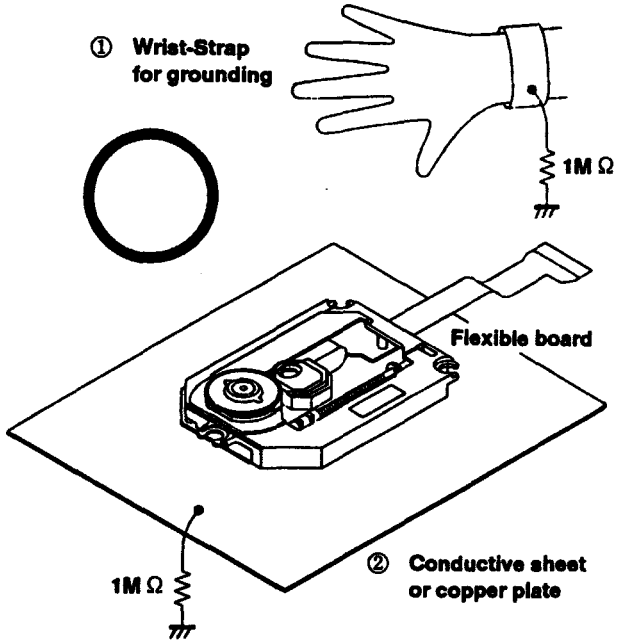
Note: Note on Repairing Optical Device (KSM-360ABM) or Base Unit.

When opening or repairing the unit, grounding is required to prevent damage caused by static electricity and is as follow:

1. Grounding for the human body
   Be sure to wear a wrist-strap for grounding (with impedance lower than $10^8\,\Omega$) whose other end is ground. The strap works to drain away static electricity build-up on the human body.
2. Grounding for the work table
   Be sure to lay a conductive sheet (with impedance lower than $10^9\,\Omega$) on the table, such as a sheet of copper, which is ground.
3. As static electricity build-up on clothes is not drained away, be careful not to let your clothes touch the unit.



Optical Device



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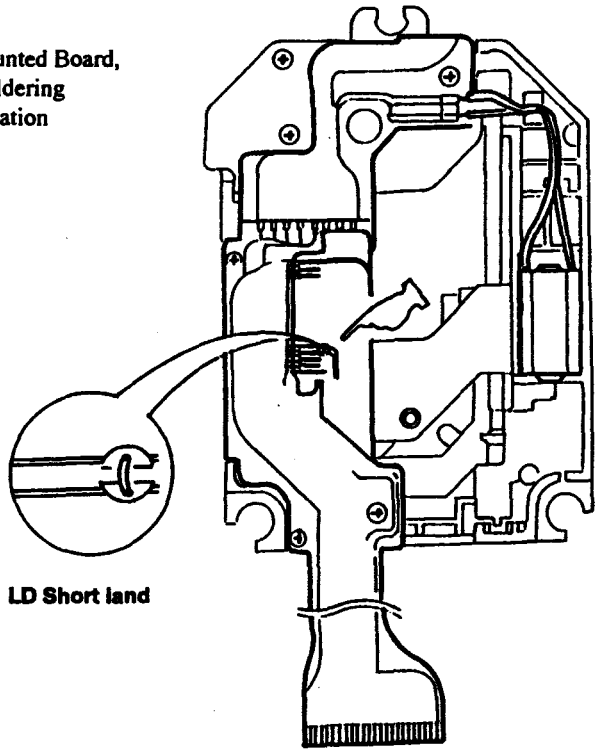
4. After connection to the MA-1/MA-2 Mounted Board, to open the LD short land, remove the soldering quickly with a soldering iron whose insulation resistance is larger than 10 MΩ.



LD Short land

SECTION 1
INTRODUCTION

1-1 CONFIGURATION OF SERVICE MANUAL

This manual is a maintenance guide for model CDU31A series.

SECTION 2 describes disks and tools necessary for maintenance.

SECTION 3 provides fault diagnostic procedures that may require spare parts or some adjustments.

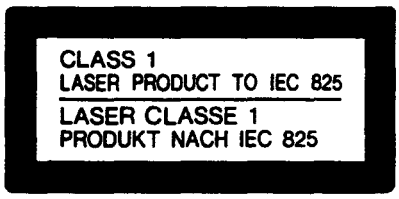
The overall check after removal and adjustments will be included in this section.

SECTION 4 and 5 cover parts replacement and adjustments, respectively.

SECTION 6 consist of circuit diagrams, ass'y drawings, and parts lists.

1-2 CAUTION

Caution: As the laser beam used in this drive is harmful to the eyes, do not attempt to disassemble the cabinet. Refer servicing to qualified personnel only.



Caution: This CD-ROM drive is classified as a CLASS 1 LASER product. The CLASS 1 LASER PRODUCT label is located on the case.

1-3 PRECAUTIONS

1-3-1 Installation

a. Avoid placing the drive in a location subject to :
   high humidity
   high temperature
   excessive dust
   mechanical vibration
   direct sunlight

b. This drive can be used horizontally only.

1-3-2 Operation

a. Do not move the drive while it is operating. Doing so may cause a malfunction to occur.

b. Avoid exposing the drive to sudden changes in temperature. This may cause condensation to collect inside the drive. If the ambient temperature should suddenly rise while the drive is turned on, wait at least one hour before turning off the drive. If you attempt to operate the drive immediately after a sudden increase in temperature, a malfunction may occur during reading.

1-3-3 Transportation

a. Keep the original packing materials to facilitate transporting the drive.

b. Always remove the disc before moving the drive. After removing the drive from the computer, repack the drive into its original packing.

1-4 INTRODUCTION

a. CDU31A series is a drive unit for CD-ROM (Compact Disc Read-Only Memory) discs, which store as much as 540 Mbytes of digital data.

b. The drive unit offers the following features:
   - 5.25 inch half-height drive form factor.
   - Audio output to enable Audio CD playback.
   - Audio channel selectable by software (stereo, monaural, reverse, etc.)
   - Fast access time providing high-speed read operation.
   - Real time layered error correction.
   - Emergency eject function for manual disc ejection.
   - CD-ROM XA, CD Bridge disc and CD-I disc play.

   Software requirement:
   - To read data reading of the data stored on a disc, install the appropriate application software.
   - To read data from CD-ROM discs with the High Sierra Group (HSG) or ISO-9660 logical format, you can use Sony OPA-474 series MS-DOS CD-ROM Extensions. This software extends MS-DOS*. It is designed for use on IBM PC/ATs**

* MS-DOS is registered trademark of Microsoft Corporation.

** IBM PC, PC/ST, and PC/AT are registered trademarks of International Business Machines Corporation.

SECTION 2
TOOLS AND MEASURING INSTRUMENTS

2-1 GENERAL AND SPECIAL TOOL LIST

The tools and measuring instruments for performing maintenance on the CDU31A series are listed below.

2-1-1 General Tools

	SONY Parts No.
⊕ Driver 2.6mm	(7-700-749-03)
Tweezers	(7-700-753-02)
Round Nose Plier	(7-700-757-01)
Cutter	(7-700-758-02)
PC-DOS Disk	
Soldering Iron (20W)	
Desoldering Metal Braid (Solder Wick)	
Tester (DRM)	
Power Supply ± 12V (min. 0.5A)	
BNC-BNC Cable (1.5m)	
SONY Test Disc (YEDS-18)	(3-702-101-01)

This disc is used to adjust EF Balance.

2-1-2 Special Tools

IBM PS/2 System

PS/2 Model 30 or equivalent (640 k Byte RAM, 3.5" FDD, Video RAM-CGA or Higher)

OPA-4741 System

CDB-334 Interface Card

Connection 50P Cable	(1-696-776-11)
50P Connector Ass'y	(A-4675-385-A)
DC Power supply	(1-413-362-12)
Headphone (Stereo type/mini jack)	
SONY Test Disc (YHDS-100)	
SONY Test Disc (YHDS-50)	
Power Cord	(1-559-370-11)
ATP SLCD disk (OR-D900)	(8-969-923-00)

This Disk is used for Final Check.

BNC (one-end) Cable	(J-907-202-0A)
S/A Attachment Tool	(J-907-503-0A)
SLCD Test disk (OR-D901)	(8-969-923-01)
SRV SLCD Test disk (OR-D914)	(8-969-923-14)
Torque Driver two Bits	(J-623-807-0A)
Fixture CD1	(J-907-203-0A)
Line Out Relay Ass'y	(A-4675-386-A)
Active Speaker	

2-1-3 Measuring Equipment

Oscilloscope Dual Trace 20MHz (probe x10)

Frequency Response Analyzer (recommend 5010A (NF Electronic Instruments))

DC Volt Meter (min. 10mA)

2-1-4 Expendable and Chemical Supplies

Cleaning Liquid Lens	(J-250-100-0A)
Molykote Grease (EM-30L)	(4-918-645-01)
Cotton swab (200 pieces)	(7-740-900-65)

2-2 SPECIAL TOOLS

2-2-1 S/A Attachment Tool

This tool is used to measure the open loop characteristics of the Focusing/Tracking servo of the CD-ROM drive without cutting its servo circuit.

(1) S/A Attachment Tool Configuration (Refer to Fig. 2-2 (a))

(2) S/A Attachment Tool Function

Terminals

❶ FB IN... This terminal is connected to the BNC (one end) Cable which leads from the CD-ROM drive. (FE3 or TE3 test lands)

❷ FB OUT... This terminal is connected to the BNC Cable (application) which leads from CH-1 channel of the analyzer.

❸ ERR OUT... This terminal is connected to the BNC Cable (application) which leads from CH-2 channel of the analyzer or connected oscilloscope probe.

❹ ERR IN/DIS OUT... This terminal is connected to the BNC (one end) Cable which leads from CD-ROM drive. (FE2 or TE2 test lands)

❺ DIS IN... This terminal is connected to the BNC Cable (application) which leads from OSC channel of the analyzer.

❻ +12V/ −12V/ GND... These terminals have a supplied voltage of +12V/ − 12V from power supply.

Switch

❼ S1... This switch is to start the test.

(3) S/A Attachment Tool Circuit Diagram (Refer to Fig. 2-2 (b))

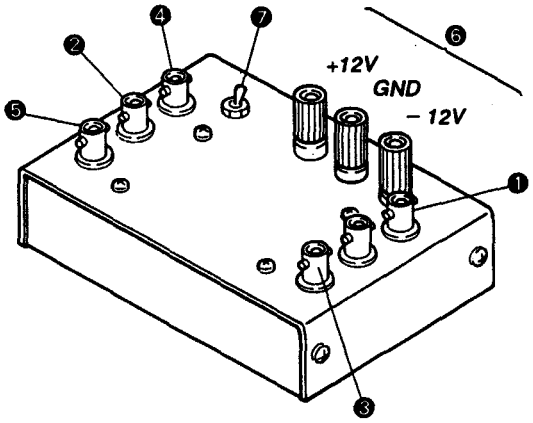


Fig. 2-2 (a) S/A Attachment Tool Configuration

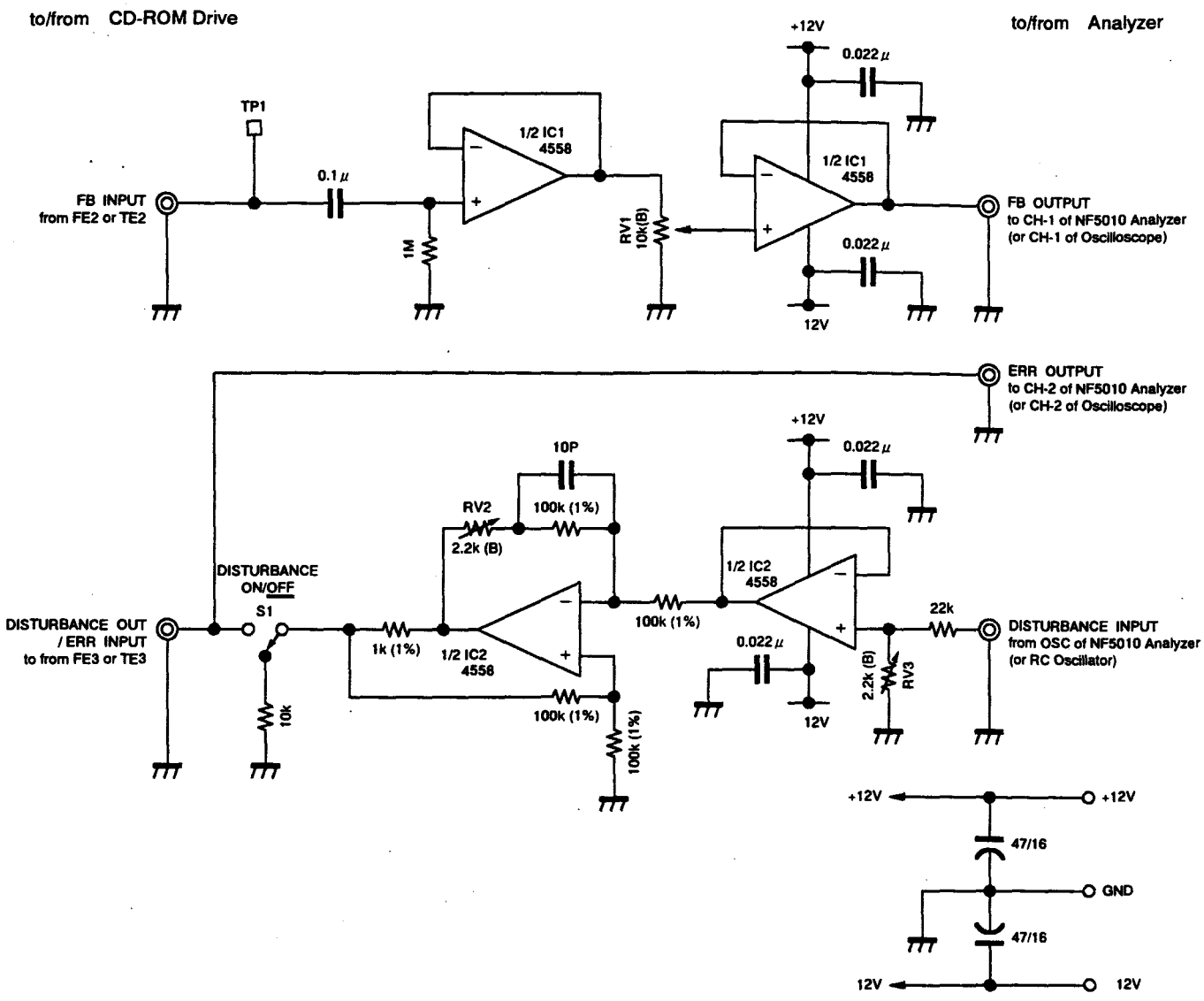


Fig. 2-2 (b) S/A Attachment Tool

2-2-2 Fixture CD1

(1) Fixture CD1 Configuration (Refer to Fig. 2-2 (c))

(2) Fixture CD1 Function

Switch

❶ S1 ... This switch is used for adjustment.

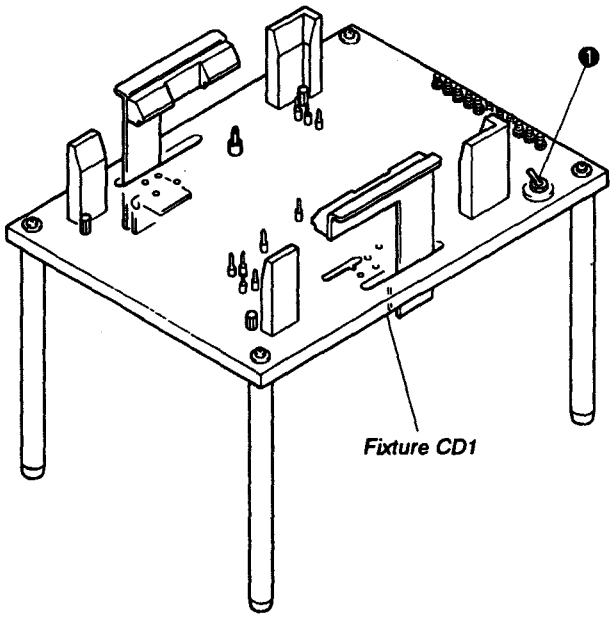


Fig. 2-2 (c) Fixture CD1 Configuration

2-3 PS/2 SYSTEM SETTING AND CONFIGURATION

2-3-1 Set up PS/2 System

Note: Make sure that the PC-DOS has been installed on the hard disk.

a. Install the SONY CDB-334 interface card in the PS/2 system.

2-3-2 System configuration

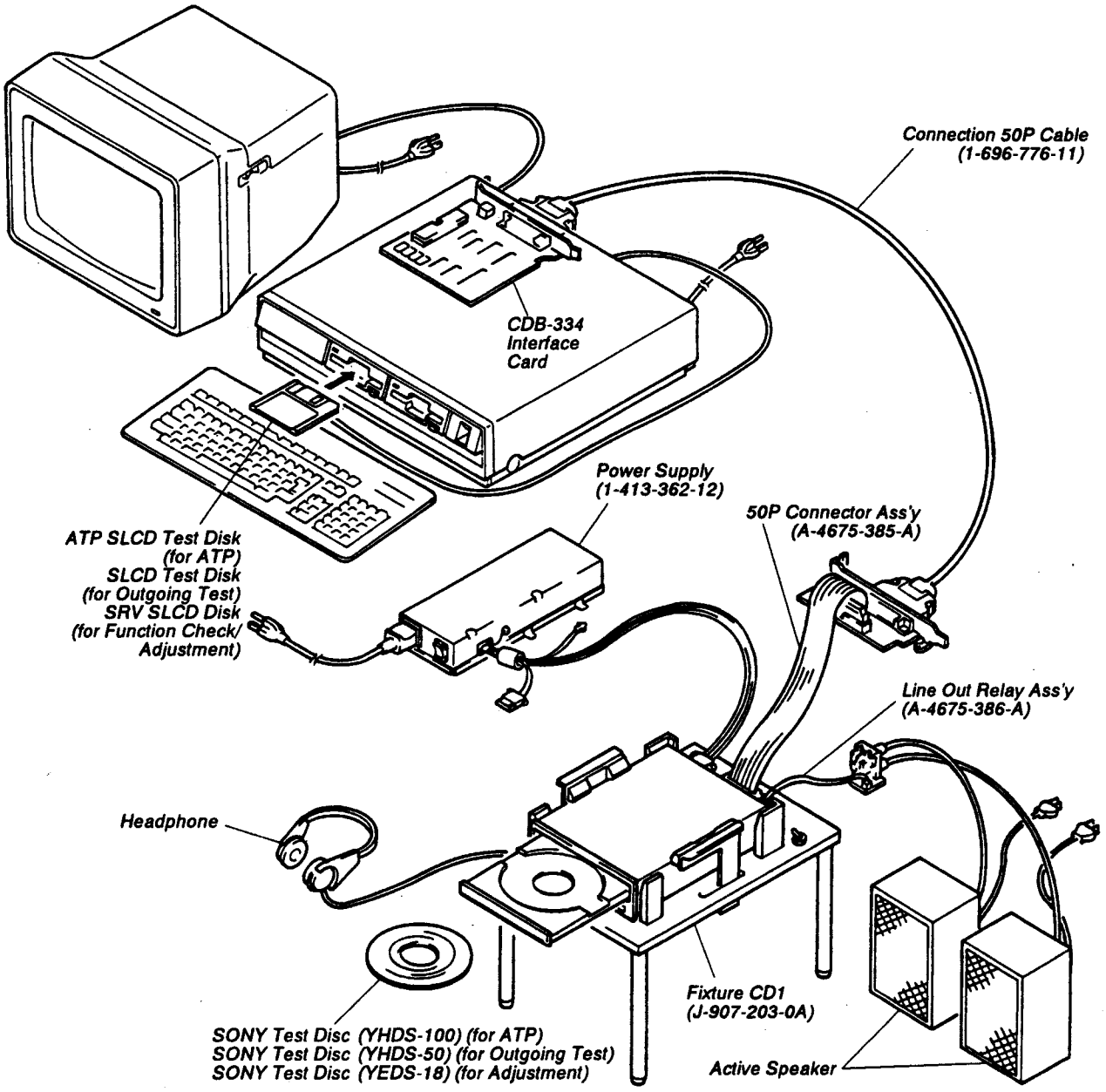


Fig. 2-2 ATP/Function check/Outgoing Test/Adjustment System

SECTION 3
TROUBLESHOOTING

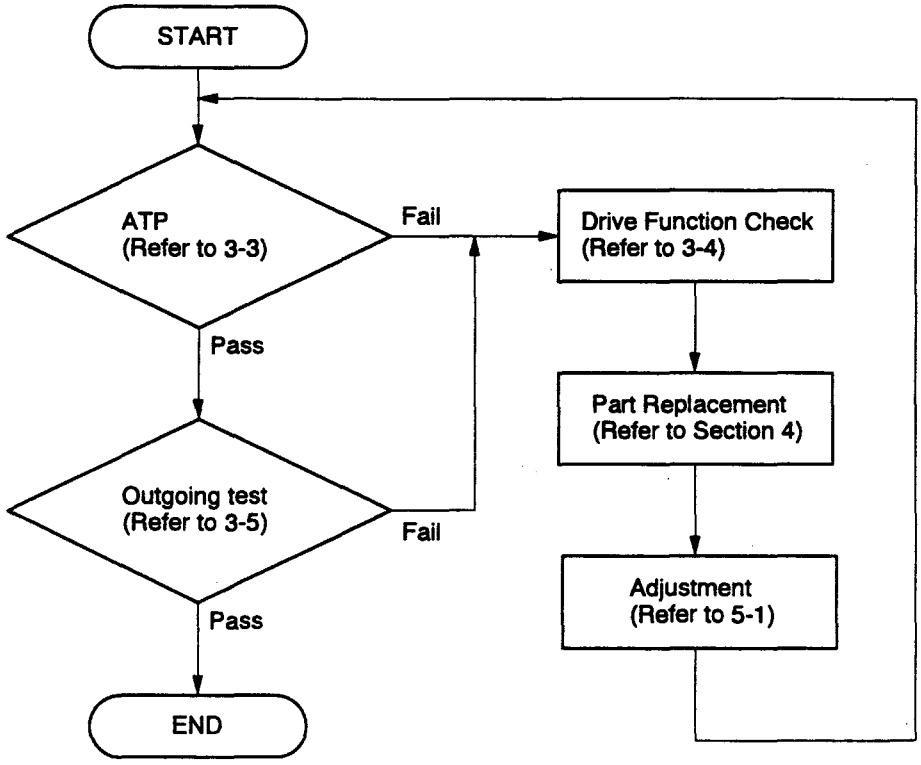
This section describes troubleshooting methods.
Section 3-2 shows the flowchart of the processing routine of the unit. Section 3-3 describes the ATP procedures.
Section 3-5 describes the outgoing test procedures. These descriptions define the defective parts under operating conditions.

3-1 BEFORE TROUBLESHOOTING

The following procedures are recommended to verify if the drive is really faulty or not:

a. Poor connection with the host system
   (esp. GND-related connection, frame GND, etc.)
b. Incorrect operational procedure.
c. Program error of host system
d. No Interface Cable Terminator at the end of Data Bus.
e. Wrong Drive Number selection
f. Wrong supply voltage
g. Environmental conditions (where electrical noise easily jumps into signal)
h. Influence of strong magnetic field

3-2 FLOWCHART FOR TROUBLESHOOTING



3-3 PROCEDURE OF ATP TEST

3-3-1 Pre-setting

a. Connect the test drive to the ATP System. (Refer to Fig. 2-2-2)

b. Turn on the power of the Computer.

Note: Make sure PC-DOS had been installed in the hard disk of the computer.

c. After system loading, insert ATP SLCD DISK into drive A.

d. Change directory in drive A.

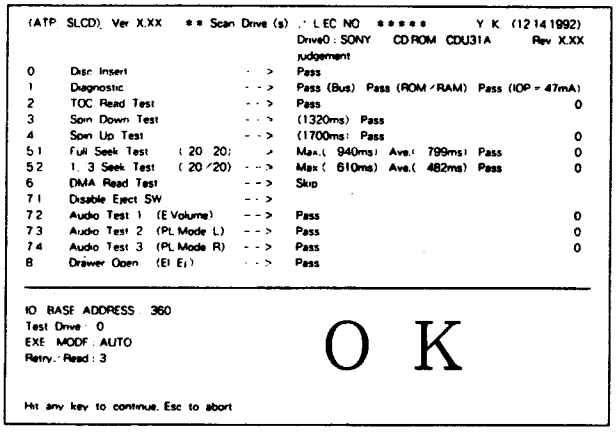
e. Type [A][T][P][_][S][L][C][D] and [Enter] key. (After test program loading, Display 3-3-1 (a) shows up.)

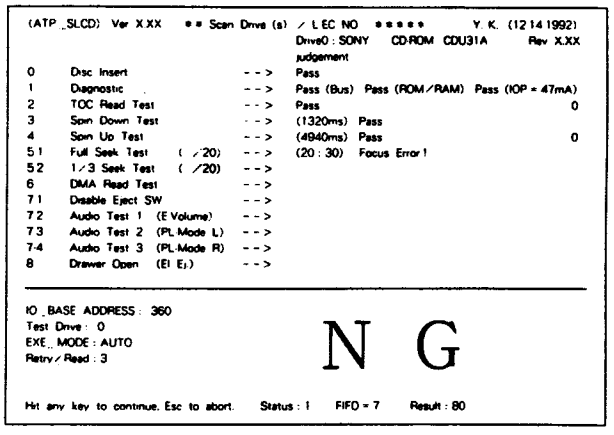
```
(ATP_SLCD) Ver X.XX    xxxx xxxx xxxx
                                        SONY          CD-ROM  CDU31A      Rev x.xh
                                        judgement
0       Disc Insert                  - - >
1       Diagnostic                   - - >
2       TOC Read Test                - - >
3       Spin Down Test               - - >
4       Spin Up Test                 - - >
5-1     Full Seek Test     ( /20)    - - >
5-2     1/3 Seek Test      ( /20)    - - >
6       DMA Read Test                - - >
7-1     Disable Eject SW             - - >
7-2     Audio Test 1                 - - >
7-3     Audio Test 2  (DI Ej.)       - - >
7-4     Audio Test 3  (DI Ej.)       - - >
8       Drawer Open   (EI Ej.)       - - >
-------------------------------------------------------------------------------

IO_BASE ADDRESS : 360
(IRQ : 2  DRQ : 3  Not Used.)
EXE_MODE : AUTO
Eject Timeout : 20000 ms
Timer :  DOS TIMER

Hit any key to continue, Esc to abort.
```

Display 3-3-1(a)

3-3-2 Test Procedure

Test item	Check point
To execute ATP test of the drive. 1. Turn on the power supply. 2. Insert SONY Test Disc (YHDS-100) into the test drive. **Note:** When an error occurs during testing, all of the test items are cancelled and an error message will be displayed in the message column. **Note:** If each test result meets the specification, the message "Pass" or the value of the test result will be displayed in the judgement column. a. Disc Insert test will be executed. b. Diagnostic test will be executed. c. TOC Read test will be executed. d. Spin Down test will be executed. e. Spin Up test will be executed. f. Seek test will be executed. g. DMA Read test will be skipped.	
3. "Hit any key when ready." message will be displayed in the message column. a. Audio test 1 will be executed.	The sound diminishes slowly. (After several minutes, the drive is set to mute mode.)
b. Audio test 2 (DI Ej.) will be executed by pushing the eject button. c. Audio test 3 (DI Ej.) will be executed by pushing the eject button.	The sound (both left and right side) can be heard from the headphone.
d. Drawer Open (EI Ej.) will be executed by pushing the eject button.	SONY Test Disc (YHDS-100) is ejected automatically.
The ATP test ends. **Note:** If all of the test items are completed, the "OK" message will be displayed on the screen. If not, "NG" will be displayed.	





3-3-3 Edit Test Condition

Note: Any editor can be used to edit any of the test conditions of the ATP SLCD. In this manual, the EDLIN editor is used to edit test conditions.

1. Type [e][d][l][i][n][ ][A][T][P][_][S][L][C][D][.][S][Y][S] and hit [Enter] key. (Display 3-3-3 (a) shows up)

2. Type [L] and [Enter] key. (Display 3-3-3 (b) (Specification list (S list)) shows up.)

```
End of input file
*
```

Display 3-3-3(a)

```
 1: ExeMode AUTO                          ; AUTO or STEP
 2: diag on                               ; diagnostics on or off
 3: Audio Test on
 4:
 5: I/O Base Address (hex) = 360          ; base address (default : 360)
 6:*IRQ channel  = 2                      ; IRQ channel (default : 2)
 7: DRQ channel = 3                       ; DRQ, DACK channel (default : 3)
 8:
 9: SDwn  = /31A : 500                    ; 500 ms
10: SUp   = /31A : 3000                   ; 3000 ms = 3.0 sec
11:
12: Full   = 20                           ; Count of full stroke (default : 20)
13: Fmax  = /31A : 1500
14: 1/3   = 20                            ; Count of 1/3 stroke (default : 20)
15: Tave  = /31A : 850
16:
17: ASeek = 31A : 650
18:
19: EjTimeOut = 20000                     ; Max 32000 ! Eject pressing Time-out (ms)
20: EjTm      = /31A : 1500
21:
22:
```

Display 3-3-3 (b)

3. To edit any test conditions.

   a. To change address of I/O port. (default setting = 360)

   ex. If it is 340 : (This address is set by dip switch. (Refer to Instruction Manual))

   a-1. Hit [5] key in S list and hit [Enter] key.

   The following will be displayed on the bottom of the screen.

```
5:*I/O Base Address (hex) = 360          ; base address (default : 360)
5:*
```

   a-2. Type I/O port address as below and hit [Enter] key.

```
5:*I/O Base Address (hex) = 340          ; base address (default : 360)
```

   b. Other items are not necessary to change the specification.

4. To quit.

a. To save the new parameter

a-1. Hit [E] and [Enter] key.

b. To keep the original parameter

b-1. Hit [Q] and [Enter] key.

The following will be displayed on the bottom of the screen.

```
abort edit (Y/N) ?
_
```

b-2. If abort, hit [Y] key.

The following will be displayed on the bottom of the screen.

```
:\>
```

If not, hit [N] key.

The following will be displayed on the bottom of the screen.

```
*
```

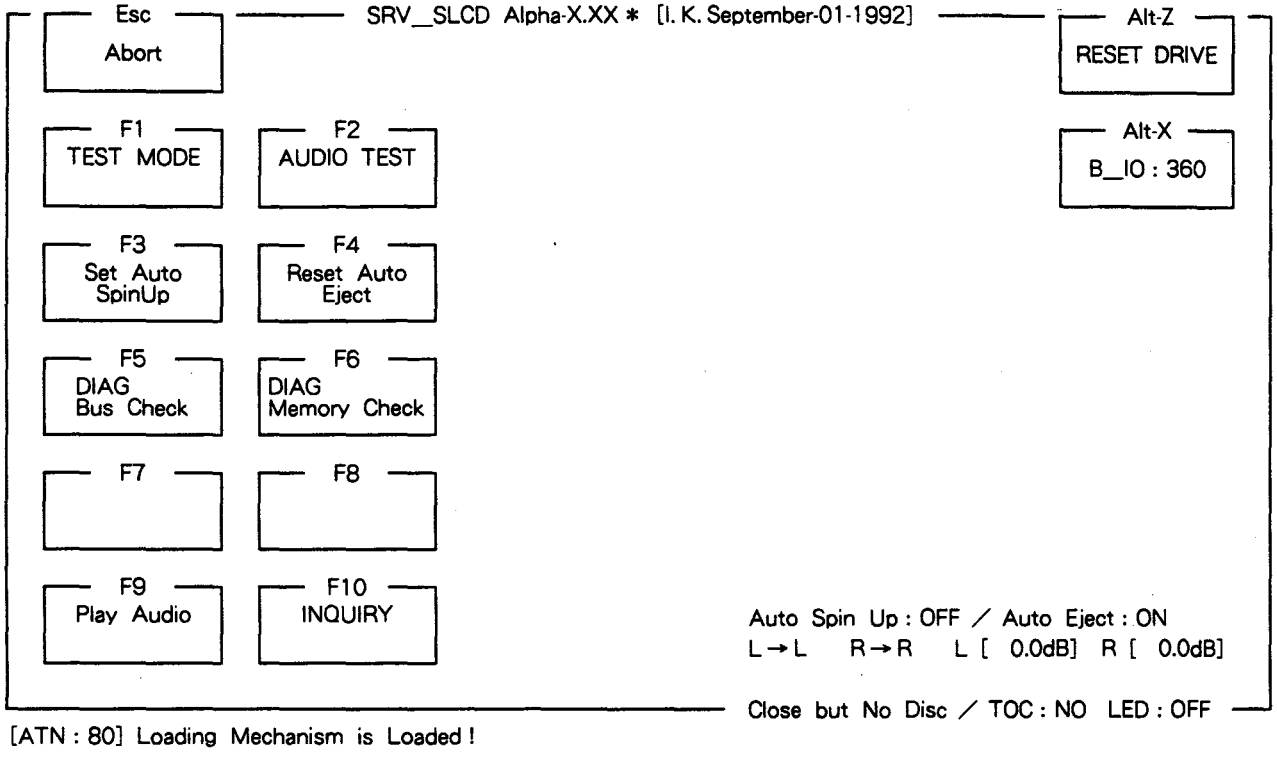
3-4 DRIVE FUNCTION CHECK

3-4-1 Pre-Setting

a. Disassemble the following parts before testing.
   Bottom Plate Ass'y (Refer to 4-2)
b. Connect the test drive to the ATP System. (Refer to Fig. 2-2.)
c. Turn on the power of the Computer.

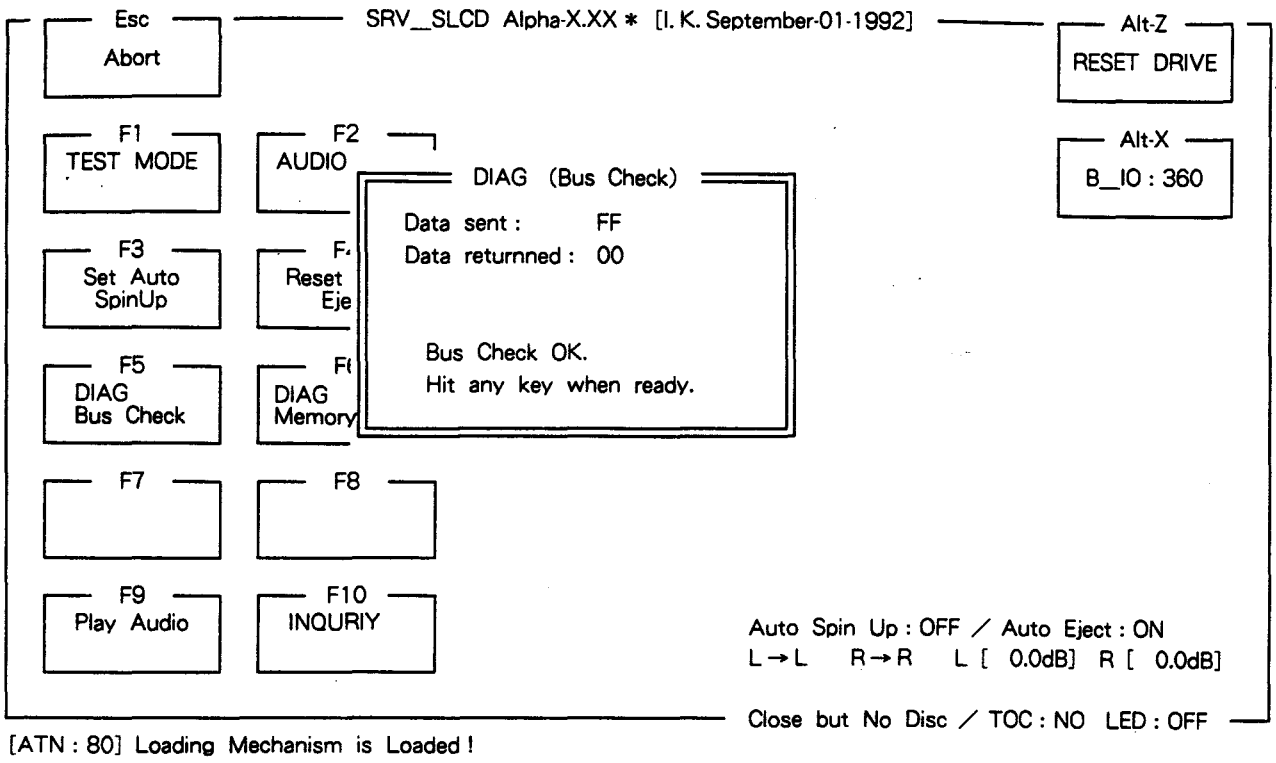
Note: Make sure PC-DOS has been installed in the hard disk of the computer.

d. After system loading, insert SRV_SLCD Test Disk into the drive A.
e. Change directory in the A drive.
f. Type [S][R][V][_][S][L][C][D] and [Enter] key to start the function check. (Main menu will be displayed.)

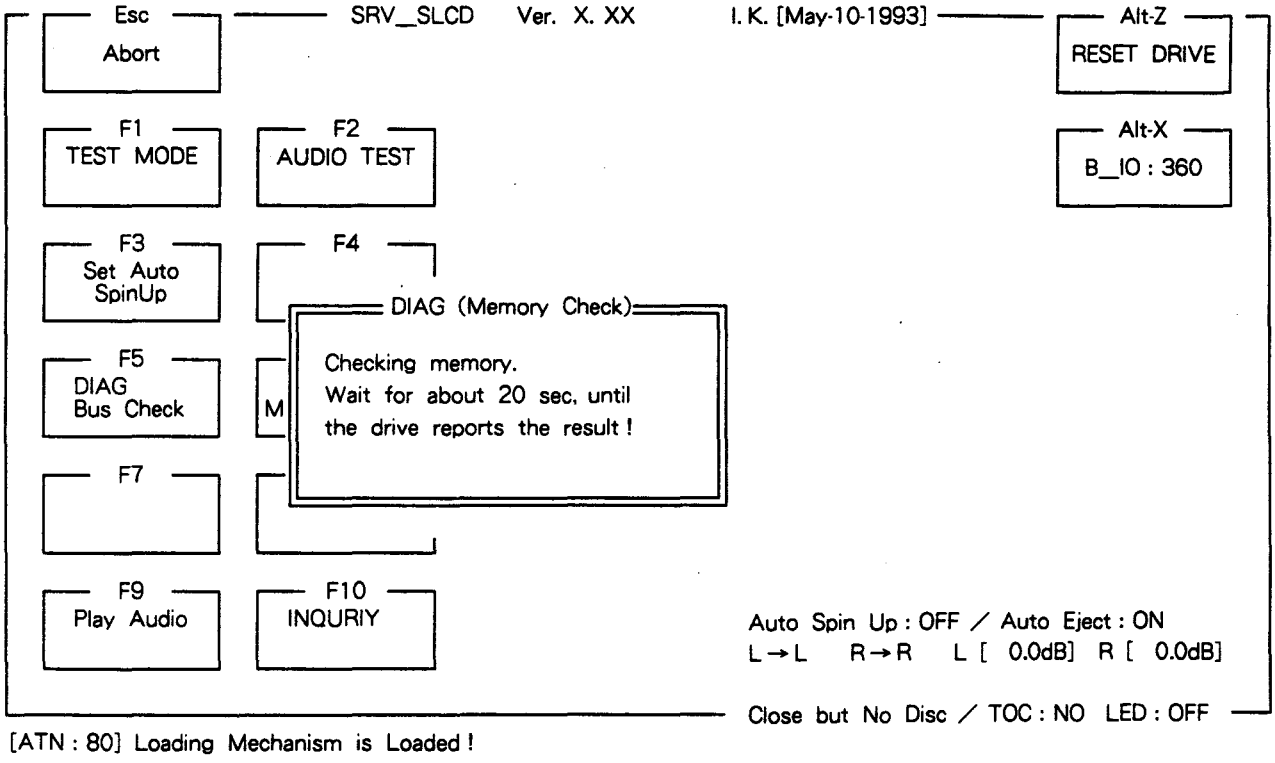


Display 3-4-1

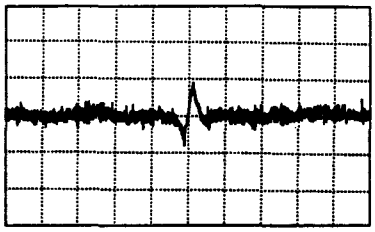
Item/Procedure	Specification (Normal Status)	Check point
1. Power on a. Turn on the power.	1. The spindle motor does not rotate. (VS test land is 0V.) 2. Green LED on the front panel lights up. (XBUSY test land is High level.)	Q104, Q105. Q201, IC201-14.
2. Tray open a. Push the eject button when the "Reset Auto Eject." message is displayed.	1. Tray is opened automatically. (OPEN test land is High level and also SLNID is 8 to 10V.)	IC201-8, Q203, voltage of +12V.
3. Bus check a. Hit [F5] (DIAG Bus Check) key. (Refer to Display 3-4-2) b. Hit [Enter] key to return to Main Menu.	1. "Bus Check OK." message appears on the screen.	CN202, CN203, IC212, IC213, IC202, IC215, IC209, IC210.
4. Memory check a. Hit [F6] (DIAG Memory Check) key. (Refer to Display 3-4-3) b. Hit [Enter] key to return to Main Menu.	1. "Program ROM OK.", "Work RAM OK." and "Data Buffer RAM OK." message appears on the screen.	IC212, IC213

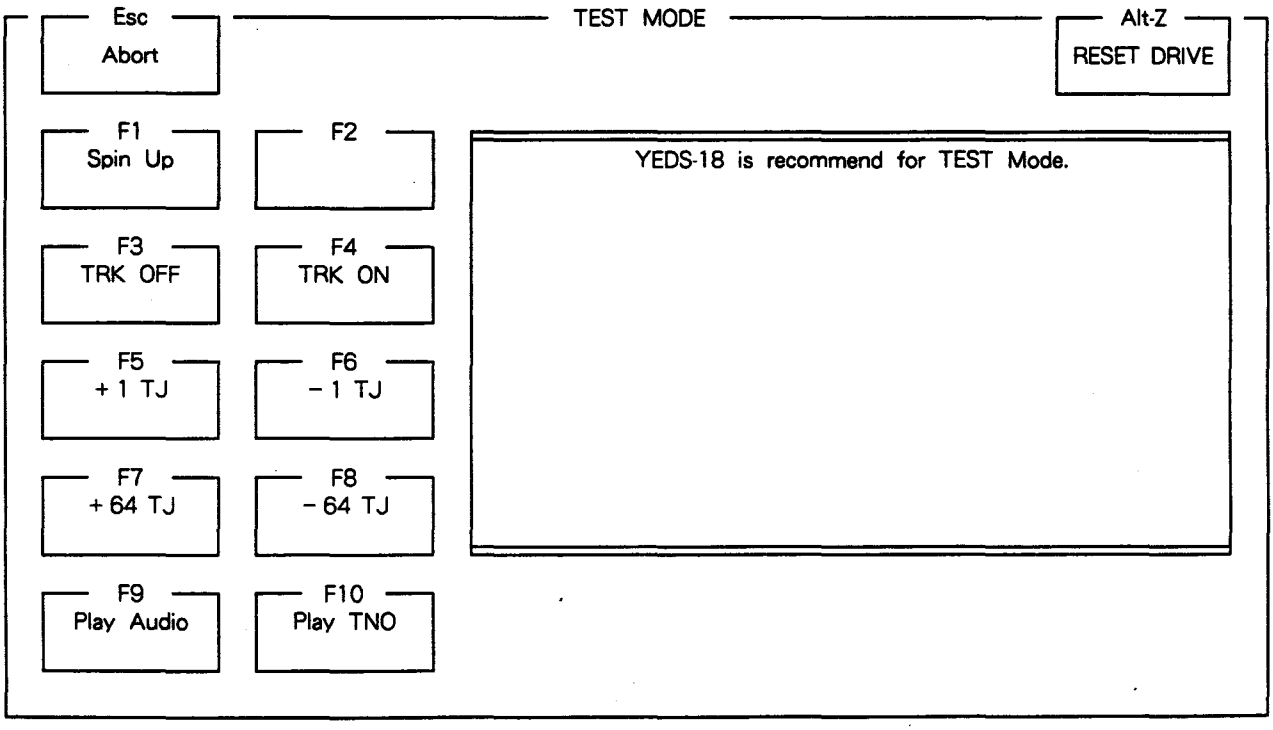


Display 3-4-2



Display 3-4-3

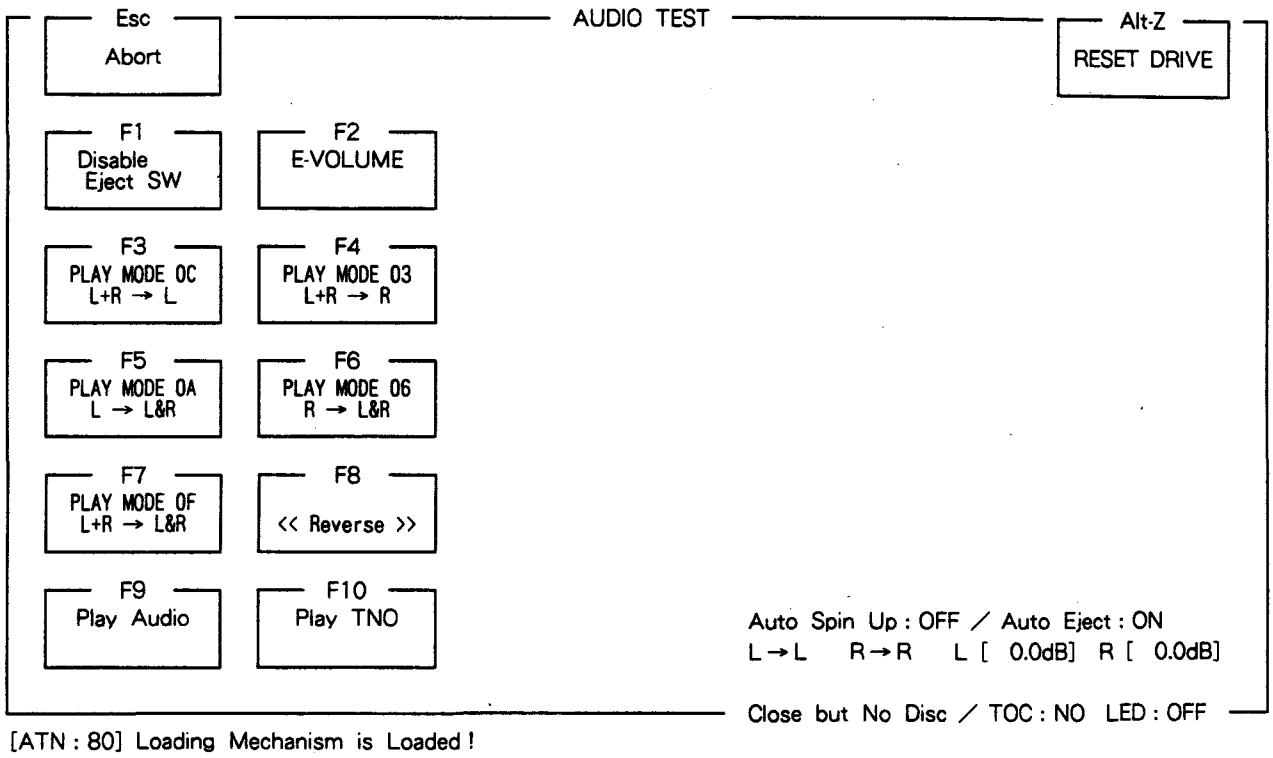
Item/Procedure	Specification (Normal Status)	Check point
5. Spin up **Note:** Set the S1 switch of Fixture CD 1 to on. a. Hit F3 (Set Auto SpinUp) key to set the "auto spin up" mode. **Note:** The message changes from "Set Auto Spin Up" to "Reset Auto Spin Up". b. Hit F1 (TEST MODE) key. (Display 3-4-4 shows up) c. Hit F1 (Spin Up) key to start spinning up, then "Wait a while during spinning up." message will be displayed. After completion, the message will change to "Wait a while recovering TOC." d. Hit Esc key to return to Main Menu.	1. Blinking Time Corder. 2. Amber LED lights during read operation.	RF level is mis-adjusted. (Refer to 5-2) lens is durty. (check IOP (Refer to 5-3)) Check tracking error operation. (Fig. 3-4 (a) can be obtain at TE test land after TOC reading.) D204.  *Fig. 3-4 (a)*



[ATN : 80] Loading Mechanism is Loaded !

Display 3-4-4

Item/Procedure	Specification (Normal Status)	Check point
6. Audio play a. Hit F2 (Audio TEST) key. (Display 3-4-5 shows up) b. Hit F9 (Play Audio) key to start audio play.	1. The both left/right of speakers and the both left/right of headphone are sounding during audio play mode. (MUTE test land is low level.)	When the both of headphone and speakers are not sound, check IC201-9, IC211-8, IC103-88, IC302, IC301. Only when the speakers are not sound, check L301, L302. Only when the headphone are not sound, check Q305, IC305. When the left side are not sound, check IC304, IC302, IC303. When the right side are not sound, check IC306, IC302, IC303.

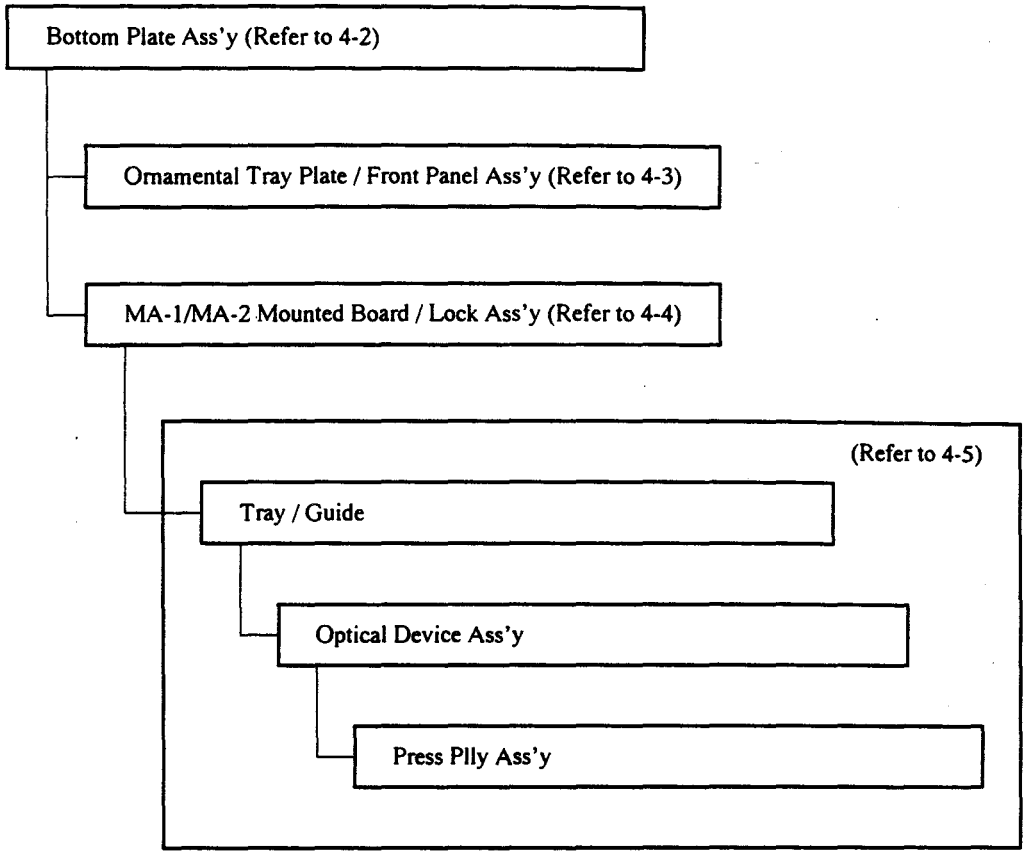


Display 3-4-5

SECTION 4
PART REPLACEMENT

4-1 EASY REFERENCE CHART

The following chart outlines the parts disassembly procedure. (Refer to the following pages for details.)



4-2 BOTTOM PLATE ASS'Y REPLACEMENT

4-2-1 Removal

a. Remove four Wave Screws (PTP 2.6x10) with spring washer securing Bottom Plate Ass'y. (Refer to Fig. 4-2)

b. Lift up the Bottom Plate Ass'y as shown in Fig. 4-2. The Bottom Plate Ass'y can be taken out.

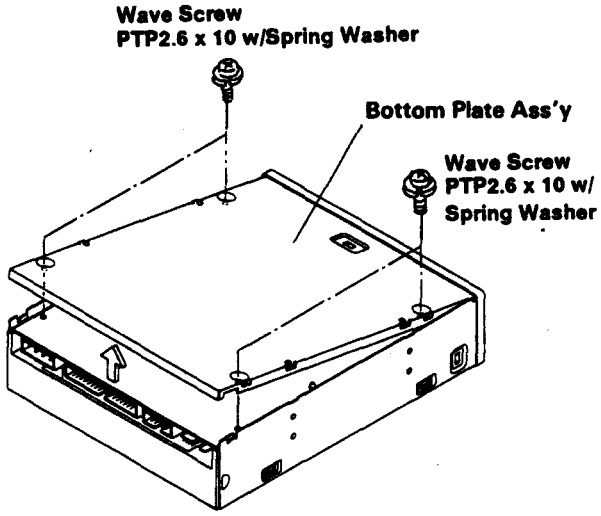


Fig. 4-2 Bottom Plate Ass'y Replacement

4-2-2 Installation

a. Insert the Bottom Plate Ass'y to the groove of front panel and place it to proper position. (Refer to Fig. 4-2)

b. Secure the Bottom Plate Ass'y with four Wave Screws (PTP 2.6x10) with spring washer with torque force of 58.8 N•cm (6kgf•cm).

4-3 FRONT PANEL ASS'Y REPLACEMENT

4-3-1 Removal

a. Open the Tray by inserting in the clip to opening of Front Panel Ass'y. (Refer to Fig. 4-3 (a))

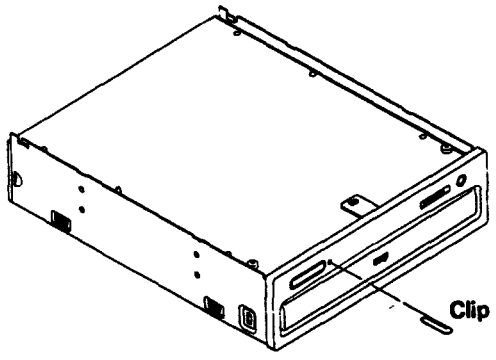


Fig. 4-3 (a) Emergency Eject

b. Remove hooks of the tray and pull Ornamental Tray Plate slowly up ward. (Refer to Fig. 4-3 (b))

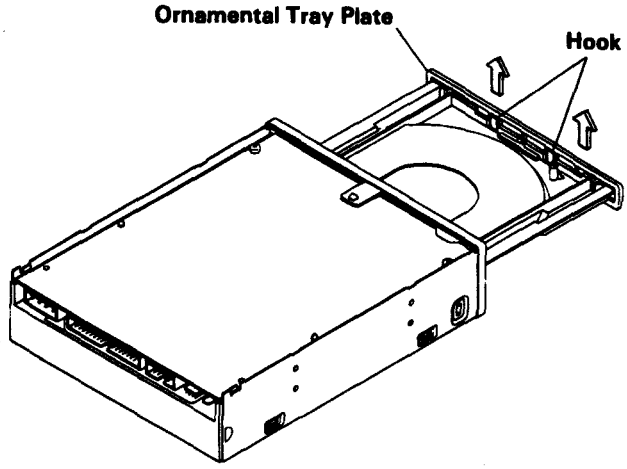


Fig. 4-3 (b) Ornamental Tray Plate Replacement

c. Push slightly plastic hooks located both sides and top of Front Panel Ass'y, and pull it slowly toward you. (Refer to Fig. 4-3 (c))

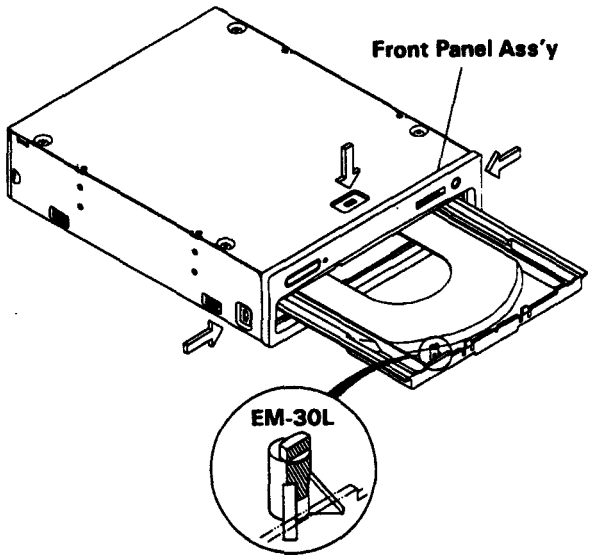


Fig. 4-3 (c) Front Panel Ass'y Replacement

4-3-2 Installation

a. Pass the tray through the opening of the front panel, then install the front panel by sliding hooks located on both sides and top of Front Panel Ass'y.

Note: Make sure that protuberances of jack and knob properly located in the recess and opening of the Front Panel Ass'y

b. Hook the Ornamental Tray Plate to the Tab of the tray.

4-4 MA-1/MA-2 MOUNTED BOARD REPLACEMENT

4-4-1 Removal

a. Remove the bottom plate ass'y. (Refer to 4-2)

b. Open the tray by inserting the clip to opening of front panel ass'y. (Refer to Fig. 4-3 (a))

c. Remove the front panel ass'y (No need to remove the ornamental tray plate). (Refer to 4-3)

d. Remove two wave screws (PTP2.6x8) securing MA-1/MA-2 Mounted Board. (Refer to Fig. 4-4 (a))

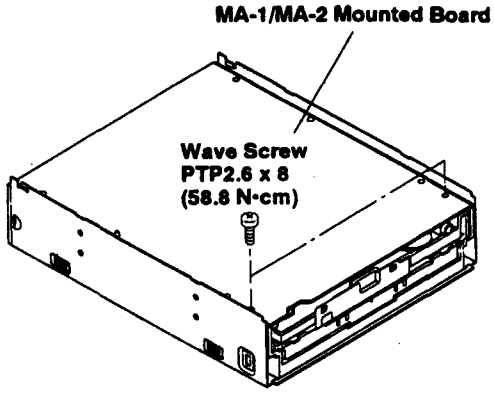


Fig. 4-4 (a) MA-1/MA-2 Mounted Board Replacement

e. Lock ass'y removal

e-1. While lifting up the MA-1/MA-2 Mounted Board as shown in Fig. 4-4 (b), disconnect the CN204 connector and take out the lock ass'y from the drive.

f. Unlock the CNJ101 connector and disconnect the flat flexible cable of optical device.

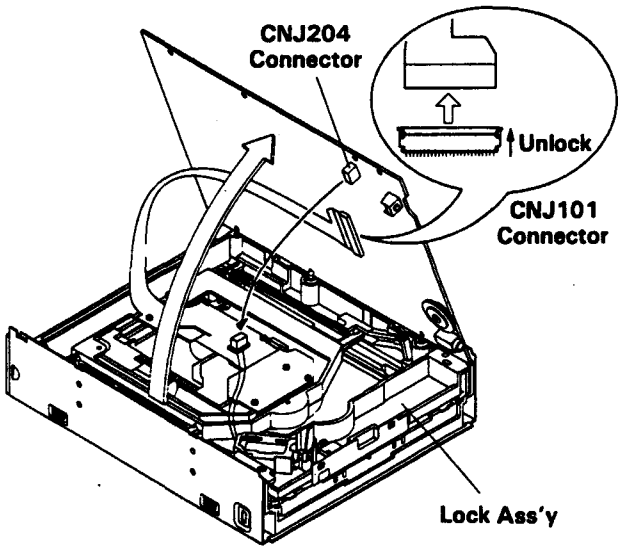


Fig. 4-4 (b)

4-4-2 Installation

a. Insert the flat flexible cable to CNJ101 connector and lock it with the retainer cover.

b. Connect the plunger cable to CNJ204 connector and place the lock ass'y in the drive.

Note: If the Lock Release Lever and the Lock Lever are locked, shift the Lock Lever with clip to unlock the Lock Ass'y as shown in Fig. 4-4 (c).

c. Place the MA-1/MA-2 Mounted Board and secure it with two wave screws (PTP2.6x8) with torque force of 58.8 N •cm (6kgf•cm).

d. Perform the electrical adjustment. (Refer to 5-1)

e. Install the bottom plate ass'y. (Refer to 4-2)

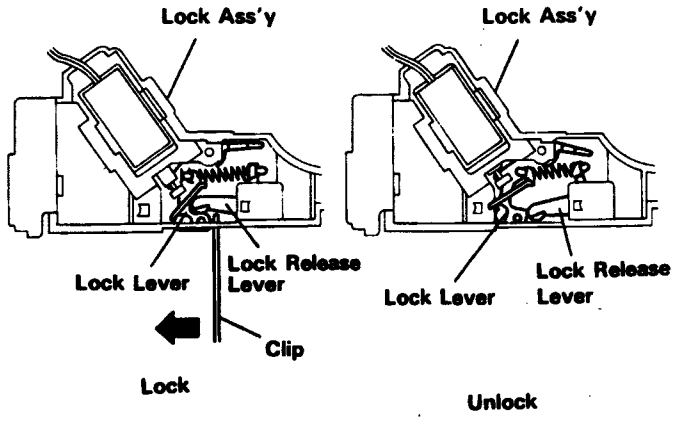


Fig. 4-4 (c)

4-5 OPTICAL DEVICE REPLACEMENT

4-5-1 Removal

a. Remove the bottom plate. (Refer to 4-2)

b. Remove the front panel ass'y. (Refer to 4-3)

c. Remove the MA-1/MA-2 mounted board. (Refer to 4-4)

d. Remove the end of Tension Springs on both of the guides. (Refer to Fig. 4-5 (a))

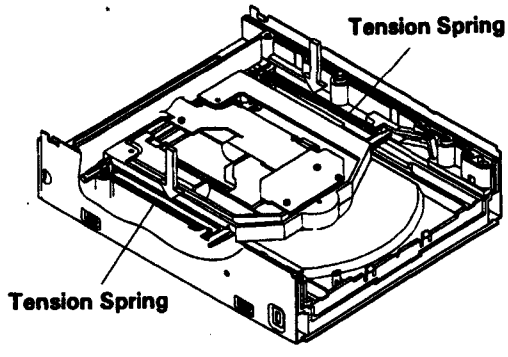


Fig. 4-5 (a) Tension Spring Removal

e. **Tray removal**

e-1. While lifting the Tray as shown in Fig. 4-5 (b), pull it toward you.

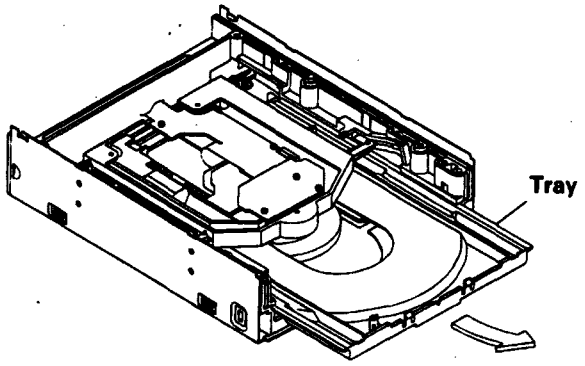


Fig. 4-5 (b) Tray Removal

f. **Guide removal**

f-1. Remove the both of guides. (Refer to Fig. 4-5 (c)).

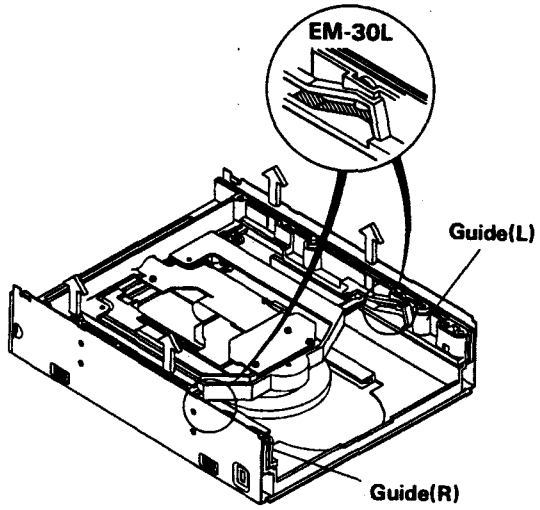


Fig. 4-5 (c) Guide Removal

g. Stand Optical Device Ass'y vertically as shown in Fig. 4-5 (d). The ass'y can be taken out from the drive.

h. Remove three Step Screws securing the Optical Device. (Refer to Fig. 4-5 (e))

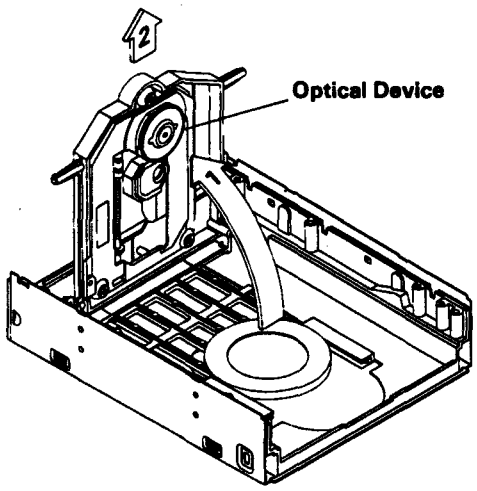


Fig. 4-5 (d) Optical Device Removal

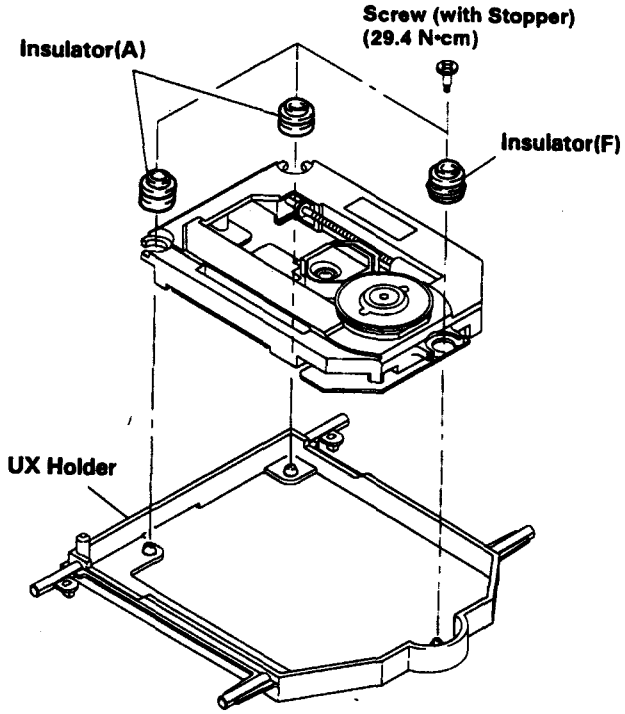


Fig. 4-5 (e) Optical Device Replacement

i. Press Pulley Ass'y removal

i-1. Slide the Press Pulley Ass'y toward you and the ass'y can be taken out. (Refer to Fig. 4-5 (f))

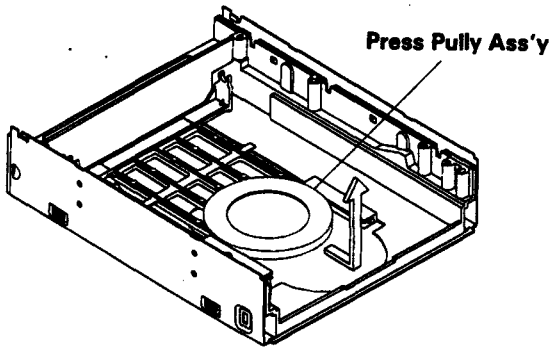


Fig. 4-5 (f) Press Pulley Ass'y Replacement

i-2. Remove the hooks of Press (b) Pulley as shown in Fig. 4-5 (g).

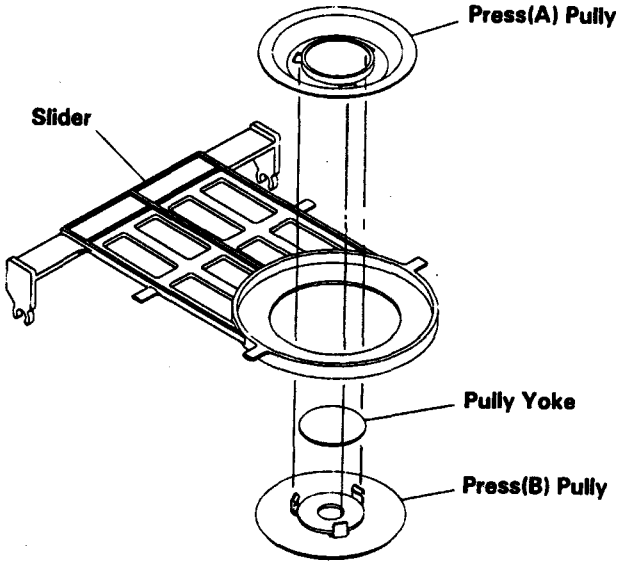


Fig. 4-5 (g) Press Pulley Ass'y Replacement

j. Main Frame Ass'y removal

j-1. Remove the hooks located both side of Main Frame Ass'y, and take it out from the Case. (Refer to Fig. 4-5 (h))

4-5-2 Installation

a. Main frame Ass'y installation

a-1. Attach the hooks of Main Frame Ass'y to the opening of the case.

b. Press Pulley Ass'y installation

Note: Apply molykote grease (EM-30L) (same quantity of match tip) to the specified area of the case as shown in Fig. 4-5 (c).

b-1. Put Pulley Yoke, Slider in order on the Press (a) Pulley, then insert the hooks of Press (b) Pulley to opening Press (a) Pulley and hang it.

b-2. Put the Press Pulley Ass'y on the drive and slide it backward.

c. Install the Optical Device to the UX Holder with three Screws (with Stopper). (Torque force is 3 kgf•cm)

d. Install the both arms of Optical Device Ass'y to the Press Pulley Ass'y and place it in the drive.

e. Install the both of the guide and install the Front Panel the drive.

f. Tray installation

f-1. Insert Tray between guide and frame, lever while lifting it a little, insert it completely.

Note: If the lock release lever and the lock lever are locked, release them as shown in Fig. 4-4 (c).

g. Hook the Tension Springs to the tab of guide.

h. Install the MA-1/MA-2 mounted board. (Refer to 4-4)

Note: Before adjustment, check if the RF level obtains at RF0 terminal for later adjustment. (Refer to 5-2).

i. Perform the electrical adjustment (Refer to 5-1)

j. Perform the RF level (Laser power) and laser current adjustment. (Refer to 5-2)

k. Install the bottom plate ass'y. (Refer to 4-2)

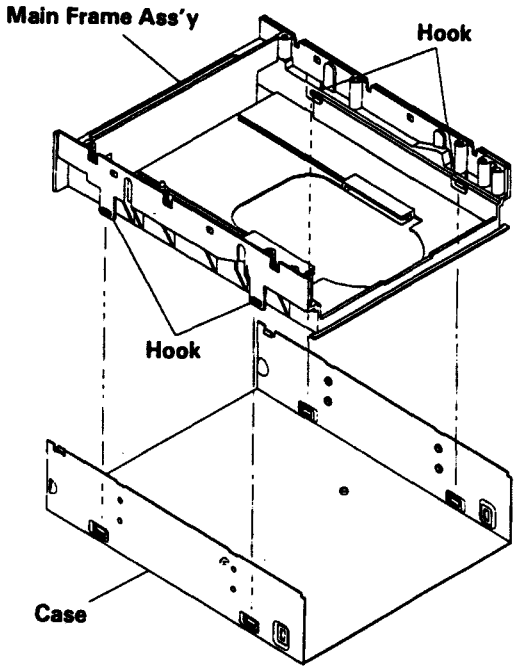


Fig. 4-5 (h) Main Frame Ass'y Removal

SECTION 5
CHECK AND ADJUSTMENT

5-1 ELECTRICAL ADJUSTMENT

Disassemble the following parts and then perform the adjustment.

a. Bottom Plate Ass'y (Refer to 4-2)

5-1-1 Special Tools and Measuring Equipment

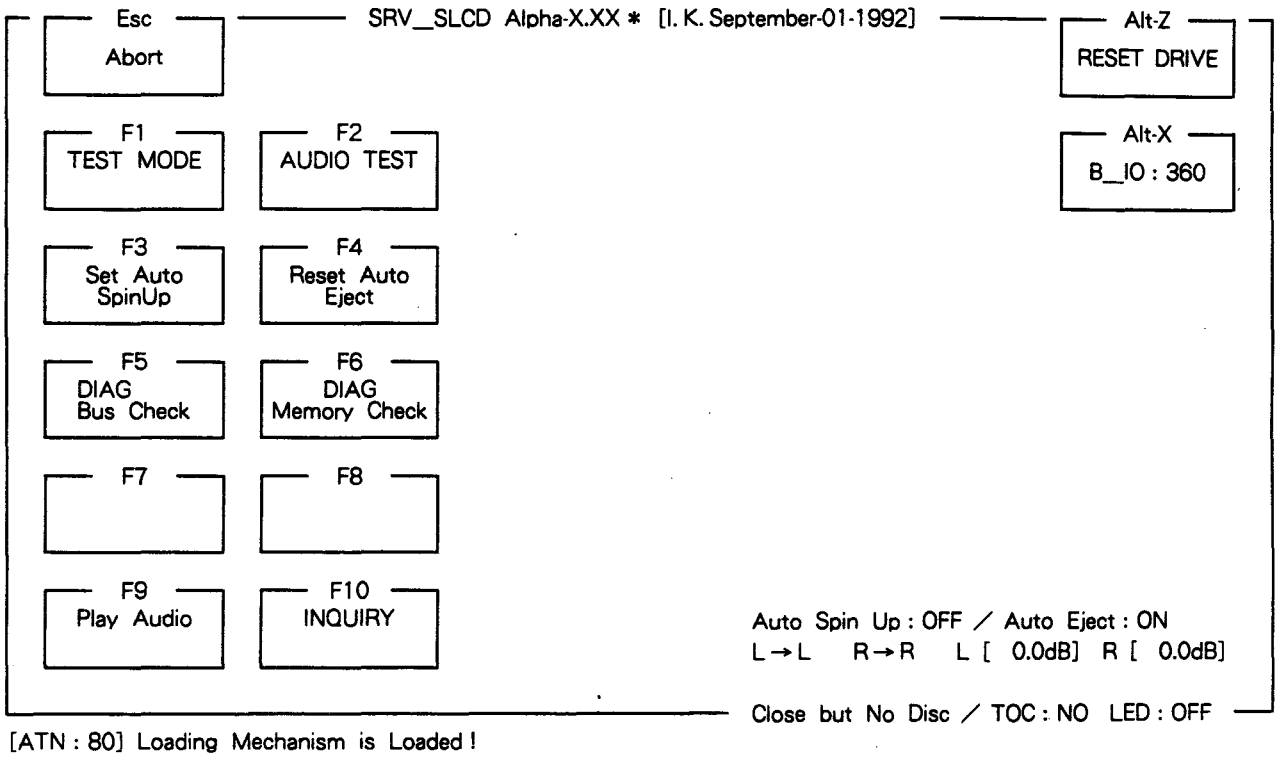
a. Oscilloscope
b. SONY Test Disc (YEDS-18)
c. IBM PS/2 System
d. S/A Attachment Tool
e. SRV SLCD Disk
f. BNC (one end) Cable (2pcs)
g. Frequency Response Analyzer

5-1-2 Pre-Setting

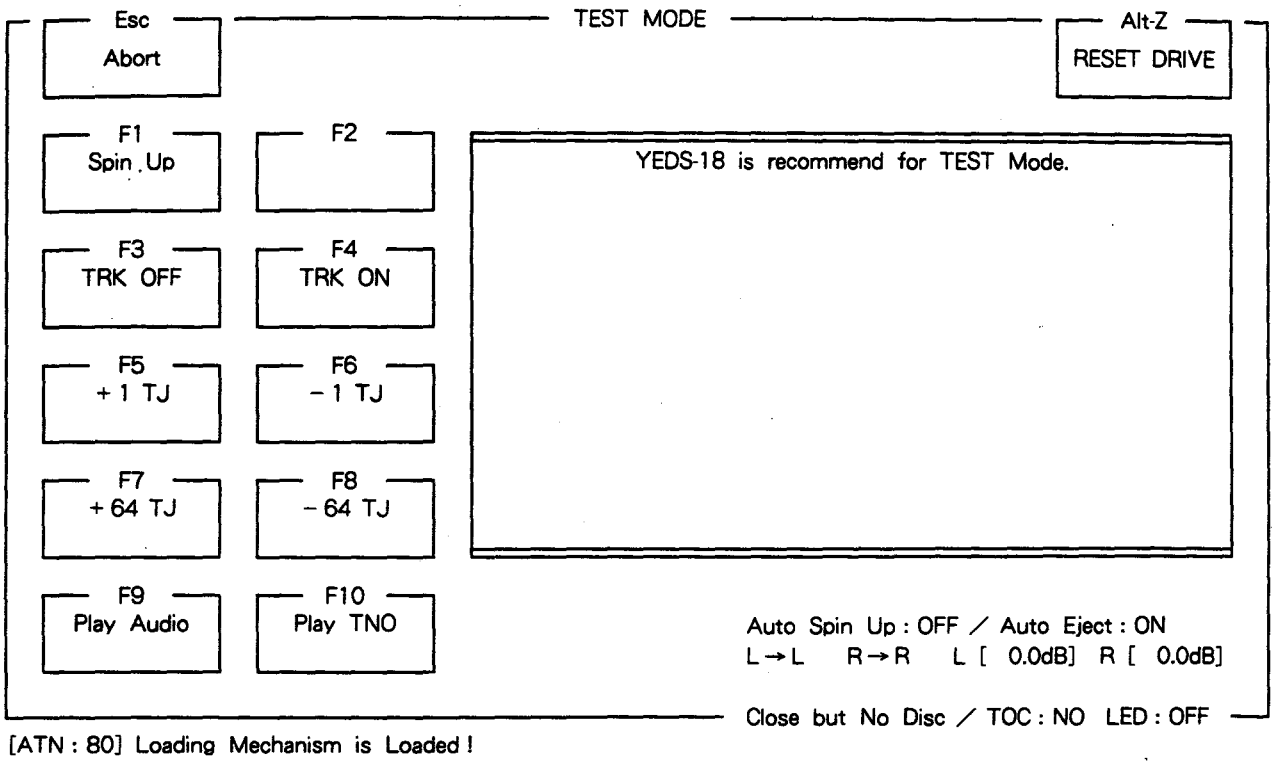
a. Connect the test drive to the ATP System. (Refer to Fig. 2-2.)
b. Turn on the power of Computer.

Note: Make sure PC-DOS had been install the hard disk of computer.

c. After system loading, insert SRV SLCD Test Disk into the drive A.
d. Change directory in the A drive.
e. Turn on the S1 of the Fixture CD1, and then turn on the power supply.
f. Type [S][R][V][_][S][L][C][D] and hit [Enter] key to start the adjustment. (Main menu will be displayed.)
g. Insert the Test Disc (YEDS-18) to the test drive.
h. Select Test Mode by hitting [F1] key. (Test Mode menu will be displayed.)
i. Select Spin Up by hitting [F1] key in Test Mode menu.



Main Menu



Test Mode Menu

5-1-3 EF Balance

a. Connect CH-1 probe of oscilloscope to VC terminal on fixture CD1 and GND. (Refer to Fig. 5-1-3 (a))

Note: Set the oscilloscope as below

Display : CH-1 / DC mode
Range : 50mV/div. 5ms/div.
Trigger : AUTO mode

b. Then set the waveform to the center scale of oscilloscope by turning of up/down positioning knob.

c. Change the CH-1 probe to terminal of TE2 from VC.

d. Select Play TNO by hitting the F10 key in Test Mode menu.

e. Select No. 18 with arrow key, then hit Enter key.

f. Select TRK OFF by hitting the F3 key in Test Mode menu.

g. Check if the EF Balance (ratio of plus and minus) meets the following formula. (Refer to Fig. 5-1-3 (b))

$|A - B| < 10mV$

h. If the ratio of EF Balance does not meet the specification, adjust RV102 so that its Balance is less than 7 mV.

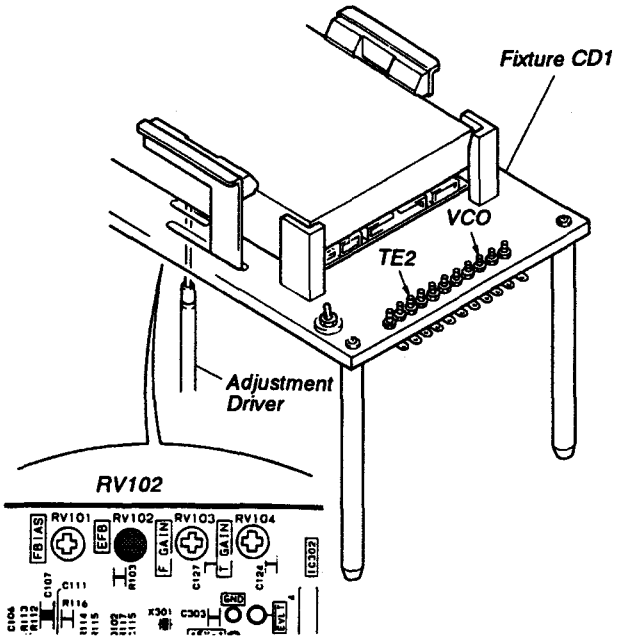


Fig. 5-1-3 (a) EF Balance Adjustment

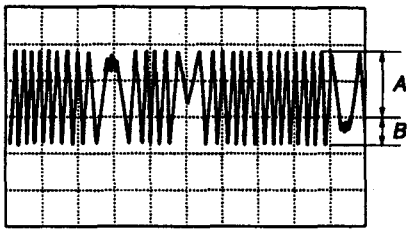


Fig. 5-1-3 (b) EF Balance Waveform

5-1-4 Focus Servo Loop Gain

a. Connect Frequency Response analyzer and S/A Attachment Tool to PS/2 system. (Refer to Fig. 5-1-4)

b. Connect the BNC (one end) cable between FE-2 terminal on fixture CD1 and FB IN terminal on S/A Attachment Tool.

c. Connect another BNC (one end) cable between FE-3 terminal on fixture CD1 and ERR IN/DIS out terminal on S/A Attachment Tool.

d. Turn on the power of the analyzer and S/A Attachment Tool.

e. Set mode of Frequency Response Analyzer as below. (Refer to Instruction Manual for detail)

Disturbance frequency	:	1kHz
Disturbance amplitude	:	100mV rms
Integration time	:	5 times (both CH)
Analysis mode	:	CH-1/CH-2
Float	:	GND

f. Set the S1 switch of S/A Attachment Tool to on.

g. Select Play TNO by hitting the F10 key in Test Mode menu.

h. Select No. 18 with arrow key, then hit Enter key.

i. Hit Measure button on the analyzer to start the measurement of Focus Servo Loop Gain.

j. After for a while, check if the Focus Servo Loop Gain indicated on the analyzer, meets specification of 0 ± 0.5dB.

k. If the Focus Servo Loop Gain does not meet the specification, adjust RV103 so that its gain is within 0 ± 0.2dB during above measuring.

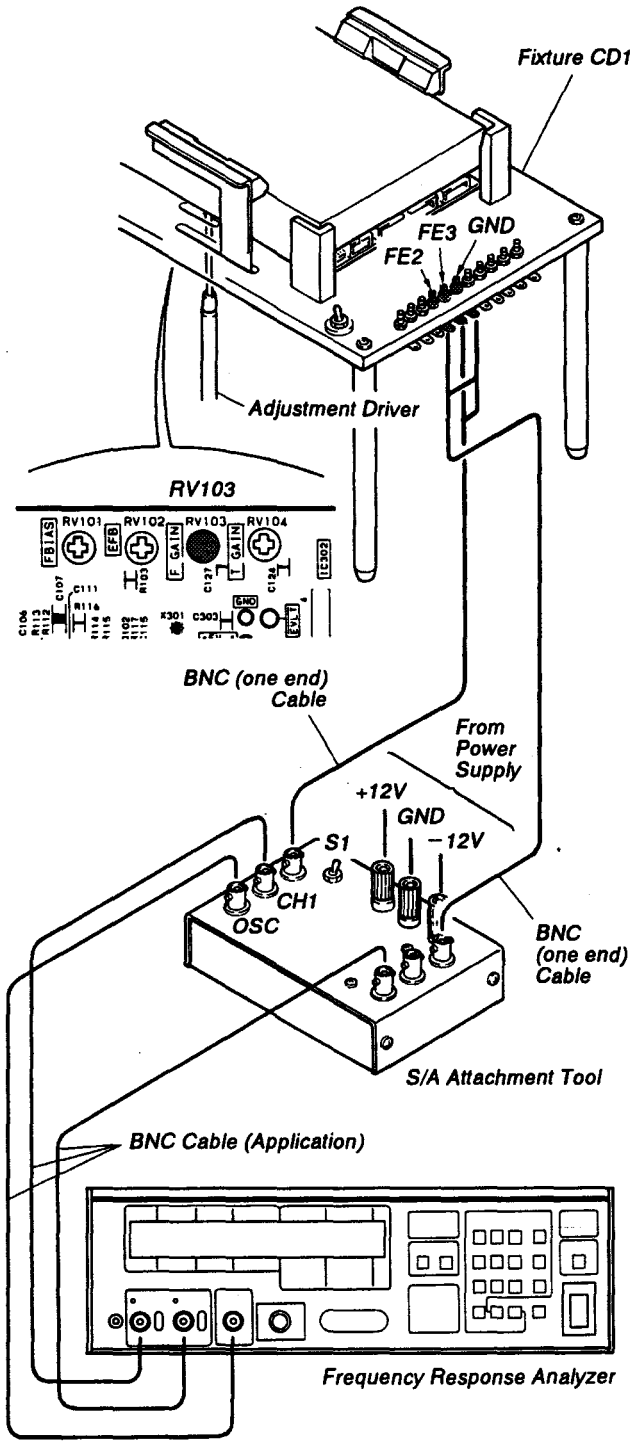


Fig. 5-1-4 Focus Servo Loop Gain Adjustment

5-1-5 Tracking Servo Loop Gain

a. Change the BNC (one end) cable connection location to TE-2 from FE-2 terminal. (Refer to Fig. 5-1-5)

b. Change the BNC (one end) cable connection location to TE-3 from FE-3 terminal. (Refer to Fig. 5-1-5)

c. Set mode of Frequency Response Analyzer as below. (Refer to Instruction Manual for detail)

Disturbance frequency	:	1.2kHz
Disturbance amplitude	:	100mV rms
Integration time	:	5 times (both CH)
Analysis mode	:	CH-1/CH-2
Float	:	GND

d. Select Play TNO by hitting the [F10] key in Test Mode menu.

e. Select No. 18 with arrow key, then hit [Enter] key.

f. Hit [Measure] button on the analyzer to start the measurement of Tracking Servo Loop Gain.

g. After for a while, check if the Tracking Servo Loop Gain indicated on the analyzer, meets specification of 0 ± 0.5dB.

h. If the Tracking Servo Loop Gain does not meet the specification, adjust the RV104 so that its Gain is within 0 ± 0.3dB during above measuring.

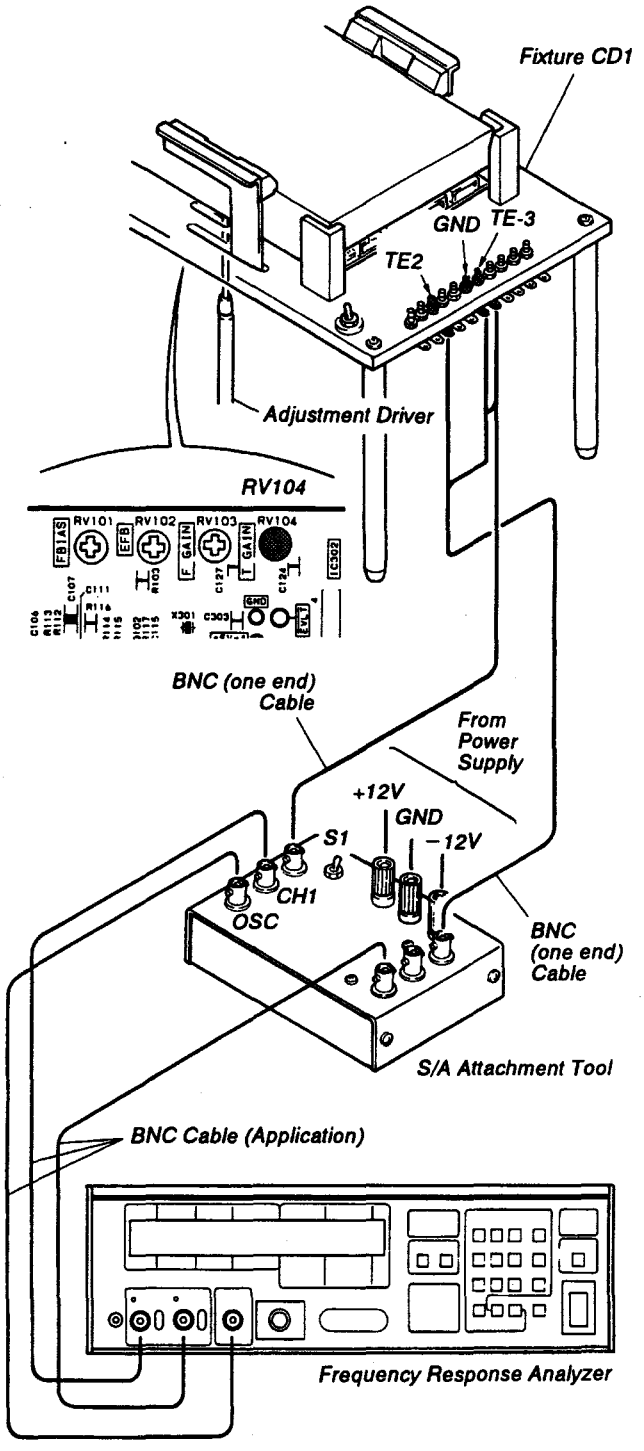


Fig. 5-1-5 Tracking Servo Loop Gain Adjustment

5-1-6 Focus Bias

a. Connect the CH-1 probe of oscilloscope to RF0 terminal on fixture CD1 and GND. (Refer to Fig. 5-1-6 (a))

Note: Set the oscilloscope as below

Display : CH-1 / AC mode (20mV/div.)

Trigger : AUTO mode

b. Select Play TNO by hitting the F10 key in Test Mode menu.

c. Select No. 18 with arrow key, then hit Enter key.

d. Adjust the RV101 so that the jitter of waveform is minimum and so that output level is maximum. (Refer to Fig. 5-1-6 (b))

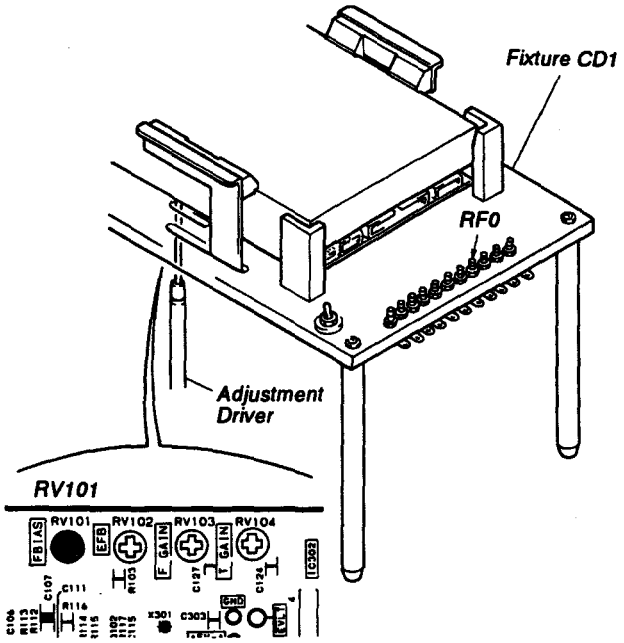


Fig. 5-1-6 (a) Focus Bias Adjustment

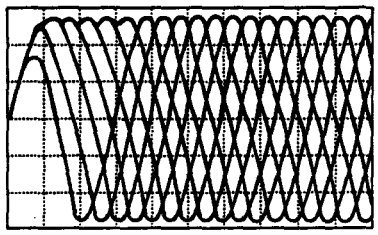


Fig. 5-1-6 (b)

5-2 RF LEVEL (LASER POWER) AND LASER CURRENT

Disassemble the following parts and then perform the measurement.

a. Bottom Plate Ass'y (Refer to 4-2)

5-2-1 Special Tools and Measuring Equipment

a. IBM PS/2 System
b. SRV_SLCD Disk
c. BNC (one end) Cable (2pcs)
d. Oscilloscope
e. Fixture CD1

5-2-2 Measurement

a. Connect the drive to DC power supply.

Note: Make sure turn off the power of DC power supply.

b. Turn on the power supply.
c. Insert the Test Disc (YEDS-18) to the test drive.
d. Connect the CH-1 probe of oscilloscope to RF0 terminal on fixture CD1 and GND.

Note: Set the oscilloscope as below

Display: CH-1 / AC mode
Range: 0.2V/div. 500ns/div.
Trigger: AUTO mode

e. Select Play TNO by hitting the F10 key in Test Mode menu.
f. Select No. 18 with arrow key, then hit Enter key.
g. Check if the RF Level (Laser Power) satisfy the 1.2 V ± 0.3 Vp-p (Refer to Fig. 5-1-6 (b)). If the RF level is less than 900mV, perform optics cleaning. (Refer to 5-3) After optical device cleaning, the level should meet specification. If not, replace the Optical Device.

5-3 OPTICAL DEVICE CLEANING

Disassemble the following parts and then clean the optical device.

a. Optical Device (Refer to 4-5)

5-3-1 Special Tools and Measuring Equipment

a. Cotton Swab (200 pieces).

b. Cleaning Liguid Lens.

5-3-2 Cleaning with lens cleaner

a. Soak cotton swab in the Lens Cleaner.

b. Wipe the lens surface lightly using a cotton swab. (Refer to Fig. 5-3)

Note: Please use the wet cotton swab unless the nature of the dust on the lens is rather sticky or greasy which may require cleaning liquid. After removing dirts and dusts, please wipe once again using a dried cotton swab.

Note: Do not apply an excessive pressure to the lens as it is rather delicate mechanism.

Note: Make sure that no residue remains on the lens.

c. Install the Optical device in accordance with section 4-5.

d. Perform the RF level (Laser Power) and laser current. (Refer to 5-2)

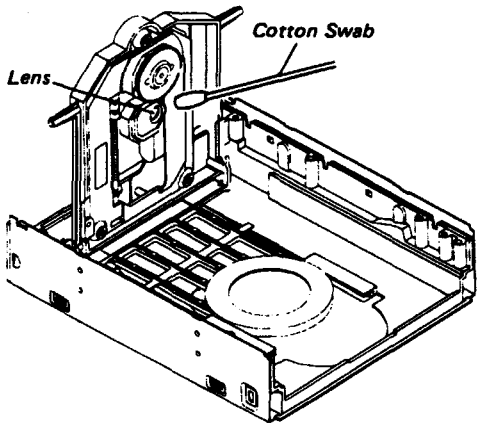
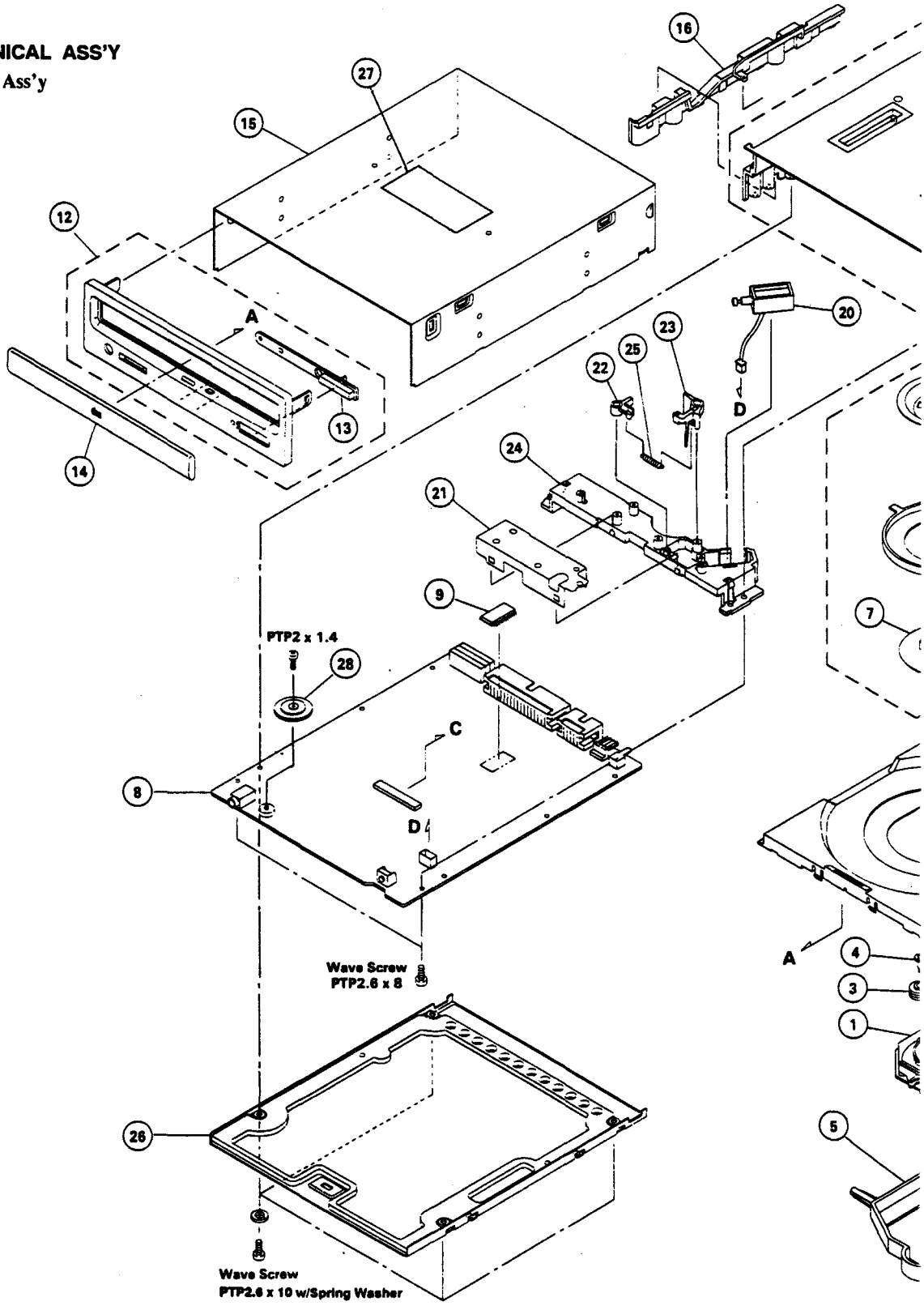


Fig. 5-3 Optical Device Cleaning

SECTION 6
EXPLODED VIEWS AND LIST

6-1 MECHANICAL ASS'Y

6-1-1 Overall Ass'y



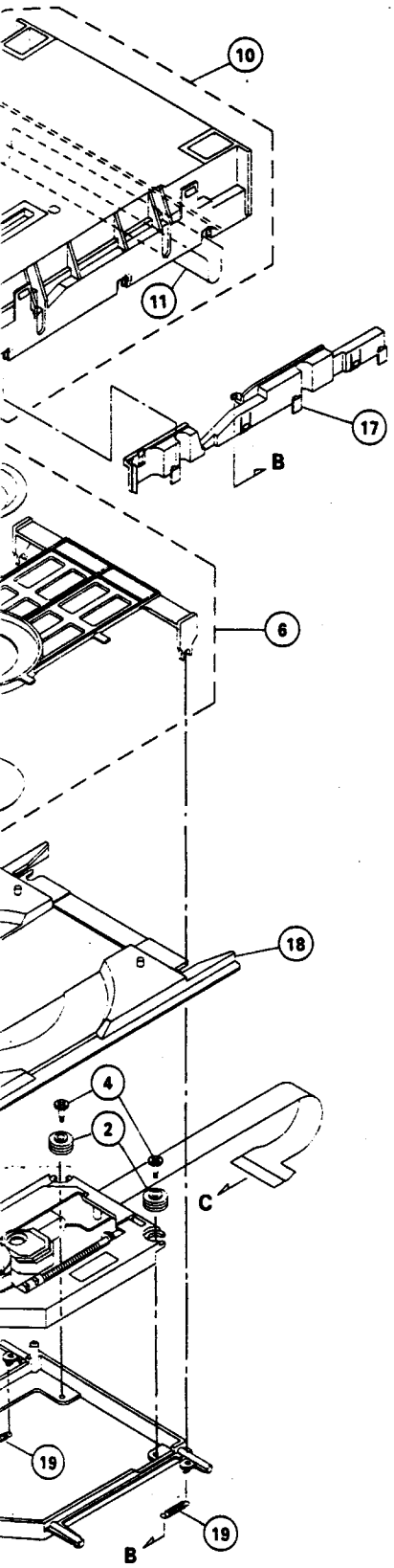


Table 1 (ROM)

Model Name	P/No.	Description	Remarks
CDU31A-01	8-759-190-03	TC54256AF-SLCD-13A	
CDU31A-02	8-759-190-03	TC54256AF-SLCD-13A	
CDU31A-51	8-759-190-03	TC54256AF-SLCD-13A	
CDU31A-81	8-759-190-03	TC54256AF-SLCD-13A	
CDU31A-GW	8-759-190-03	TC54256AF-SLCD-13A	
CDU31A-LL	8-759-190-03	TC54256AF-SLCD-13A	

Table 2 (Front Panel Ass'y, Eject Button, Volume Knob)

Model Name	Front Panel Ass'y	Eject Button	Volume Knob
CDU31A-01	X-4942-945-3	4-952-768-01	4-953-623-01
CDU31A-02	X-4942-945-3	4-952-768-01	4-953-623-01
CDU31A-51	X-4944-116-1	4-952-768-21	4-953-623-21
CDU31A-81	X-4942-964-1	4-952-768-01	4-953-623-01
CDU31A-GW	X-4943-419-1	4-952-768-11	4-953-623-11
CDU31A-LL	X-4942-964-1	4-952-768-01	4-953-623-01

Note: 1. Items marked " * " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

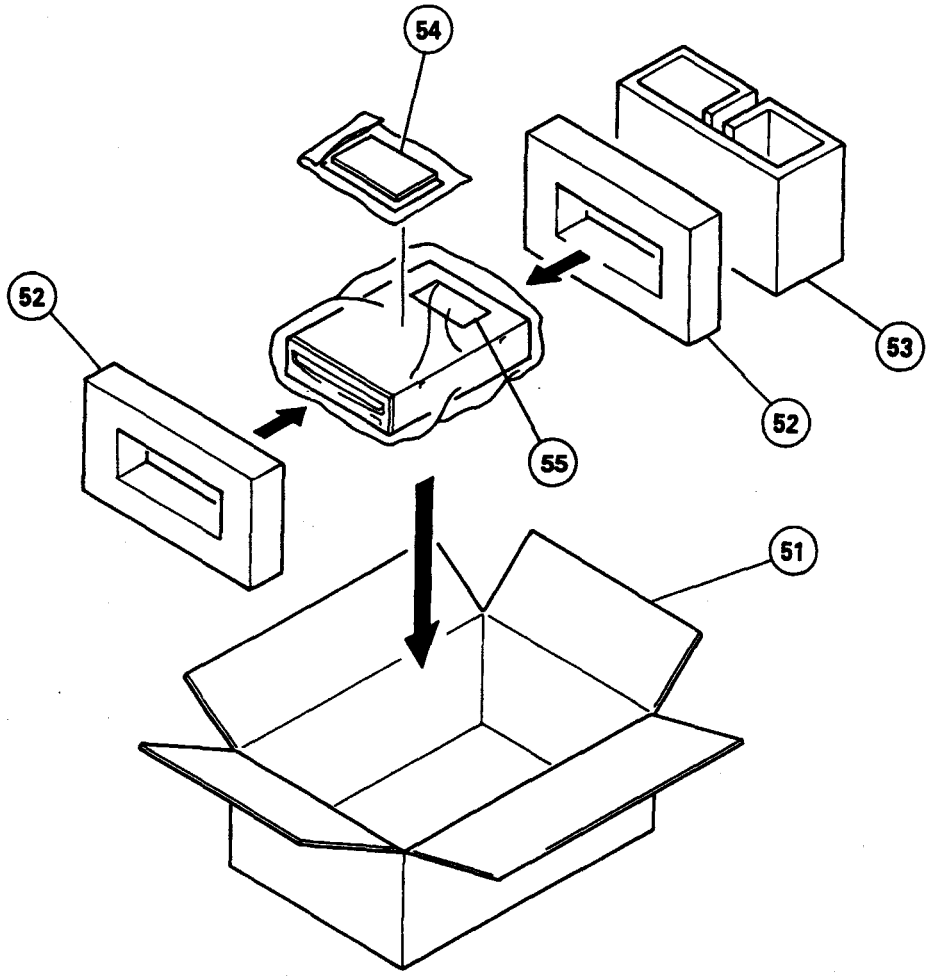
2. Substitute the screws and washers may be supplied are similar to ones listed because of Sony's part standardization program.

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

No.	Parts No.	Description
1	⚠8-848-249-11	Optical Device (KSM-360ABM)
2	*4-953-076-01	Insulator (A)
3	*4-954-841-01	Insulator (F)
4	4-953-093-01	Step Screw
5	*4-952-771-05	UX Holder
6	A-4675-375-C	Press Pulley Ass'y
7	*4-952-774-03	Press Pulley (B)
8	*A-4646-610-A	MA-1 Mounted Board (Service) (only for CDU31A-01)
	*A-4646-609-A	MA-1 Mounted Board (Service) (for CDU31A-02/-51/-81/-GW/-LL)
9	Refer to Table 1	ROM
10	*X-4942-962-1	Main Frame Ass'y
	(CDU31A-02 Serial NO.3000001 thru 3122560)	
	(CDU31A-GW Serial NO.3000001 thru 3034100)	
	(CDU31A-LL Serial NO.3000001 thru 3025000)	
	*X-4942-962-2	Main Frame Ass'y
	(CDU31A-01 Serial NO.3013000 thru 4000000)	
	(CDU31A-02 Serial NO.3122561 thru 4000000)	
	(CDU31A-51 Serial NO.3000001 thru 4000000)	
	(CDU31A-81 Serial NO.3000001 thru 4000000)	
	(CDU31A-GW Serial NO.3034101 thru 4000000)	
	(CDU31A-LL Serial NO.3025001 thru 4000000)	
11	4-953-620-01	Dust Packing (B)
12	Refer to Table 2	Front Panel Ass'y
13	Refer to Table 2	Eject Button
14	4-952-766-01	Ornamental Tray Plate (for CDU31A-01/-02/-81/-LL)
	4-952-766-21	Ornamental Tray Plate (only for CDU31A-51)
	4-952-766-11	Ornamental Tray Plate (only for CDU31A-GW)
15	*4-952-772-01	Case
16	*4-952-776-01	Guide (L)
	(CDU31A-02 Serial NO.3000001 thru 3122560)	
	(CDU31A-GW Serial NO.3000001 thru 3034100)	
	(CDU31A-LL Serial NO.3000001 thru 3025000)	
	*4-952-776-04	Guide (L)
	(CDU31A-01 Serial NO.3013000 thru 4000000)	
	(CDU31A-02 Serial NO.3122561 thru 4000000)	
	(CDU31A-51 Serial NO.3000001 thru 4000000)	
	(CDU31A-81 Serial NO.3000001 thru 4000000)	
	(CDU31A-GW Serial NO.3034101 thru 4000000)	
	(CDU31A-LL Serial NO.3025001 thru 4000000)	

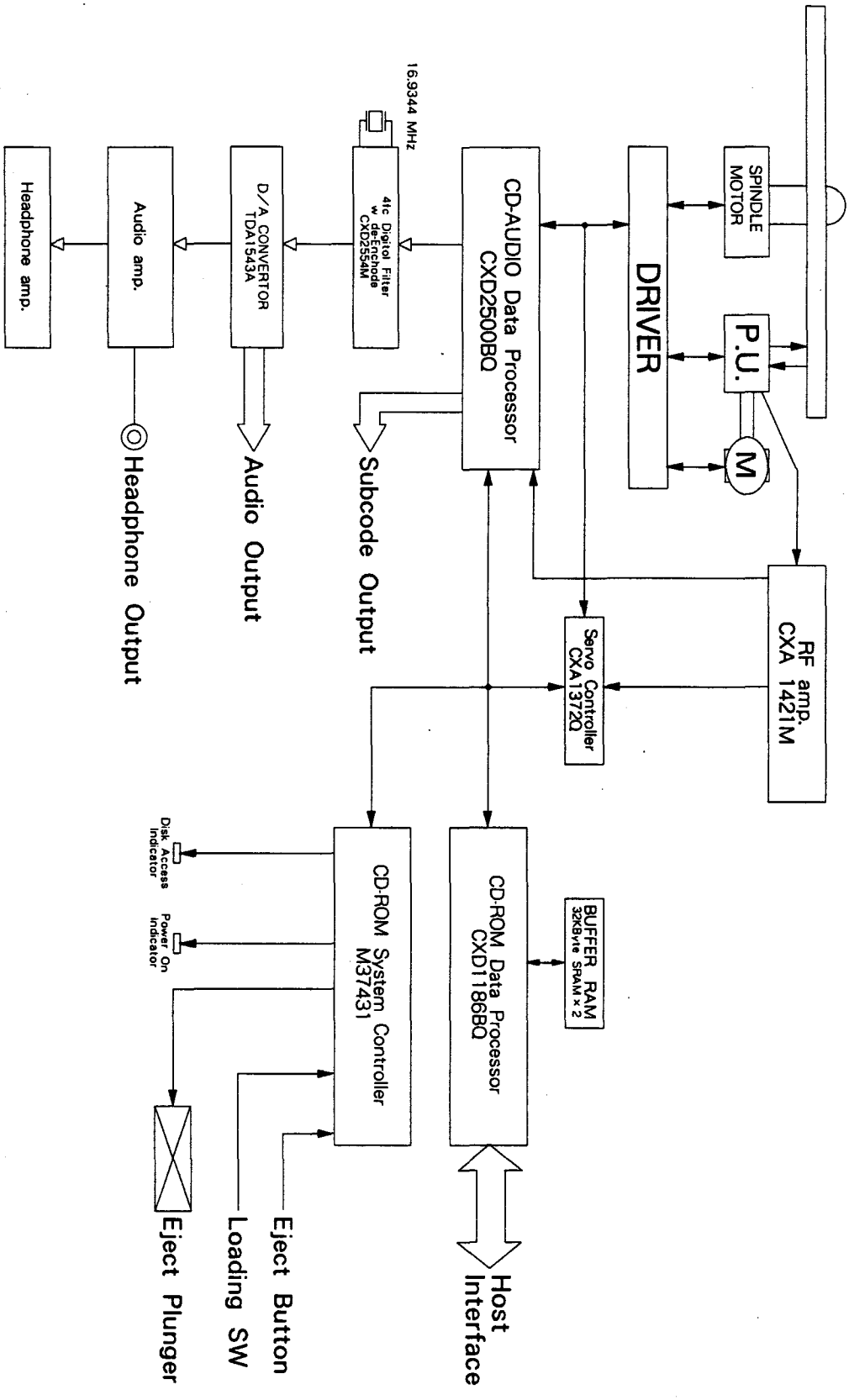
17	*4-952-777-01	Guide (R)
	(CDU31A-02 Serial NO.3000001 thru 3122560)	
	(CDU31A-GW Serial NO.3000001 thru 3034100)	
	(CDU31A-LL Serial NO.3000001 thru 3025000)	
	*4-952-777-04	Guide (R)
	(CDU31A-01 Serial NO.3013000 thru 4000000)	
	(CDU31A-02 Serial NO.3122561 thru 4000000)	
	(CDU31A-51 Serial NO.3000001 thru 4000000)	
	(CDU31A-81 Serial NO.3000001 thru 4000000)	
	(CDU31A-GW Serial NO.3034101 thru 4000000)	
	(CDU31A-LL Serial NO.3025001 thru 4000000)	
18	4-952-779-01	Tray
	(CDU31A-02 Serial NO.3000001 thru 3122560)	
	(CDU31A-GW Serial NO.3000001 thru 3034100)	
	(CDU31A-LL Serial NO.3000001 thru 3025000)	
	*X-4943-682-1	Tray Ass'y
	(CDU31A-01 Serial NO.3013000 thru 4000000)	
	(CDU31A-02 Serial NO.3122561 thru 4000000)	
	(CDU31A-51 Serial NO.3000001 thru 4000000)	
	(CDU31A-81 Serial NO.3000001 thru 4000000)	
	(CDU31A-GW Serial NO.3034101 thru 4000000)	
	(CDU31A-LL Serial NO.3025001 thru 4000000)	
19	4-953-075-01	Loading Spring
20	1-454-591-11	Plunger Solenoid
21	*4-952-519-01	Tray Cover
22	*4-952-520-01	Lock Release Lever
23	*4-952-542-01	Lock Lever
24	4-952-770-01	Lock Release Lever Bracket
25	4-953-626-01	Lock Lever Spring
26	*X-4942-961-4	Bottom Plate Ass'y
27	*4-955-150-01	FCC Approval Label (CDU31A-02 Serial No. 3,001,001 thru 3,003,500)
28	Refer to Table 2	Volume Knob
	4-955-250-01	Wave Screw +PTP 2.6x8
	4-958-529-01	Wave Screw +PTP 2.6x10
	4-952-938-01	M1.4x4

6-1-2 Packing Material



No.	Parts No.	Description
51	∗4-959-043-01	Individual Carton
52	4-924-311-03	Cushion
53	∗4-955-359-01	Spacer
54	⚠3-755-260-14	Instruction Manual (for CDU31A-01/-02/-51)
	⚠3-755-260-41	Instruction Manual (only for CDU31A-81)
55	4-957-079-31	Power Connecter Caution Label

6-2 BLOCK DIAGRAMS



6-3 PART LAYOUT AND CIRCUIT DIAGRAM

6-3-1 Parts Layout on MA-1/MA-2 Mounted Board

- **Semiconductor Location**

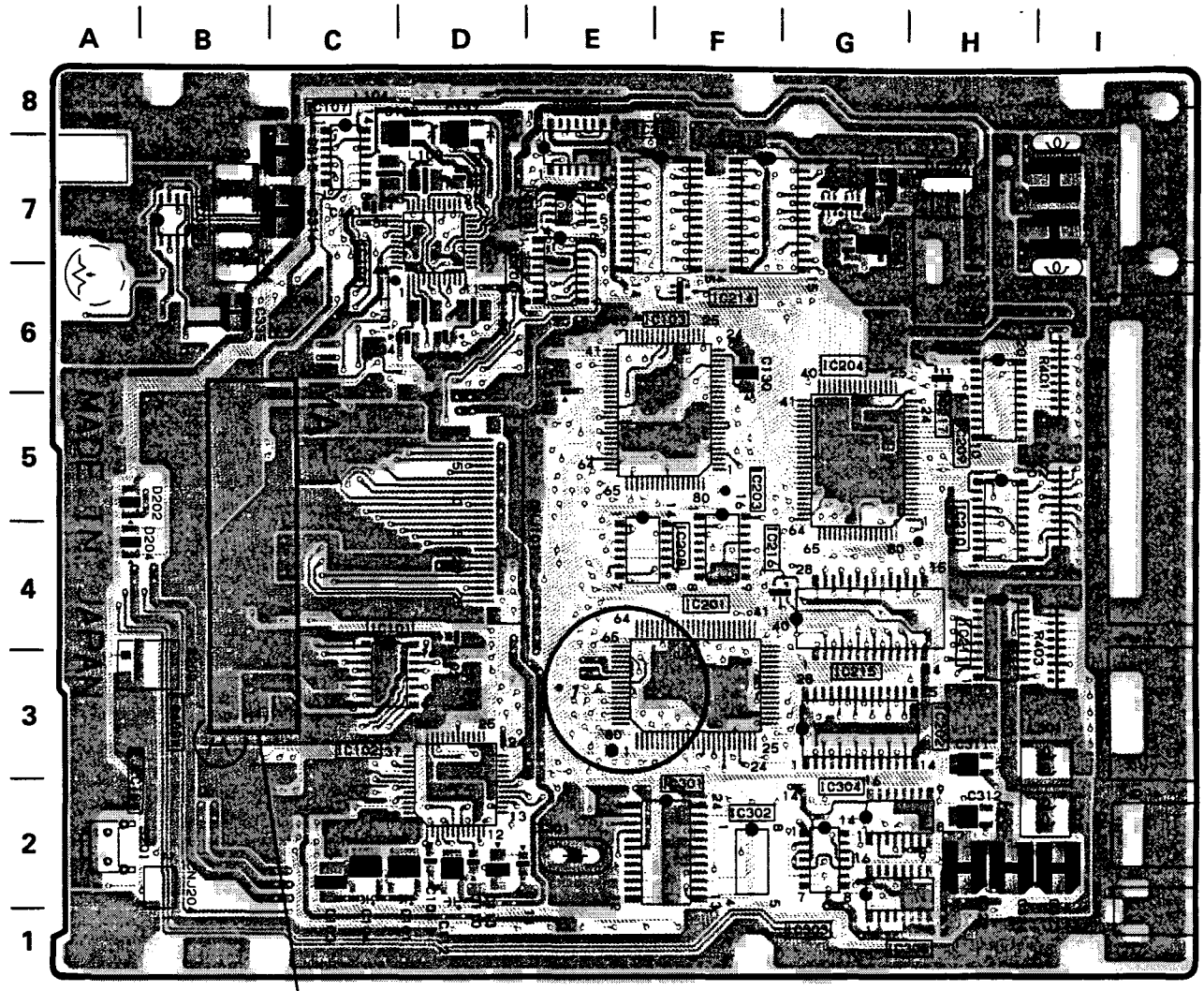
Component Side

Ref. No.	Location
D202	B-5
Q204	G-7
Q205	G-7
IC101	C-3
IC102	D-3
IC103	F-6
IC104	D-7
IC105	E-7
IC106	E-7
IC107	C-7
IC201	F-3
IC202	G-3
IC203	F-4
IC204	G-5
IC205	E-7
IC206	G-7
IC207	H-7
IC208	E-4
IC209	H-5
IC210	H-5
IC211	H-4
IC212	F-7
IC215	G-4
IC216	F-4
IC217	H-5
IC301	F-2
IC302	F-2
IC303	G-2
IC304	G-2
IC305	B-7
IC306	G-2

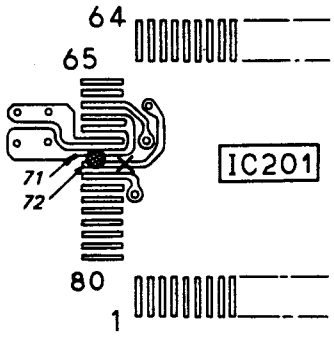
Pattern Side

Ref. No.	Location
D201	H-7
D203	I-3
D301	I-2
Q101	C-4
Q104	D-7
Q105	D-6
Q201	D-7
Q202	D-7
Q203	D-8
Q301	H-3
Q302	H-2
Q303	H-2
Q304	H-2
Q305	B-6

– Component Side – (for CDU31A-01 with Serial No. 3000001 thru Serial No. 3013000)
(for CDU31A-02 with Serial No. 3000001 thru Serial No. 3025843)



Dust Sheet (B)
9-953-096-01
(for CDU31A-01 Serial No. 3000001 thru Serial No. 3101060)
(for CDU31A-02 Serial No. 3000001 thru Serial No. 3105060)

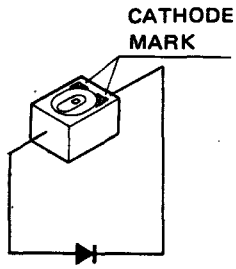


*Detail * 1*

SECTION 7
SEMICONDUCTORS PIN ASSIGNMENT

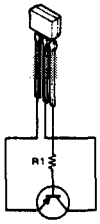
CL-181G-C (GREEN) (CITIZEN)
CL-181Y-C(YELLOW)(CITIZEN)

— TOP VIEW —



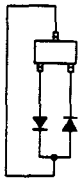
DTC143TS (ROHM)
(R1=4.7k)

–TOP VIEW–



HSM88AS (TOSHIBA)

— TOP VIEW —



RD8.2M-B1 (NEC)

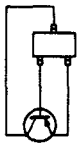
— TOP VIEW —

SB05-05CP

— TOP VIEW —

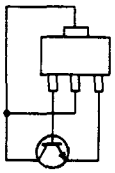
2SA812-M6

— TOP VIEW —



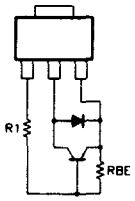
2SB1123-R (SANYO)

— TOP VIEW —



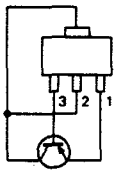
2SB1323-C
(R1=160, RBE=0.8k)

— TOP VIEW —



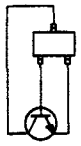
2SB798-DL (NEC)

— TOP VIEW —



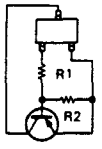
2SC1623-L5L6 (NEC)
2SC3624A-L15

— TOP VIEW —



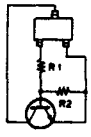
DTA114EK
(R1=10k, R2=10k)

— TOP VIEW —



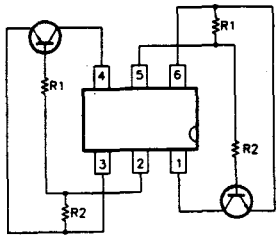
DTC124EK
(R1 = 22k, R2 = 22k)

— TOP VIEW —



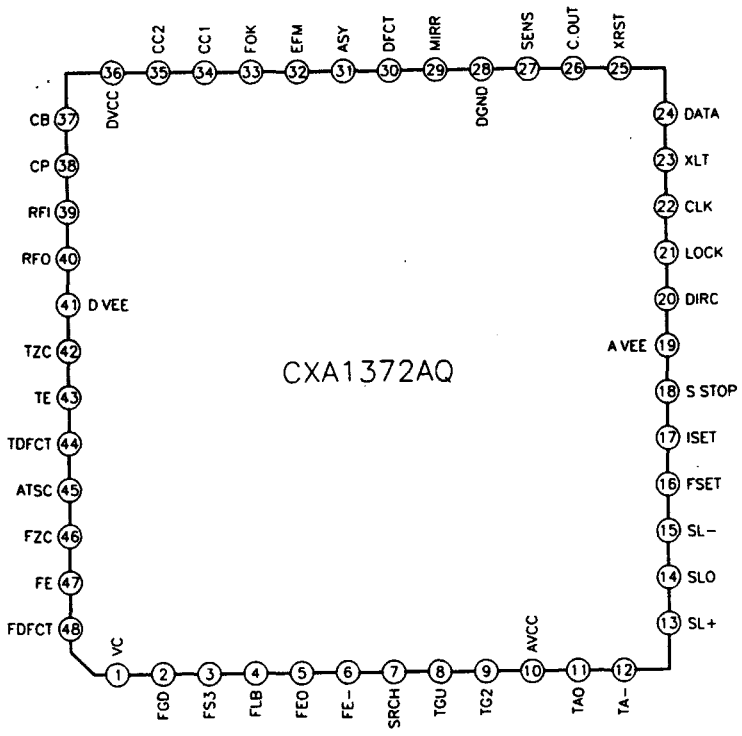
IMD3 (ROHM)
(R1=10k, R2=10k)

— TOP VIEW —

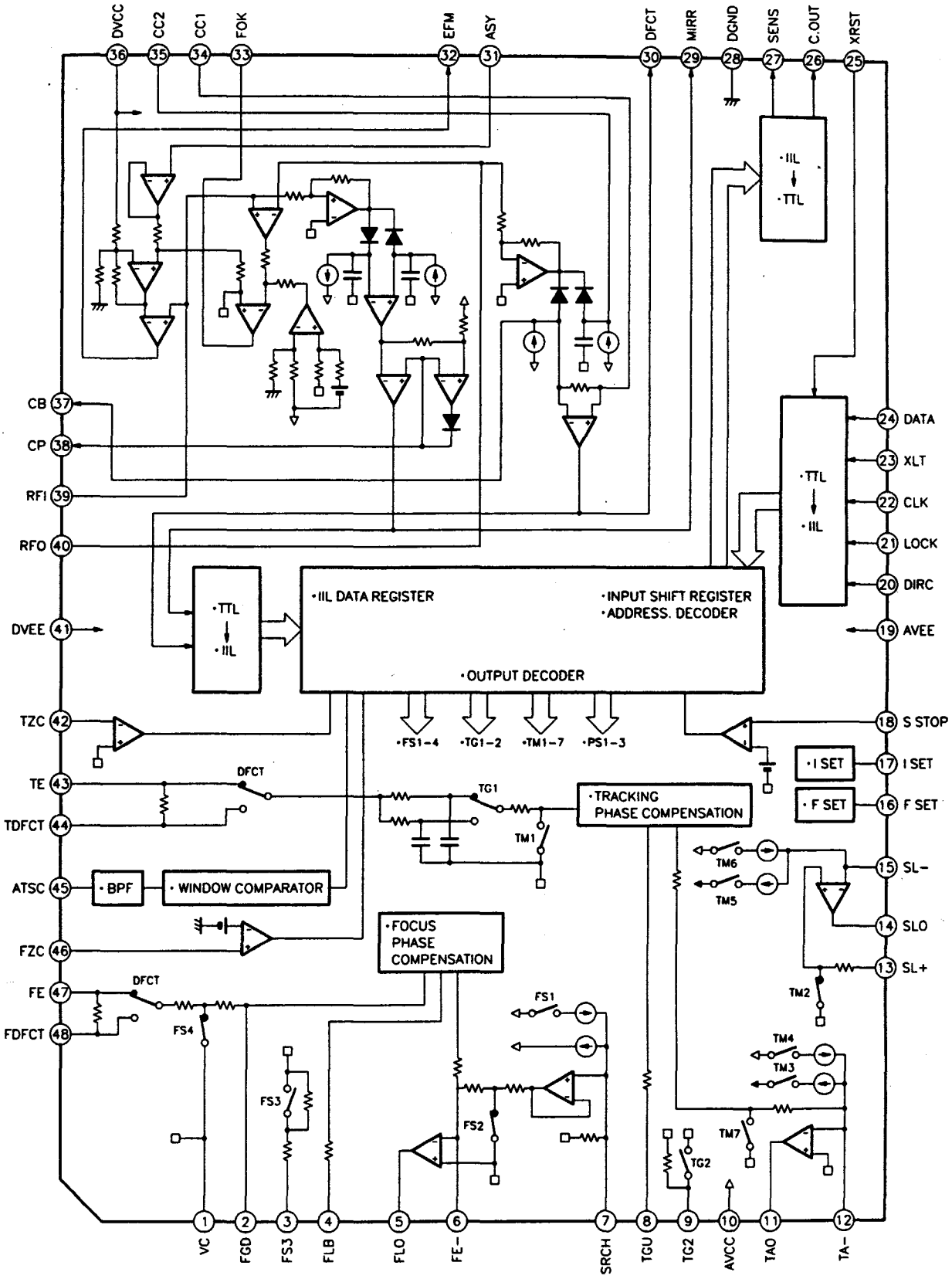


CXA1372AQ

— TOP VIEW —

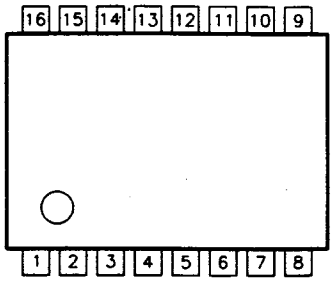


Pin	Symbol	I/O	Pin	Symbol	I/O
1	VC	I	25	XRST	I
2	FGD	I	26	SENS	O
3	FS3	I	27	C. OUT	O
4	FLB	I	29	MIRR	O
5	FEO	O	30	DFCT	O
6	FE −	I	31	ASY	I
7	SRCH	I	32	EFM	O
8	TGU	I	33	FOK	O
9	TG2	I	34	CC1	I
11	TAO	O	35	CC2	O
12	TA −	I	37	CB	I
13	SL +	I	38	CP	I
14	SLO	O	39	RF1	I
15	SL −	I	40	RFO	O
16	FSET	I	42	TZC	I
17	ISET	I	43	TE	I
18	SSTOP	I	44	TDFCT	I
20	DIRC	I	45	ATSC	
21	LOCK	I	46	FZC	I
22	CLK	I	47	FE	I
23	XLT	I	48	FDFCT	I
24	DATA	I			

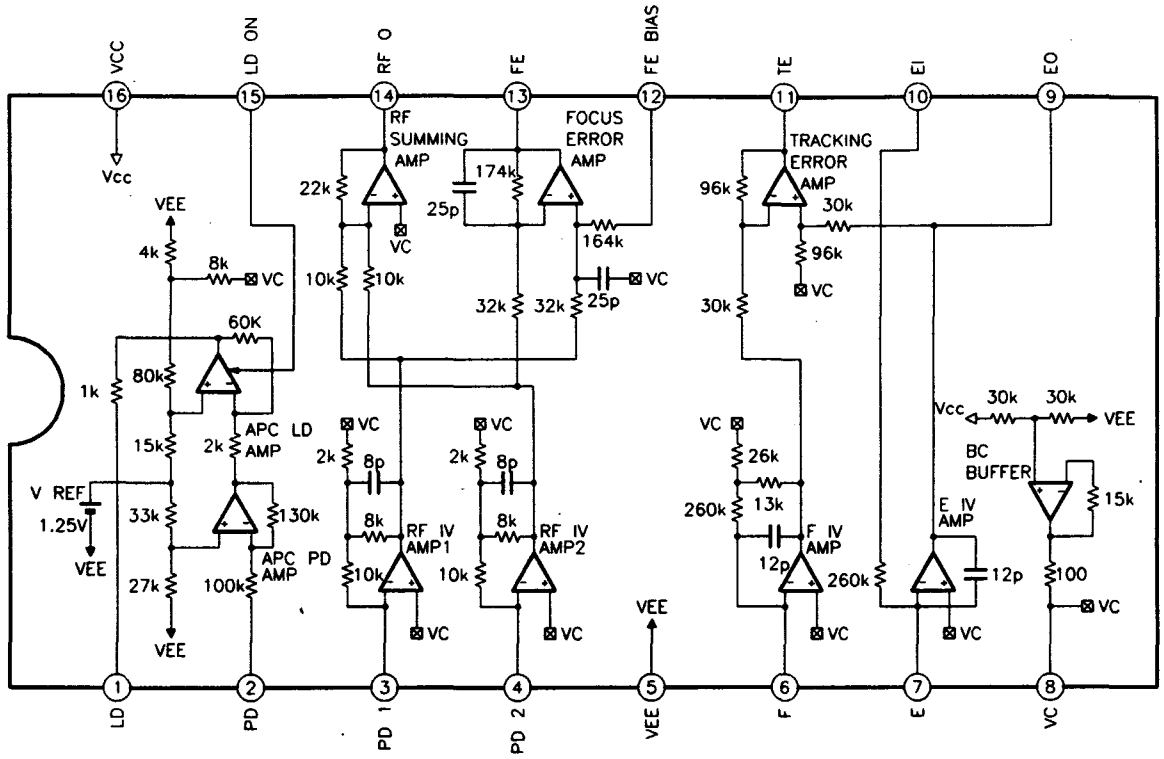

DVCC
CC2
CC1
FOK
EFM
ASY
DFCT
MIRR
DGND
SENS
C.OUT
XRST
36
35
34
33
32
31
30
29
28
27
26
25
·IIL
·TTL
CB 37
CP 38
RFI 39
RFO 40
DVEE 41
TZC 42
TE 43
TDFCT 44
ATSC 45
FZC 46
FE 47
FDFCT 48
·TTL
·IIL
·IIL DATA REGISTER
·INPUT SHIFT REGISTER
·ADDRESS. DECODER
·OUTPUT DECODER
·FS1-4
·TG1-2
·TM1-7
·PS1-3
DFCT
TG1
TM1
·TRACKING
PHASE COMPENSATION
·BPF
·WINDOW COMPARATOR
·FOCUS
PHASE
COMPENSATION
FS4
FS3
FS1
FS2
TM6
TM5
TM4
TM3
TM2
TM7
TG2
24 DATA
23 XLT
22 CLK
21 LOCK
20 DIRC
19 AVEE
18 S STOP
·I SET
17 I SET
·F SET
16 F SET
15 SL-
14 SLO
13 SL+
1 VC
2 FGD
3 FS3
4 FLB
5 FLO
6 FE-
7 SRCH
8 TGU
9 TG2
10 AVCC
11 TAO
12 TA-

CXA1421M

— TOP VIEW —

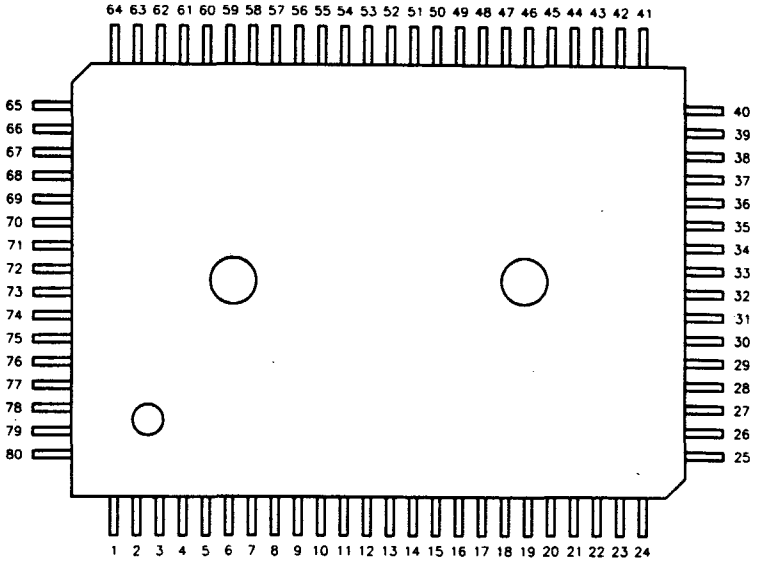


Pin No.	Symbol	I/O	Description
1	LD	O	APC amplifier output
2	PD	I	APC amplifier input
3	PD1	I	RF I-V amplifier inverted input. Receive the current input from A+C, B+D terminals of photo-diodes.
4	PD2		
6	F-IN	I	F, E I-V amplifier inverted input. Receive the current input from F, E terminals of photo-diodes.
7	E-IN		
8	VC	O	(VCC + VEE) /2 dc voltage output
9	EO	O	I-V amplifier E monitoring output
10	EI	–	I-V amplifier E gain adjusting
11	TE	O	Tracking error amplifier output. E-F signal is out.
12	FE-BIAS	I	Focus error amplifier non-inverted side bias adjusting.
13	FE	O	Focus error amplifier output
14	RFO	O	RF amplifier output
15	$\overline{\text{LD-ON}}$	I	APC amplifier ON/OFF selector. GND : ON Vcc : OFF



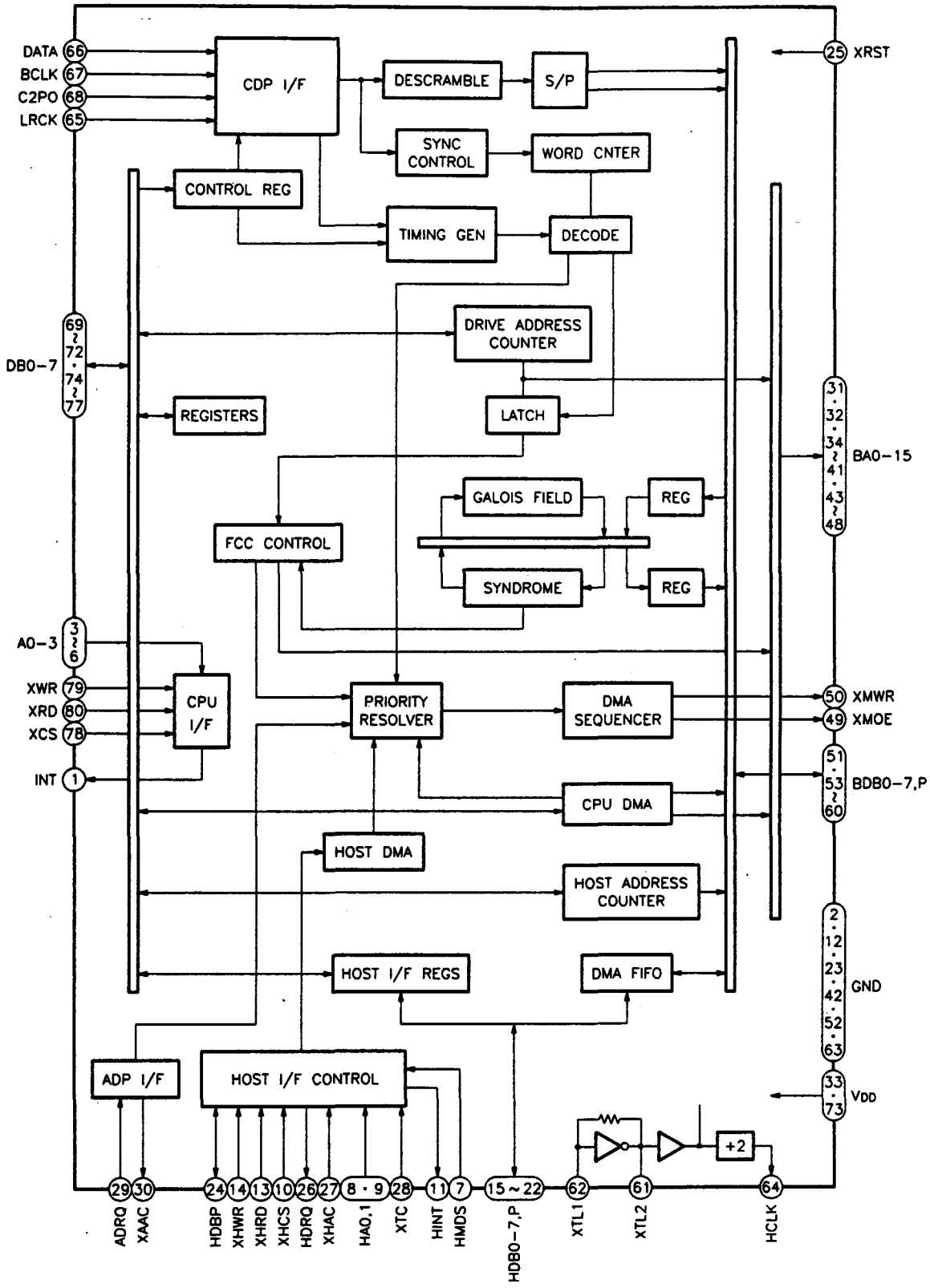
CXD1186BQ

— TOP VIEW —



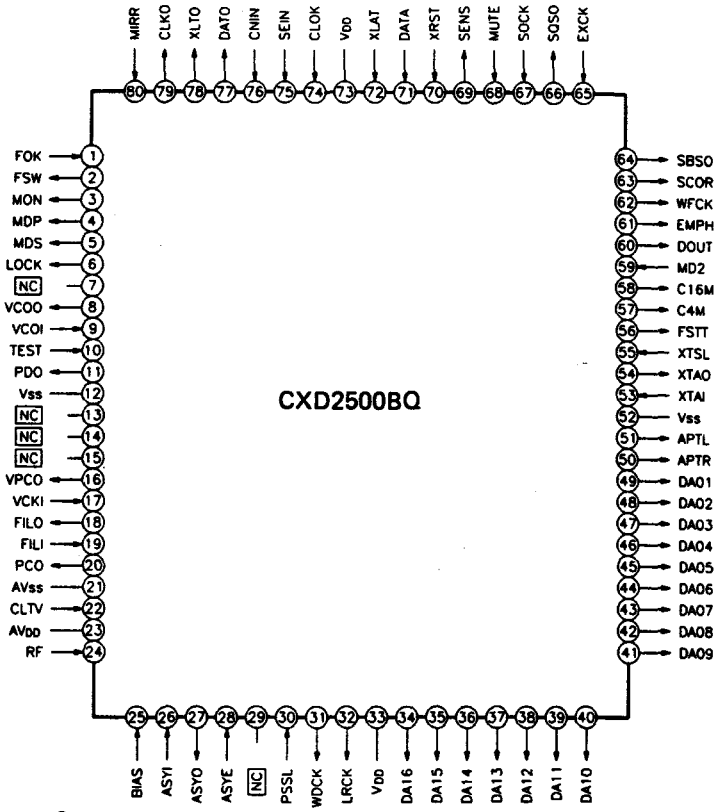
Pin	Symbol	I/O	Description
1	INT	O	Interrupt request signal to CPU
2	GND	–	Grounnd terminal
3	A0	I	CPU address singnal
4	A1	I	CPU address singnal
5	A2	I	CPU address singnal
6	A3	I	CPU address singnal
7	HMDS	I	Host mode select signal
8	HA0	I	Host address signal
9	HA1	I	Host address signal
10	XHCS	I	Chip select negative logic signal from host
11	HINT	O	Interrupt request negative logic signal to host
12	GND	–	Grounnd terminal
13	XHRD	I/O	Data reading strobe signal from host or to SCSI cantrol IC
14	XHWR	I/O	Data writing strobe signal fron host or to SCSI control IC
15	HD80	I/O	Host data bus
16	HD81	I/O	Host data bus
17	HD82	I/O	Host data bus
18	HD83	I/O	Host data bus
19	HD84	I/O	Host data bus
20	HD85	I/O	Host data bus
21	HD86	I/O	Host data bus
22	HD87	I/O	Host data bus
23	GND	–	Grounnd terminal
24	HDBP	I/O	Error flag · Host data bus.
25	XRST	I	Reset negative logic signal
26	HDRQ	O	Data request positive logic signal to host. or DMA achnowledge negative logic signal to SCSI control IC.
27	XHAC	I	Data acknowledge negative logic signal from host. or Data repuest positive logic signal from SCSI control IC.
28	XTC	I	Terminal cunt negative logic signal
29	ADRQ	I	DMA request positive logic signal from ADP
30	XAAC	O	DMA acknowledge negative logic signal to ADP
31	BA0	O	BUFFER MEMORY ADDRESS
32	BA1	O	BUFFER MEMORY ADDRESS
33	V_{DD}	–	Power supply (+5v) terminal
34	BA2	O	BUFFER MEMORY ADDRESS
35	BA3	O	BUFFER MEMORY ADDRESS
36	BA4	O	BUFFER MEMORY ADDRESS
37	BA5	O	BUFFER MEMORY ADDRESS
38	BA8	O	BUFFER MEMORY ADDRESS
39	BA7	O	BUFFER MEMORY ADDRESS
40	BA8	O	BUFFER MEMORY ADDRESS

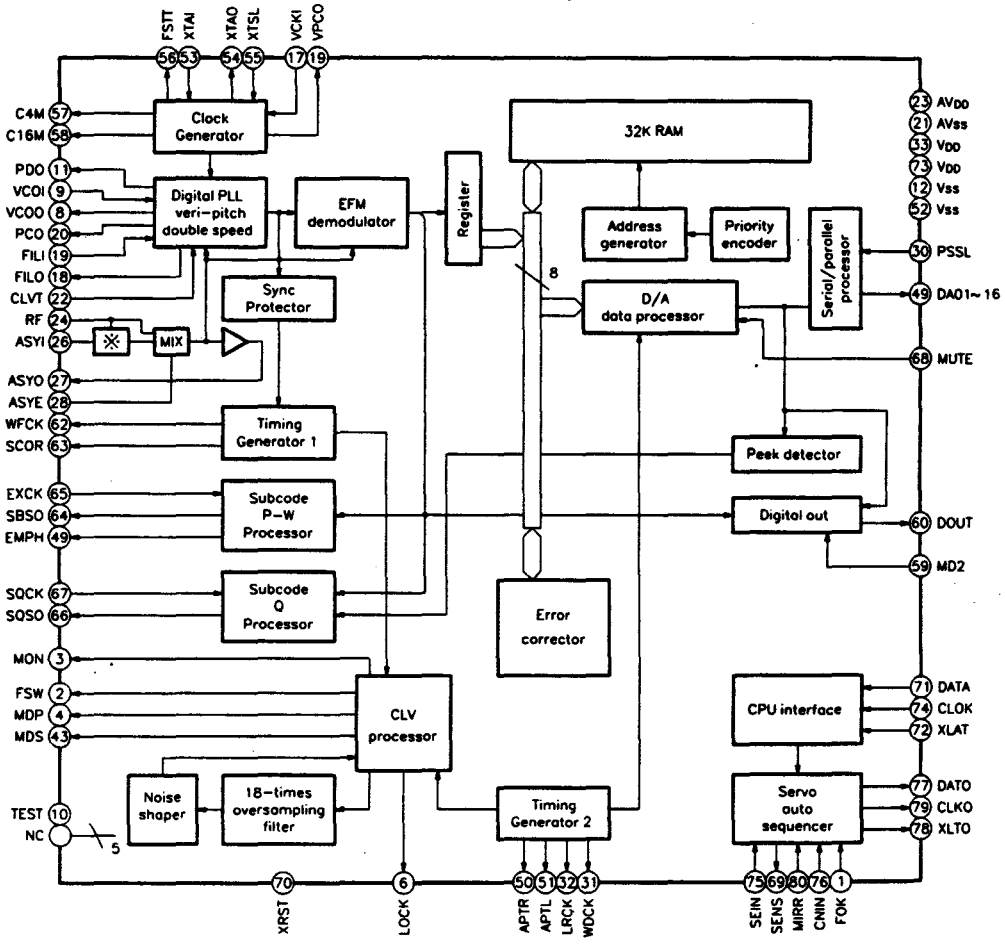
Pin	Symbol	I/O	Description
41	BA9	O	BUFFER MEMORY ADDRESS
42	GND	–	Grounnd terminal
43	BA10	O	BUFFER MEMORY ADDRESS
44	BA11	O	BUFFER MEMORY ADDRESS
45	BA12	O	BUFFER MEMORY ADDRESS
46	BA13	O	BUFFER MEMORY ADDRESS
47	BA14	O	BUFFER MEMORY ADDRESS
48	BA15	O	BUFFER MEMORY ADDRESS
49	XMOE	O	Buffer memory output enable negative logic signal
50	XMWR	O	Buffer memory write negative logic signal
51	BD80	I/O	Buffer memory data bus
52	GND	–	Grounnd terminal
53	BD81	O/O	BUFFER MEMORY DATA BUS
54	BD82	I/O	BUFFER MEMORY DATA BUS
55	BD83	I/O	BUFFER MEMORY DATA BUS
56	BD84	I/O	BUFFER MEMORY DATA BUS
57	BD85	I/O	BUFFER MEMORY DATA BUS
58	BD86	I/O	BUFFER MEMORY DATA BUS
59	BD87	I/O	BUFFER MEMORY DATA BUS
60	BDBP	I/O	BUFFER MEMORY POINTER DATA BUS
61	XTL2	O	X'tal oscillation circuit otput termind
62	XTL1	I	X'tal oscillation circuit input termind
63	GND	–	Grounnd terminal
64	HCLK	O	XTL1 1/2 divided clock signal
65	LRCK	I	LR clock from CD player
66	DATA	I	Serial data from CD player
67	BCLK	I	Bit cliock from CD plyayer
68	C2PO	I	C2 pointer from CD player
69	DB0	I/O	CPU DATA BUS
70	DB1	I/O	CPU DATA BUS
71	DB2	I/O	CPU DATA BUS
72	DB3	I/O	CPU DATA BUS
73	V_{DD}	–	Power supply (+5v) terminal
74	DB4	I/O	CPU DATA BUS
75	DB5	I/O	CPU DATA BUS
76	DB6	I/O	CPU DATA BUS
77	DB7	I/O	CPU DATA BUS
78	XCS	I	Chip select negative logic signal from CPU
79	XRD	I	Internal register in this IC reading strobe negative logic sic signal of CPU
80	XWR	I	Internal register in this IC writing staobe negative logic signal of CPU


DATA 66
BCLK 67
C2PO 68
LRCK 65
CDP I/F
DESCRAMBLE
S/P
25 XRST
SYNC CONTROL
WORD CNTER
CONTROL REG
TIMING GEN
DECODE
DRIVE ADDRESS COUNTER
DB0–7 69 ≀ 72 · 74 ≀ 77
REGISTERS
LATCH
31 · 32 · 34 ≀ 41 · 43 ≀ 48 BA0–15
GALOIS FIELD
REG
FCC CONTROL
SYNDROME
REG
A0–3 3 ≀ 6
XWR 79
XRD 80
XCS 78
CPU I/F
PRIORITY RESOLVER
DMA SEQUENCER
50 XMWR
49 XMOE
INT 1
51 · 53 ≀ 60 BDB0–7,P
CPU DMA
HOST DMA
HOST ADDRESS COUNTER
2 · 12 · 23 · 42 · 52 · 63 GND
HOST I/F REGS
DMA FIFO
ADP I/F
HOST I/F CONTROL
33 · 73 VDD
+2
29 30 24 14 13 10 26 27 8 · 9 28 11 7 15 ~ 22 62 61 64
ADRQ XAAC HDBP XHWR XHRD XHCS HDRQ XHAC HA0,1 XTC HINT HMDS HDB0–7,P XTL1 XTL2 HCLK

CXD2500BQ

— TOP VIEW —





※ Asymmetry correction.

CXD2500BQ (2/2)

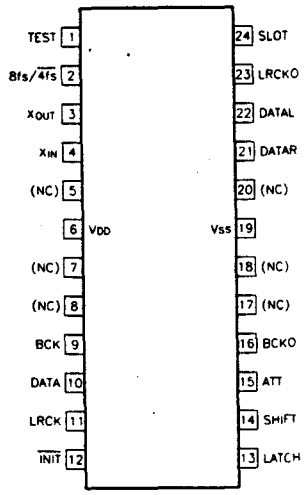
Pin Descripption

Pin No.	Pin Sign	I/O		Description
1	FOK	I		Focus OK input terminal
2	FSW	O	Z, 0	Spindle motor output filter select output
3	MON	O	1, 0	Spindle motor ON-OFF control output
4	MDP	O	1, Z, 0	Spindle motor servo control
5	MDS	O	1, Z, 0	Spindle motor servo control
6	LOCK	O	1, 0	When GFS is High, High output. When GFS is low 8 times continuously, Low output.
7	NC	———		
8	VCOO	O	1, 0	Analogue EFM PLL oscillating circuit output.
9	VCOI	I		Analogue EFM PLL oscillating circuit input. f_{LOCK} = 8.6436MHz
10	TEST	I		Terminal for TEST. Ordinarily connected to GND.
11	PDO	O	1, Z, 0	Analogue EFM PLL charge pump output
12	Vss			GND
13	NC	———		
14	NC	———		
15	NC	———		
16	VPCO	O	1, Z, 0	Vary pitch PLL charge pump output
17	VCKI	I		Clock input f_{Center} = 16.9344MHz from external VCO for vary pitch.
18	FILO	O	analogue	Filter output for master PLL (slave = digital PLL)
19	FILI	I		Filter input for master PLL
20	PCO	O	1, Z, 0	Charge pump output for master PLL
21	AVss			Analogue GND
22	CLTV	I		VCO control voltage input for master
23	AVDD			Analogue power supply (+ 5V)
24	RF	I		EFM signal input
25	BIAS	I		Assymmetry circuit constant current input
26	ASYI	I		Assymmetry comperate voltage input
27	ASYO	O	1, 0	EFM full-swing output (L = Vss, H = VDD)
28	ASYE	I		L : Assymmetry circuit OFF H : Assymmetry circuit ON
29	NC	———		
30	PSSL	I		Audio data output mode select input. L : Serial output/H : Parallel output
31	WDCK	O		D/A interface for 48 bit slot
32	LRCK	O		D/A interface for 48 bit slot
33	VDD			Power supply (+ 5V)
34	DA16	O	1, 0	On PSSL = 1, DA16 (MSB) output. On PSSL = 0, 48 bit slot serial data.
35	DA15	O	1, 0	On PSSL = 1, DA15 output. On PSSL = 0, 48 bit slot bit clock.
36	DA14	O	1, 0	On PSSL = 1, DA14 output. On PSSL = 0, 64 bit slot serial data.
37	DA13	O	1, 0	On PSSL = 1, DA13 output. On PSSL = 0, 64 bit slot bit clock.
38	DA12	O	1, 0	On PSSL = 1, DA12 output. On PSSL = 0, 64 bit slot LR clock.
39	DA11	O	1, 0	On PSSL = 1, DA11 output. On PSSL = 0, GTOP output.
40	DA10	O	1, 0	On PSSL = 1, DA10 output. On PSSL = 0, XUGF ouput.
41	DA09	O	1, 0	On PSSL = 1, DA09 output. On PSSL = 0, XPLCK output.
42	DA08	O	1, 0	On PSSL = 1, DA08 output. On PSSL = 0, GFS output.

Pin No.	Pin Sign	I/O		Description
43	DA07	O	1, 0	On PSSL = 1, DA07 output. On PSSL = 0, RFCK output
44	DA06	O	1, 0	On PSSL = 1, DA06 output. On PSSL = 0, C2PO output.
45	DA05	O	1, 0	On PSSL = 1, DA05 output. On PSSL = 0, XRAOF output.
46	DA04	O	1, 0	On PSSL = 1, DA04 output. On PSSL = 0, MNT3 output.
47	DA03	O	1, 0	On PSSL = 1, DA03 output. On PSSL = 0, MNT2 output.
48	DA02	O	1, 0	On PSSL = 1, DA02 output. On PSSL = 0, MNT1 output.
49	DA01	O	1, 0	On PSSL = 1, DA01 output. On PSSL = 0, MNT0 output.
50	APTR	O	1, 0	Aperture correction control output. On Rch, H.
51	APTL	O	1, 0	Aperture correction control output. On Lch, H.
52	Vss			GND
53	XTAI	I		16.9344MHz crystal oscillating circuit input. Or 33.8688MHz input.
54	XTAO	O	1, 0	16.9344MHz crystal oscillating circuit output
55	XTSL	I		Crystal select input terminal. When crystal is 16.9334MHz, it becomes L, when 33.8688MHz, becomes H.
56	FSTT	O	1, 0	2/3 dividing output of Pins 53 and 54. Not changing by vary pitch.
57	C4M	O	1, 0	4.2336MHz output. When pitch is varied, it changes at the same time.
58	C16M	O	1, 0	16.9344MHz output. When pitch is varied, it changes at the same time.
59	MD2	I		Digital-Out ON/OFF control. H : ON, L : OFF
60	DOUT	O	1, 0	Digital-Out output terminal
61	EMPH	O	1, 0	When the playback disc is emphasized, H is out, not emphasized, L is out.
62	WFCK	O	1, 0	WFCK (Write Frame Clock) output
63	SCOR	O	1, 0	When the sub-code sync. S0 or S1 is detected, H is out.
64	SBSO	O	1, 0	SubP to W serial output
65	EXCK	I		SBSO read-out clock input
66	SQSO	O	1, 0	SubQ 80bit and PCM peak level data 16bit output
67	SQCK	I		SQSO read-out clock input
68	MUTE	I		H : Mute on, L : Mute off
69	SENS	–	1, Z, 0	SENS output to CPU
70	XRST	I		System reset. Reset on "L"
71	DATA	I		Serial data input from CPU
72	XLAT	I		Lach input from CPU. Latch serial data on falling edge
73	VDD			Power supply (+ 5V)
74	CLOK	I		Serial data transfer clock input from CPU
75	SEIN	I		Sense input from SSP
76	CNIN	I		Track jump numbers count signal input
77	DATO	O	1, 0	Serial data output to SSP
78	XLTO	O	1, 0	Serial data latch output to SSP. Latch on falling edge.
79	CLKO	O	1, 0	Serial data transfer clock output to SSP
80	MIRR	I		Miror signal input

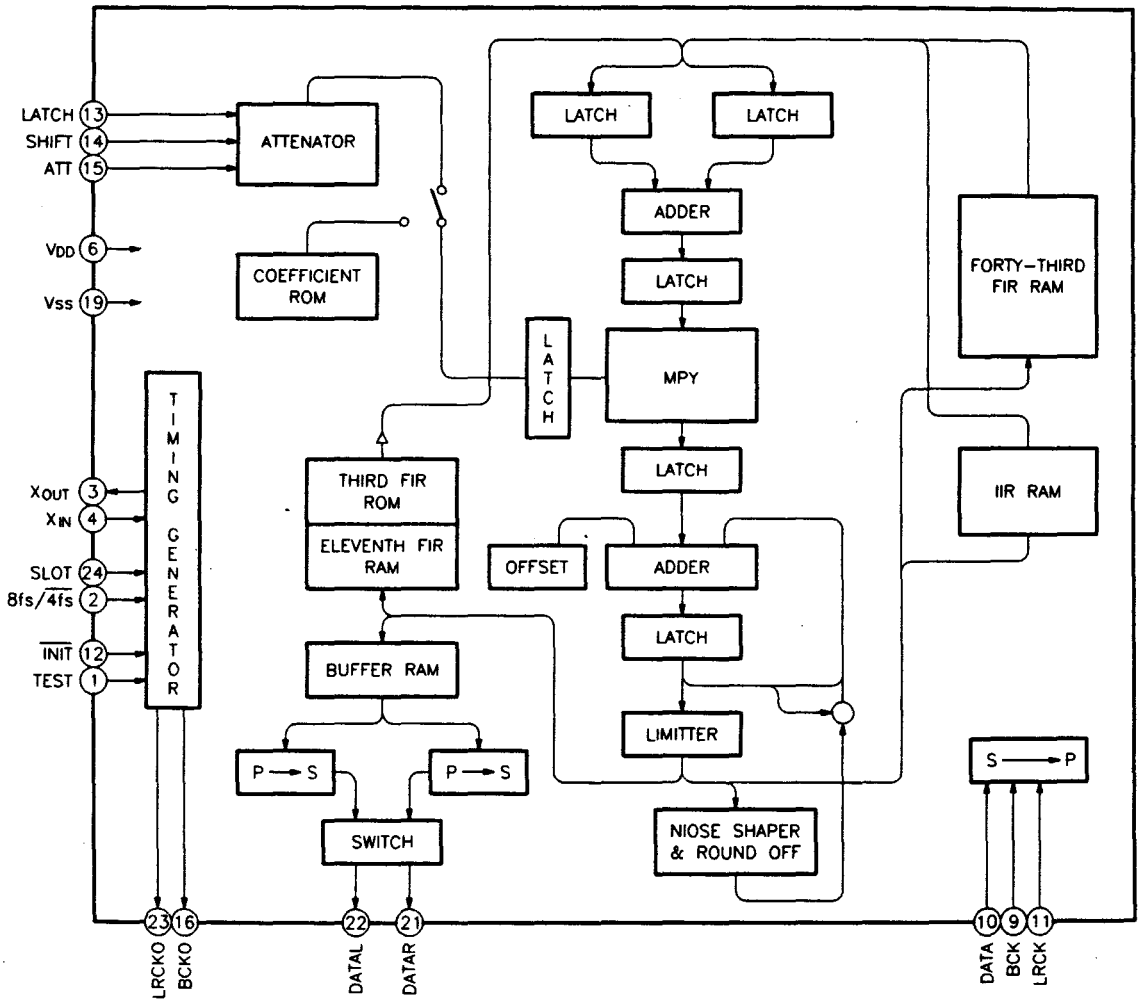
CXD2554M

— TOP VIEW —

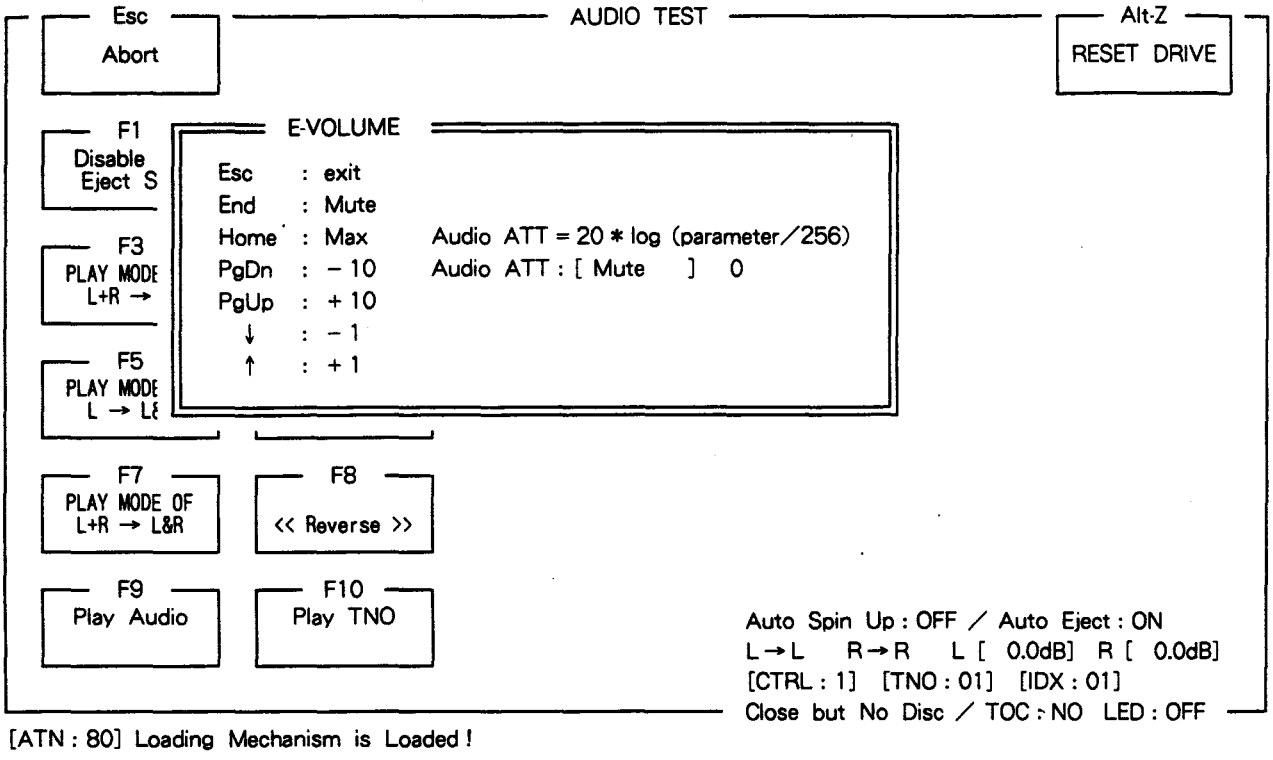


Pin No.	Pin Name	I/O	Description
1	TEST	I	For test. Normally set to "L" level.
2	8fs/4fs	I	Specifies FIR3 "H" : 8fs "L" : 4fs
3	XOUT	O	Master clock ontput (f = 384fs)
4	XIN	I	Master clock on input (f = 384fs)
5	(NC)	–	Not connected
6	VDD	–	Power supply (+ 5V)
7 8	(NC)	–	Not connected
9	BCK	I	BCK input
10	DATA	I	Serial data input (Complement of 2)
11	LRCK	I	LRCK input
12	INIT	I	Synchronized again at the rising edge of this signal
13	LATCH	I	Latch clock input
14	SHIFT	I	Shift clock input
15	ATT	I	Attenuate data input
16	BCKO	O	BCK output
17 18	(NC)	–	Not connected
19	Vss (GND)	–	Power supply
20	(NC)	–	Not connected
21	DATAR	O	On 4fs : WCK output On 8fs : R-ch serial data output (Complement of 2)
22	DATAL	O	On 4fs :L-ch, R-ch time divided serial data outpnt (Complement of 2) On 8fs : L-ch serial data output (Complement of 2)
23	LRCKO	O	LRCK output
24	SLOT	I	Specifies output slot "H" : 18bit slot "L" : 16bit slot

※TEST, 8fs/4fs, SLOT pins havee pull down resistors within.



Item/Procedure	Specification (Normal Status)	Check point
7. Muting a. Hit F2 (E-Volume) key. (Display 3-4-6 shows up) b. Hit End key to start Muting.	1. The sound stops. (MUTE test land is High level.)	IC201-9, IC211-8, IC103-88.



Display 3-4-6

3-5 PROCEDURE OF OUTGOING TEST

3-5-1 Pre-Setting

a. Connect the test drive to the ATP System. (Refer to Fig. 2-2)

b. Turn on the power of the computer.

Note: Make sure PC-DOS has been installed in the hard disk of the computer.

c. After system loading, insert the SLCD Test Disk into drive A.

d. Change directory in drive A.

e. Type [s][l][c][d][t][e][s][t] and [Enter] key to start the test. (Main menu will be displayed.)

f. I/O address setting

f-1. Select the [DRIVE & I/O Card SELECT] in the right column with arrow keys, then hit [Enter] key. (I/O card menu will be displayed.)

f-2. Type [3][6][0] and [Enter] key.

g. Open the tray by pressing the Eject button located on the front panel ass'y.

h. Put the YHDS-50 disc on the tray and then insert the tray.

i. Spin up mode setting

i-1. Select [51H Spin up] in the right column with arrow keys, then hit [Enter] key.

i-2. Select [EXEC] with arrow keys, then hit [Enter] key to execute Spin Up. (Spin Up Menu will be displayed.)

Main Menu

Exercizer program for SONY CD-ROM drive < SLCD > Ver X.XX (C) 1991, 92 SONY

COMMAND

00H Request Drive Config 01H Request Drive Mode 02H Request Drive Param. 03H Request Mecha. Status 04H Request Audio Status	30H Read TOC 31H Seek 32H Read 33H (Reserved) 34H Read w/Blk Err. Status 35H (Reserved)	50H Eject 51H Spin Up 52H Spin Down
10H Set Drive Parameter	40H Audio Playback 41H Audio Stop 42H Audio Scan	60H Write Buffer 61H Read Buffer 62H Diagnostics
20H Request TOC Data 21H Request Subcode Addr 22H Request UPC/EAN 23H Request ISRC	36H Read TOC 24H Request TOC Data (Reserved)	DRIVE STATUS (get REG) DRIVE & I/O card SELECT CHANGE TRANSFER/INTERRUPT
Any command		(Reserved) (Reserved)

Message

Attention !!! code (FF).
Attention !!! code (FF).
Attention !!! code (FF).
Attention !!! code (FF).
Attention !!! code (FF).

< CURSOR > / ReqDrvCfg < ALT-V > / SpinUp < ALT-X > / ReadTOC < ALT-C > / Read < ALT-R > / ZoomM < ALT-Z >

Exercizer program for SONY CD-ROM drive < SLCD > Ver X.XX (C) 1991, 92 SONY

(DRIVE & I/O card SELECT)

SLCD I/F I/O address (360H)

Message

Attention !!! code (FF).
Attention !!! code (FF).
Attention !!! code (FF).
Attention !!! code (FF).
Attention !!! code (FF).

Drive & I/O Card Select Menu

Exercizer program for SONY CD-ROM drive < SLCD > Ver X.XX (C) 1991, 92 SONY

(51H Spin Up)

PROCEDURE

BUSY bit	LOW
P. Reg W. Rdy	HI
W. Command	51
Result. Rdy	HI
Result Read	00 00

RESULT

SELECT
E X E C
E X I T

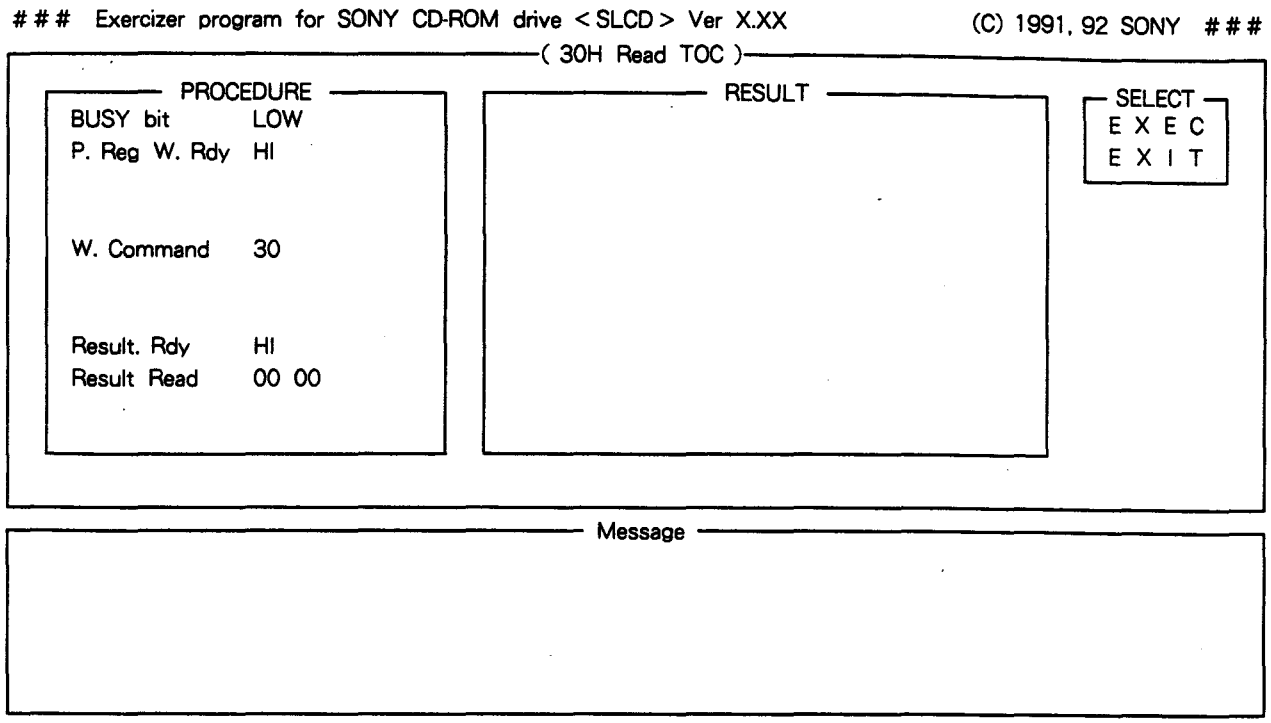
Message

Spin Up Menu

j. Read TOC mode setting.

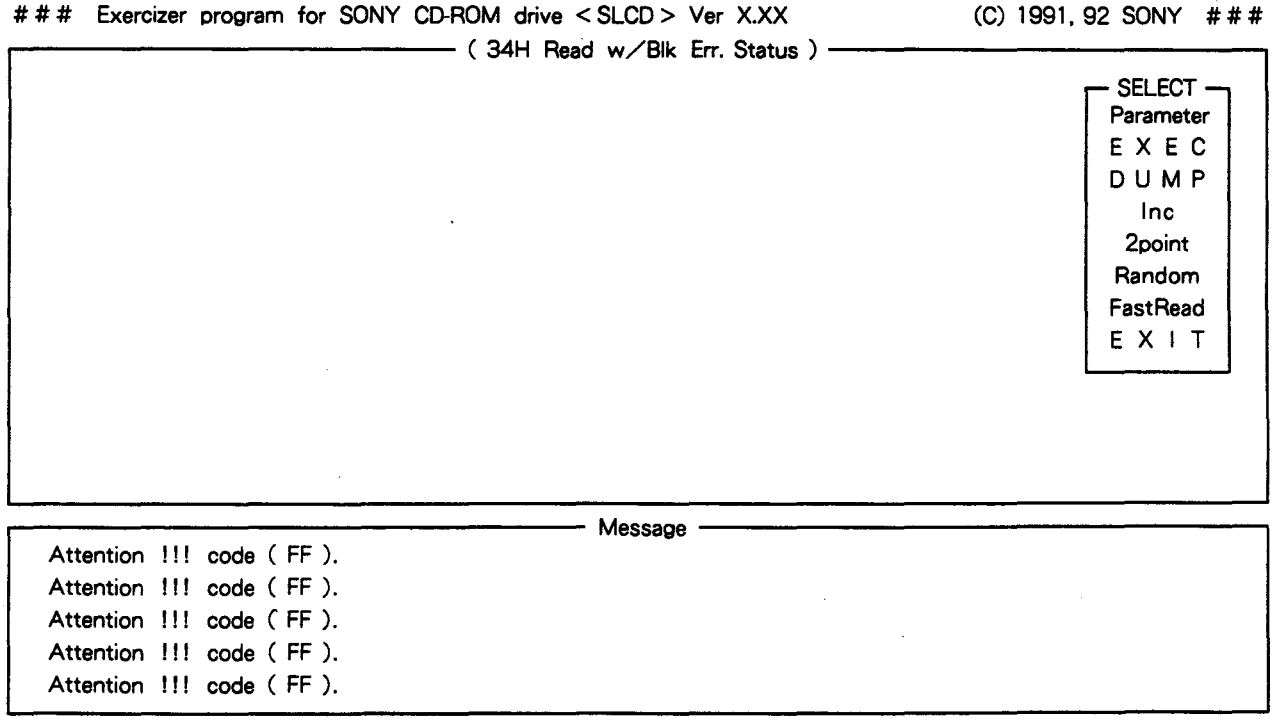
j-1. Select [30H Read TOC] with arrow keys and hit [Enter] key. (Read TOC Menu will be displayed.)

j-2. Select [EXEC] with arrow keys, then hit [Enter] key to execute Read TOC.



Read TOC Menu

k. Select the [Read w/Blk Err. Status] with arrow keys, then hit [Enter] key. (Read w/Blk Err. Status menu will be displayed.)



Read w/Blk Err. Status Menu

l. Select [Random] with arrow keys, then hit [Enter] key. (Random mode menu will be displayed.)

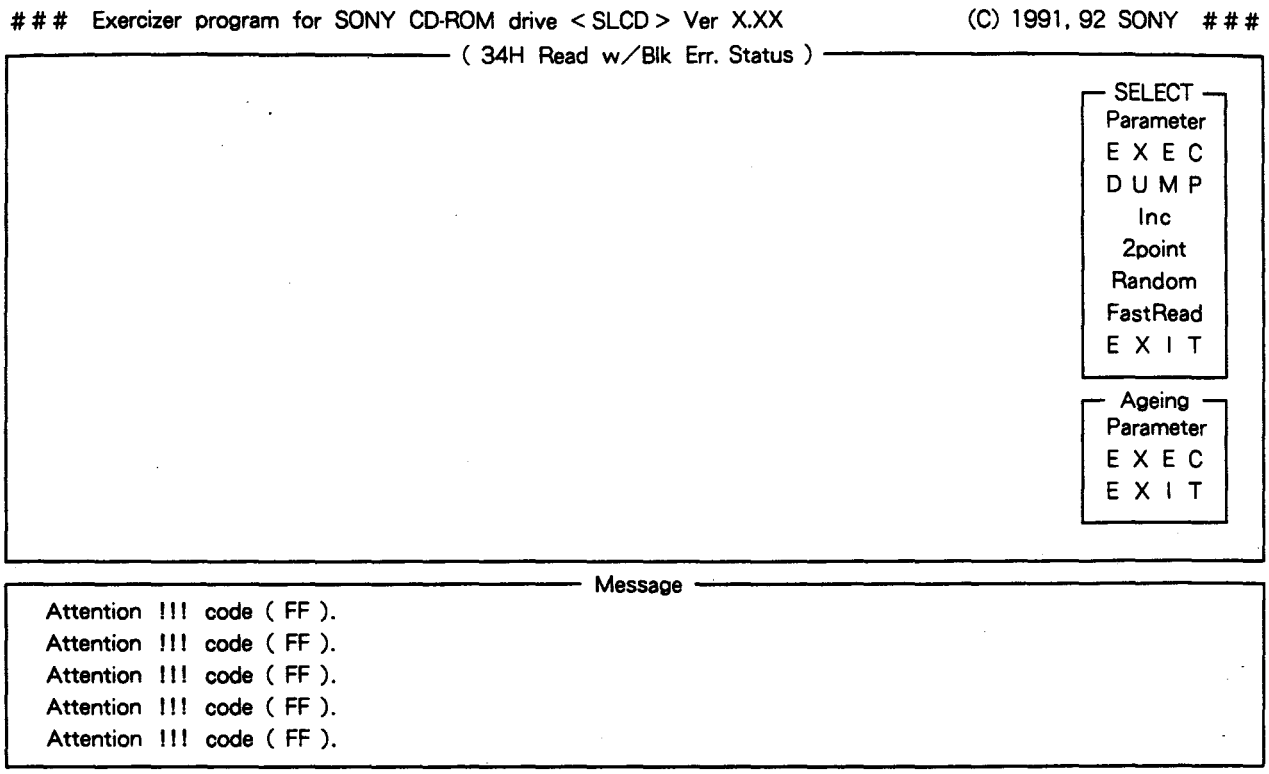
m. Select [Parameter] with arrow keys, then hit [Enter] key. (Parameter will be displayed.)

n. Set the number of Loop Cnt in parameter to 1000.

o. Set the mode of Check SUM to 1.

p. Set the mode of Stop On Error to 1.

q. After setting parameter, hit [Enter] key.



Random Mode Menu

r. Select [EXEC] with arrow keys, then hit [Enter] key to start the outgoing test. (Error counter window will be displayed.)

Note: If the outgoing test is completed, "Ageing Complete" message will be displayed and Error counter is 0. If not (error counter is 1 or more), error message and error code will be displayed. Re-check the drive in accordance with the error code. (Refer to 3-6)

Start	00M02S00F
End	60M01S74F
Length	00000001
Loop Cnt	00001000
Check Sum	1
Stop On Error	1
Data Log	0

Parameter

3-6 TYPE OF ERROR

3-6-1 Sum Error

In order to check data within User Data, Check Sum is recorded in the last 2 bytes (16 bits) of this area.

3-6-2 Address Error

The Addr that the drive detects differs from Header Addr and Data Addr.

3-6-3 Hardware Error

Some commands (6, 5, 4) bit are set 1 when Tray, Eject, or Spindle motor error occurred.

a. Tray
   The drive detects that YHDS-50 doesn't insert a drive during testing.

b. Eject Button
   The drive detects that Eject Button is pressed during testing.

c. Spindle Motor
   The drive detects that spindle motor doesn't rotate during testing.

3-6-4 Disc Type Error

This type of error is classified as follows.

NO DISC
ILLEGAL DISC
AUDIO TRACK
CD-ROM TRACK
OTHER MODE
MODE 0

3-6-5 Seek Error

This type of error is classified as follows.

BLOCK NOT FOUND
LEAD OUT AREA
DISC NOT READABLE
END OF TRACK

3-6-6 Data Error

The drive detects the error that occurred in data area.

a. Not Cor Retry / Correct Retry
   These items mean number of retry.

b. Not Cor L-EC / Correct L-EC
   These items are effective when parameter of L-EC is set to " ON ".

3-7 ERROR / ATTENTION CODE

3-7-1 Error Code

Command Error Group

- 10h Illegal command code
- 11h Illegal command parameter
- 12 – 1Fh (reserved)

Mechanism Error Group

- 20h Loading mechanism in not loaded
- 21h No disc
- 22h Disc is not spinning
- 23h Disc is spinning
- 24h (reserved)
- 25h Spindle servo error
- 26h Focus servo error
- 27 – 28h (reserved)
- 29h Eject mechanism error
- 2Ah Audio play in progress
- 2Bh (reserved)
- 2Ch Emergency Eject
- 2D – 2Fh (reserved)

Seek Error Group

- 30h Focus error
- 31h Frame sync error
- 32h Subcode address error
- 33h Block sync error
- 34h Header address error
- 35 – 3Fh (reserved)

Read Error Group

- 40h Illegal track
- 41h Mode 0
- 42h Illegal mode
- 43h Illegal block size
- 44h Mode error
- 45h Form error
- 46h Lead-out error
- 47h Buffer overrun on Audio
- (reserved)

Data Error Group

- 50 – 52h (reserved)
- 53h Unrecovered Error with CIRC
- 54 – 56h (reserved)
- 57h Unrecovered Error with L-ECC
- 58 – 5Fh (reserved)

Subcode Error Group

- 60h No TOC information
- 61h Subcode Data Not valid
- 62h (reserved)
- 63h Focus error on TOC read
- 64h Frame sync error on TOC read
- 65h TOC Data Error
- 66 – 6Fh (reserved)

Hardware Failure Group

- 70h Hardware failure
- 71 – 7Fh (reserved)

Audio Error Group

- 91h Lead in error
- 92h Lead out error
- 93h Data track error
- 94 – 9Fh (reserved)

3-7-2 Attention Code

Standard Attention Group

- 2Ch Emergency eject
- 70h Hardware failure
- 80h Loading mechanism is loaded
- 81h Eject button is pushed
- 82 – 8Fh (reserved)

Audio Attention Group

- 90h Audio play complete
- 91h Lead-in error
- 92h Lead-out error
- 93h Data Track error
- 94h Audio playback error
- 95 – 9Fh (reserved)

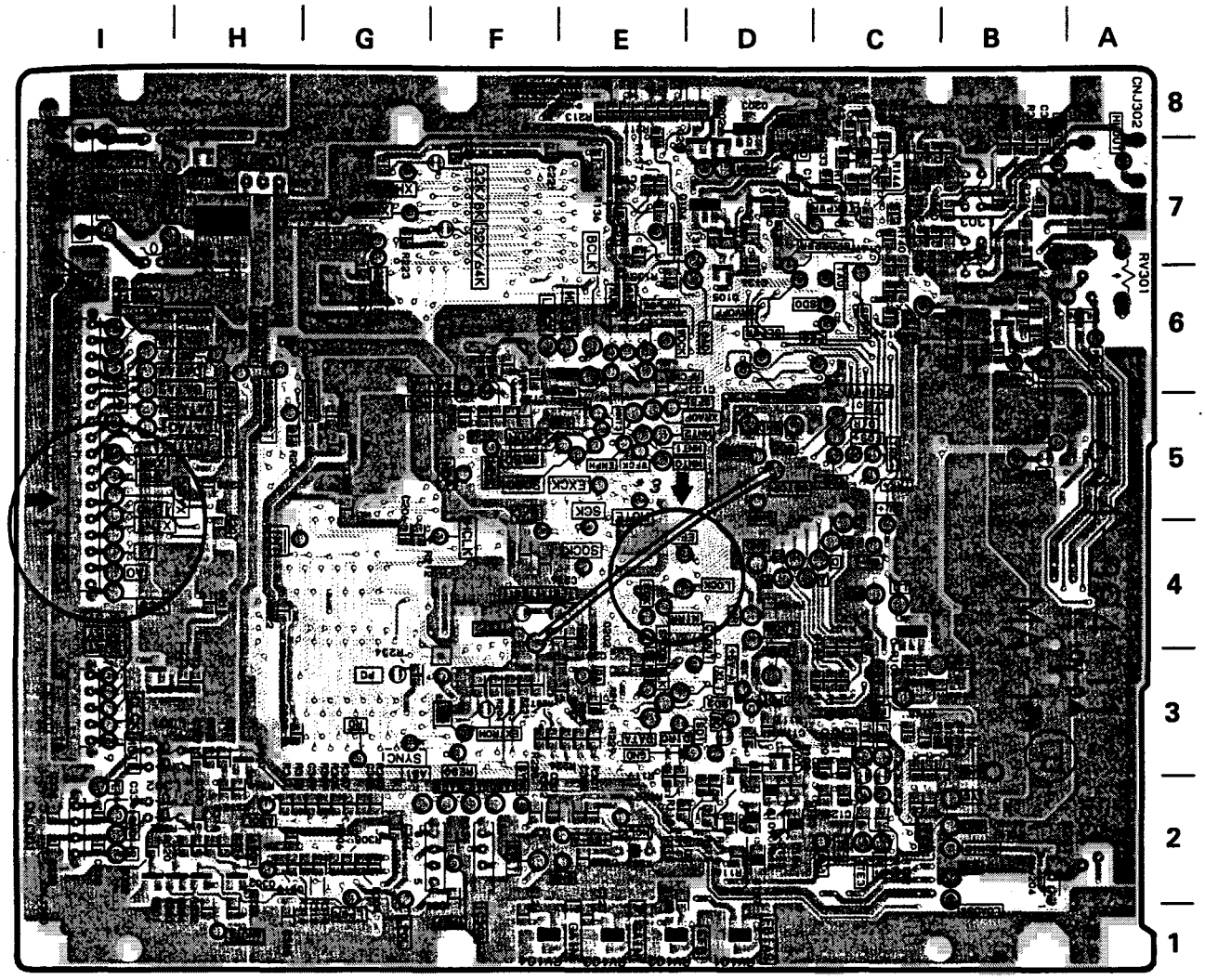
Auto Spin up Attention Group

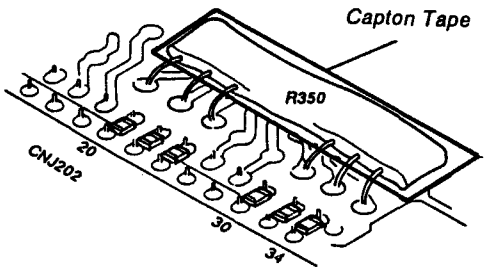
- 24h Spin up complete
- 25h Spindle servo error
- 26h Focus servo error
- 62h TOC read complete
- 63h Focus error on TOC read
- 64h Frame sync error on TOC read
- 65h TOC data error

Auto Eject Attention Group

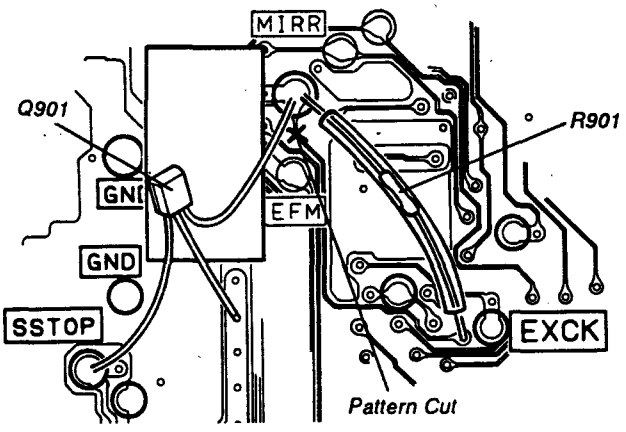
- 27h Spin down complete
- 28h Eject complete
- 29h Eject mechanism error

– Pattern Side –





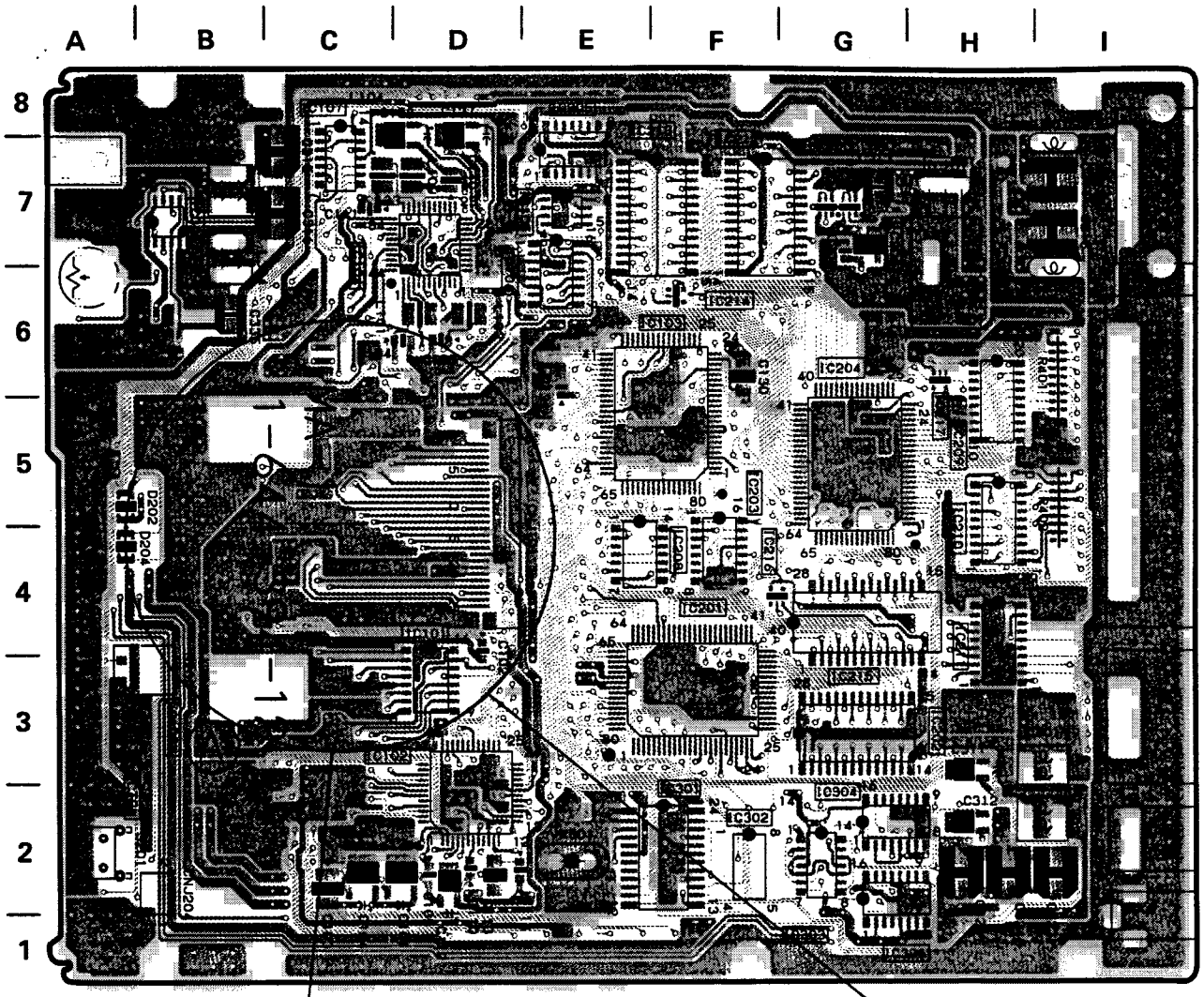
View * 2

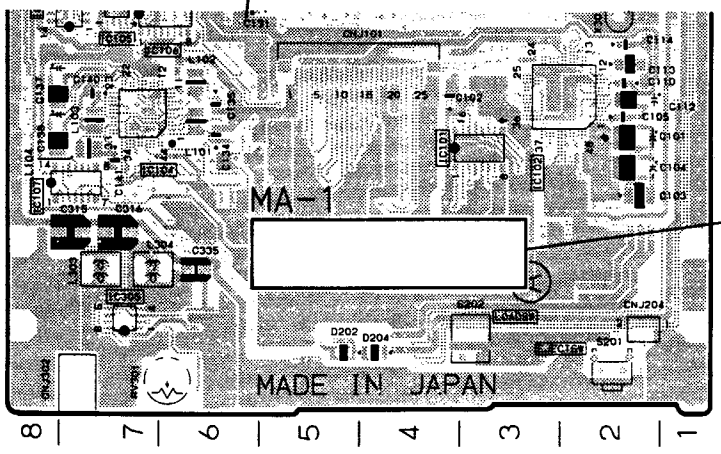


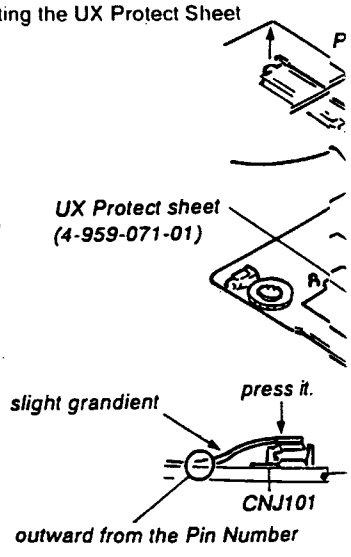
View * 3

Q901	DTC 143TS	(for CDU31A-01 Serial No. 3000001 thru Serial No. 3013000)
		(for CDU31A-02 Serial No. 3000001 thru Serial No. 3015100)
R901	RES, METAL FILM	(for CDU31A-01 Serial No. 3000001 thru Serial No. 3013000)
		(for CDU31A-02 Serial No. 3000001 thru Serial No. 3015100)

– Component Side – (for CDU31A-02 with Serial No. 3025844 thru Serial No. 3254470)
(for CDU31A-GW with Serial No. 3000001 thru Serial No. 3253230)
(for CDU31A-LL with Serial No. 3000001 thru Serial No. 3038660)



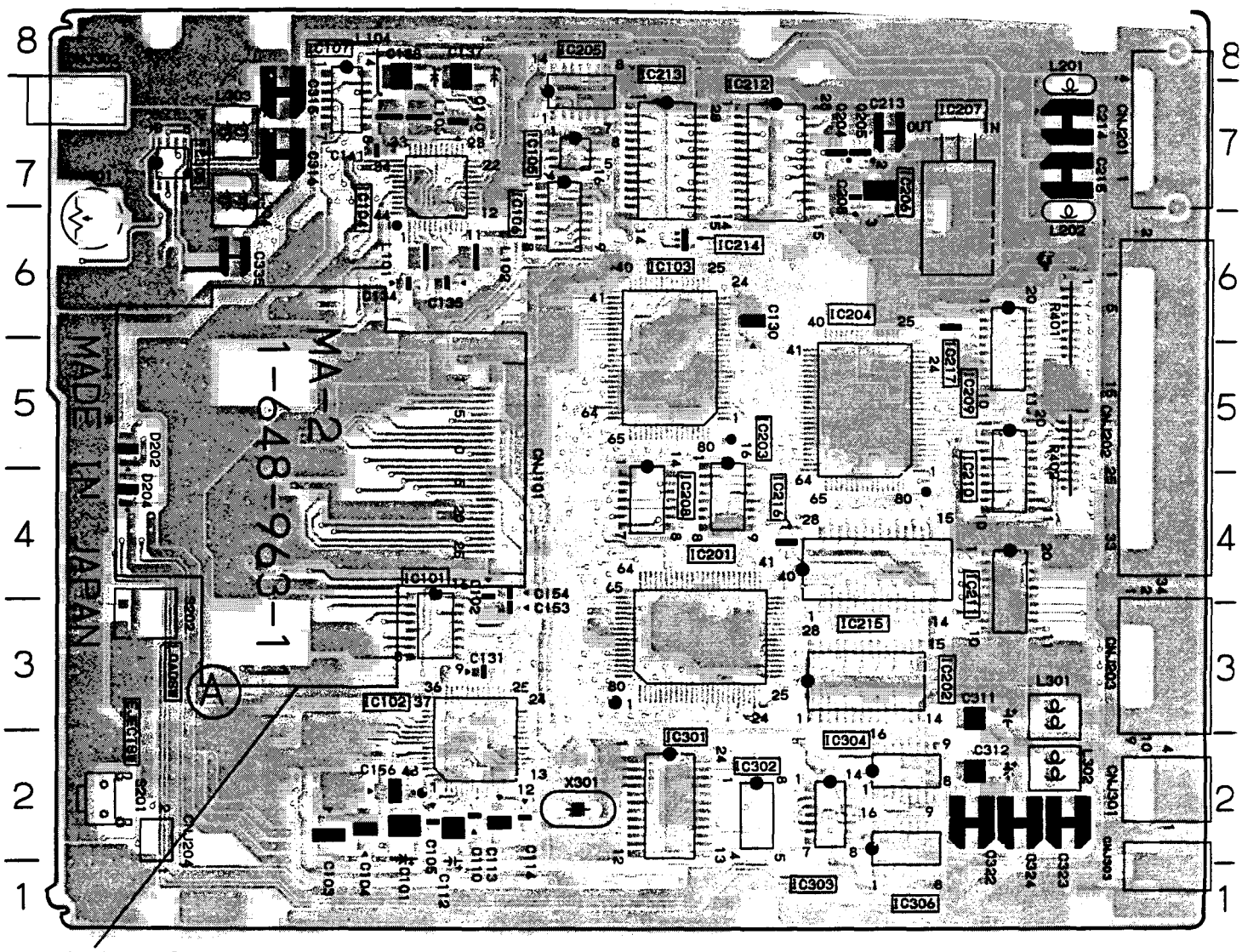


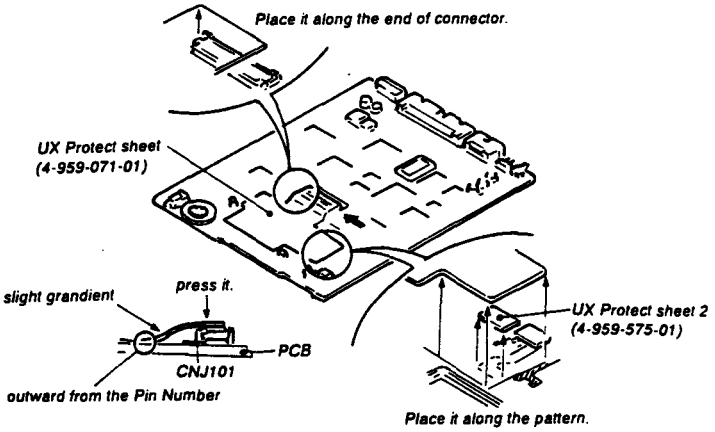


Dust Sheet (B) (for CDU31A-02 Serial No. 3000001 thru Serial No. 3105060)
4-953-096-01 (for CDU31A-GW Serial No. 3000001 thru Serial No. 3032470)
(for CDU31A-LL Serial No. 3000001 thru Serial No. 3024950)

Note : Attach the sheet with s

– Pattern Side –

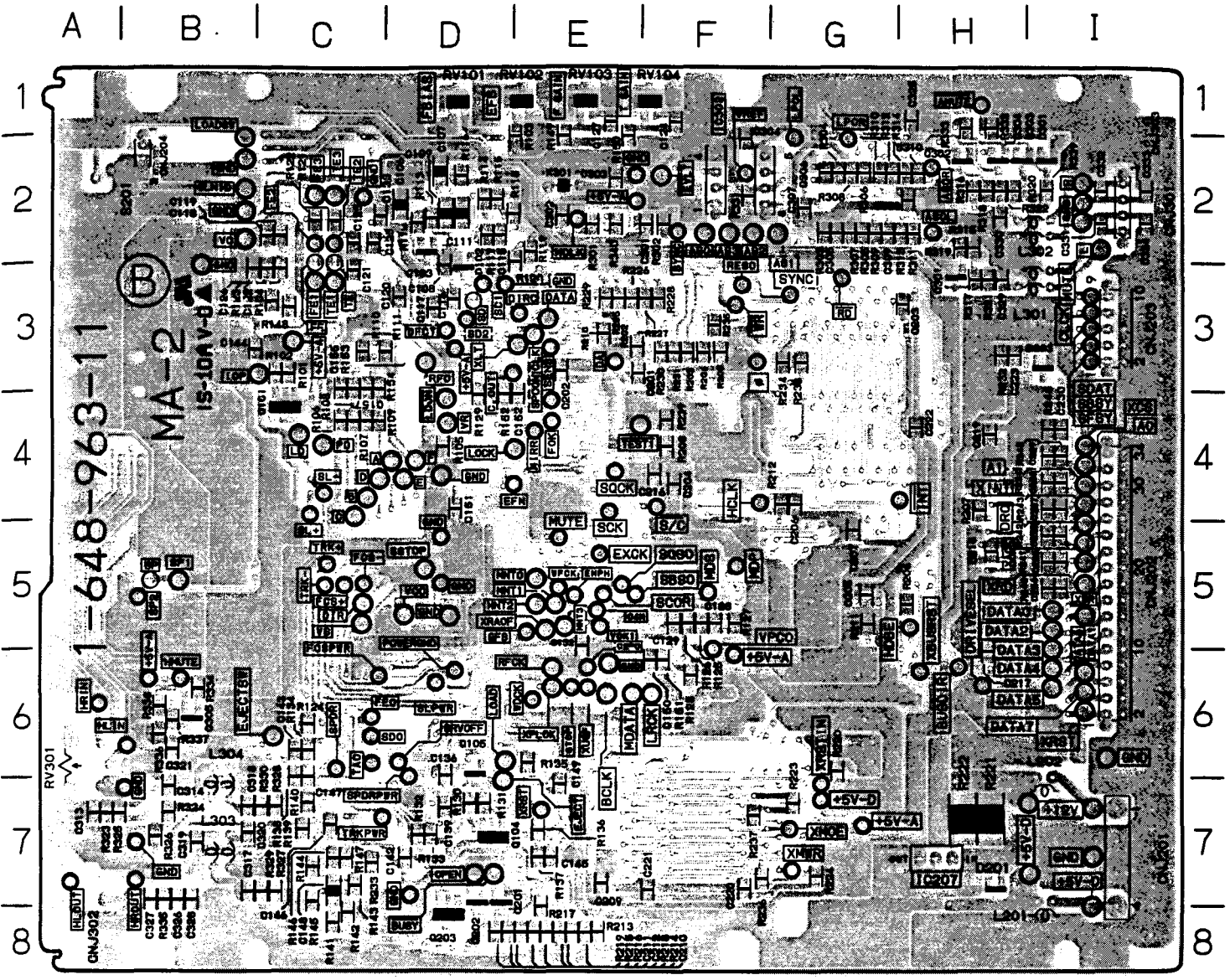




UX Protect Sheet (for CDU31A-01 Seri
4-959-071-02 (for CDU31A-02 Seri
UX Protect Sheet (2) (for CDU31A-51 Seri
4-959-575-01 (for CDU31A-81 Seri
(for CDU31A-GW Se
(for CDU31A-LL Seri

Note : Attach the sheet with a slight gradient so that it may not peel off easily.

– Pattern Side –

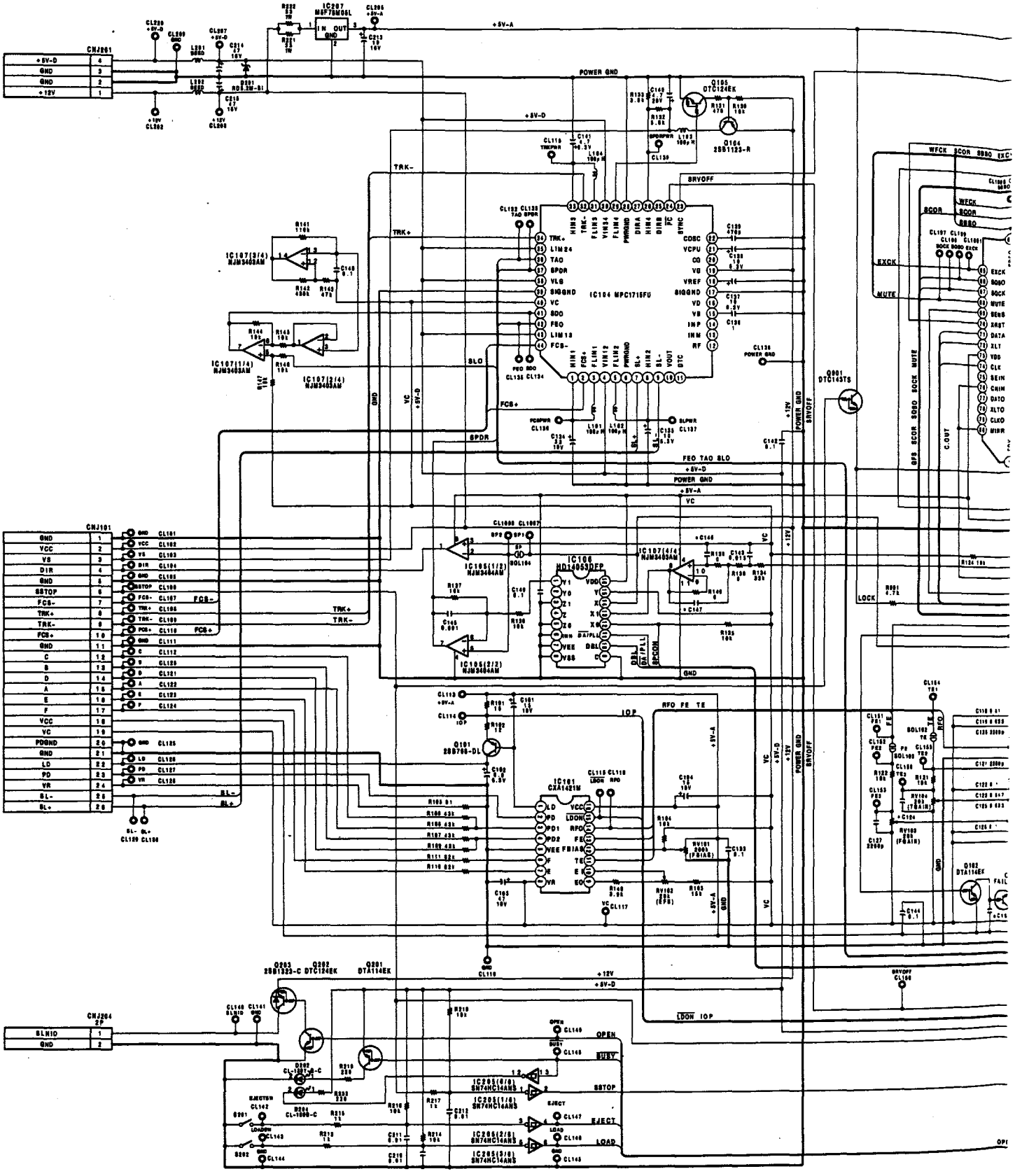


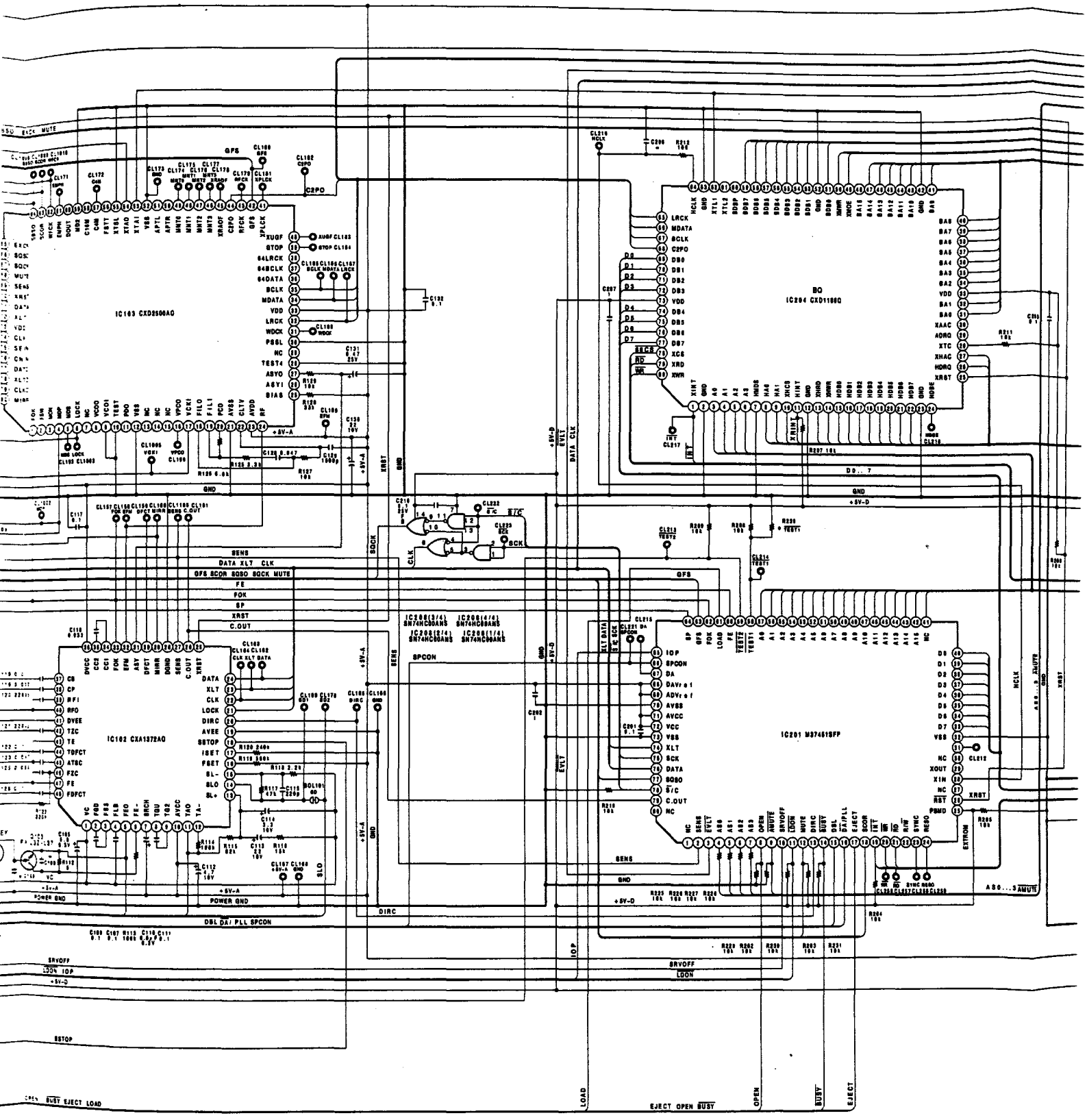
. 3013001 thru Serial No. 4000000)
. 3105061 thru Serial No. 4000000)
. 3000001 thru Serial No. 4000000)
. 3000001 thru Serial No. 4000000)
o. 3032471 thru Serial No. 4000000)
. 3024951 thru Serial No. 4000000)

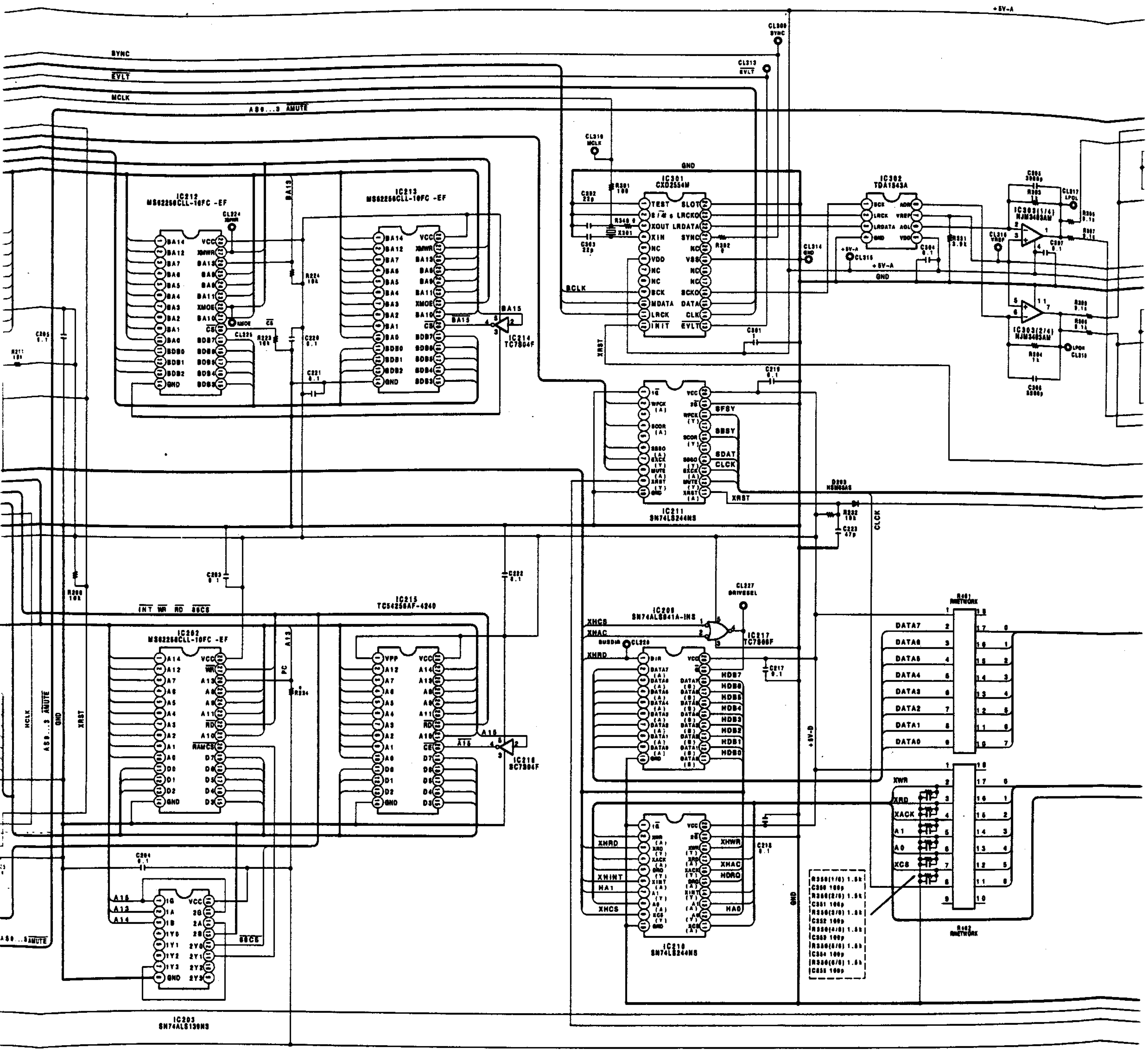
6-3-2 Circuit Diagram on MA-1 Mounted Board

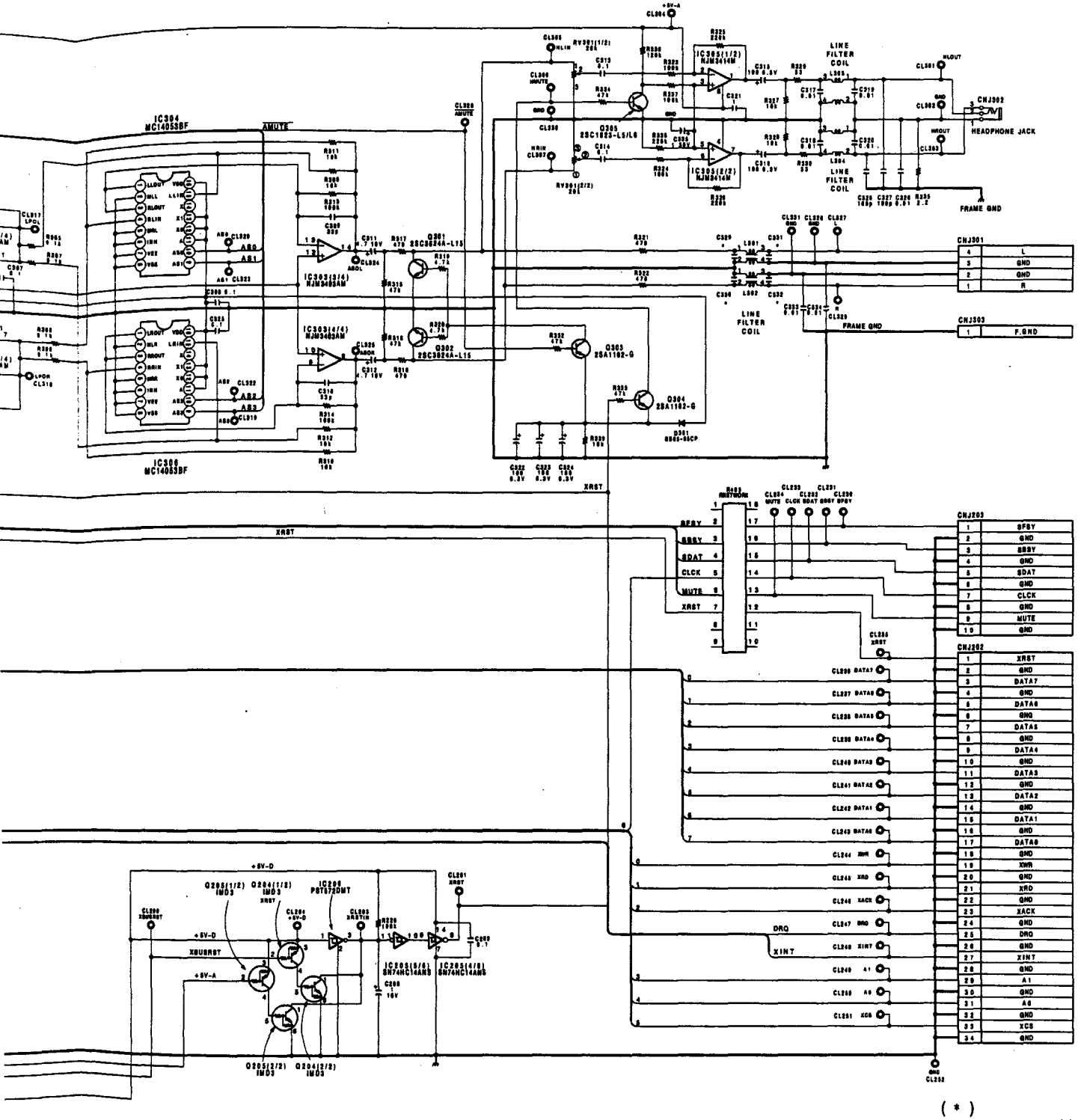
(for CDU31A-01 with Serial No. 3000001 thru Serial No. 3013000)

(for CDU31A-02 with Serial No. 3025843)






SYNC
EVLT
MCLK
IC212
MS62256CLL-10FC -EF
IC213
MS62256CLL-10FC -EF
IC214
TC7S04F
IC301
CXD2554M
IC302
TDA1543A
IC303(1/4)
NJM3403AM
IC303(2/4)
NJM3403AM
IC211
SN74LS244NS
BCLK
XRST
CLCK
IC202
MS62256CLL-10FC -EF
IC215
TC54256AF-4240
IC216
SC7S04F
IC208
SN74ALS641A-INS
IC217
TC7S08F
IC210
SN74LS244NS
IC203
SN74ALS139NS
DATA7
DATA6
DATA5
DATA4
DATA3
DATA2
DATA1
DATA0
XWR
XRD
XACK
A1
A0
XCS
XHCS
XHAC
XHRD
XHINT
HA1
HDB7
HDB6
HDB5
HDB4
HDB3
HDB2
HDB1
HDB0
XHWR
HDRQ
HA0
GND
+5V-A
+5V-D

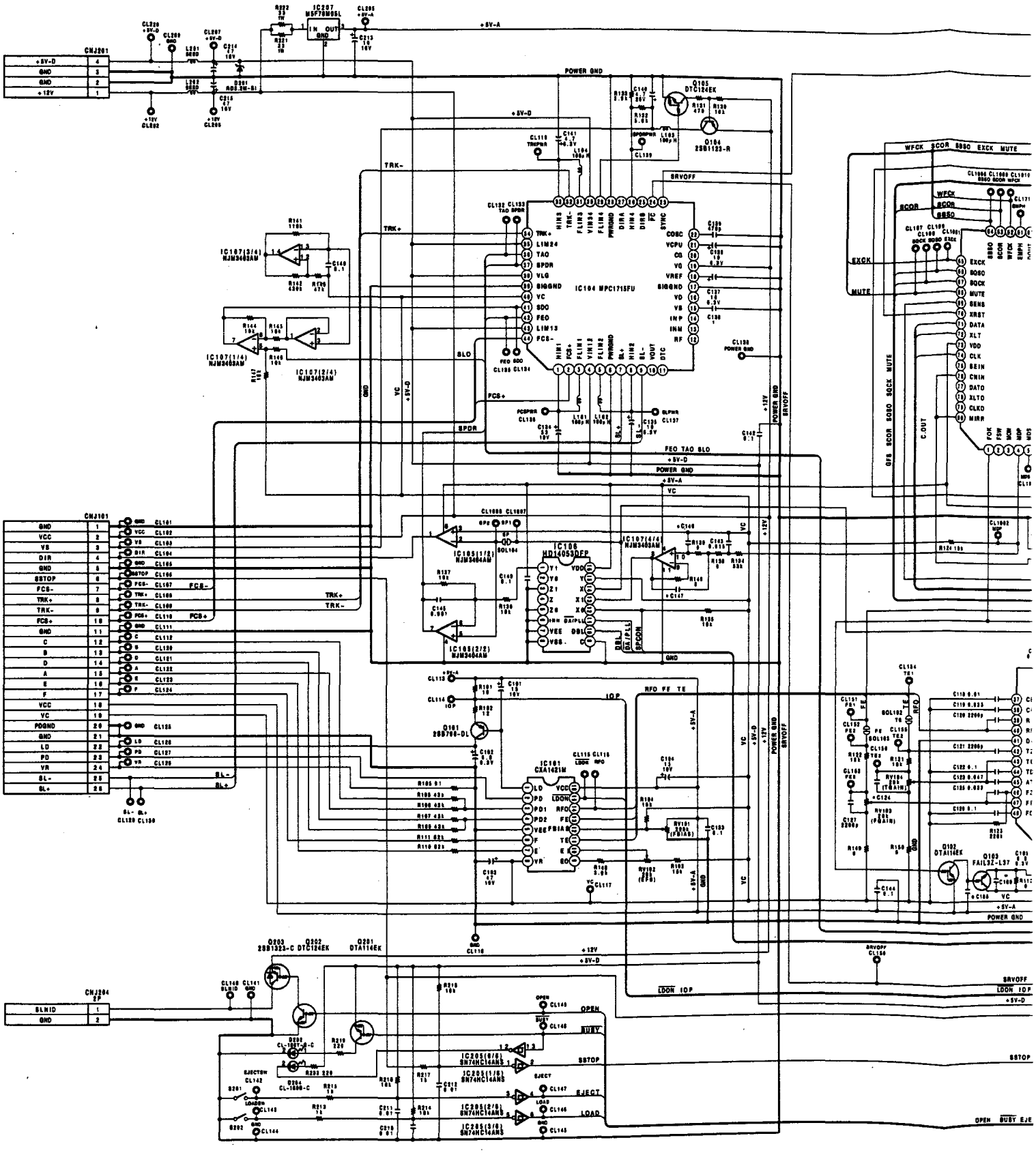


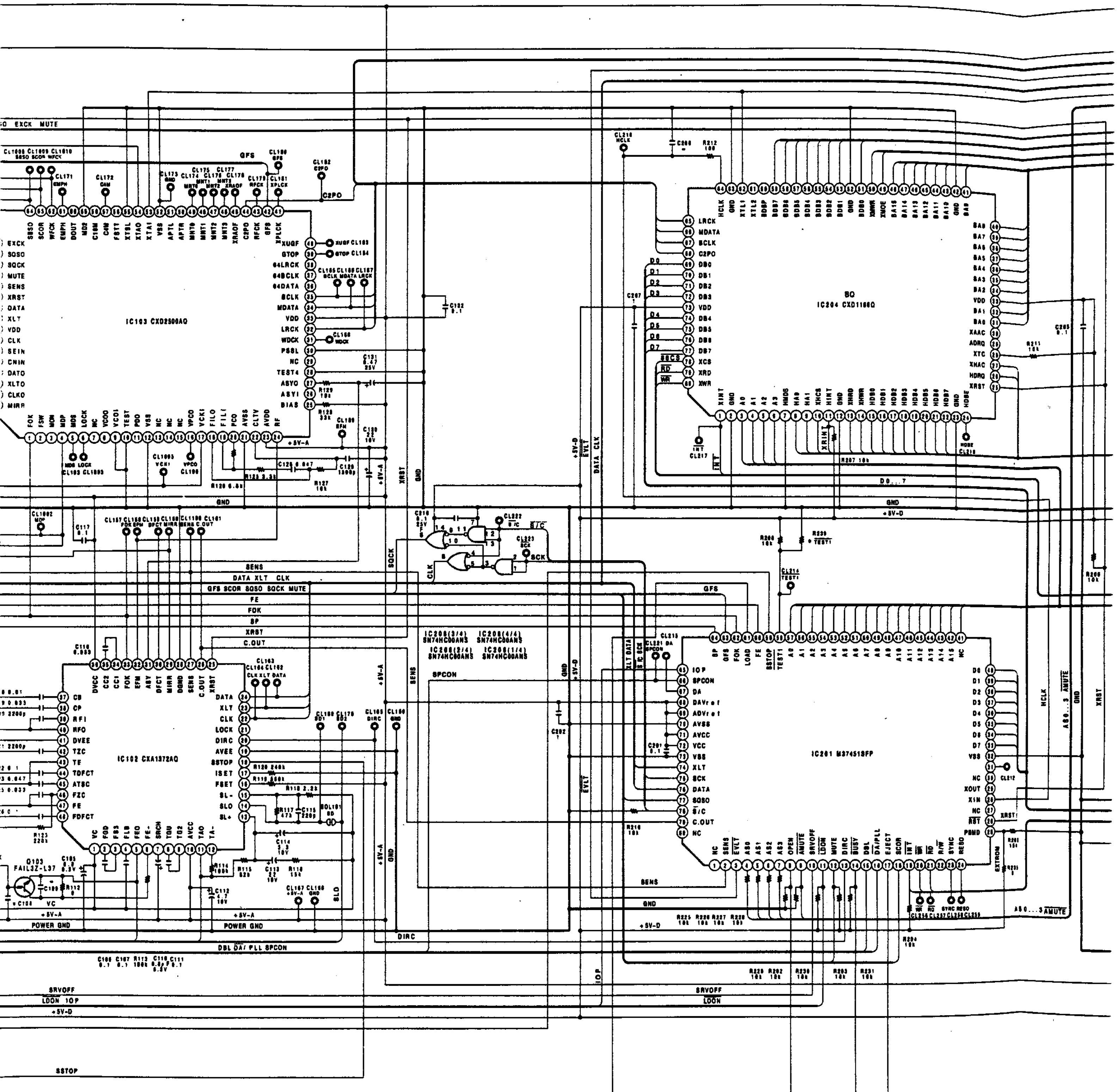
(*)
no mount tor this model.
* means

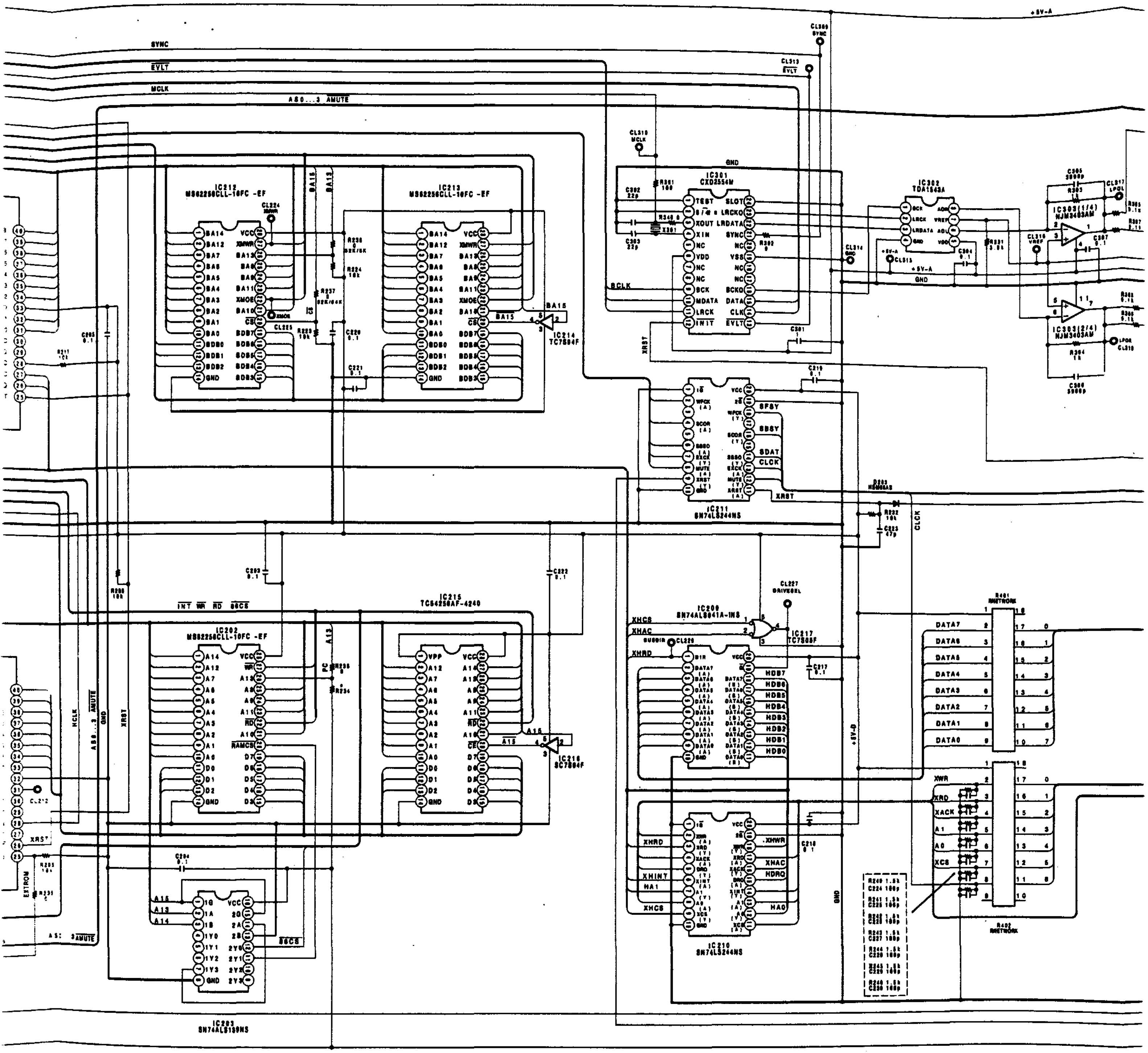
(for CDU31A-02 with Serial No. 3025844 thru Serial No. 3254470)

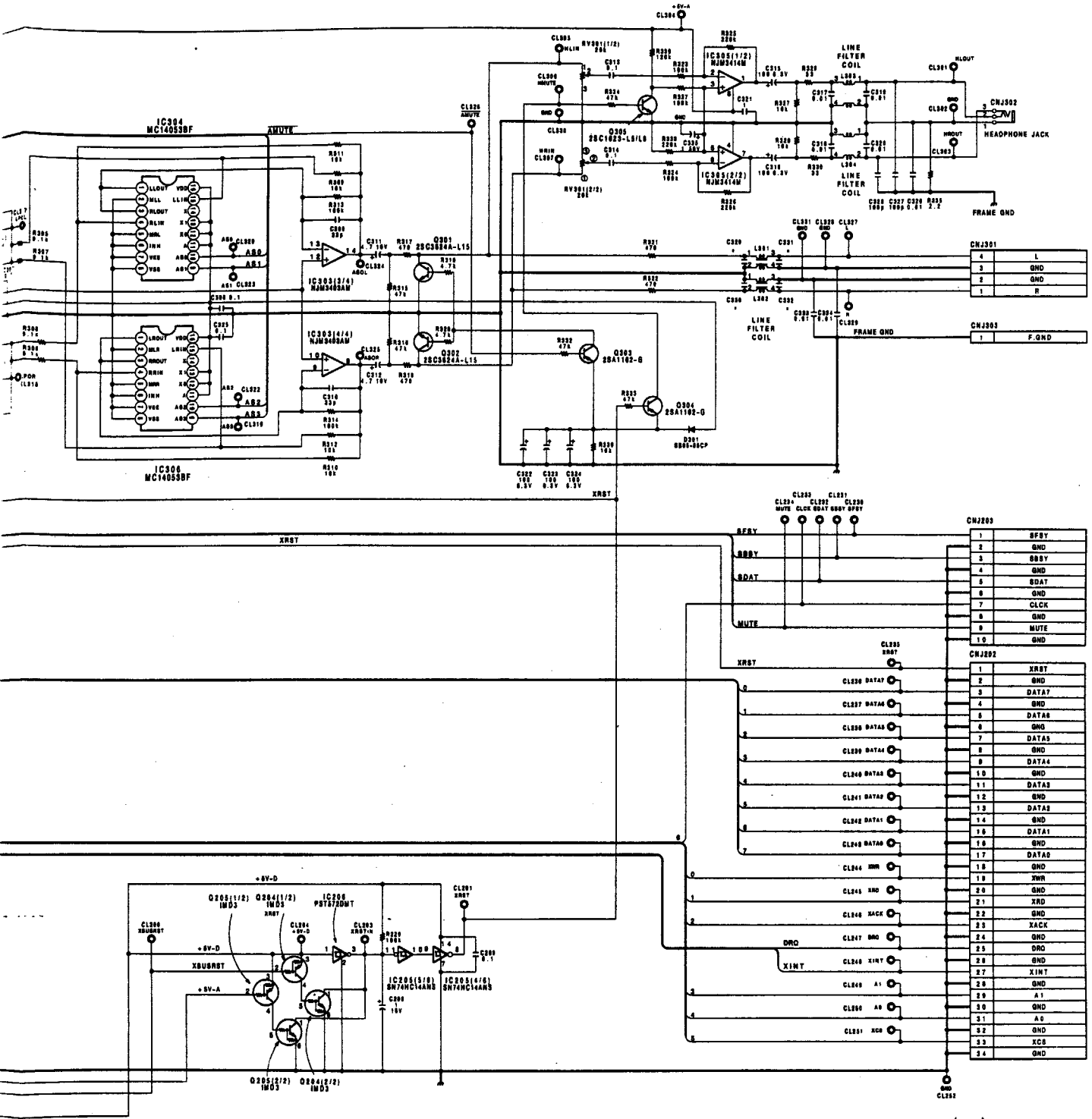
(for CDU31A-GW with Serial No. 3000001 thru Serial No. 3253230)

(for CDU31A-LL with Serial No. 3000001 thru Serial No. 3038660)




IC103 CXD2500AQ
IC102 CXA1372AQ
IC204 CXD1186Q
IC201 M37451SFP
IC208(3/4) SN74HC00ANS
IC208(4/4) SN74HC00ANS
IC208(2/4) SN74HC00ANS
IC208(1/4) SN74HC00ANS
SENS
DATA XLT CLK
GFS SCOR SQSO SQCK MUTE
FE
FOK
SP
XRST
C.OUT
GND
+5V-D
+5V-A
POWER GND
DBL DA/PLL SPCON
DIRC
SRVOFF
LDON IOP
SSTOP
OPEN BUSY EJECT LOAD
EJECT OPEN BUSY
SPCON


SYNC
EVLT
MCLK
IC301
IC302
IC212
IC213
IC202
IC215
IC203
IC211
IC210
XHCS
XHAC
XHRD
DATA7
DATA6
DATA5
DATA4
DATA3
DATA2
DATA1
DATA0
HDB7
HDB6
HDB5
HDB4
HDB3
HDB2
HDB1
HDB0
XWR
XRD
XACK
A1
A0
XCS
XHRD
XHINT
HA1
XHCS
XHWR
XHAC
HDRQ
HA0
BCLK
XRST
SBSY
SDAT
CLCK
GND



CNJ301	
4	L
3	GND
2	GND
1	R

CNJ303	
1	F.GND

CNJ203	
1	SFSY
2	GND
3	SBSY
4	GND
5	SDAT
6	GND
7	CLCK
8	GND
9	MUTE
10	GND

CNJ202	
1	XRST
2	GND
3	DATA7
4	GND
5	DATA6
6	GND
7	DATA5
8	GND
9	DATA4
10	GND
11	DATA3
12	GND
13	DATA2
14	GND
15	DATA1
16	GND
17	DATA0
18	GND
19	XWR
20	GND
21	XRD
22	GND
23	XACK
24	GND
25	DRQ
26	GND
27	XINT
28	GND
29	A1
30	GND
31	A0
32	GND
33	XCS
34	GND

(*)
no mount for this model.
* means

6-3-3 Circuit Diagram on MA-2 Mounted Board

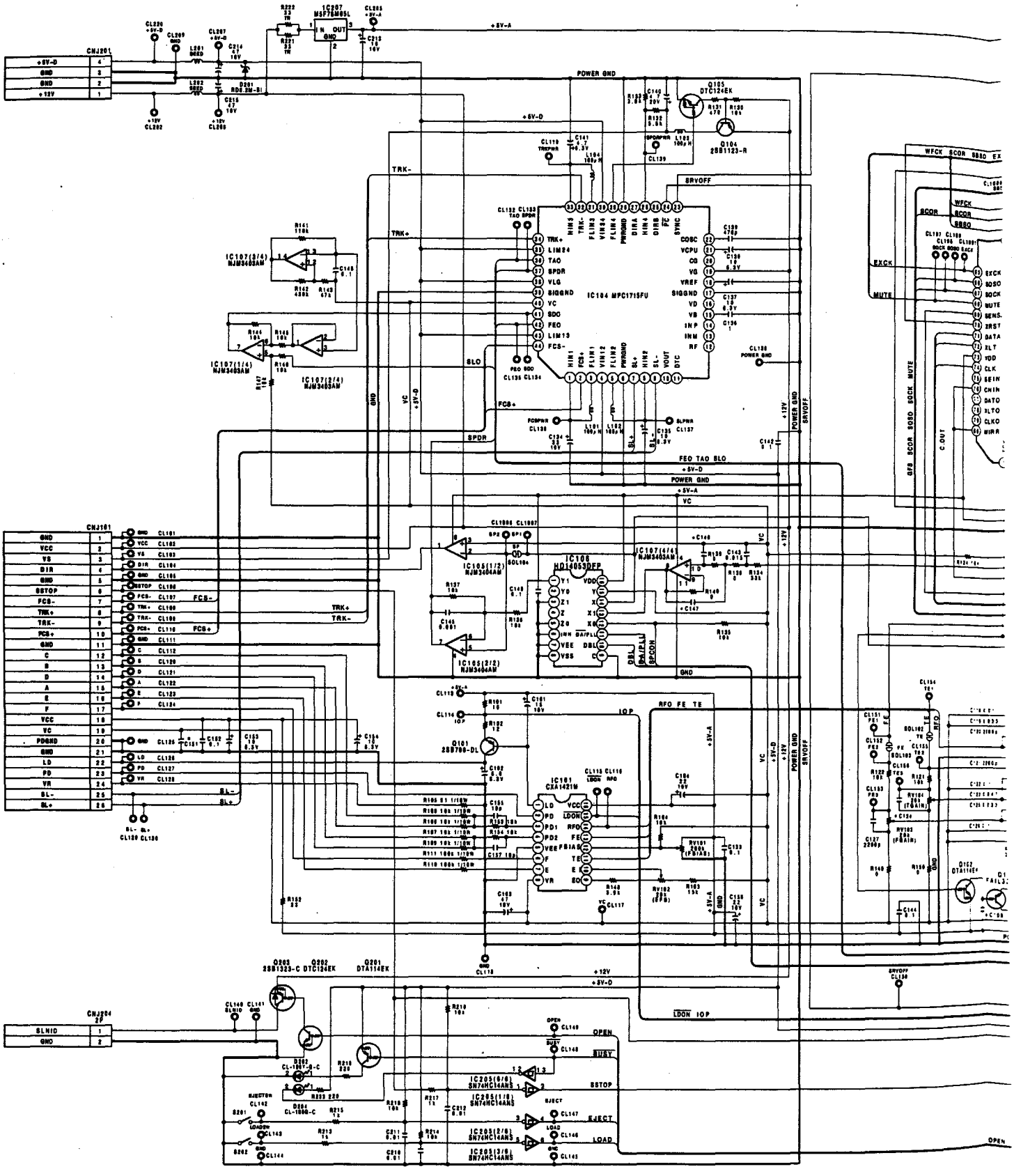
(for CDU31A-01 with Serial No. 3013001 thru Serial No. 4000000)

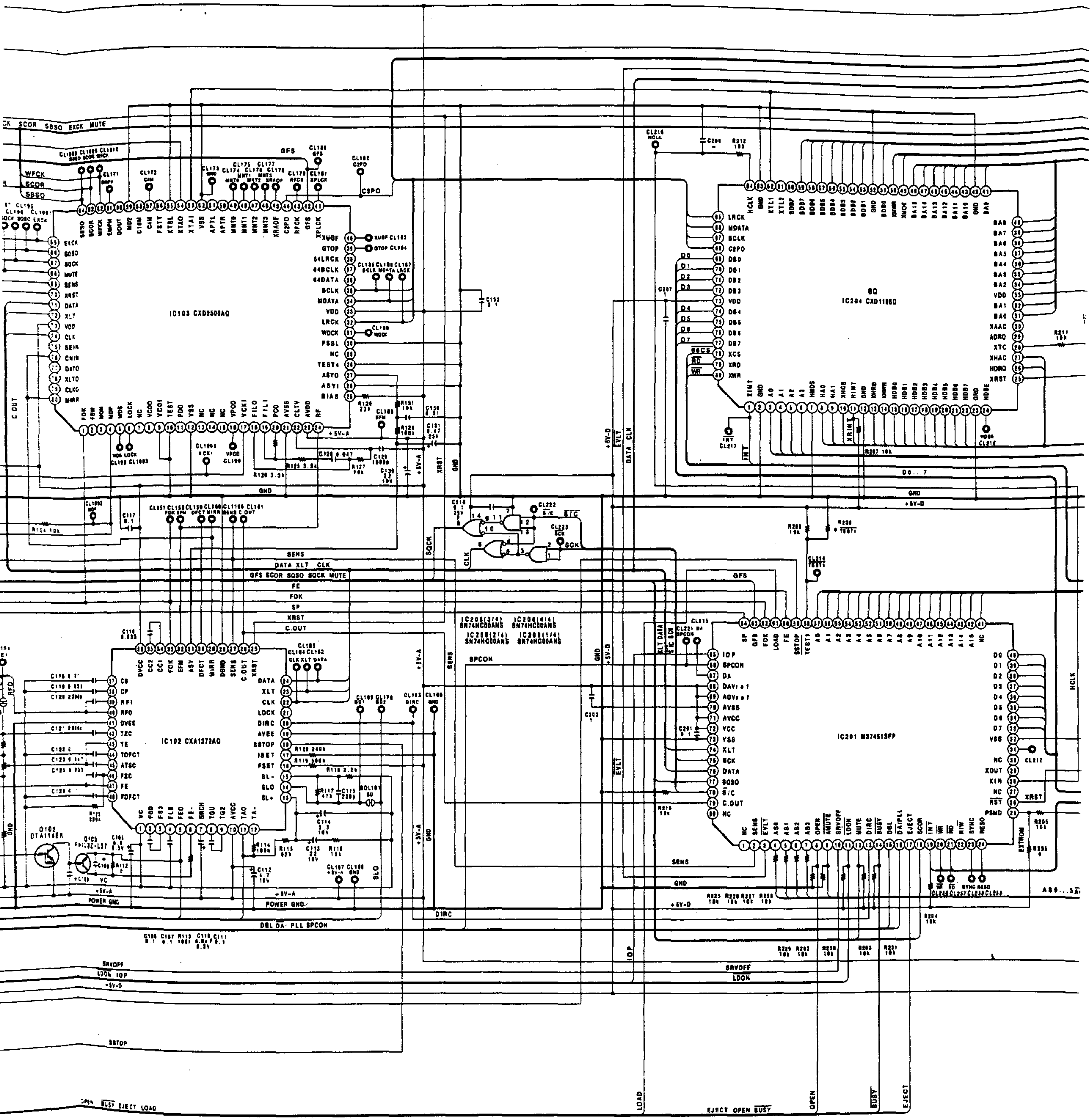
(for CDU31A-02 with Serial No. 3254471 thru Serial No. 4000000)

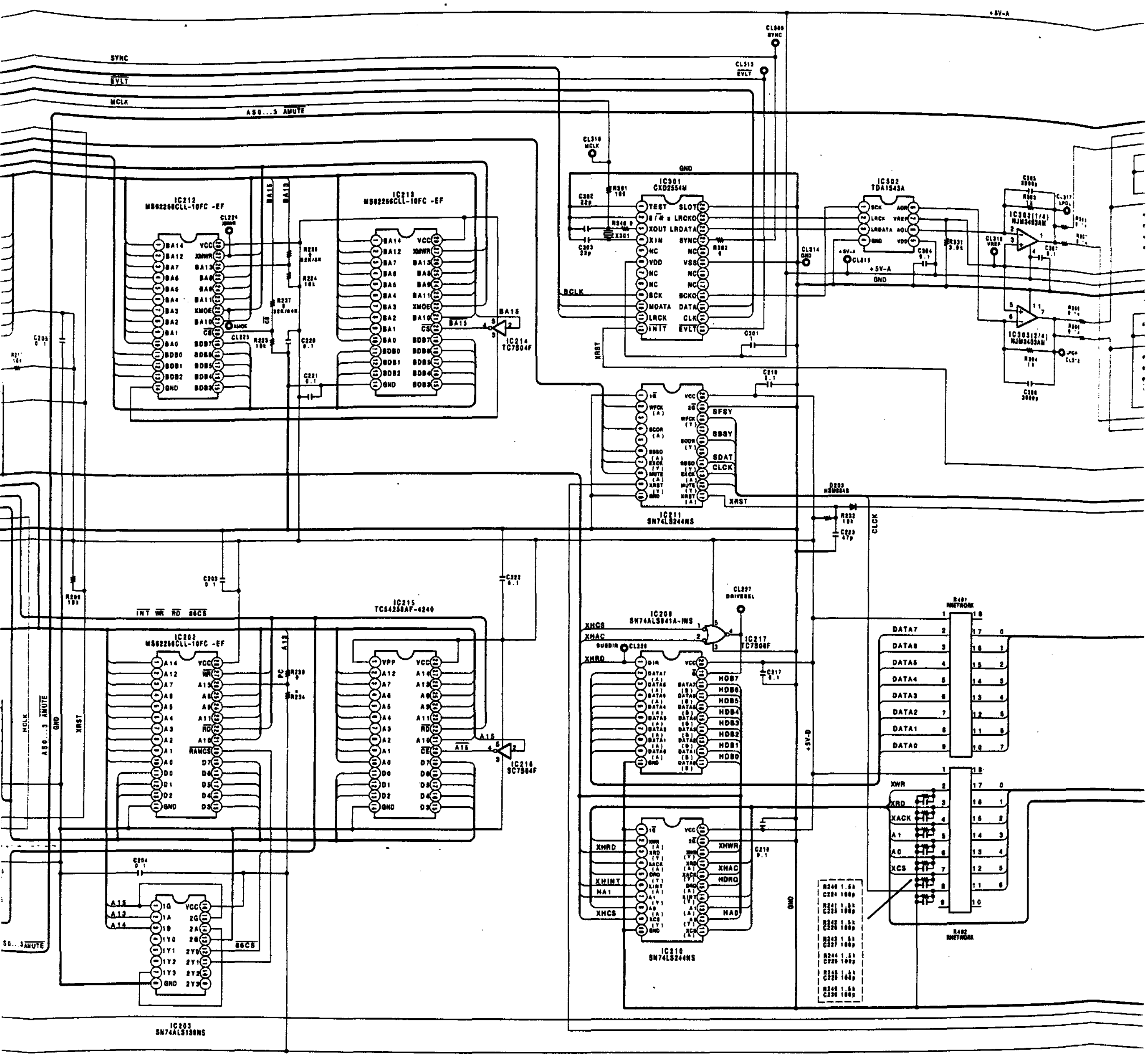
(for CDU31A-51/-81 with Serial No. 3000001 thru Serial No. 4000000)

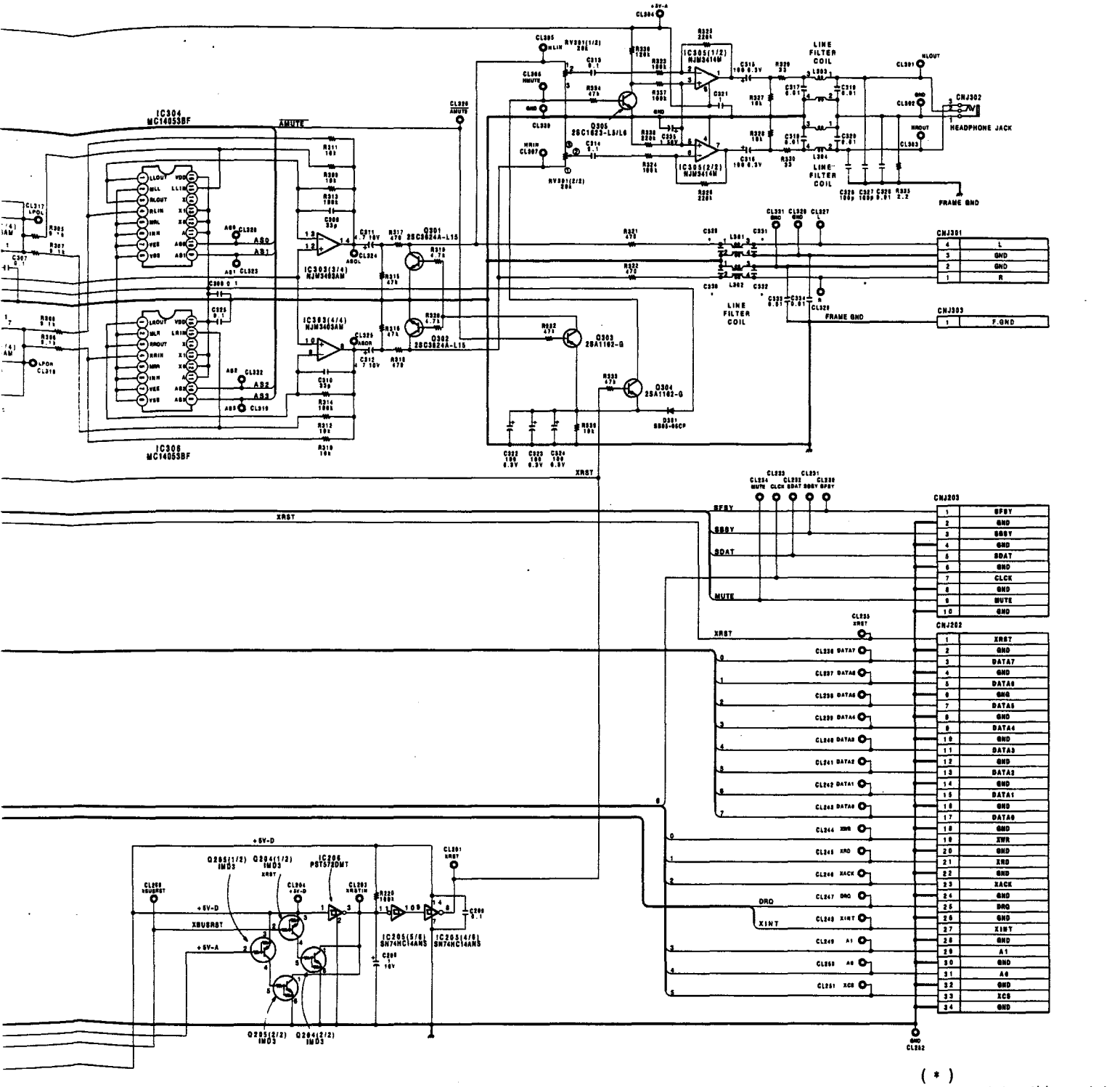
(for CDU31A-GW with Serial No. 3253231 thru Serial No. 4000000)

(for CDU31A-LL with Serial No. 3038661 thru Serial No. 4000000)




IC103 CXD2500AQ
IC204 CXD1186Q
IC102 CXA1372AQ
IC201 M37451SFP
IC206(3/4) SN74HC00ANS
IC206(4/4) SN74HC00ANS
IC206(2/4) SN74HC00ANS
IC206(1/4) SN74HC00ANS
SENS
DATA XLT CLK
GFS SCOR SQSO SQCK MUTE
FE
FOK
SP
XRST
C.OUT
GND
+5V-D
SRVOFF
LDON
SSTOP
EJECT OPEN BUSY
LOAD
DIRC
DBL DA PLL SPCON


IC212
MS62256CLL-10FC -EF
IC213
MS62256CLL-10FC -EF
IC301
CXD2554M
IC302
TDA1543A
IC214
TC7S04F
IC211
SN74LS244NS
IC215
TC54256AF-4240
IC202
MS62256CLL-10FC -EF
IC209
SN74ALS641A-INS
IC217
TC7S08F
IC216
SC7S04F
IC210
SN74LS244NS
IC203
SN74ALS139NS
SYNC
EVLT
MCLK
BCLK
XRST
CLCK
SFSY
SBSY
SDAT
DATA7
DATA6
DATA5
DATA4
DATA3
DATA2
DATA1
DATA0
XWR
XRD
XACK
A1
A0
XCS
XHCS
XHAC
XHRD
XHINT
HA1
+5V-A
+5V-D
GND



(*)
no mount tor this model.
* means

6-4 ELECTRICAL PARTS LIST

ELECTRIC PARTS LIST

Note: 1. All resistors are in ohms.

2. CHIP" stands for chip component.

3. Items marked " * " are not stocked since they are seldom required for routine service.

   Some delay should be anticipated when ordering these items.

4. All capacitors are in micro farads unless otherwise specified.

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

>>> MA-1/MA-2 MOUNTED BOARD
(A-4646-609-A for CDU31A-02/-51/-81/-GW/-LL)

(A-4646-610-A only for CDU31A-01) <<<

CAPACITORS

Ref. No.	Parts No.	Description			
C101	1-128-026-21	ELECT CHIP	15	0	10V
C102	1-135-211-11	TANTAL. CHIP	6.8	20%	6.3V
C103	1-135-166-21	TANTAL. CHIP	47	20%	10V
C104	1-128-026-21	ELECT CHIP	15	0%	10V
	(for MA-1 Mounted Board)				
	1-135-161-21	ELECT CHIP	22	20%	10V
	(for MA-2 Mounted Board)				
C105	1-135-211-11	TANTAL. CHIP	6.8	20%	6.3V
C106	1-623-077-00	CERAMIC CHIP	0.1		25V
C107	1-623-077-00	CERAMIC CHIP	0.1		25V
C110	1-135-211-11	TANTAL. CHIP	6.8	20%	6.3V
	(CDU31A-01 Serial No. 3000001 thru Serial No. 3013000)				
	(CDU31A-02 Serial No. 3000001 thru Serial No. 3019700)				
	(CDU31A-LL Serial No. 3000001 thru Serial No. 3012000)				
C111	1-623-077-00	CERAMIC CHIP	0.1		25V
C112	1-128-024-11	ELECT CHIP	4.7	0	10V
C113	1-135-161-21	TANTAL. CHIP	22	20%	10V
C114	1-135-180-21	TANTAL. CHIP	3.3	10%	6.3V
C115	1-163-001-11	CERAMIC CHIP	220pF	10%	50V
C116	1-163-989-11	CERAMIC CHIP	0.033	10%	25V
C117	1-163-038-00	CERAMIC CHIP	0.1		25V
C118	1-164-232-11	CERAMIC CHIP	0.01	10%	50V
C119	1-163-989-11	CERAMIC CHIP	0.033	10%	25V
C120	1-164-161-11	CERAMIC CHIP	2200pF	10%	50V
C121	1-164-161-11	CERAMIC CHIP	2200PF	10%	50V
C122	1-163-038-00	CERAMIC CHIP	0.1		25V
C123	1-163-809-11	CERAMIC CHIP	0.047	10%	25V
C125	1-163-989-11	CERAMIC CHIP	0.033	10%	25V
C126	1-163-038-00	CERAMIC CHIP	0.1		25V
C127	1-164-161-11	CERAMIC CHIP	2200pF	10%	50V
C128	1-163-809-11	CERAMIC CHIP	0.047	10%	25V
C129	1-163-145-00	CERAMIC CHIP	1500pF	5%	50V
C130	1-135-161-21	TANTAL. CHIP	22	20%	10V
C131	1-135-145-11	TANTAL. CHIP	0.47	20%	25V
C132	1-163-038-00	CERAMIC CHIP	0.1		25V
C133	1-163-038-00	CERAMIC CHIP	0.1		25V
C134	1-135-180-21	TANTAL. CHIP	3.3	20%	6.3V
	(CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(CDU31A-02 Serial No. 3000501 thru Serial No. 4000000)				
	(CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)				
C135	1-135-259-11	TANTAL. CHIP	10	20%	6.3V
C136	1-164-346-11	CERAMIC CHIP	1		16V
C137	1-128-020-11	ELECT CHIP	10	0	6.3V
C138	1-128-020-11	ELECT CHIP	10	0	6.3V
C139	1-163-133-00	CERAMIC CHIP	470pF	5%	50V
C140	1-135-214-21	TANTAL. CHIP	4.7	20%	20V
C141	1-135-181-21	TANTAL. CHIP	4.7	20%	6.3V
	(CDU31A-01 Serial No. CR92-14 thru Serial No. 4000000)				
	(CDU31A-02 Serial No. 3019701 thru Serial No. 4000000)				
	(CDU31A-51/-81/-GW Serial No. 3000001 thru Serial No. 4000000)				
	(CDU31A-LL Serial No. 3012001 thru Serial No. 4000000)				
C142	1-163-038-00	CERAMIC CHIP	0.1		25V
C143	1-163-023-00	CERAMIC CHIP	0.015	10%	50V
C144	1-163-038-00	CERAMIC CHIP	0.1		25V
C145	1-163-009-11	CERAMIC CHIP	0.001	10%	50V
C148	1-623-077-00	CERAMIC CHIP	0.1	10%	25V
C149	1-163-038-00	CERAMIC CHIP	0.1		25V
C150	1-164-232-11	CERAMIC CHIP	0.01	10%	100V
	(for MA-2 Mounted Board)				
C152	1-163-038-00	CERAMIC CHIP	0.1		25V
	(for MA-2 Mounted Board)				
C153	1-135-259-11	CERAMIC CHIP	10	20%	6.3V
	(for MA-2 Mounted Board)				
C154	1-135-259-11	CERAMIC CHIP	10	20%	6.3V
	(for MA-2 Mounted Board)				
C155	1-163-227-11	CERAMIC CHIP	10pF	0.5pF	50V
	(for MA-2 Mounted Board)				
C156	1-135-161-21	CERAMIC CHIP	22	20%	10V
	(for MA-2 Mounted Board)				
C157	1-163-227-11	CERAMIC CHIP	10pF	0.5pF	50V
	(for MA-2 Mounted Board)				
C201	1-163-038-00	CERAMIC CHIP	0.1		25V
C202	1-164-346-11	CERAMIC CHIP	1		16V
C203	1-163-038-00	CERAMIC CHIP	0.1		25V
C204	1-163-038-00	CERAMIC CHIP	0.1		25V
C205	1-163-038-00	CERAMIC CHIP	0.1		25V
C207	1-164-346-11	CERAMIC CHIP	1		16V
C208	1-135-091-00	TANTAL. CHIP	1	20%	16V
C209	1-163-038-00	CERAMIC CHIP	0.1		25V
C210	1-164-232-11	CERAMIC CHIP	0.01	10%	50V
C211	1-164-232-11	CERAMIC CHIP	0.01	10%	50V
C212	1-164-232-11	CERAMIC CHIP	0.01	10%	50V
C213	1-124-779-00	ELECT CHIP	10	20%	16V
C214	1-126-204-11	ELECT CHIP	47	20%	16V
C215	1-126-204-11	ELECT CHIP	47	20%	16V
C216	1-163-038-00	CERAMIC CHIP	0.1		25V
C217	1-163-038-00	CERAMIC CHIP	0.1		25V
C218	1-163-038-00	CERAMIC CHIP	0.1		25V
C219	1-163-038-00	CERAMIC CHIP	0.1		25V
C220	1-163-038-00	CERAMIC CHIP	0.1		25V
C221	1-163-038-00	CERAMIC CHIP	0.1		25V
C222	1-163-038-00	CERAMIC CHIP	0.1		25V
C223	1-163-109-00	CERAMIC CHIP	47pF	5%	50V

Ref. No.	Parts No.	Description			
C224	1-163-117-00	CERAMIC CHIP	100pF	5%	50V
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)				
C225	1-163-117-00	CERAMIC CHIP	100pF	5%	50V
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000))				
C226	1-163-117-00	CERAMIC CHIP	100pF	5%	50V
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)				
C227	1-163-117-00	CERAMIC CHIP	100pF	5%	50V
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)				
C228	1-163-117-00	CERAMIC CHIP	100pF	5%	50V
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)				
C229	1-163-117-00	CERAMIC CHIP	100pF	5%	50V
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)				
C230	1-163-117-00	CERAMIC CHIP	100pF	5%	50V
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)				
C301	1-164-346-11	CERAMIC CHIP	1		16V
C302	1-163-235-11	CERAMIC CHIP	22pF	5%	50V
C303	1-163-235-11	CERAMIC CHIP	22pF	5%	50V
C304	1-163-038-00	CERAMIC CHIP	0.1		25V
C305	1-164-652-11	CERAMIC CHIP	3900pF	10%	50V
C306	1-164-652-11	CERAMIC CHIP	3900pF	10%	50V
C307	1-163-038-00	CERAMIC CHIP	0.1		25V
C308	1-163-038-00	CERAMIC CHIP	0.1		25V
C309	1-163-105-00	CERAMIC CHIP	33pF	5%	50V
C310	1-163-105-00	CERAMIC CHIP	33pF	5%	50V
C311	1-128-024-11	ELECT CHIP	4.7	0	10V
C312	1-128-024-11	ELECT CHIP	4.7	0	10V
C313	1-163-038-00	CERAMIC CHIP	0.1		25V
C314	1-163-038-00	CERAMIC CHIP	0.1		25V
C315	1-126-206-11	ELECT CHIP	100	20%	6.3V
C316	1-126-206-11	ELECT CHIP	100	20%	6.3V
C317	1-164-232-11	CERAMIC CHIP	0.01	10%	50V
C318	1-164-232-11	CERAMIC CHIP	0.01	10%	50V
C319	1-164-232-11	CERAMIC CHIP	0.01	10%	50V
C320	1-164-232-11	CERAMIC CHIP	0.01	10%	50V
C321	1-164-346-11	CERAMIC CHIP	1		16V
C322	1-126-206-11	ELECT CHIP	100	20%	6.3V
C323	1-126-206-11	ELECT CHIP	100	20%	6.3V
C324	1-126-206-11	ELECT CHIP	100	20%	6.3V
C325	1-163-038-00	CERAMIC CHIP	0.1		25V
C326	1-164-232-11	CERAMIC CHIP	0.01	10%	50V
C327	1-163-117-00	CERAMIC CHIP	100pF	5%	50V
C328	1-163-117-00	CERAMIC CHIP	100pF	5%	50V
C333	1-164-232-11	CERAMIC CHIP	0.01	10%	50V

Ref. No.	Parts No.	Description			
C334	1-164-232-11	CERAMIC CHIP	0.01	10%	50V
C335	1-126-193-11	ELECT CHIP	1	20%	50V
C350	1-163-117-00	CERAMIC CHIP	100pF	5%	50V
	(for CDU31A-01 Serial No. 3000001 thru Serial No. 3013000)				
	(for CDU31A-02 Serial No. 3000001 thru Serial No. 3025843)				
C351	1-163-117-00	CERAMIC CHIP	100pF	5%	50V
	(for CDU31A-01 Serial No. 3000001 thru Serial No. 3013000)				
	(for CDU31A-02 Serial No. 3000001 thru Serial No. 3025843)				
C352	1-163-117-00	CERAMIC CHIP	100pF	5%	50V
	(for CDU31A-01 Serial No. 3000001 thru Serial No. 3013000)				
	(for CDU31A-02 Serial No. 3000001 thru Serial No. 3025843)				
C353	1-163-117-00	CERAMIC CHIP	100pF	5%	50V
	(for CDU31A-01 Serial No. 3000001 thru Serial No. 3013000)				
	(for CDU31A-02 Serial No. 3000001 thru Serial No. 3025843)				
C354	1-163-117-00	CERAMIC CHIP	100pF	5%	50V
	(for CDU31A-01 Serial No. 3000001 thru Serial No. 3013000)				
	(for CDU31A-02 Serial No. 3000001 thru Serial No. 3025843)				
C355	1-163-117-00	CERAMIC CHIP	100pF	5%	50V
	(for CDU31A-01 Serial No. 3000001 thru Serial No. 3013000)				
	(for CDU31A-02 Serial No. 3000001 thru Serial No. 3025843)				

CONNECTORS

CNJ101	1-580-875-11	SOCKET, CONNECTOR (SMT) 26P
CNJ201	1-566-418-21	PIN, CONNECTOR (Pin Header) 4P
CNJ202	1-565-730-11	PIN, CONNECTOR (RIGHT ANGLE) 34P
CNJ203	1-695-220-11	PIN, CONNECTOR (PC BOARD) 10P
CNJ204	1-564-704-11	PIN, CONNECTOR (SMALL TYPE) 2P
CNJ301	1-508-847-00	PIN, CONNECTOR 4P
CNJ302	1-580-709-11	JACK
CNJ303	4-953-192-01	TERMINAL, GROUND

DIODES

D201	8-719-106-31	DIODE RD8.2M-B1
D202	8-719-030-58	DIODE CL-180Y-C
D203	8-719-948-47	DIODE HSM88AS
D204	8-719-028-43	DIODE CL-180G-C
D301	8-719-938-75	DIODE SB05-05CP

ICS

IC101	8-752-039-03	IC CXA1421M
IC102	8-752-058-77	IC CXA1372AQ
IC103	8-752-352-93	IC CXD2500BQ
IC104	8-759-030-17	IC MPC1715FU
IC105	8-759-701-40	IC NJM3404AM
IC106	8-759-300-71	IC HD14053BFP
IC107	8-759-701-36	IC NJM3403AM
IC201	8-759-075-99	IC M37451SFP
IC202	8-759-515-54	IC MS62256CLL-10FC-EF
IC203	8-759-984-63	IC SN74ALS139NS
IC204	8-752-344-71	IC CXD1186BQ
IC205	8-759-925-80	IC SN74HC14ANS
IC206	8-759-074-39	IC PST572DMT
IC207	8-759-604-35	IC M5F78M05L
IC208	8-759-927-46	IC SN74HC00ANS
IC209	8-759-934-89	IC SN74ALS641A-1NS
IC210	8-759-933-65	IC SN74LS244NS
IC211	8-759-933-65	IC SN74LS244NS
IC212	8-759-515-54	IC MS62256CLL-10FC-EF
IC213	8-759-515-54	IC MS62256CLL-10FC-EF
	(for CDU31A-02/-51/-81/-GW/-LL)	
IC214	8-759-031-84	IC TC7S04F
	(for CDU31A-02/-51/-81/-GW/-LL)	

Ref. No.	Parts No.	Description
IC215	8-759-194-12	TC54256AF-4240 (only for CDU31A-01)
IC216	8-759-031-84	IC SC7S04F
IC217	8-759-234-20	IC TC7S08F
IC301	8-752-337-10	IC CXD2554M
IC302	8-759-990-13	IC TDA1543A
IC303	8-759-701-36	IC NJM3403AM
IC304	8-759-300-71	IC HD14053BFP
IC305	8-759-981-82	IC NJM3414M-T1
IC306	8-759-300-71	IC HD14053BFP

SOCKET

ICS215	1-251-066-12	SOCKET, IC

COILS

L101	1-412-039-51	INDUCTOR CHIP 100UH
L102	1-412-039-51	INDUCTOR CHIP 100UH
L103	1-412-039-51	INDUCTOR CHIP 100UH
L104	1-412-039-51	INDUCTOR CHIP 100UH
L201	1-412-694-11	INDUCTOR, BEED
L202	1-412-694-11	INDUCTOR, BEED
L301	1-424-102-11	COIL, LINE FILTER
L302	1-424-102-11	COIL, LINE FILTER
L303	1-424-102-11	COIL, LINE FILTER
L304	1-424-102-11	COIL, LINE FILTER

TRANSISTORS

Q101	8-729-101-07	TRANSISTOR 2SB798-DK
Q104	8-729-807-33	TRANSISTOR 2SB1123-R
Q105	8-729-901-00	TRANSISTOR DTC124EK
Q201	8-729-901-04	TRANSISTOR DTA114EK
Q202	8-729-901-00	TRANSISTOR DTC124EK
Q203	8-729-017-58	TRANSISTOR 2SB1323-C
Q204	8-729-907-28	TRANSISTOR IMD3
Q205	8-729-907-28	TRANSISTOR IMD3
Q301	8-729-107-46	TRANSISTOR 2SC3624A
Q302	8-729-107-46	TRANSISTOR 2SC3624A
Q303	8-729-216-22	TRANSISTOR 2SA812-M6
Q304	8-729-216-22	TRANSISTOR 2SA812-M6
Q305	8-729-120-28	TRANSISTOR 2SC1623-L6
Q901	8-729-900-74	TRANSISTOR DTC143TS (for CDU31A-01 Serial No. 3000001 thru Serial No. 3013000) (for CDU31A-02 Serial No. 3000001 thru Serial No. 3015100)

RESISTORS

Ref. No.	Parts No.	Description			
R101	1-216-603-11	METAL CHIP	10	0.50%	1/10W
R102	1-216-605-11	METAL CHIP	12	0.50%	1/10W
R103	1-216-077-00	METAL GLAZE	15K	5%	1/10W
R104	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R105	1-216-626-11	METAL CHIP	91	0.50%	1/10W
R106	1-216-691-11	METAL CHIP (for MA-1 Mounted Board)	47K	0.50%	1/10W
	1-216-675-11	METAL CHIP (for MA-2 Mounted Board)	10K	0.5%	1/10W
R107	1-216-691-11	METAL CHIP (for MA-1 Mounted Board)	47K	0.50%	1/10W
	1-216-675-11	METAL CHIP (for MA-2 Mounted Board)	10K	0.5%	1/10W
R108	1-216-691-11	METAL CHIP (for MA-1 Mounted Board)	47K	0.50%	1/10W
	1-216-675-11	METAL CHIP (for MA-2 Mounted Board)	10K	0.5%	1/10W
R109	1-216-691-11	METAL CHIP (for MA-1 Mounted Board)	47K	0.50%	1/10W
	1-216-675-11	METAL CHIP (for MA-2 Mounted Board)	10K	0.5%	1/10W
R110	1-216-699-11	METAL CHIP	100K	0.50%	1/10W
R111	1-216-699-11	METAL CHIP	100K	0.50%	1/10W
R112	1-216-295-00	METAL GLAZE	0	5%	1/10W
R113	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R114	1-216-699-11	METAL CHIP	100K	0.50%	1/10W
R115	1-216-095-00	METAL GLAZE	82K	5%	1/10W
R116	1-216-077-00	METAL GLAZE	15K	5%	1/10W
R117	1-216-691-11	METAL CHIP	47K	0.50%	1/10W
R118	1-216-659-11	METAL CHIP	2.2K	0.50%	1/10W
R119	1-216-115-00	METAL GLAZE	560K	5%	1/10W
R120	1-218-761-11	METAL CHIP	240K	0.50%	1/10W
R121	1-216-079-00	METAL GLAZE	18K	5%	1/10W
R122	1-216-079-00	METAL GLAZE	18K	5%	1/10W
R123	1-216-105-00	METAL GLAZE	220K	5%	1/10W
R124	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R125	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R126	1-216-069-00	METAL GLAZE (for MA-1 Mounted Board)	6.8K	5%	1/10W
	1-216-061-00	METAL GLAZE (for MA-2 Mounted Board)	3.3K	5%	1/10W
R127	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R128	1-216-085-00	METAL GLAZE	33K	5%	1/10W
R129	1-216-073-00	METAL GLAZE (for MA-1 Mounted Board)	10K	5%	1/10W
	1-216-097-00	METAL GLAZE (for MA-2 Mounted Board)	100K	5%	1/10W
R130	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R131	1-216-041-00	METAL GLAZE	470	5%	1/10W
R132	1-216-067-00	METAL GLAZE	5.6K	5%	1/10W
R133	1-216-063-00	METAL GLAZE	3.9K	5%	1/10W
R134	1-216-085-00	METAL GLAZE	33K	5%	1/10W
R135	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R136	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R137	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R138	1-216-295-00	METAL GLAZE	0	5%	1/10W
R139	1-216-295-00	METAL GLAZE	0	5%	1/10W
R140	1-216-295-00	METAL GLAZE	0	5%	1/10W
R141	1-218-753-11	METAL CHIP	110K	0.5%	1/10W
R142	1-218-767-11	METAL CHIP	430K	0.50%	1/10W
R143	1-216-691-11	METAL CHIP	47K	0.50%	1/10W
R144	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R145	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R146	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R147	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R148	1-216-063-00	METAL GLAZE	3.9K	5%	1/10W
R149	1-216-295-00	METAL GLAZE (for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000) (for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000) (for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)	0	5%	1/10W
R150	1-216-295-00	METAL GLAZE (for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000) (for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000) (for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)	0	5%	1/10W
R151	1-216-073-00	METAL GLAZE (for MA-2 Mounted Board)	10K	5%	1/10W
R152	1-216-013-00	METAL GLAZE (for MA-2 Mounted Board)	33	5%	1/10W

Ref. No.	Parts No.	Description			
R153	1-216-681-11	METAL GLAZE	18K	0.5%	1/10W
	(for MA-2 Mounted Board)				
R154	1-216-681-11	METAL GLAZE	18K	0.5%	1/10W
	(for MA-2 Mounted Board)				
R202	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R203	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R204	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R205	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R206	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R207	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R208	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R209	1-216-073-00	METAL GLAZE	10K	5%	1/10W
	(for CDU31A-01 Serial No. 3000001 thru Serial No. 3013000)				
	(for CDU31A-02 Serial No. 3000001 thru Serial No. 3025843)				
R210	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R211	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R212	1-216-025-00	METAL GLAZE	100	5%	1/10W
R213	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R214	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R215	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R216	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R217	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R218	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R219	1-216-033-00	METAL GLAZE	220	5%	1/10W
R220	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R221	1-218-620-91	METAL CHIP	33	5%	1W
R222	1-218-620-91	METAL CHIP	33	5%	1W
R223	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R224	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R225	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R226	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R227	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R228	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R229	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R230	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R231	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R232	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R233	1-216-033-00	METAL CHIP	220	5%	1/10W
R235	1-216-295-00	METAL GLAZE	0	5%	1/10W
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)				
R236	1-216-295-00	METAL GLAZE	0	5%	1/10W
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)				
R237	1-216-295-00	METAL GLAZE	0	5%	1/10W
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)				
R238	1-216-295-00	METAL GLAZE	0	5%	1/10W
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)				
R240	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)				
R241	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)				
R242	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000000 thru Serial No. 4000000)				
R243	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000000 thru Serial No. 4000000)				
R244	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)				
R245	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)				
R246	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)				
R301	1-216-025-00	METAL GLAZE	100	5%	1/10W
R302	1-216-295-00	METAL GLAZE	0	5%	1/10W
R303	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R304	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R305	1-216-674-11	METAL CHIP	9.1K	0.50%	1/10W
R306	1-216-674-11	METAL CHIP	9.1K	0.50%	1/10W
R307	1-216-674-11	METAL CHIP	9.1K	0.50%	1/10W
R308	1-216-674-11	METAL CHIP	9.1K	0.50%	1/10W
R309	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R310	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R311	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R312	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R313	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R314	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R315	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R316	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R317	1-216-041-00	METAL GLAZE	470	5%	1/10W
R318	1-216-041-00	METAL GLAZE	470	5%	1/10W
R319	1-216-065-00	METAL GLAZE	4.7K	5%	1/10W
R320	1-216-065-00	METAL GLAZE	4.7K	5%	1/10W
R321	1-216-041-00	METAL GLAZE	470	5%	1/10W
R322	1-216-041-00	METAL GLAZE	470	5%	1/10W
R323	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R324	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R325	1-216-105-00	METAL GLAZE	220K	5%	1/10W
R326	1-216-105-00	METAL GLAZE	220K	5%	1/10W
R327	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R328	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R329	1-216-013-00	METAL GLAZE	33	5%	1/10W
R330	1-216-013-00	METAL GLAZE	33	5%	1/10W
R331	1-216-063-00	METAL GLAZE	3.9K	5%	1/10W
R332	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R333	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R334	1-216-089-00	METAL GLAZE	47K	5%	1/10W

Ref. No.	Parts No.	Description			
R335	1-216-298-00	METAL GLAZE	2.2	5%	1/10W
R336	1-216-099-00	METAL GLAZE	120K	5%	1/10W
R337	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R338	1-216-105-00	METAL GLAZE	220K	5%	1/10W
R339	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R340	1-216-295-00	METAL GLAZE	0	5%	1/10W
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)				
	(for CDU31A-02 Serial No. 3025844 thru Serial No. 4000000)				
	(for CDU31A-51/-81/-GW/-LL Serial No. 3000001 thru Serial No. 4000000)				
R350	1-235-714-11	RES, ENCAPSULATED CERAMET			
	(for CDU31A-01 Serial No. 3000001 thru Serial No. 3013000)				
	(for CDU31A-02 Serial No. 3000001 thru Serial No. 3025843)				
R401	1-239-385-11	RES, NETWORK (CHIP TYPE)			
R402	1-239-385-11	RES, NETWORK (CHIP TYPE)			
R403	1-239-385-11	RES, NETWORK (CHIP TYPE)			
	(for CDU31A-01 Serial No. 3000001 thru Serial No. 3013000)				
	(for CDU31A-02 Serial No. 3000001 thru Serial No. 3025843)				
R901	1-215-437-00	METAL FILM	4.7K	1%	1/4W
	(for CDU31A-01 Serial No. 3000001 thru Serial No. 3013000)				
	(for CDU31A-02 Serial No. 3000001 thru Serial No. 3015000)				
	(for CDU31A-GW)				
	(for CDU31A-LL)				

VARIABLE RESISTORS

RV101	1-241-965-11	RES, ADJ, CERMET 200K			
RV102	1-241-964-11	RES, ADJ, CERMET 20K			
RV103	1-241-964-11	RES, ADJ, CERMET 20K			
RV104	1-241-964-11	RES, ADJ, CERMET 20K			
RV301	1-238-754-11	RES, VAR, CARBON 20K/20K			

SWITCH

S201	1-554-088-00	SWITCH, KEY BOARD
S202	1-571-754-11	SWITCH, PUSH (1 KEY)

OSCILLATOR

X301	1-567-908-11	VIBRATOR, CRYSTAL

DUST SHEET

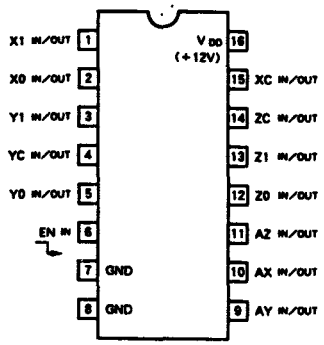
#4-953-096-01	DUST SHEET (B)	
	(for CDU31A-01 Serial No. 3000001 thru Serial No. 3101060)	
	(for CDU31A-02 Serial No. 3000001 thru Serial No. 3105060)	
	(for CDU31A-GW Serial No. 3000001 thru Serial No. 3032470)	
	(for CDU31A-LL Serial No. 3000001 thru Serial No. 3024950)	

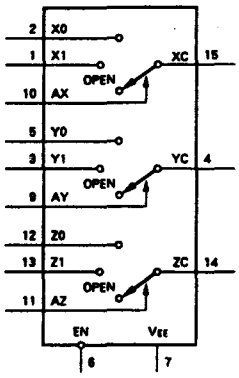
PROTECT SHEET

4-959-071-02	UX PROTECT SHEET	
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)	
	(for CDU31A-02 Serial No. 3105061 thru Serial No. 4000000)	
	(for CDU31A-51 Serial No. 3000001 thru Serial No. 4000000)	
	(for CDU31A-81 Serial No. 3000001 thru Serial No. 4000000)	
	(for CDU31A-GW Serial No. 3032471 thru Serial No. 4000000)	
	(for CDU31A-LL Serial No. 3024951 thru Serial No. 4000000)	
4-959-575-01	UX PROTECT SHEET (2)	
	(for CDU31A-01 Serial No. 3013001 thru Serial No. 4000000)	
	(for CDU31A-02 Serial No. 3105061 thru Serial No. 4000000)	
	(for CDU31A-51 Serial No. 3000001 thru Serial No. 4000000)	
	(for CDU31A-81 Serial No. 3000001 thru Serial No. 4000000)	
	(for CDU31A-GW Serial No. 3032471 thru Serial No. 4000000)	
	(for CDU31A-LL Serial No. 3024951 thru Serial No. 4000000)	

HD14053BFP (HITACHI)

— TOP VIEW —



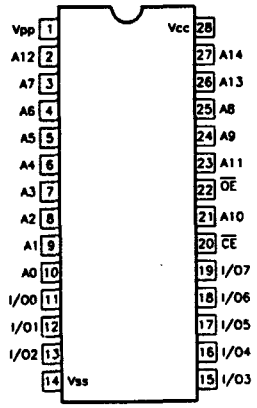


0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

CONT. INPUT		ON CHANNEL
EN	A (X, Y, Z)	
0	0	0
1	1	1
X	X	OPEN

HN27C256AFP-12T-A0

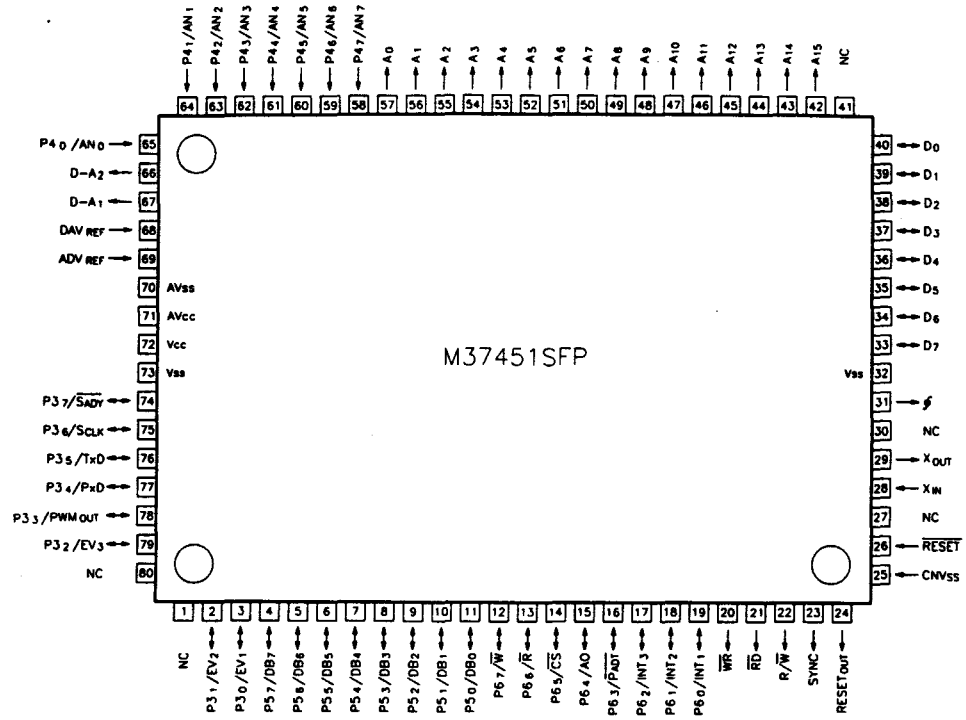
— TOP VIEW —



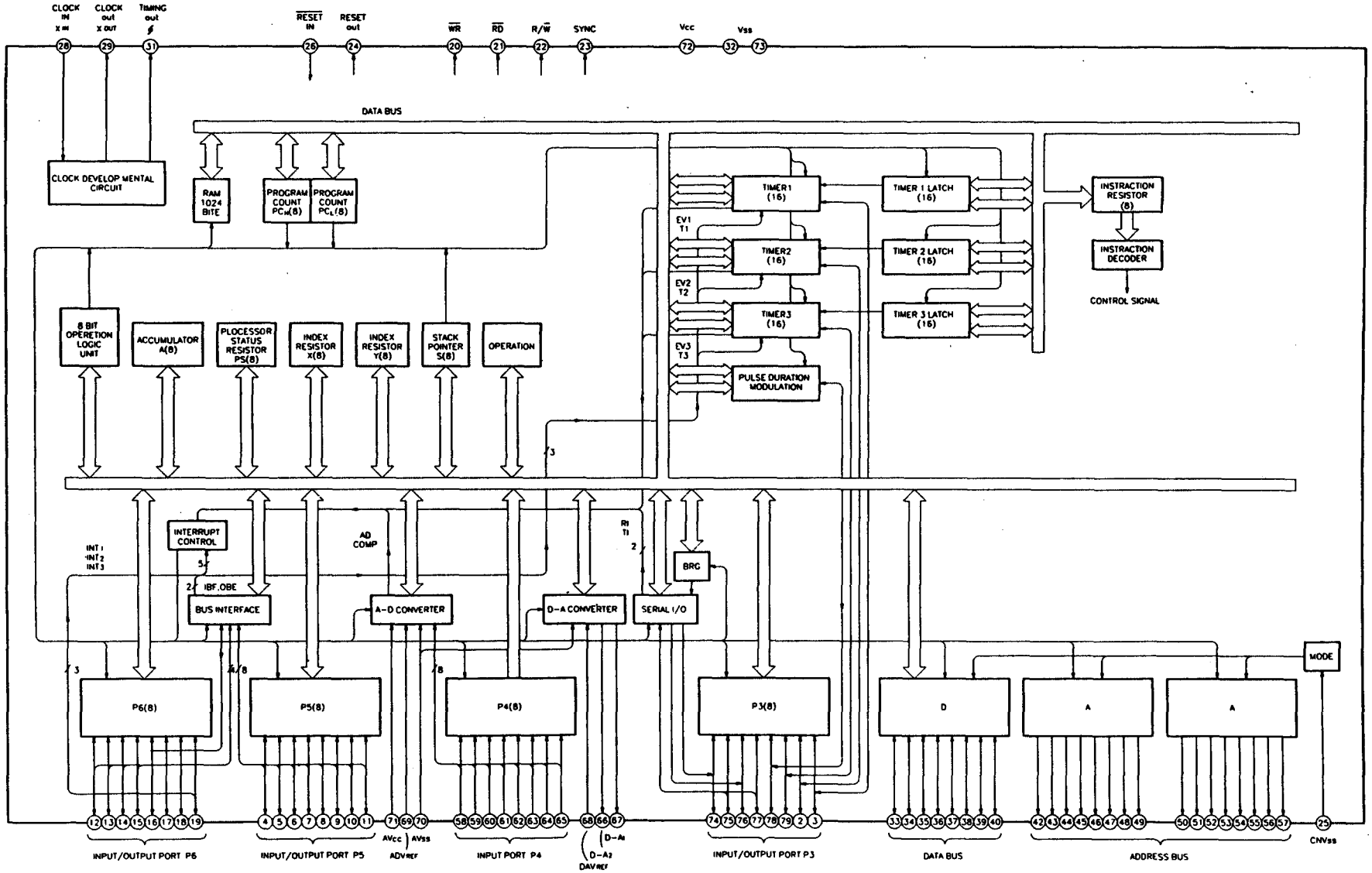
Pin	Pin Name
A0 – A14	Address input
I/O0 – I/O7	Data input/output
$\overline{CE}$	Chip enable
$\overline{OE}$	Output enable
Vcc	Power supply
Vpp	Program power supply
Vss	Ground

M37451SFP (MITSUBISHI)

— TOP VIEW —

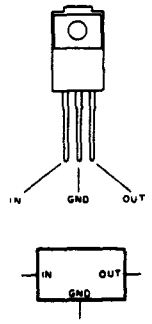


Pin	Symbol	I/O	Description
2~3, 74~79	$P3_0 - P3_7$	I/O	CMOS input/output port (serial I/O PWM output event)
4~11	$P5_0 - P5_7$	I/O	8-Bit input/output port data bus during slave mode
12~19	$P6_0 - P6_7$	I/O	8-Bit input/output port control bus during slave mode
20	$\overline{WR}$	O	Write control signal (Low active)
21	$\overline{RD}$	O	Read control signal (Low active)
22	R/$\overline{W}$	O	R/W Status output (H = Read mode, L = Write mode)
23	SYNC	O	Synchronism signal output
24	$\overline{RESET}_{OUT}$	O	Reset control signal
26	$\overline{RESET}$	I	Reset input (Low active)
28	X_{IN}	I	Clock generator
29	X_{OUT}	O	Clock generator
31	ϕ	O	divided (1/4) frequency timing output
33~40	$D_0 - D_7$	I/O	8-bit data bus
42~57	$A_0 - A_{15}$	O	16-bit address bus
63~65	$P4_0 - P4_2$	I	Analog signal input
66~67	$D\text{-}A_1$, $D\text{-}A_2$	O	Analog signal output
68	DAV_{REF}	I	D-A Standard voltage input
69	ADV_{REF}	I	A-D Standard voltage input
70	AV_{SS}	–	GND
71	AV_{CC}	–	V_{CC}


CLOCK IN
CLOCK out
TIMING out
RESET IN
RESET out
WR
RD
R/W
SYNC
Vcc
Vss
DATA BUS
CLOCK DEVELOP MENTAL CIRCUIT
RAM 1024 BITE
PROGRAM COUNT PCH(8)
PROGRAM COUNT PCL(8)
TIMER1 (16)
TIMER2 (16)
TIMER3 (16)
TIMER 1 LATCH (16)
TIMER 2 LATCH (16)
TIMER 3 LATCH (16)
INSTRACTION RESISTOR (8)
INSTRACTION DECODER
CONTROL SIGNAL
EV1 T1
EV2 T2
EV3 T3
PULSE DURATION MODULATION
8 BIT OPERETION LOGIC UNIT
ACCUMULATOR A(8)
PLOCESSOR STATUS RESISTOR PS(8)
INDEX RESISTOR X(8)
INDEX RESISTOR Y(8)
STACK POINTER S(8)
OPERATION
INTERRUPT CONTROL
INT1 INT2 INT3
IBF,OBE
BUS INTERFACE
AD COMP
A-D CONVERTER
D-A CONVERTER
SERIAL I/O
BRG
RI TI
MODE
P6(8)
P5(8)
P4(8)
P3(8)
D
A
A
AVcc
AVss
ADVREF
D-A1
D-A2
DAVREF
CNVss
INPUT/OUTPUT PORT P6
INPUT/OUTPUT PORT P5
INPUT PORT P4
INPUT/OUTPUT PORT P3
DATA BUS
ADDRESS BUS

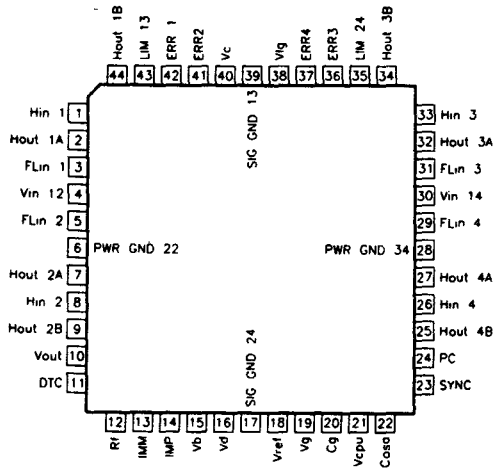
M5F78M05L (MITSUBISHI)

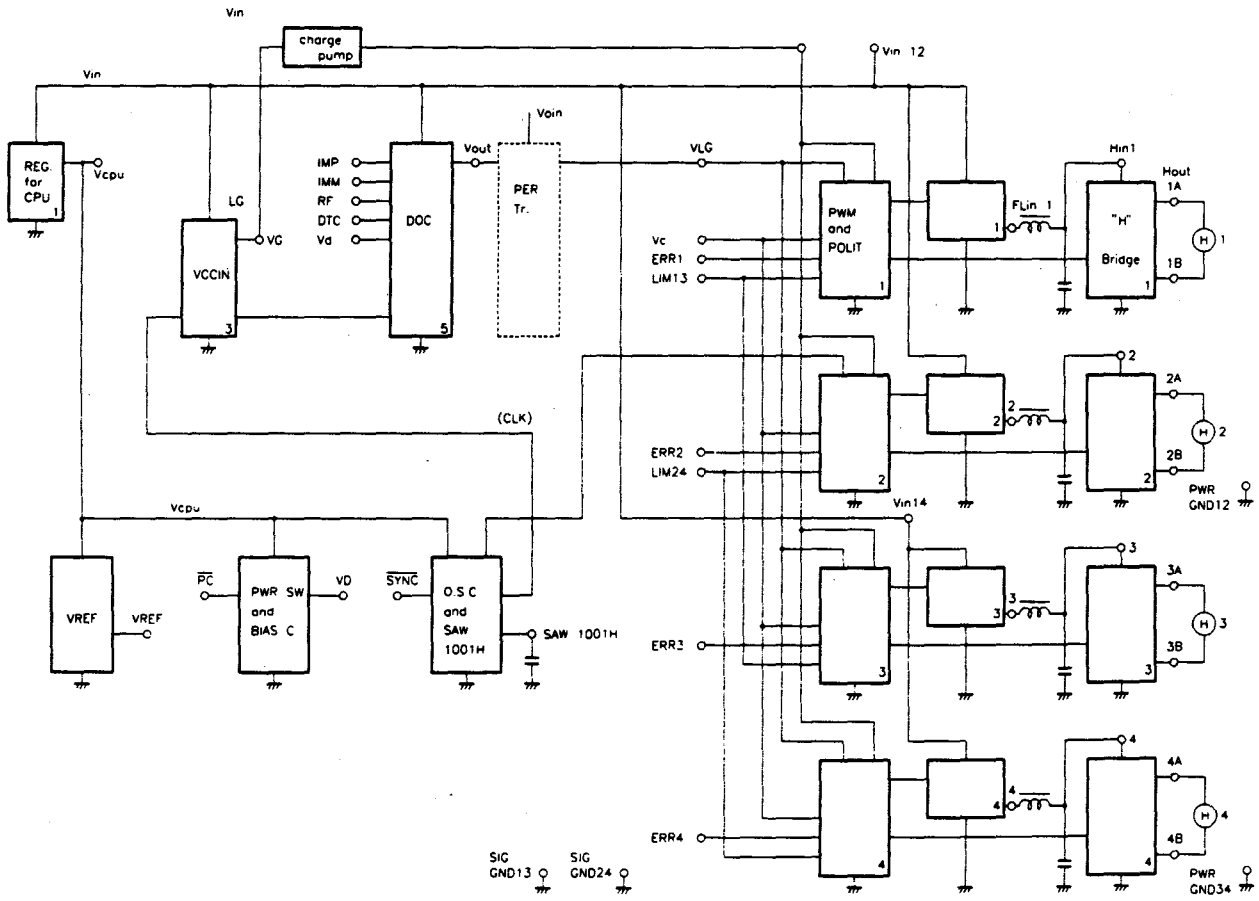
– PRINTED SIDE VIEW –



MPC1715FU (MOTOROLA)

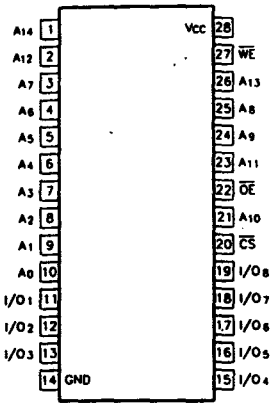
— TOP VIEW —





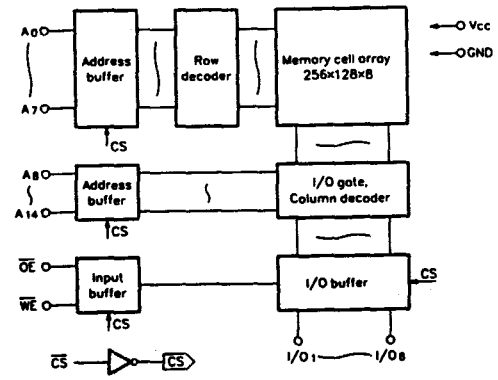
MS62256CLL-10FC-EF

— TOP VIEW —



Symbol	Port Name
A_0~A_{14}	Address input
I/O_1~I/O_8	Data I/O
$\overline{CS}$	Chip select
$\overline{OE}$	Output enable

Symbol	Port Name
$\overline{WE}$	Write enable
Vcc	Power supply (+5V)
GND	GND

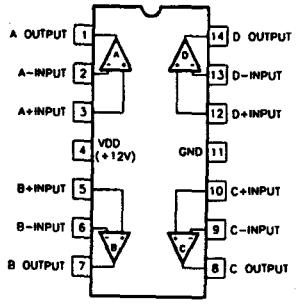


$\overline{CS}$	$\overline{OE}$	$\overline{WE}$	Operation Mode	I/O Terminal	Power Supply Current
H	×	×	Unselect	High impedance	Standby
L	H	H	Output disable	High impedance	Active
L	L	H	Read	Output data	Active
L	×	H	Write	Input data	Active

H : High level, L : Low level, × : Regardless of "H" or "L"

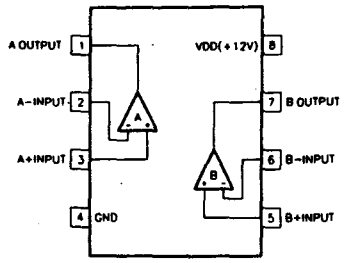
NJM3403AM

— TOP VIEW —



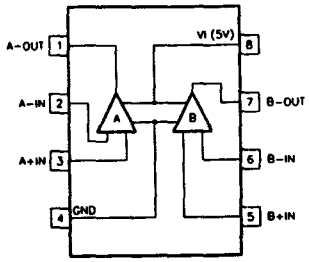
NJM3404AM

— TOP VIEW —



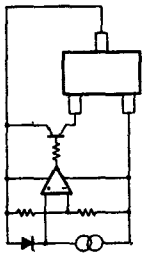
RC3414M

— TOP VIEW —



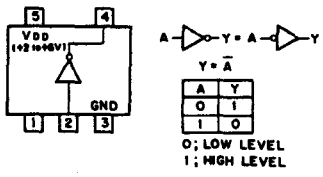
PST572DMT

— TOP VIEW —



SC7S04F

— TOP VIEW —

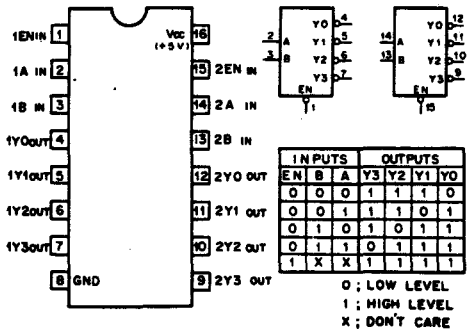


A	Y
0	1
1	0

0 ; LOW LEVEL
1 ; HIGH LEVEL

SN74ALS139NS

— TOP VIEW —

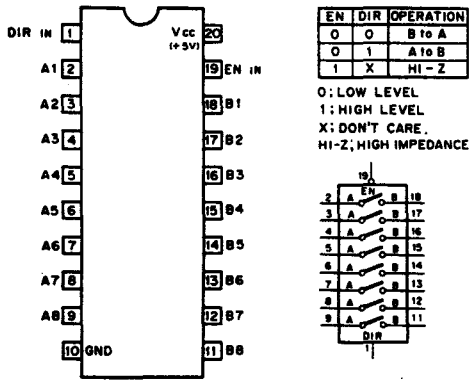


INPUTS			OUTPUTS			
EN	B	A	Y3	Y2	Y1	Y0
0	0	0	1	1	1	0
0	0	1	1	1	0	1
0	1	0	1	0	1	1
0	1	1	0	1	1	1
1	X	X	1	1	1	1

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

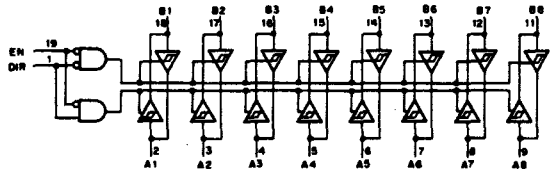
SN74ALS641A-1NS

— TOP VIEW —



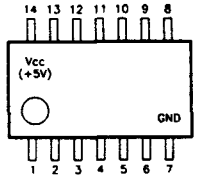
EN	DIR	OPERATION
0	0	B to A
0	1	A to B
1	X	HI-Z

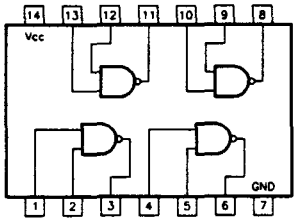
0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE.
HI-Z; HIGH IMPEDANCE



SN74HC00ANS

— TOP VIEW —

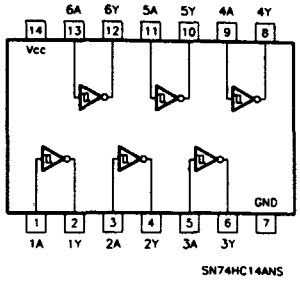




Dositive Logic: $Y = \overline{AB}$

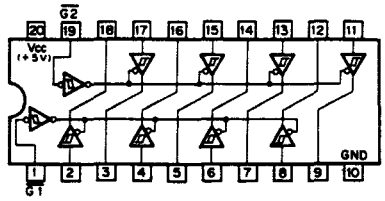
SN74HC14ANS (TEXAS INSTRUMENTS)

— TOP VIEW —



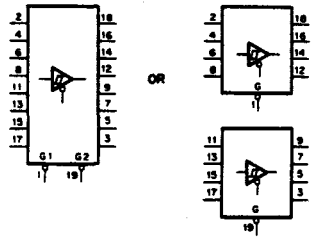
SN74LS244NS

— TOP VIEW —



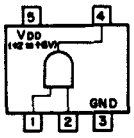
G	A	Y
0	0	0
0	1	1
1	X	HI-Z

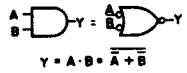
0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE
HI-Z; HIGH IMPEDANCE



TC7S08F (TOSHIBA)

— TOP VIEW —





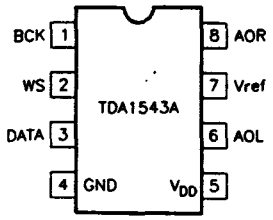
$Y = A \cdot B = \overline{\overline{A} + \overline{B}}$

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

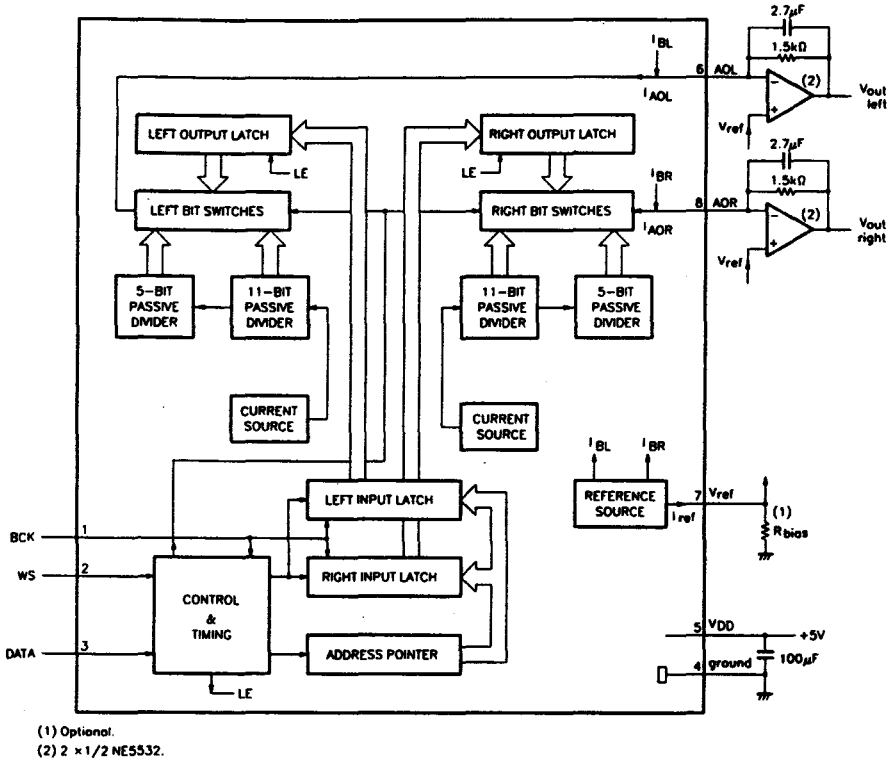
0; LOW LEVEL
1; HIGH LEVEL

TDA1543A (PHILIPS)

— TOP VIEW —



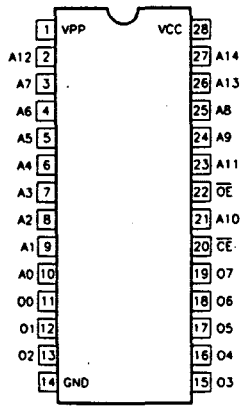
Pin	Symbol	Description
1	BCK	bit clock input
2	WS	word select input
3	DATA	data input
4	GND	ground
5	V_{DD}	+5 V supply voltage
6	AOL	left channel output
7	Vref	reference voltage output
8	AOR	right channel output



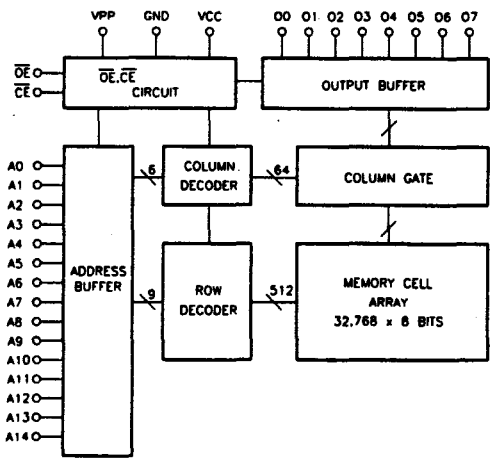
(1) Optional.
(2) 2 × 1/2 NE5532.

TC54256AF-SLCD ??? (TOSHIBA)

–TOP VIEW–



Pin	Pin Name
A0 – A14	Address input
O0 – O7	Data output
$\overline{CE}$	Chip enable input
$\overline{OE}$	Output control input
VPP	Program power supply
VCC	Power supply (+ 5V)
GND	Ground



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Data Storage Group

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