TANDY GRiD

3830 SL
(25-3573)

1660
(GRi-3573)

Service Manual

WARNING

For UK

• Disconnect the mains plug from the supply socket when not in use.
• This equipment is not designed for connection to an IT power system.
• Care must be taken to ensure that the integrity of the PELV (Protective Extra Low Voltage) system is maintained when interfacing to other parts of equipment takes place.

This equipment is produced to BS800/1983.

For the Netherlands

VOLDOET AAN EEC RIGHTLJN 82/499 E.E.C.

For UK

WARNING

This apparatus must be earthed for your safety.

To ensure safe operation three pin-plug (not for U.K.) must be inserted only into a standard three-pin power point which is effectively earthed through the normal household wiring.
Ensure the main outlet socket is easily accessible to enable the user to isolate the apparatus from the main supply by withdrawing the main plug.
Extension cords used with the equipment must be three-core and be correctly wired to provide connection to earth. Wrongly wired extension cords are major cause of fatalities.
The fact that the equipment operates satisfactorily does not imply that the power point is earthed and that the installation is completely safe.
For your safety, if any doubt about the effective earthing of the power point, consult a qualified electrician.

IMPORTANT

The wires in this mains lead are coloured in accordance with the following code:
   Green-and-Yellow: Earth
   Blue: Neutral
   Brown: Live

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured marking identifying the terminals in your plug, produced as follows: The wire which is coloured GREEN-and- YELLOW must be connected to the terminal in the plug which is marked by the letter E or by the safety earth symbol or coloured GREEN of GREEN-and-YELLOW.
The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLACK.
The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

VANADIUM LITHIUM BATTERY ⚠

• **CAUTION**

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

IBM PC XT/AT and PS/2 are registered trademarks of International Business Machines Corporation.
MS-DOS and QBasic are registered trademarks of Microsoft Corporation.

Contents

Safety Precaution

There are special components used in the computer which are important for safety. These parts are shaded on the schematic diagram and indicated by a safety mark △ on the replacement parts list. It is essential that these critical parts should be replaced with the manufacturer's specified parts to prevent shock, fire or other hazards. Do not modify the original design without written permission of the manufacturer or this will void the original parts and labor guarantee.

1. System Overview

1.1 General Description

This computer is based on the 80386SL microprocessor and can run up to 25 MHz.

An 80387SX (or 80387SL) math co-processor socket is included.

The system supports up to 8 megabytes of RAM (Total); 2 megabytes are placed on the main logic board, and an additional 2 or 6 megabytes can be added using optional RAM board.

Both system BIOS and video BIOS can be in shadow RAM.

Without processor RAM cache, the system uses pagemode memory and/or interleaved memory to attain virtual zero-wait-state operation.

Standard ports include two serial (one of which is used mainly with a modem), one parallel, one VGA, one external mouse, and one external keyboard (IBM-PS/2-style mini DIN size).

The disk drives are a 2.5-inch 80 megabytes hard disk and a 3.5-inch 1.44 megabytes floppy disk drive.

The VGA interface is on the main logic board and it supports an analog monitor and a 640 × 480 black and white liquid crystal display. The track ball is included as a useful pointing device.

The AT bus port socket is present for optional docking unit.

1.2 Specifications

Main Unit

PROCESSOR

CPU	Microprocessor 80386SL, 25/12.5 MHz
	Co-processor (Option) 80387SX (or 80387SL), 25 MHz

Memory

RAM   2MB Standard, 64KB Cache SRAM (for GRiD 1660); 16KB Cache SRAM (for Tandy 3830 SL)
Up to 8 MB expandable using optional RAM Card

Total RAM	4 MB	8 MB
Type of RAM Card	2 MB RAM Card	6 MB RAM Card

ROM   128 KB FLASH ROM with 32 pins PLCC type including VGA BIOS (not expandable)

Real Time Clock   256-byte CMOS RAM backed up by Vanadium Lithium Battery (rechargeable)
RTC battery life time: Approx. 3 months

Internal slot   For dedicated MODEM

Storage

  FDD

    Floppy Disk   3 1/2″ double sided, high density, double tracked
    Recording Capacity   1.44 M/720 K bytes

  HDD

    Hard Disk   2 1/2″
    Capacity   81.18 MB (formatted)
    Transfer Rate   12 M bits/sec (to/from media)
    Seek Time   Average 19 msec

Display

   Type   See-through type LCD (black character/white background, reversible) with FL backlight

   Resolution   640 × 480 dots
                      80 characters × 25 lines

   Format

      Character   80 columns × 25 lines
                    40 columns × 25 lines

      Graphics   640 × 480 dots
   Aspect Ratio 1.000 : 1.000
   Gray Scale   16 levels (64 levels only for mode 13)

Keyboard

   Number of keys 84
                    External Keyboard (Optional PS/2-style)

   Special Key   Following combinations are supported by ROM-BIOS.

      Combination Even if another keyboard interrupt driver is installed, these functions work except Fn+F2.

Fn+F1: Turns LCD reversed mode On/Off or change color mapping
Fn+Shift+F1: Reverses cyclic order of Fn+F1
Fn+F2: Changes display device (LCD/CRT/LCD & CRT simultaneously)
Fn+F3: Changes CPU clock speed (High/Low speed)
Fn+F4: Turns the hard disk drive motor Off
Fn+F5: Turns speaker On/Off
Fn+F6: Backlit brightness control   (Low, Medium, High)
Fn+F7: Turns LCD and backlight Off
Fn+F8: Turns serial interface and modem Off
Fn+F9: Does nothing
Fn+F10: Turns system to full standby mode
Fn+F11: Turns text expansion On/Off on LCD in text mode (Tandy 3830 SL only)
Fn+F12: Changes Bi-level/Gray shades video on LCD in text mode (Tandy 3830 SL only)

Fn: Numeric keypad
Fn+Keypad: Lock numeric keypad

   I/O   Parallel Port DB-25 (female)
                    Serial Port DB-9 (male)
                    VGA Monitor Port DB-15 (female)
                    AT-Bus Port 200 pin (female)

   Control   Power Switch On/Off
                    Contrast
                    Reset Button

Resume Battery

   Type   Rechargeable Vanadium Lithium battery
   Nominal Voltage 3 Volts
   Nominal Capacity 100 mAH (5 hour rating)
   Duty Cycle   Average 1000 times
   Weight   0.01 lbs × 2 (6.5 g × 2)

LED Indicators

   Power/Speed

LED Color	On	Off
Green	High speed operation	Power off
Orange	Low speed operation	

   Battery

LED Color		
Red	Getting low battery*	
Orange	Charging*	

＊Additionally orange blinking means that no battery is connected for charging, also red blinking indicates trouble with charging controller.

Caps Lock (Shift Lock)*	LED Color	On	Off
	Green	Caps (Shift) On	Caps (Shift) Off
Scroll Lock	Green	Scroll lock On	Scroll lock Off
Num Lock	Green	Numeric key On	Numeric key Off
Key Pad	Green	Keypad is enabled	
HDD	Green	HDD is operating	
FDD	Orange	FDD is operating	

Warning Beep

Type PIEZO

Battery Low

Voltage When output voltage of battery becomes low, system begins beeping every 20 seconds during the last 2.5 minutes of battery life.
Then system goes into the suspended/resume mode automatically, then resuming function is enabled.

Resuming Function
- Backup time with fully charged battery pack (Ni-MH):
  Typ. 7 days (2MB DRAM)
  Typ. 5 days (8MB DRAM)
- Backup time with fully charged resume (Vanadium Lithium) battery:
  Typ. 1 hour (2MB RAM)
  Typ. 1 hour (8MB RAM)

Software

Operating System MS-DOS Ver. 5.0

EMS Driver LIM Ver. 4.0 compatible included in MS-DOS disk

Application

Software QBASIC Ver. 1.0, Windows Version 3.1

Input Voltage 22.8V

Current Consumption 1.25A (Max.)

Temperature

Operating 50°F to 100°F (10°C to 38°C)

Storage −4°F to 150°F (−20°C to 60°C)

Humidity

Operating Max. 80%

Storage Max. 80%

Weight 5.9lbs (2.7kg)

Dimensions

(W × H × D) 11.7 x 1.7 x 8.7 inch (299 × 44 × 220mm)

*Note: For France and Belgium

AC Adapter

Primary	110V – 240Vac
Secondary	
Voltage	22.8Vdc at 0.88A
	17Vdc at 1.25A
Current Capacity	1.25A (Max.)
Operating Temperature	32°F to 104°F (0°C to 40°C)
Weight	0.82lbs (0.37kg)
Dimensions (W × H × D)	2.5 × 1.5 × 5.7 inch (65 × 39.5 × 140mm)

Battery Pack

Type	Rechargeable Ni-MH (Nickel-Metal Hydride) Battery
Capacity	1.45AH (5 hour rating) (Avg.)
	14.4V (Avg.)
Operating Time	Approx. 3 hours under the following conditions:
	FL backlight (medium brightness): 90% on
	HDD operation: 10%
	FDD operation: 1%
Charging Time	Approx. 5 hours (Power On: at normal operation) (*Notes)
	Approx. 2 hours (Power Off)
Duty Cycle	Average 500 times
Dimensions	7.1 × 0.7 × 2.4 inch (181.2 × 19.5 × 61.2mm)
Weight	0.95lbs (430g)
*Notes	Power consuming condition (such as heavy FDD/HDD access) may cause longer charging time.
	Quick charging is done when the battery temperature is within approx. 4°C (40°F) to 50°C (122°F). Outside this range, no charging is done to prevent battery damage.

1.3 Location of Controls and Components

■ Front View

1. LCD Display
2. LCD CONTRAST Control
3. POWER Indicator
4. BATTERY Indicator
5. Click Buttons
6. Track Ball
7. Operation Indicators
8. POWER Switch
9. Floppy Disk Drive
10. Eject Button
11. FDD Indicator
12. Keyboard

■ Bottom View

13. Rear Cover
14. Latch
15. Modem Cover
16. Battery Release
17. Battery Pack Compartment
18. Hard Disk Drive Cover
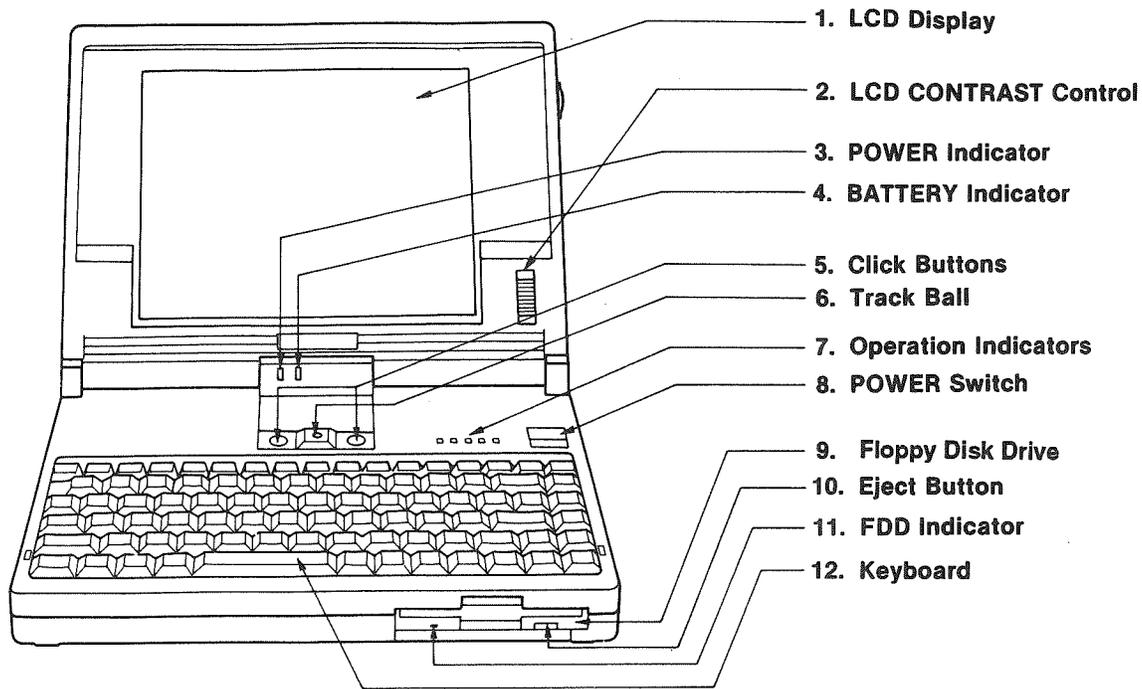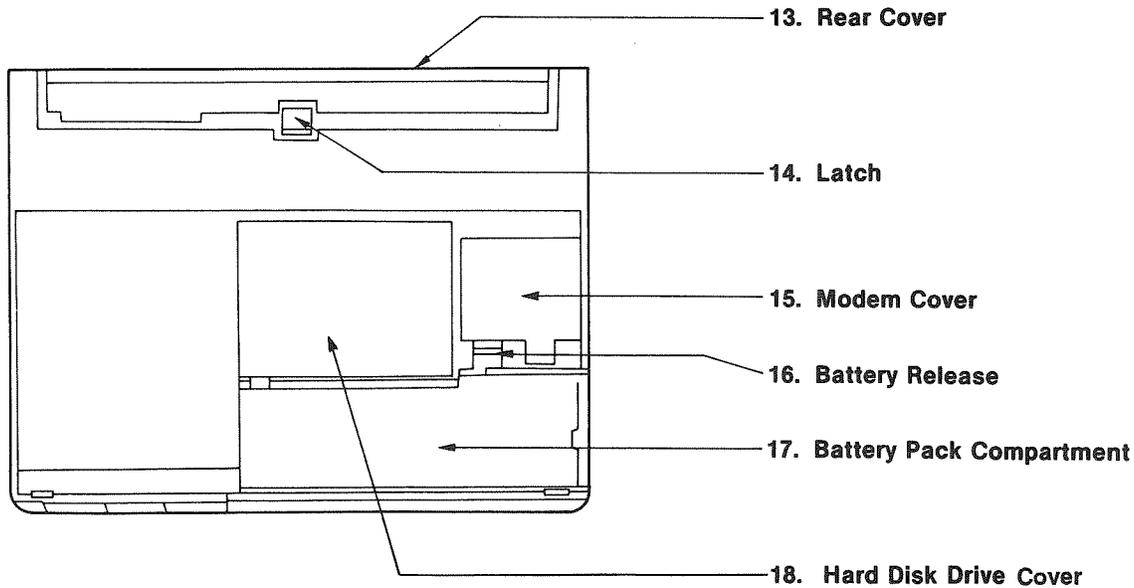
1. **LCD Display**
2. **LCD CONTRAST Control**   This control adjusts contrast of the LCD display relative to the viewing angle.
3. **POWER Indicator**   This green LED lights when the power switch is ON.
This indicator reflects the following CPU speed as well:
Lit orange: Slow (12.5 MHz)
Lit green: Fast (25 MHz)
4. **BATTERY Indicator**   The battery indicator reflects the following five conditions:

BATTERY Indicator Status	Battery Pack Status
BATTERY indicator not lit	The computer is being powered from the battery pack.
Lit orange	Quick charging
Lit green	Trickle charging
Lit red	Low battery pack power. The battery supply will last approximately 10 minutes after the BATTERY indicator glows red. The beeper sounds every 20 seconds during the last 2.5 minutes.
Blinking orange	The computer is being powered from the AC adapter and the battery pack is not attached.
Blinking red	Trouble has occured in the battery charging controller, etc.

5. **Click Buttons**   When using the track ball, press the button to control the computer.
6. **Track Ball**   This is a pointing device that works like a mouse, except that you don't need a tabletop to roll it around on.
7. **Operation Indicators**   These indicators consist of HDD, Shift LK (Caps LK), Num LK, Scr LK, and Key Pad.
8. **POWER Switch**   Press this switch to turn the computer on/off.
9. **Floppy Disk Drive**
10. **Eject Button**   Press this button to remove the floppy disk from the floppy disk drive.
11. **FDD Indicator**   This lights when the computer reads from or writes to the floppy disk.
12. **Keyboard**   The keyboard features   84   typewriter keys and special function keys.
13. **Rear Cover**   Swing this down to raise the back of the computer.
14. **Latch**   Used to hold the rear cover when the cover is used as a stand.   Slide this to release the cover.
15. **Modem Cover**   Open this when you install or remove a modem.
16. **Battery Release**   To remove the battery pack, push the battery release in the direction indicated and slide the battery pack.
17. **Battery Pack Compartment**   This houses the battery pack.
18. **Hard Disk Drive Cover**   This covers the computer's hard disk drive.

■ Rear View

18. RAM Board Slot Cover
19. VGA Monitor Port
20. Parallel Port
21. Serial Port
22. AT Bus Port

■ Right Side View

23. Open Latch
24. RESET Button
25. External keyboard Port
26. External Mouse Port

■ Left Side View

23. Open Latch
27. Modem Jack Cover
28. DC IN Jack (22.8V)
   (⊖—ⓒ—⊕)
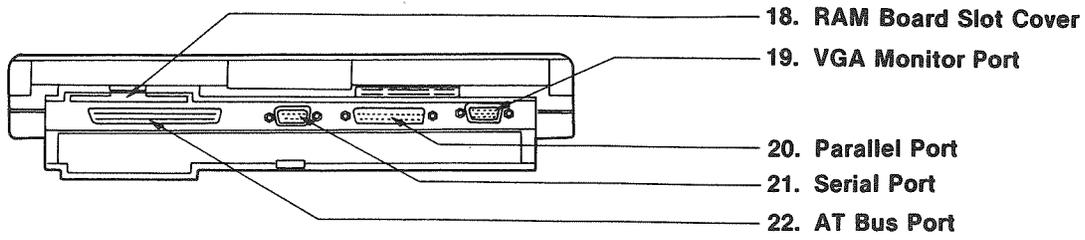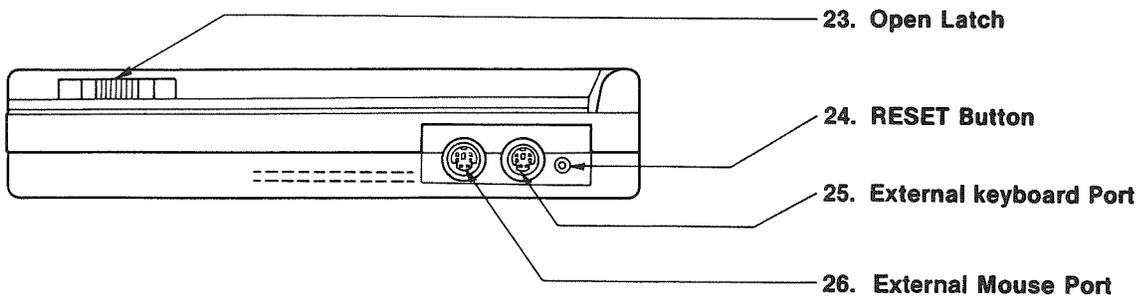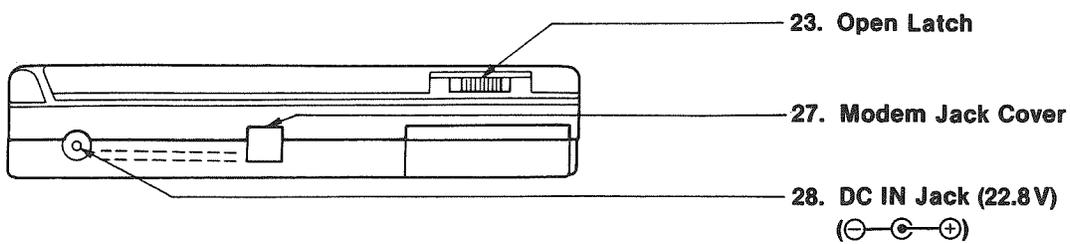
18. **RAM Board Slot Cover**	Open this to insert or remove a RAM board.
19. **VGA Monitor Port**	When using an external VGA monitor, connect it to this port with a monitor cable.
20. **Parallel Port**	Used to connect a printer.
21. **Serial Port**	Used to connect a serial device such as a mouse or modem.
22. **AT Bus Port**	Used to connect the optional docking unit, which is used for installing the expansion boards.
23. **Open Latch**	Slide the levers on both sides of the computer toward the front to open the display panel.
24. **RESET Button**	Use this button when releasing resume function or if there's no other way to restart the computer. Use a narrow object, such as the tip of a ball-point pen to push the button. CAUTION: Do not use a pencil to push the button. Pencil lead can break off inside the computer and damage the computer's circuitry.
25. **External Keyboard Port**	When using as external keyboard (PS/2 type), connect its plug to this jack.
26. **External Mouse Port**	A PS/2 type mouse can be connected to this port.
27. **Modem Jack Cover**	Remove this only when connecting an internal modem card to this computer.
28. **DC IN Jack**	Connect the DC plug of the supplied AC Adapter.

■ Attaching the Battery Pack

First turn off the computer and disconnect the AC adapter.
Then turn the computer upside down.
Install the battery pack in the battery compartment at the underside of the computer, using the following procedure.
Attachment:
1. Insert the battery pack so that its end is aligned with the line marked in the battery pack compartment.
2. Slide the battery pack firmly until it locks in position.

Marker Line
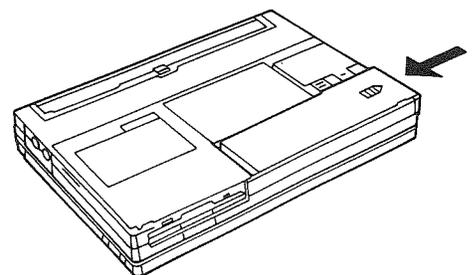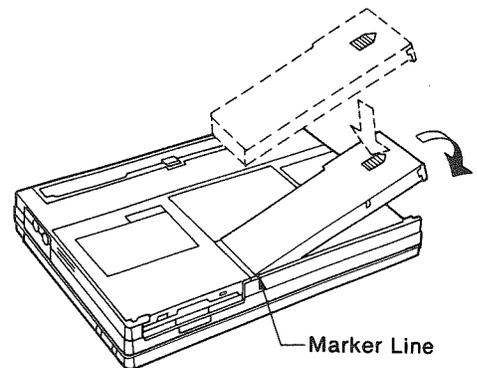
■ How to Remove the Track Ball for Cleaning

Cautions:

● Do not use chemical solvents to clean the track ball.

● After you remove the track ball cover, do not touch any metal parts in the computer.

1. Insert the blade of a small, flat-blade screwdriver or a similar tool into the slot between the top left corner of the track ball cover and the computer. Then, carefully pry up and remove the cover from left to right.

   Note: Be careful not to break the tabs on the cover.

2. Remove the track ball from the compartment.

3. Clean the track ball with soap and water. Then, rinse the track ball with water and thoroughly dry the track ball with a clean, soft cloth.

4. Replace the track ball and its cover.

   Note: The track ball fits only one way.

Regular Screwdriver

Groove

1.4 Block Diagrams

• Power Logic Diagram

Notes: • —— Power Lines
         • —— Control Lines
         • Refer to Sheet 8/10 for schematic diagram

MAIN P C B (LOWER)

MAIN P C B (UPPER)

(SHEET 9/10)
To OPTIONAL MODEM
CN 2
SERIAL PORT
CN3
To INTERNAL HDD
CN6

(SHEET 1/10)
To FL INVERTER P C B
CN309
To LCD
(SHEET 3/10)
CN308
CD 0~15

(SHEET 9/10)
IC5
DALT1137CSXU
DRIVER/RECEIVER

LCD CONTROL
CLK
GDPO~7

IC304
DA5863
AJ25TS
CACHE

IC305
DA5863
AJ25TS
CACHE

IC303
80387SX
Socket

COM XX
CX1, COM X1
HDD CONTROL

(SHEET 9/10)
CN10
CN305
SAO~19
SDO~15
LAI7~23
CPU CONTROL

(SHEET 1/10)
SAO~19

IC302
DAKU386SL25I
CPU

CA1~13

OPTIONAL CO-PROCESSOR
(SHEET 1/10)

(SHEET 5/10)

IC3
DAKU82360SLI
I/O SUBSYSTEM

IC1
DA70BBF0EW
GA 2

CMUX [0~11]
CASH0
CASL0

CN306
RA31~3
CAS1~3
To OPTIONAL MEMORY CARD (SHEET 2/10)

IRQ0~15
LPTD0~7
XD7

IC6
DFWV06B
0072Z
BIOS

DRQ2
DACK2

CPU CONTROL

PDCLK
ISACLK2(16MHz)
EFI (CPU50MHz)

MD0~15
MAA0~10

IC311
DA9127-01X0F
CLOCK GENERATOR

(SHEET 4/10)
14.318MHz

FRA4~8

IC318
MN2C4256
AJ7T
FRAME MEMORY

IC306
DA4440
AJ8LTM
4M BIT
DRAM

IC307
DA4440
AJ8LTM
4M BIT
DRAM

CN1
To OPTIONAL DOCKING UNIT (SHEET 9/10)

SA
SD
LA
XD
DRQ, DACK
IRQ

CN9
CN303

SQCLK
(VGA 43.8MHz)

IC314
DAGD6410-XV
VGA

FRADO~3

IC308
DA4440
AJ8LTM
4M BIT
DRAM

IC309
DA4440
AJ8LTM
4M BIT
DRAM

RAS0

RGB
IRQ9
GAADB0~3
PDDATA

(SHEET 3/10)

CPUDB~15
CPUD0~7

M0D0~3
M2D0~3

DRQ2
DACK2
IRQ6

IC10
DADP8473V-N
FDC

IRQ1,12

IC12
DA80C42-597D
KBC

SA2

IC17
DA37451
E111M
SKBE

IRQ10

IC319
DAACT
245SJLN
BUS TRANS.

IC320
DAACT
245SJLN
BUS TRANS.

IC316
MN2C4256
AJ7T
VRAM

IC317
MN2C4256
AJ7T
VRAM

SD8~15
SD0~7
VGACLK
VAA0~8
VAB0~8

IC310
DA9104 01SX0F
PROG.FREQ.
GENERATOR
(SHEET 4/10)

IC9
DABC
244FTO
DRIVER/RECEIVER

IC8
DAACT
244
SJLN
DRIVER/RECEIVER

From Power Unit

IC321
DA7220J4KW
GAI

SCANOUT0~11
SCANIN0~7

CN4
PARALLEL PORT
(SHEET 7/10)

CN5
To INTERNAL FDD
(SHEET 7/10)

CN7
To EXTERNAL KEYBOARD
(SHEET 6/10)

CN8
To EXTERNAL MOUSE

CN11
To EXTERNAL VGA MONITOR
(SHEET 9/10)

CN301
To INTERNAL TRACK BALL
(SHEET 2/10)

CN310
To BEEPER
(SHEET 2/10)

CN304
To LED PCB

CN302
To POWER/ BATTERY LED PCB.
(SHEET 2/10)

CN312
To INTERNAL KEYBOARD

1.5 System Memory Map

The Main Logic Board supports 128K bytes of ROM area using 1 piece 128K × 8-bit ROM, and 2M bytes of RAM area using 4 pieces of 1M × 4-bit RAM.
The 2MB of RAM area is expandable up to 8M bytes using an optional RAM Board in the RAM Slot.

Address	Region	Boundary	Size	Description
0	BASE MEMORY	0	640KB	RAM on MAIN LOGIC BOARD
A0000	VRAM	640KB	128KB	RAM on MAIN LOGIC BOARD for GRAPHIC DISPLAY BUFFER (256K bit × 4) × 2 pcs.
C0000	VGA BIOS		32KB	DUPLICATED CODE at ADDRESS E0000 or SHADOW RAM
C8000	RESERVED			
D0000			64KB	
E0000	VGA BIOS		128KB	BIOS (128K × 8-bit ROM CHIP) × 1 pc.
E8000	DIAGNOSTIC			
F3000	SYSTEM BIOS			
100000		1MB		
200000		2MB	2MB	For OPTIONAL 2MB RAM BOARD (2MB RAM BOARD × 1 pc.)
400000		4MB		
600000		6MB	6MB	For OPTIONAL 6MB RAM BOARD (6MB RAM BOARD × 1 pc.)
800000		8MB		
1000000	BIOS	16MB	128KB	DUPLICATED CODE at ADDRESS E0000

1 — 12

1.6 I/O Address Map

1) System

Address	Function	IC No.
0H	DMA Channel 0 base and current address	IC3
1H	DMA Channel 0 base and word count	IC3
2H	DMA Channel 1 base and current address	IC3
3H	DMA Channel 1 base and word count	IC3
4H	DMA Channel 2 base and current address	IC3
5H	DMA Channel 2 base and word count	IC3
6H	DMA Channel 3 base and current address	IC3
7H	DMA Channel 3 base and word count	IC3
8H	Command register, DMA controller 1	IC3
9H	Request Register, DMA controller 1	IC3
0AH	Mask Register, DMA controller 1	IC3
0BH	Mode Register, DMA controller 1	IC3
0CH	Clear byte pointer, DMA controller 1	IC3
0DH	Master Clear, DMA controller 1	IC3
0DH	Temporary Register, DMA controller 1	IC3
0FH	Write all Mask Register Bits, DMA controller 1	IC3
0EH	Clear Mask Register, DMA controller 1	IC3
20H	Initialization Control Word ICW1, Interrupt Controller 1	IC3
21H	Initialization Control Word ICW2, Interrupt Controller 1	IC3
21H	Initialization Control Word ICW3, (Master Device) Interrupt Controller 1	IC3
21H	Initialization Control Word ICW3, (Slave Device) Interrupt Controller 1	IC3
21H	Initialization Control Word ICW4, Interrupt Controller 1	IC3
21H	Operation Control Word OCW1, Interrupt Controller 1	IC3
20H	Operation Control Word OCW2, Interrupt Controller 1	IC3
20H	Operation Control Word OCW3, Interrupt Controller 1	IC3
22H	CPU Power Mode Register	IC302
23H	Configuration Space Status Register	IC3
24H	Configuration Index Register	IC3
25H	Configuration Data Register	IC3
40H	Timer Counter 1 Channel 0 count	IC3
41H	Timer Counter 1 Channel 1 count	IC3
42H	Timer Counter 1 Channel 2 count	IC3
43H	Timer Counter 1 Command Register	IC3
48H	Timer Counter 2 Channel 0 count	IC3
4AH	Timer Counter 2 Channel 2 count	IC3
4BH	Timer Counter 2 Command Register	IC3
60H	Keyboard Controller data I/O input buffer	IC3
60H	Keyboard Controller data I/O output buffer	IC3
61H	Port 61	IC3
61H	Port 61	IC3
64H	Keyboard Controller Command	IC3

Address	Function	IC No.
64H	Keyboard Controller Status	IC3
70H	CMOS RAM Address port and NMI Mask	IC3
71H	RTC CMOS RAM data port	IC3
74H	Extended CMOS RAM address port (protected)	IC3
76H	Extended CMOS RAM data port (protected)	IC3
80H	Reserved	IC3
81H	DMA Memory Address Mapper Page Register Channel 2	IC3
82H	DMA Memory Address Mapper Page Register Channel 3	IC3
83H	DMA Memory Address Mapper Page Register Channel 1	IC3
84H	Reserved	IC3
85H	Reserved	IC3
86H	Reserved	IC3
87H	DMA Memory Address Mapper Page Register Channel 0	IC3
88H	Reserved	IC3
89H	DMA Memory Address Mapper Page Register Channel 6	IC3
8AH	DMA Memory Address Mapper Page Register Channel 7	IC3
8BH	DMA Memory Address Mapper Page Register Channel 5	IC3
8CH	Reserved	IC3
8DH	Reserved	IC3
8EH	Reserved	IC3
8FH	DMA Memory Address Mapper Page Register - Refresh	IC3
92H	Port 92	IC3
0A0H	Initialization Control Word ICW1, Interrupt Controller 2	IC3
0A1H	Initialization Control Word ICW2, Interrupt Controller 2	IC3
0A1H	Initialization Control Word ICW3, (Master Device) Interrupt Controller 2	IC3
0A1H	Initialization Control Word ICW3, (Slave Device) Interrupt Controller 2	IC3
0A1H	Initialization Control Word ICW4, Interrupt Controller 2	IC3
0A1H	Operation Control Word OCW1, Interrupt Controller 2	IC3
0A0H	Operation Control Word OCW2, Interrupt Controller 2	IC3
0A0H	Operation Control Word OCW3, Interrupt Controller 2	IC3
0C0H	DMA Channel 4 base and current address	IC3
0C2H	DMA Channel 4 base and current word count	IC3
0C4H	DMA Channel 5 base and current address	IC3
0C6H	DMA Channel 5 base and current word count	IC3
0C8H	DMA Channel 6 base and current address	IC3
0CAH	DMA Channel 6 base and current word count	IC3
0CCH	DMA Channel 7 base and current address	IC3
0CEH	DMA Channel 7 base and current word count	IC3
0D0H	Command register, DMA controller 2	IC3
0D0H	Status Register, DMA controller 2	IC3
0D2H	Request Register, DMA controller 2	IC3
0D4H	Mask Register, DMA controller 2	IC3
0D6H	Mode Register, DMA controller 2	IC3
0D8H	Clear byte pointer, DMA controller 2	IC3
0DAH	Master Clear, DMA controller 2	IC3
0DAH	Temporary Register, DMA controller 2	IC3

Address	Function	IC No.
0DCH	Clear Mask Register, DMA controller 2	IC3
0DEH	Write all Mask Register Bits, DMA controller 2	IC3
0EEH	Special Featuer Set Fast A20 Gate	IC3
0EFH	Special Featuer Set Fast CPU Reset	IC3
0F0H	MCP Register 0	IC303
0F4H	Slow CPU Register	IC302
0F5H	Fast CPU Register	IC302
0F9H	Special Feature Set Disable	IC3, IC302
0FBH	Special Feature Set Enable	IC3, IC302

2) Peripherals

Address	Function	IC No.
0102H	Parallel Port Configuration	IC3
278H	LPT2 Data Port	IC3
279H	LPT2 Status Port	IC3
27AH	LPT2 Control	IC3
27BH-27FH	Automatic data strobe registers	IC3
2F8H	Serial Controller Port B Receiver Buffer	IC3
2F8H	Serial Controller Port B Transmit holding Buffer	IC3
2F8H	Serial Controller Port B Divisor Latch Least Significant Byte	IC3
2F9H	Serial Controller Port B Divisor Latch Most Significant Byte	IC3
2F9H	Serial Controller Port B Interrupt Enable Register	IC3
2FAH	Serial Controller Port B Interrupt Id Register	IC3
2FBH	Serial Controller Port B Line Control Register	IC3
2FCH	Serial Controller Port B MODEM Control Register	IC3
2FDH	Serial Controller Port B Line Status Register	IC3
2FEH	Serial Controller Port B MODEM Status Register	IC3
2FFH	Serial Controller Port B Scratch Register	IC3
378H	LPT1 Data Port	IC3
379H	LPT1 Status	IC3
37AH	LPT1 Control	IC3
37BH-37FH	Automatic data strobe registers	IC3
3B4H	CRTC Index MP	IC314
3B5H	CRTC Data MP	IC314
3BCH	LPT3 Data Port	IC3
3BDH	LPT3 Status	IC3
3BEH	LPT3 Control	IC3
3C0H	Attribute Controller Index	IC314
3C1H	Attribute Controller Data in VGA	IC314
	Attribute Controller Data in EGA	
3C2H	Miscellaneous Output, Feature	IC314
3C3H	Motherboard Sleep Address	IC314
3C4H	Sequencer	IC314
3C5H	Sequencer	IC314
3C6H	RAMDAC Pixel Mask	IC314
3C7H	RAMDAC Address Register Read Mode	IC314
	RAMDAC Status Register	
3C8H	RAMDAC Address Register Write Mode	IC314

Address	Function	IC No.
3C9H	RAMDAC Data	IC314
3CAH	Feature Control	IC314
3CCH	Miscellaneous Output	IC314
3CEH	Graphic Controller and Extensions Index	IC314
3CFH	Graphic Controller and Extensions Data	IC314
3D4H	CRTC Index	IC314
3D5H	CRTC Data	IC314
3DAH	Feature Control, Display Status	IC314
3F0H	Floppy Disk Controller Port Status Register A	IC10
3F1H	Floppy Disk Controller Port Status Register B	IC10
3F2H	Floppy Disk Controller Digital Output Register	IC10
3F4H	Floppy Disk Controller Main Status Register	IC10
3F5H	Floppy Disk Controller Data Register	IC10
3F6H	Fixed Disk Register	IC10
3F7H	Floppy Disk Controller Digital Input Register	IC10
3F7H	Floppy Disk Controller Control Register	IC10
3F7H	Fixed Disk Decode	IC10
3F8H	Serial Controller Port A Receiver Buffer	IC3
3F8H	Serial Controller Port A Transmit holding Buffer	IC3
3F8H	Serial Controller Port A Divisor Latch Least Significant Byte	IC3
3F9H	Serial Controller Port A Divisor Latch Most Significant Byte	IC3
3F9H	Serial Controller Port A Interrupt Enable Register	IC3
3FAH	Serial Controller Port A Interrupt Id Register	IC3
3FBH	Serial Controller Port A Line Control Register	IC3
3FCH	Serial Controller Port A MODEM Control Register	IC3
3FDH	Serial Controller Port A Line Status Register	IC3
3FEH	Serial Controller Port A MODEM Status Register	IC3
3FFH	Serial Controller Port A Scratch Register	IC3
461H	Port 461 EISA Mode	IC3
46E8	AT Adapter Sleep Address	IC314

1.7 Pin Configurations

Top View of Main PCB (Upper)
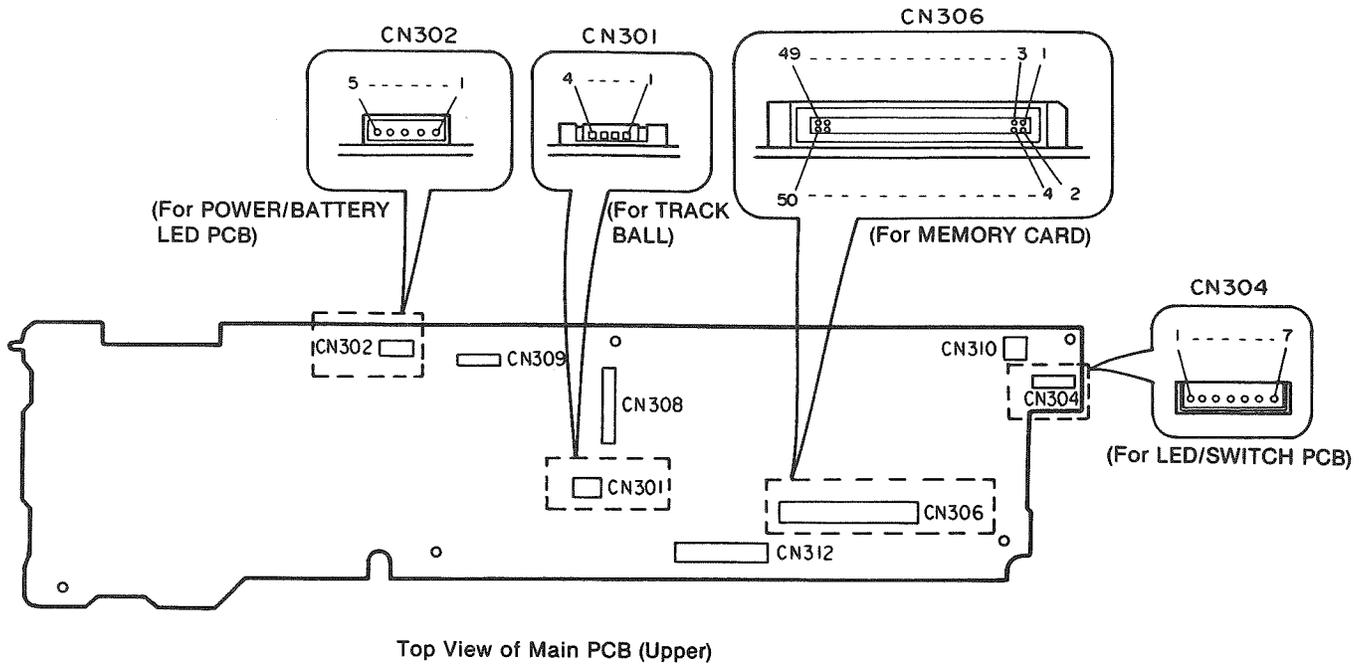
Main PCB (UPPER)

CN301   TRACK BALL Connector (4-pin)

Pin No.	Signal Name/ Description	Direction
1	PDCLK	Out
2	PDDATA	In
3	GND	—
4	VCC	Out

CN302   POWER/BATTERY LED PCB Connector (5-pin)

Pin No.	Signal Name/ Description	Direction
1	PWRLED	Out
2	SPDLED	Out
3	BATLED	Out
4	CHGLED	Out
5	GND	—

CN304   LED/SWITCH PCB Connector (7-pin)

Pin No.	Signal Name/ Description	Direction
1	CAP	Out
2	NUM	Out
3	SCRL	Out
4	KEYPAD	Out
5	HDLUMP	Out
6	$\overline{\text{POWERSW}}$	Out
7	GND	—

CN306   MEMORY CARD Connector (50-pin)

Pin No.	Signal Name/ Description	Direction	Pin No.	Signal Name/ Description	Direction
1	VBB	Out	26	MD8	In/Out
2	GND	—	27	$\overline{\text{CASL1}}$	Out
3	MAA0	Out	28	MD9	In/Out
4	MD0	In/Out	29	$\overline{\text{CASL2}}$	Out
5	MAA1	Out	30	MD10	In/Out
6	MD1	In/Out	31	$\overline{\text{CASH1}}$	Out
7	MAA2	Out	32	MD11	In/Out
8	MD2	In/Out	33	$\overline{\text{CASH2}}$	Out
9	MAA3	Out	34	MD12	In/Out
10	MD3	In/Out	35	$\overline{\text{WLE}}$	Out
11	MAA4	Out	36	MD13	In/Out
12	MD4	In/Out	37	$\overline{\text{WHE}}$	Out
13	MAA5	Out	38	MD14	In/Out
14	MD5	In/Out	39	GND	—
15	MAA6	Out	40	MD15	In/Out
16	MD6	In/Out	41	$\overline{\text{RAS1}}$	Out
17	MAA7	Out	42	$\overline{\text{CASL3}}$	Out
18	MD7	In/Out	43	$\overline{\text{RAS2}}$	Out
19	MAA8	Out	44	$\overline{\text{CASH3}}$	Out
20	GND	—	45	VBB	Out
21	MAA9	Out	46	$\overline{\text{RAS3}}$	Out
22	GND	—	47	GND	—
23	MAA10	Out	48	VBB	Out
24	VBB	Out	49	GND	—
25	GND	—	50	GND	—
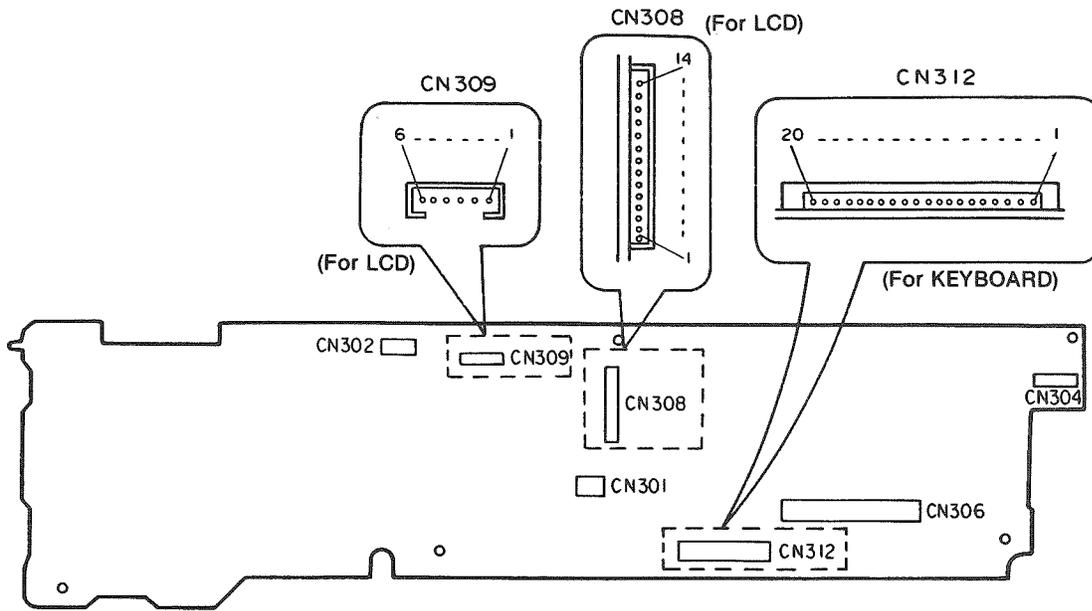
Top View of Main PCB (Upper)

CN308   LCD Connector (14-pin)

Pin No.	Signal Name/ Description	Direction
1	S	Out
2	CP1	Out
3	CP2	Out
4	VDD	Out
5	VSS	Out
6	VEE	Out
7	DV0	Out
8	DV1	Out
9	DV2	Out
10	DV3	Out
11	DL0	Out
12	DL1	Out
13	DL2	Out
14	DL3	Out

CN309   LCD Connector (6-pin)

Pin No.	Signal Name/ Description	Direction
1	VFL	Out
2	FLCONT	Out
3	FLVAR	Out
4	FLVSS	Out
5	CONLCD	Out
6	CONVAR	Out

CN312   KEYBOARD Connector (20-pin)

Pin No.	Signal Name/ Description	Direction
1	ww9	In
2	ww10	In
3	ww11	In
4	ww12	In
5	ww13	In
6	ww14	In
7	ww15	In
8	ww16	In
9	ww1	In
10	ww2	In
11	ww3	In
12	ww4	In
13	ww5	In
14	ww6	In
15	ww7	In
16	ww8	In
17	ww17	In
18	ww18	In
19	ww19	In
20	ww20	In

CN303

CN310 (For Beeper)

2 1

CN310

CN303

Bottom View of Main PCB (Upper)

CN305

30   60

31

(For Main PCB (Lower))
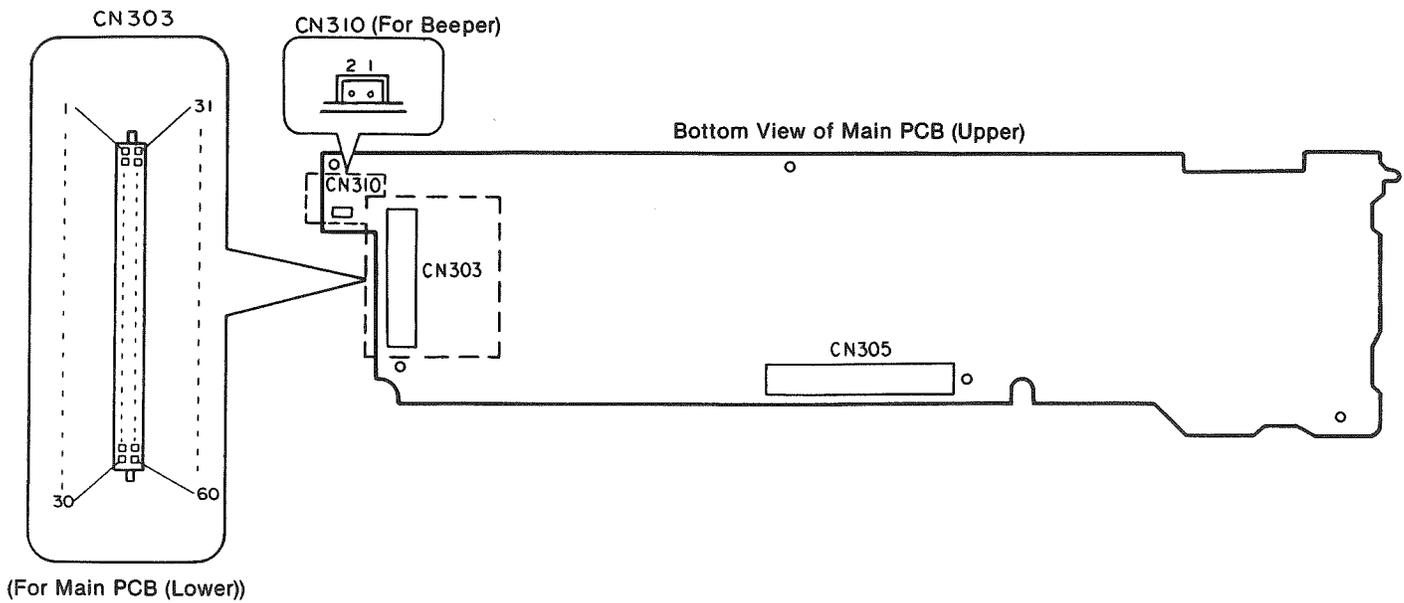
CN310   BEEPER Connector (2-pin)

Pin No.	Signal Name/Description	Direction
1	—	Out
2	—	Out

CN303   PCB Connector (60-pin)

Pin No.	Signal Name/Description	Direction	Pin No.	Signal Name/Description	Direction
1	GND	—	31	VBB	In
2	VCC	Out	32	VBB	In
3	VCC	Out	33	VBB	In
4	GREEN	Out	34	AGND	—
5	RED	Out	35	AGND	—
6	BLUE	Out	36	AGND	—
7	GND	—	37	GND	—
8	VSYNC	Out	38	HSYNC	Out
9	SUBLSYNC	In	39	VM	In
10	GAADB0	In/Out	40	GAADB1	In/Out
11	GAADB2	In/Out	41	GAADB3	In/Out
12	SUBLDATA	In	42	SUBLCLK	In
13	GACMD	In	43	GAOE	In
14	MEMW	In/Out	44	MEMR	In/Out
15	GAW	In	45	SROFF	In
16	HDD	In	46	COMX1	Out
17	NC	—	47	VGAAEN	In
18	GACK	In	48	RESETDRV	In
19	MEMCS16	In/Out	49	SBHE	In
20	IRQ9	Out	50	PDDATA	In/Out
21	GND	—	51	GND	—
22	CX1	Out	52	SPKR	In
23	GAIRQ	Out	53	CONLCD	In
24	LCDVEE	Out	54	POWERSW	Out
25	GND	—	55	GND	—
26	GND	—	56	GND	—
27	ROMCS0	Out	57	GND	—
28	IOR	In/Out	58	IOW	In/Out
29	F4	In	59	F18	In
30	HDLED	In	60	SMRAMCS	In

Bottom View of Main PCB (Upper)

CN303

CN305

CN305 (For Main PCB (Lower))

41 ----------------------------------- 80

40

CN305   PCB Connector (80-pin)

Pin No.	Signal Name/Description	Direction	Pin No.	Signal Name/Description	Direction
1	SA1	In/Out	41	SA0	In/Out
2	SA3	In/Out	42	SA2	In/Out
3	SA5	In/Out	43	SA4	In/Out
4	SA7	In/Out	44	SA6	In/Out
5	SA9	In/Out	45	SA8	In/Out
6	SA11	In/Out	46	SA10	In/Out
7	SA13	In/Out	47	SA12	In/Out
8	SA15	In/Out	48	SA14	In/Out
9	SA17	In/Out	49	SA16	In/Out
10	SA19	In/Out	50	SA18	In/Out
11	GND	—	51	GND	—
12	SD0	In/Out	52	SD1	In/Out
13	SD2	In/Out	53	SD3	In/Out
14	SD4	In/Out	54	SD5	In/Out
15	SD6	In/Out	55	SD7	In/Out
16	SD8	In/Out	56	SD9	In/Out
17	SD10	In/Out	57	SD11	In/Out
18	SD12	In/Out	58	SD13	In/Out
19	SD14	In/Out	59	SD15	In/Out
20	GND	—	60	GND	—
21	REFRESH	In	61	SYSCLK	Out
22	IOCHRDY	In/Out	62	PDCLK	In/Out
23	VGACS	In	63	IOCS16	In/Out
24	PWRGOOD	In	64	CHGLED	In
25	OWS	In	65	REFREQ	In
26	STPCLK	In	66	SMI	In
27	HALT	Out	67	INTA	Out
28	A20GATE	In	68	DMA8/16	In
29	LA17	In/Out	69	HLDA	Out
30	LA19	In/Out	70	LA18	In/Out
31	LA21	In/Out	71	LA20	In/Out
32	LA23	In/Out	72	LA22	In/Out
33	GND	—	73	GND	—
34	HRQ	In	74	INTR	In
35	NMI	In	75	CPURESET	In
36	MASTER	In	76	ERROR	Out
37	BALE	Out	77	SUSSTAT	In
38	LCDPWR	Out	78	BATLED	In
39	FLVAR	In	79	CONVAR	In
40	VDD	In	80	VLCD	In

Top View of Main PCB (Lower)

C N 1
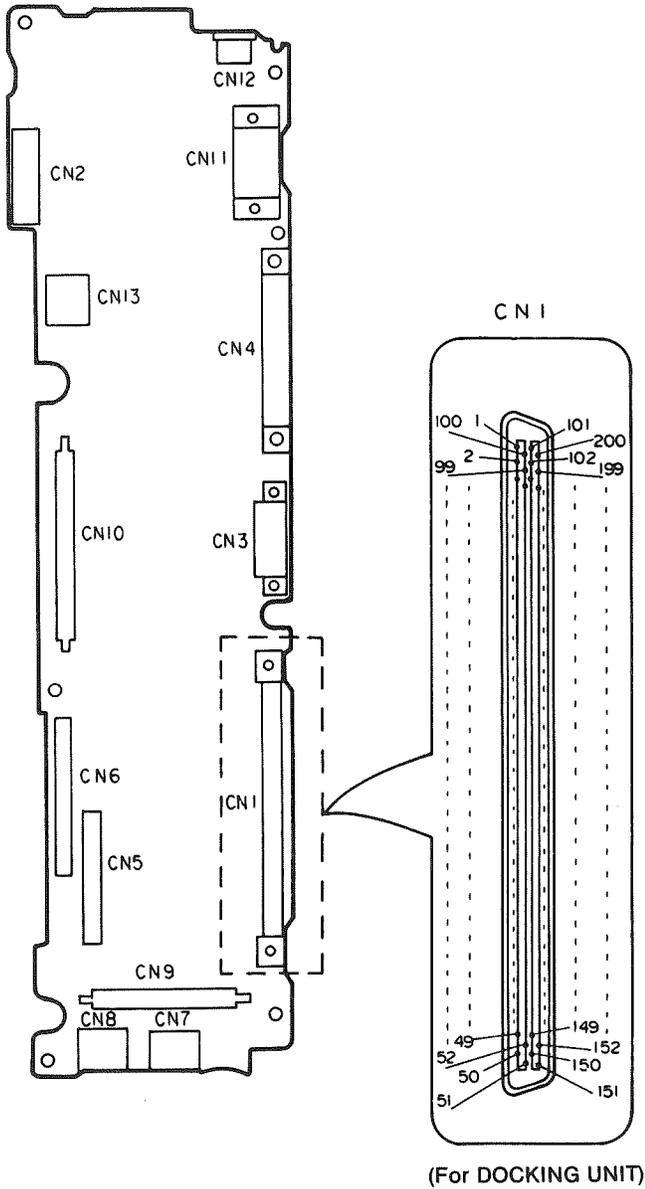
(For DOCKING UNIT)

Main PCB (Lower)

CN1   OPTIONAL DOCKING UNIT Connector
(200-pin)

Pin No.	Signal Name/ Description	Direction
1	EXT23V	In
2	EXT23V	In
3	GND	—
4	S2	Out
5	S1	Out
6	S3	In
7	S5	In
8	GND	—
9	BALE	Out
10	DRQ7	In
11	DRQ6	In
12	DRQ5	In
13	DRQ0	In
14	IRQ14	In
15	IRQ12	In
16	IRQ10	In
17	DACK2	Out
18	IRQ4	In
19	IRQ6	In
20	DRQ3	In
21	DRQ1	In
22	GND	—
23	HDCS0	Out
24	HD7	In/Out
25	GND	—
26	HD4	In/Out
27	HDLED	Out
28	IOCS16	Out
29	GND	—
30	SD0	In/Out
31	SD2	In/Out
32	SD4	In/Out
33	SD6	In/Out
34	SD8	In/Out
35	SD10	In/Out
36	SD12	In/Out
37	SD14	In/Out
38	GND	—
39	EXTKDATA	In/Out
40	EXTMCLK	In/Out
41	GND	—
42	EXT5V	In
43	EXT5V	In
44	EXT5V	In
45	EXT5V	In
46	GND	—
47	HSYNC1	Out
48	BGND	Out
49	RGND	Out
50	GGND	Out

(Continued)

1 — 21

CN1 OPTIONAL DOCKING UNIT Connector (200-pin)

Pin No.	Signal Name/Description	Direction	Pin No.	Signal Name/Description	Direction	Pin No.	Signal Name/Description	Direction
51	GREEN	Out	101	DOCKING	In	151	GND	—
52	RED	Out	102	—	Out	152	GND	—
53	BLUE	Out	103	EX5VSW	Out	153	SUBLSYNC	Out
54	VSYNC1	Out	104	IOCHCK	In	154	SUBLDATA	Out
55	GND	—	105	SMEMR	Out	155	GND	—
56	EXT5V	In	106	SMEMW	Out	156	MEMCS16	Out
57	EXT5V	In	107	MEMW	In/Out	157	DRQ2	In
58	EXT5V	In	108	MEMR	In/Out	158	P13	Out
59	EXT5V	In	109	XD7	In/Out	159	SLCTIN	Out
60	GND	—	110	EXSYSCLK	Out	160	P12	Out
61	EXTMDATA	In/Out	111	GND	—	161	NC	—
62	EXTKCLK	In/Out	112	LA17	In/Out	162	LPTINIT	Out
63	GND	—	113	LA18	In/Out	163	P11	Out
64	SD15	In/Out	114	LA20	In/Out	164	P15	Out
65	SD13	In/Out	115	GND	—	165	P10	Out
66	SD11	In/Out	116	SA9	In/Out	166	LPTAFD	Out
67	SD9	In/Out	117	SA8	In/Out	167	LPTSTRD	Out
68	SD7	In/Out	118	SA7	In/Out	168	LPTD3	In/Out
69	SD5	In/Out	119	SA6	In/Out	169	LPTD2	In/Out
70	SD3	In/Out	120	SA5	In/Out	170	LPTD4	In/Out
71	SD1	In/Out	121	SA4	In/Out	171	LPDT1	In/Out
72	GND	—	122	SA3	In/Out	172	LPTD7	In/Out
73	AEN	Out	123	SA2	In/Out	173	LPTD0	In/Out
74	PDIAG	Out	124	SA1	In/Out	174	LPTD6	In/Out
75	EXTRST	Out	125	SA0	In/Out	175	GND	—
76	IOW	In/Out	126	GND	—	176	SA11	In/Out
77	IOR	In/Out	127	LPTD5	In/Out	177	SA10	In/Out
78	HDCS1	Out	128	GND	—	178	SA12	In/Out
79	GND	—	129	F28	Out	179	SA13	In/Out
80	IRQ7	In	130	F24	In	180	SA14	In/Out
81	DACK1	Out	131	F2	In	181	SA15	In/Out
82	DACK3	Out	132	F20	In	182	SA16	In/Out
83	IRQ5	In	133	F22	In	183	SA17	In/Out
84	IRQ3	In	134	F6	In	184	SA18	In/Out
85	GND	—	135	F11	Out	185	SA19	In/Out
86	IRQ11	In	136	CE2	In	186	GND	—
87	IRQ15	In	137	F27	Out	187	LA19	In/Out
88	DACK0	Out	138	F26	Out	188	LA21	In/Out
89	DACK5	Out	139	F16	Out	189	LA22	In/Out
90	DACK6	Out	140	F12	Out	190	LA23	In/Out
91	DACK7	Out	141	F18	Out	191	GND	—
92	MASTER	In	142	F14	Out	192	REFRESH	In/Out
93	IRQ9	In	143	F4	Out	193	IOCHRDY	In/Out
94	GND	—	144	TC	Out	194	0WS	Out
95	S6	In	145	SBHE	Out	195	EXTRTCAS	Out
96	S0	Out	146	GND	—	196	EXTRTCDS	Out
97	S4	In	147	POWERSW	Out	197	EXTRTCRW	Out
98	S7	In	148	SUBLCLK	Out	198	IRQ8	In
99	GND	—	149	—	Out	199	GND	—
100	EXT23V	In	150	DOCKING	In	200	GND	—

CN 4
13 1
25 14
(For Parallel Port)

CN 3
1 5
6 . . . 9
(For Serial Port)

CN4
CN3
CN1
CN11
CN12
CN7
CN9
CN8
CN13
CN2
CN10
CN6
CN5

Top View of Main PCB (Lower)

18 1
CN2 (For MODEM)

25 1
CN5 (For INT. FDD)
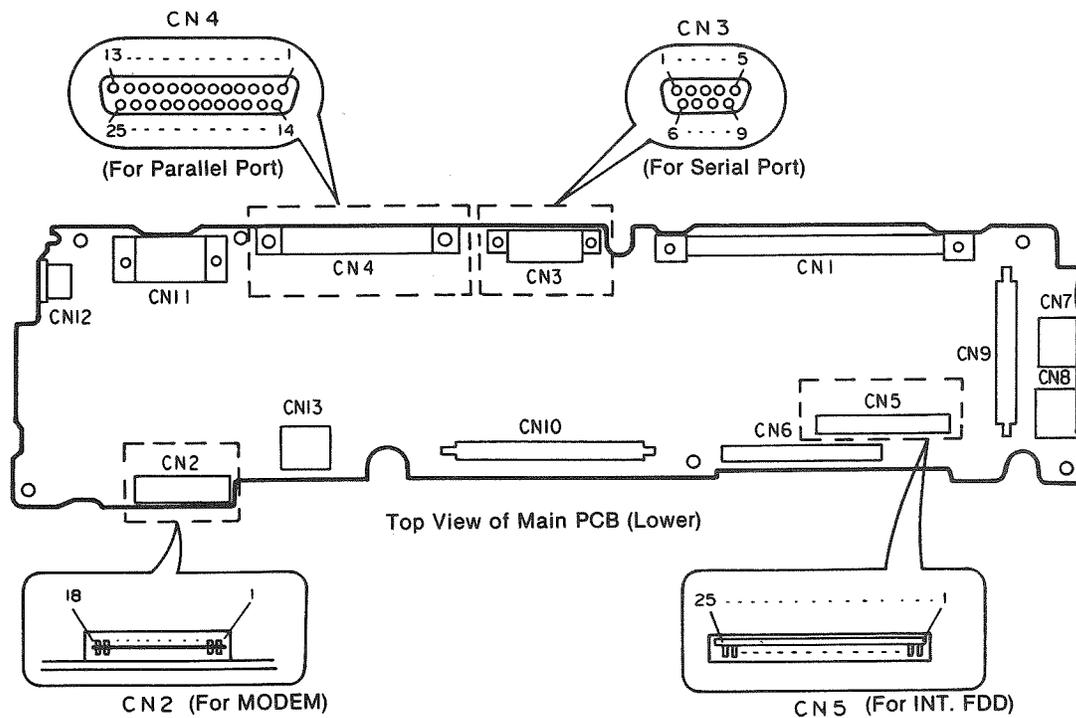
CN2 OPTIONAL MODEM Connector (18-pin)

Pin No.	Signal Name/Description	Direction
1	CT3	In
2	GND	—
3	DSR	In
4	VCC	Out
5	RSLD	In
6	SHUTDWN	Out
7	RI	In
8	RXD	In
9	SPKR	In
10	RTS	Out
11	DTR	Out
12	TXD	Out
13	RST	Out
14	GND	—
15	12V	Out
16	GND	—
17	−12V	—
18	GND	—

CN3 SERIAL PORT (9-pin)

Pin No.	Signal Name/Description	Direction
1	CD	In
2	RD	In
3	TD	Out
4	DTR	Out
5	GND	—
6	DSR	In
7	RTS	Out
8	CTS	In
9	RI	In

CN4 PARALLEL PORT (25-pin)

Pin No.	Signal Name/Description	Direction
1	STROBE	Out
2	D0	Out
3	D1	Out
4	D2	Out
5	D3	Out
6	D4	Out
7	D5	Out
8	D6	Out
9	D7	Out
10	LPTAK	In
11	LPTBUSY	In
12	LPTPE	In
13	SLCT	In
14	AFD	Out
15	ERROR	In
16	INIT	Out
17	SLCTIN	Out
18	GND	—
19	GND	—
20	GND	—
21	GND	—
22	GND	—
23	GND	—
24	GND	—
25	GND	—

CN5 INTERNAL FDD Connector (26-pin)

Pin No.	Signal Name/Description	Direction
1	VCC	Out
2	F2	In
3	VCC	Out
4	F4	In
5	VCC	Out
6	F6	Out
7	VCC	Out
8	NC	—
9	NC	—
10	F10	Out
11	F11	Out
12	F12	Out
13	GND	—
14	F14	Out
15	GND	—
16	F16	Out
17	GND	—
18	F18	Out
19	GND	—
20	F20	In
21	GND	—
22	F22	In
23	GND	—
24	F24	In
25	GND	—
26	F26	Out

Top View of Main PCB (Lower)

CN7

(For EXT. K/B)

CN8

(For MOUSE)

CN6

(For INT. HDD)

CN6 INTERNAL HDD Connector (44-pin)

Pin No.	Signal Name/Description	Direction	Pin No.	Signal Name/Description	Direction
1	IORST	Out	23	IOW	Out
2	GND	—	24	GND	—
3	HD7	In/Out	25	IOR	Out
4	SD8	In/Out	26	GND	—
5	SD6	In/Out	27	NC	—
6	SD9	In/Out	28	NC	—
7	SD5	In/Out	29	NC	—
8	SD10	In/Out	30	GND	—
9	HD4	In/Out	31	IRQ14	In
10	SD11	In/Out	32	IOCS16	In
11	SD3	In/Out	33	SA1	Out
12	SD12	In/Out	34	PDIAG	In
13	SD2	In/Out	35	SA0	Out
14	SD13	In/Out	36	SA2	Out
15	SD1	In/Out	37	HDCS0	Out
16	SD14	In/Out	38	HDCS1	Out
17	SD0	In/Out	39	HDLED	In
18	SD15	In/Out	40	GND	—
19	GND	—	41	VCC	Out
20	NC	—	42	VCC	Out
21	NC	—	43	GND	—
22	GND	—	44	VCC	Out

CN7 EXTERNAL KEYBOARD Connector (6-pin)

Pin No.	Signal Name/Description	Direction
1	EXTKDATA	In/Out
2	NC	—
3	GND	—
4	VCC	Out
5	EXTKCLK	In/Out
6	NC	—

CN8 EXTERNAL MOUSE Connector (6-pin)

Pin No.	Signal Name/Description	Direction
1	EXTMDATA	In/Out
2	NC	—
3	GND	—
4	VCC	Out
5	EXTMCLK	In/Out
6	NC	—

Top View of Main PCB (Lower)

CN 9

(For Main PCB (Upper))
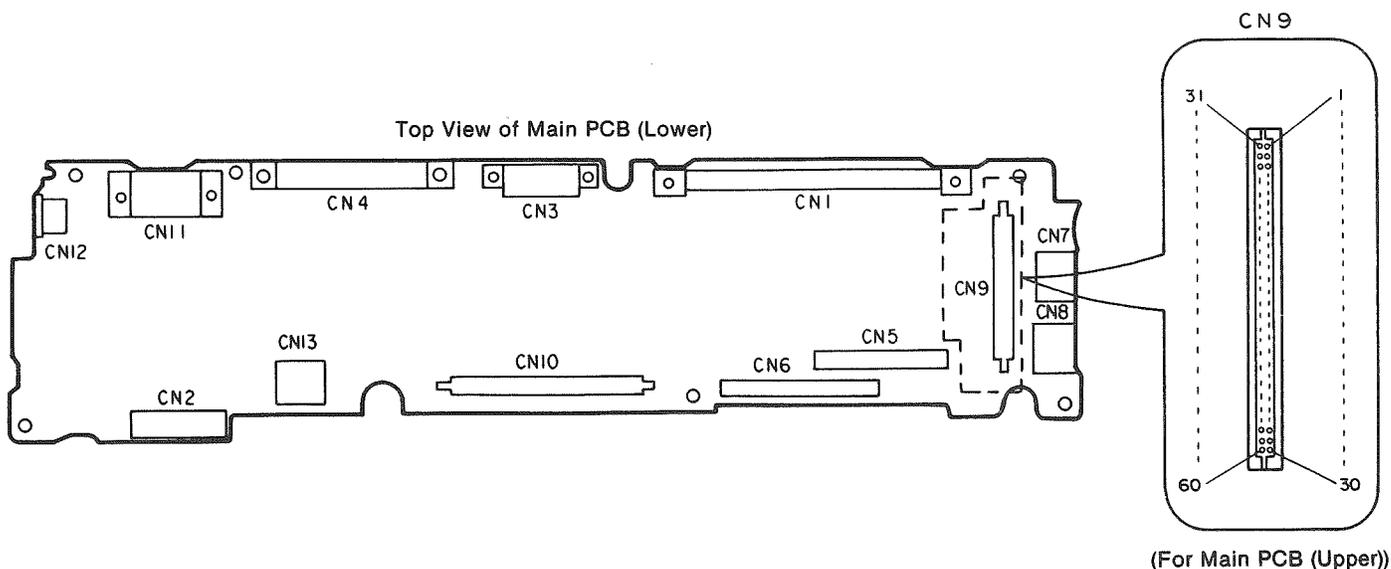
CN9 PCB Connector (60-pin)

Pin No.	Signal Name/Description	Direction	Pin No.	Signal Name/Description	Direction
1	GND	—	31	VBB	Out
2	VCC	Out	32	VBB	Out
3	VCC	Out	33	VBB	Out
4	GREEN	In	34	GGND	—
5	RED	In	35	RGND	—
6	BLUE	In	36	BGND	—
7	GND	—	37	GND	—
8	VSYNC1	In	38	HSYC1	In
9	SUBLSYNC	Out	39	VM	Out
10	GAADB0	In/Out	40	GAADB1	In/Out
11	GAADB2	In/Out	41	GAADB3	In/Out
12	SUBLDATA	Out	42	SUBLCLK	Out
13	GACMD	Out	43	GAOE	Out
14	MEMW	In/Out	44	MEMR	In/Out
15	GAW	Out	45	SROFF	Out
16	HDD	Out	46	COMX1	In
17	NC	—	47	VGAAEN	Out
18	GACK	Out	48	RESETDRV	Out
19	MEMCS16	In/Out	49	SBHE	Out
20	IRQ9	In	50	PDDATA	In/Out
21	GND	—	51	GND	—
22	CX1	In	52	SPKR	Out
23	GAIRQ	In	53	CONLCD	Out
24	LCDVEE	In	54	POWERSW	In
25	GND	—	55	GND	—
26	GND	—	56	GND	—
27	ROMCS0	In	57	GND	—
28	IOR	In/Out	58	IOW	In/Out
29	DR0/1 F4	Out	59	WGATE F18	Out
30	HDLED	Out	60	SMRAMCS	Out

Top View of Main PCB (Lower)
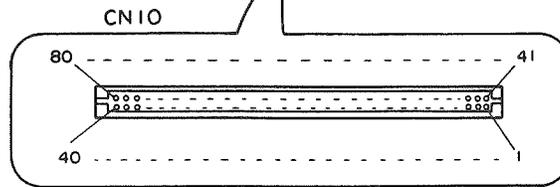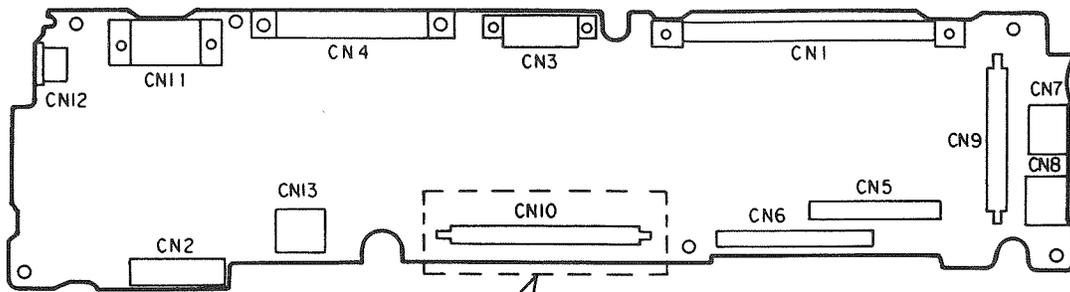
CN10

(For Main PCB (Upper))

CN10   PCB Connector (80-pin)

Pin No.	Signal Name/Description	Direction	Pin No.	Signal Name/Description	Direction
1	SA1	In/Out	41	SA0	In/Out
2	SA3	In/Out	42	SA2	In/Out
3	SA5	In/Out	43	SA4	In/Out
4	SA7	In/Out	44	SA6	In/Out
5	SA9	In/Out	45	SA8	In/Out
6	SA11	In/Out	46	SA10	In/Out
7	SA13	In/Out	47	SA12	In/Out
8	SA15	In/Out	48	SA14	In/Out
9	SA17	In/Out	49	SA16	In/Out
10	SA19	In/Out	50	SA18	In/Out
11	GND	—	51	GND	—
12	SD0	In/Out	52	SD1	In/Out
13	SD2	In/Out	53	SD3	In/Out
14	SD4	In/Out	54	SD5	In/Out
15	SD6	In/Out	55	SD7	In/Out
16	SD8	In/Out	56	SD9	In/Out
17	SD10	In/Out	57	SD11	In/Out
18	SD12	In/Out	58	SD13	In/Out
19	SD14	In/Out	59	SD15	In/Out
20	GND	—	60	GND	—
21	REFRESH	Out	61	SYSCLK	In
22	IOCHRDY	In/Out	62	PDCLK	In/Out
23	VGACS	Out	63	IOCS16	In/Out
24	PWRGOOD	Out	64	CHGLED	Out
25	0WS	Out	65	REFREQ	Out
26	STPCLK	Out	66	SMI	Out
27	HALT	In	67	INTA	In
28	A20GATE	Out	68	DMA8/16	Out
29	LA17	In/Out	69	HLDA	In
30	LA19	In/Out	70	LA18	In/Out
31	LA21	In/Out	71	LA20	In/Out
32	LA23	In/Out	72	LA22	In/Out
33	GND	—	73	GND	—
34	HRQ	Out	74	INTR	Out
35	NMI	Out	75	CPURESET	Out
36	MASTER	Out	76	ERROR	In
37	BALE	In	77	SUSSTAZ	Out
38	LCDPWR	In	78	BATLED	Out
39	FLVAR	Out	79	CONVAR	Out
40	VDD	Out	80	VLCD	Out

CN11

10 - - - - - 6
5 - - - - 1
15 - - - - - 11

(For VGA Monitor)

CN12

1
2

(For DC-IN)

Top View of Main PCB (Lower)

CN4   CN3   CN1

CN11   CN7

CN12   CN9   CN8

CN13   CN5

CN10   CN6

CN2

CN13

4

(For BATTERY PACK)
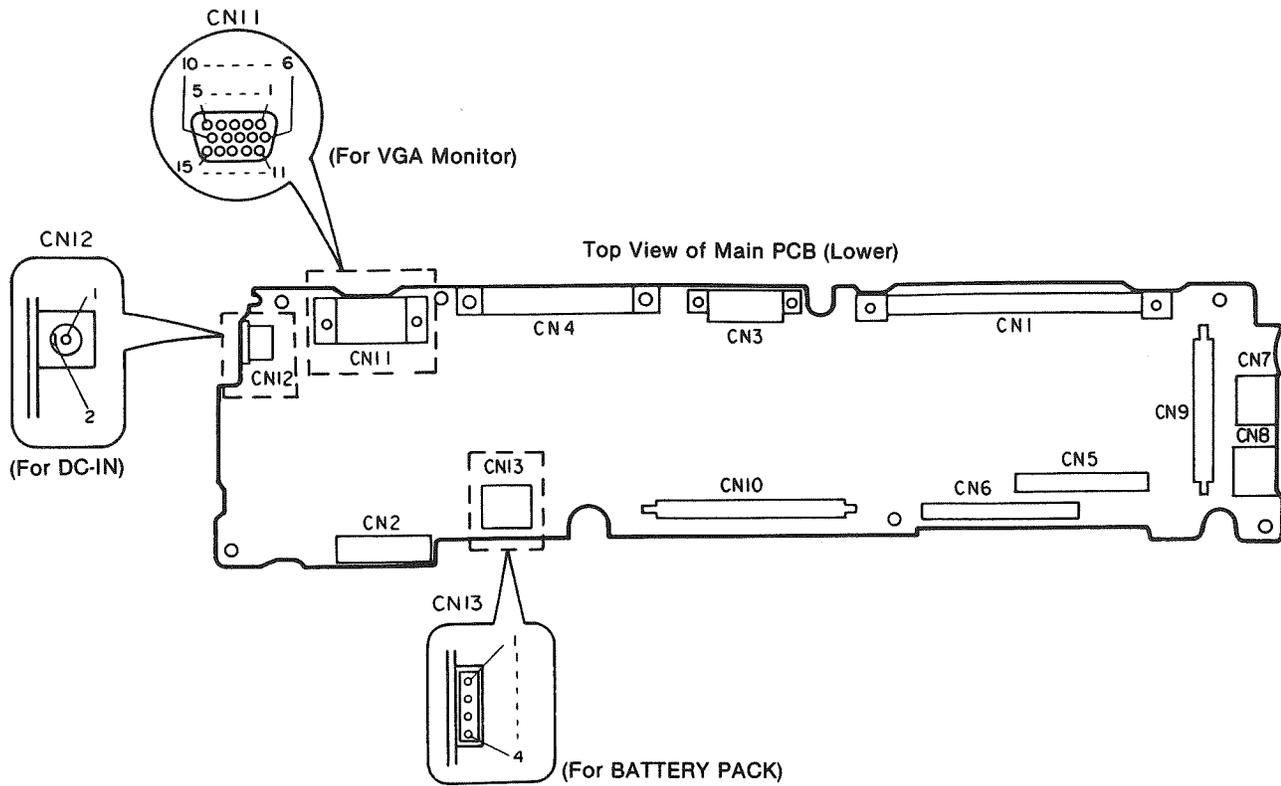
CN11   VGA Monitor Port (15-pin)

Pin No.	Signal Name/ Description	Direction
1	RED	Out
2	GREEN	Out
3	BLUE	Out
4	MS2	—
5	DGND	—
6	RGND	—
7	GGND	—
8	BGND	—
9	NC	—
10	DGND	—
11	MS0	—
12	MS1	—
13	HSD	Out
14	VSD	Out
15	NC	—

CN12   DC-IN (2-pin)

Pin No.	Signal Name/ Description	Direction
1	+23V	In
2	GND	—

CN13   BATTERY PACK Connector (4-pin)

Pin No.	Signal Name/ Description	Direction
1	VSENS	In
2	TSENS	In
3	GND	—
4	ISENS	In

2. Diagnostic Test

2.1 Outline of Diagnostic Test

This diagnostic test program is prepared for the purpose of testing and troubleshooting hardware functions of the computer.
This program is loaded from the disk drive and operates under the management of MS-DOS.
Some tests (i.e. MAIN BOARD, RAM, and FLOPPY DISK DRIVE) can be done in ROM-based test program.

Diagnostic Menu (Main Menu)

This is the menu for the testing procedures (the menu is a list of choices available to you). This menu lists the various components of your computer system that are available for testing.
Each item on the menu is described below. The menu you obtain may differ slightly depending on the devices installed in your computer system.

Note: Refer to items of step **3) Preparation** of **2.4 Diagnostic Test Procedure** on page 2-18 before starting the Diagnaostic Test.

If you choose:

(1) TEST ALL DEVICES

Each device is checked in sequence. Notice that this item is automatically programmed as the default choise. Press the [Enter] key to begin the testing.
Press the [Ctrl] and [Break] keys to stop the testing and return to the DIAGNOSTIC MENU.

(2) TEST AUTOMATICALLY

All the devices will be tested without further input from you. This testing will continue to operate until you press the [Ctrl] and [Break] keys to stop the cycle.

(3) CHANGE MENU

Allows you to add or delete items from the testing menu for the TEST ALL DEVICES or TEST AUTOMATICALLY selection.

(4) EXIT

If you decide that you do not wish to proceed with the diagnostic testing, select this item to reboot.

(5) MAIN BOARD

Tests the Main Board

(6) xxx KB RANDOM ACCESS MEMORY

Tests the base memory and extended memory.
(The number of KB or K-bytes will change depending on the configuration of your system.)

(7) KEYBOARD

Tests the keyboard.

(8) TRACK BALL

Tests the track ball.

(9) BATTERY

Tests the battery pack.

(10) 1 FLOPPY DISK DRIVE(S)

Tests the floppy disk drive connected to the system.

(11) 1 HARD DISK DRIVE(S)

Tests the hard disk drive connected to the system.

(12) VIDEO

Tests the color/monochrome mode display of LCD.
If you have an analog monitor, you can test display.

(13) 1 PARALLEL PORT(S)

Tests the parallel port and external printer connected to the system.

(14) 2 SERIAL PORT(S)

Tests the RS-232C serial port connected to the system.

Making a Selection

There are a number of items shown in the menu that you can choose from.

To select an item from the menu, move the reverse display (the item displayed in reverse video) to the desired item with the <Up-Arrow> key (upward) or <Down-Arrow> key (downward).

At the same time, the number for SELECT MENU at the bottom of the menu will automatically change to match the item.

(You can type the number of the desired option instead of using <Up-Arrow> or <Down-Arrow> key.)

Then press the <Enter> key.

In most cases, you will test the entire system using the first item on the menu (1. TEST ALL DEVICES).

The testing example in this manual will cover the entire testing procedure as contained in the first item.

To run tests on specific devices, see the sections dealing with that test.

If the correct menu has appeared on your screen, proceed to the next procedure.

Terminating the Diagnostic Tests

If during the course of testing you wish to stop the procedure, press the [Ctrl] and [Break] keys.

You may need to finish the specific tests being run, (complete the keyboard testing sequence for example) but at the conclusion of the current test, you will return to the menu.

You must press the [Ctrl] and [Break] keys to stop the automatic testing cycle started with item (2) TEST AUTOMATICALLY.

2.2 Diagnostic Description

1. | **Main Board Test** |

(Start)

(Procedure)

ROM Checksum Diagnostic

Recomputes the checksum of addresses F000:8000H~F000:FFFFH in byte unit. When the checksum is "00", it is OK; if not, NG.

Shut-Down Bytes in RTC
CMOS Reading/Writing Bytes
Diagnostic

Perform the reading and writing test for shut-down bytes in the RTC (Real Time Clock) CMOS. Data to be checked is from FFH to 00H. When reading and writing of all data is performed properly, it is OK; if not, NG.

PIT Counter Reading/Writing
Diagnostic and Counter Test

Checks reading and writing of timer #2 of the PIT (Programmable Interval Timer). Sets the initializing value on the timers #0 and #2, and verifies that counting down is functioning properly after a fixed period of time. Timer #1 will not be checked because it is used as a refresh for the DRAM.

DMA Page Register
Reading/Writing Diagnostic

Checks reading and writing of the DMA page register (I/O=80H~8EH).
Bytes I/O R/W test
Data: 00, FFH~01H
Word I/O R/W test
Data: 5555H, AAAAH, FFFFH, 0000H

DMA Controller
Reading/Writing Diagnostic

Checks reading and writing of the address register of the DMAC #0 and #1 of the word count register of the DMAC #0 and #1.
Data: 5555H, AAAAH, FFFFH, 0000H

Keyboard Controller (80C42)
Diagnostic

Sends the 80C42 self-test command AAH and confirms that the proper code 55H is returned. Sends the 80C42 interface-test command ABH confirms that the proper code 00H is returned.

PIC Reading/Writing
Diagnostic and Interrupt Test

Checks and writing of the #0 and #1 IMRs (Interrupt Mask Register) of the PIC (Programmable Interrupt Controller).   Verifies whether a PIC #0 interrupt test is carried out properly through a TIMER interrupt test.   Verifies whether a PIC #1 interrupt test is carried out properly through an RTC periodical interrupt test.

RTC Diagnostic

Confirms that the timer refreshing bit is properly turned on or off.   Confirms that the data concerning the time is within the proper range.

Gate Array Test

Send 0CH data to SKBE.
This command is to perform SKBE test and get result SKBE count 500 msec by internal clock during the test.
And get result from SKBE and check bit 0 and bit 1.
bit 0: 1   GA Write/Read Error
bit 1: 1   ROM Check Sum Error

END

2.   **RAM Diagnostic**

Start

Data Reading /Writing
Diagnostic

Performs the word reading/writing test usig data patterns AAAAH, 5555H, FFFFH and 0000H.   This applies to loaded addresses from 01000H to 9FFFFH.

Address Line Diagnostic

After clearing 64 K bytes, writes FFH only on 8000H and confirms that there is only FFH.
Follows the same procedure as above for the following addresses:
4000H, 2000H, 1000H, 0800H, 0400H, 0200H, 0100H, 0080H, 0040H, 0020H, 0010H, 0008H, 0004H, 0002H, and 0001H.

Refresh Diagnostic

In order to verify that the refreshing is functioning properly on 1 bank from 10000H, confirms that the data is perfectly stored after waiting for more than 2 seconds.

Data Reading/Writing
Diagnostic

Checks reading and writing of the 1408 KB RAM (on MAIN LOGIC BOARD) and optional RAM cards under the Extended RAM mode.

END

3. ┌─────────────────────────┐
   │ **Keyboard Diagnostic** │
   └─────────────────────────┘

(Start)

│
▼

Keyboard Codes Diagnostic

Press any key to recall a scanning code, which is converted to an ASCII code. Confirms that the ASCII code corresponds to the denotation shown on the top of the pressed key.
The following international character sets are available; USA, Germany, France, Italy, U.K., Spain, Sweden, Swiss (Gr).

│
▼

Keyboard Controller
Diagnostic

Confirms that commands for the keyboard controller are being accepted properly; that is, interrupt will take place after those commands are accepted and proper codes are returned.

│
▼

(END)

4. ┌────────────────────────────┐
   │ **Floppy Disk Diagnostic** │
   └────────────────────────────┘

(Start)

│
▼

FDC (Floppy Disk Controller) Diagnostic

Resets the FDC (initialize the reset bit of the digital output register in the FDC) and the FDC will be ready after a fixed period of time. Resets the FDC and FDD and confirms both of them have been properly initialized (INT 13H, AH=0)

│
▼

FDD (Floppy Disk Drive) Diagnostic

Resets the FDC and FDD.
Performs seeking to the track of the largest number and confirms that seeking has been carried out properly.
Then performs seeking to track No. 0 and confirms that seeking has been carried out properly.

│
▼

FDD Format Diagnostic

Sets the parameters according to the FDD and the media (INT 13H, AH=18H).
Repeats the following procedure on each track from No. 0 to the largest No.; executes formatting of each track and confirms that it has been carried out properly.

│
▼

FDD Reading/Writing Diagnostic

Sets the parameters according to the FDD and the media.
Repeats the following procedure on each track from No. 0 to the largest No.; Writes (INT 13H, AH=03H) and confirms that writing has been carried out properly. READ (INT 13H, AH=02H) and confirms that reading has been carried properly.

│
▼

FDD Sequential Seek Diagnostic

Sets the parameters according to the FDD and the media.
The following procedure on each track from No. 0 to the largest No.; Reads and verifies (INT 13H, AH=04H) and confirms that seeking has been carried out properly. Repeats the following procedure on each track from No. 0 to the largest No.; Reads and compares the result with the data of the reading/writing test to confirm that both values are equal.

│
▼

FDD Random Seek
Diagnostic

Sets the parameters according to the FDD and the media. Selects all tracks at random among tracks from No. 0 to the largest No. and repeats the following procedure on each track; Reads and verifies (INT 13H, AH=04H) and confirms that seeking has been carried out properly.
Selects all tracks at random among tracks from No. 0 to the largest No. and repeats the following procedure; Reads and compares the result with the data of the reading/writing test to confirm that both values are equal.

(END)

5. Hard Disk Diagnostic

(Start)

HDC (Hard Disk Controller)
Diagnostic

Resets the HDC and HDD, and confirms that it has been carried out properly (INT 13H, AH=0H).
Performs the HDC self-test to confirm that the HDC is functioning properly (INT 13H, AH=14H).

HDD (Hard Disk Drive)
Diagnostic

Confirms that the HDD is READY (INT 13H, AH=01H).
Recalibrates the HDD and confirms that the calibration has been carried out properly (INT 13H, AH=11H).
Performs seeking procedure up to the maximum No. cylinder in the HDD and confirms that the seeking has been carried out properly.
At the same time, displays the count value until reception of the seeking procedure finish signal.

HDD Reading/Writing (with
ECC) Diagnostic

Performs the writing test on the cylinder of the largest No. in the HDD and then with the head of the largest No.
Formats one track of the HDD and confirms that the formatting has been carried out properly. Writes one track with ECC (Error Correcting Code) and confirms that writing can be carried out properly.
Reads one track with ECC and confirms that reading can be carried out properly. Confirms that the written data is equal to the read data.

HDD Reading/Writing (with
ECC) Diagnostic (Using Error
Data)

Creates the error data (5 bits-reversed data correctable by ECC).
Writes one sector with ECC and confirms that writing has been carried out properly. Reads one sector with ECC and confirms that reading has been carried out properly (confirms that the generated errors can be corrected by the ECC before reading).

HDD Reading/Writing
Diagnostic

Writes one sector and confirms that writing has been carried out properly.
Reads one sector and confirms that reading has been carried out properly.

Sequential Seek Diagnostic

While seeking cylinders from No. 0 to the largest No., performs the following test; Reads and verifies the heads from No. 0 to the largest No. and confirms that the seeking has been carried out properly.

Random Seek Diagnostic

Selects some cylinders at random and performs the following test on each cylinder; Reads and verifies on heads from No. 0 to the largest No. and confirms that the seeking has been carried out properly.

(END)

6. | Video Diagnostic |

(Start)

Video Controller and Video Memory Diagnostic

Tests the video controller DAGD6410 for the following points; To test the I/O reading and writing of the registers R12~R15 in the controller register, using the original test data remaining on the register and the reversed data. To confirm that the display enable signal has output. To test the reading and writing of the VRAM (memory for video), using the following patterns as test data; AAAAH, 5555H, FFFFH and 0000H.

Color Text Mode Diagnostic (VGA Mode)

Checks the character attributes; displays character on 80×25, 40×25 in text mode.

Color Graphic Mode Diagnostic (VGA Mode)

Checks the color on each display mode (640×200, 640×350, 640×480).

256 Colors on Graphic Mode (VGA Mode)

Displays 256 colors on 320×200 graphic mode.

Character Sets Diagnostic

Displays ASCII character sets and checks them.

One Page Display on Text Mode Diagnostic

Checks each page (0~3) shown on the 80×25 display.

Color on Graphic Mode Diagnostic

Displays each color on the graphic mode and checks them. The difference of the color is indicated by gray shades on the display.

Graphic Mode Diagnostic

Displays rectangles and circles to verify that the 640×200 graphic mode display is correct.

Mono on Text Mode Diagnostic

Displays each mono on text mode and checks them. The difference of each text is indicated by "Normal", "Reverse", "Intensity", "Underline" and "Blink" or their complexes.

Mono on Graphic Mode Diagnostic

Displays each mono on graphic mode and checks them.
The difference of each graphic is indicated by "White", "Int. White", "Blink" and "White".

(END)

7. | Parallel Port Diagnostic |

(Start)

↓

Printer Initialization
Diagnostic and Output to
Printer Test
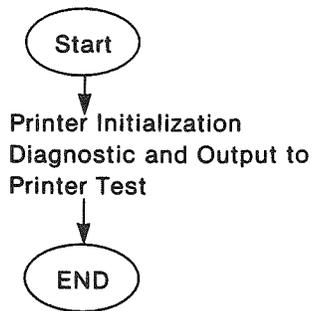
Confirms that the printer I/O ports have been set.   Resets printer and confirms that the initialization has been carried out properly.   Executes printing and confirms that it has been carried out properly.

↓

(END)

8. | Serial Port Test |

(Start)

↓

Reading/Writing to Serial
Port Diagnostic
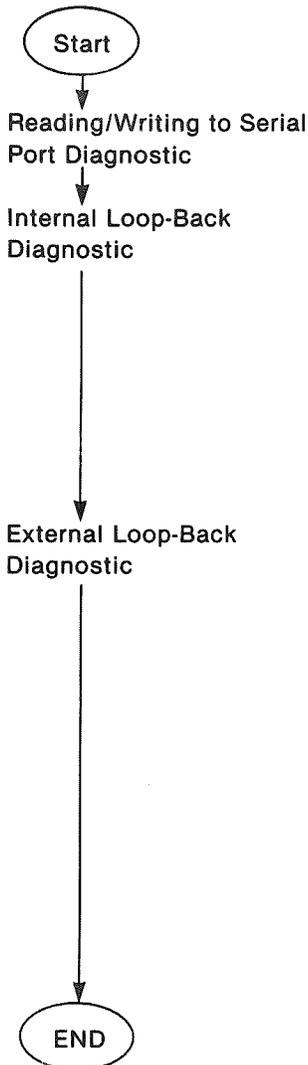
Performs the reading and writing test for the interrupt register and divider register and checks whether the setting is carried out properly.

↓

Internal Loop-Back
Diagnostic

Performs the internal loop-back test in the following procedures;
* Sets the transferring rate (9600 bps)
* Sets the transferring system (8 bit, even parity, parity check and 2 stop bit).
* Sets the loop-back mode.
* Transmits the data.
* Ready to receive the data?
* No error generated in the received data?
* Is the received data equal to the transmitted data?

Loops the data that is to be transmitted 256 times and then checks it.

↓

External Loop-Back
Diagnostic

Performs the external loop-back test in the following procedures;
* Sets the mode controlling register.
  RTS ON (Request To Send)
  DTR ON (Data Terminal Ready)
* Confirms that following responses will be returned.
  RTS outputs ON signal ⇨ RLSD (CD) and CTS receive ON signal
  DTR outputs ON signal ⇨ DSR and RI receive ON signal

Rewrites the INT CH vector and confirms that interrupts from the next serial port will be adequately generated.
1. Checks that no line status interrupts, frame error, parity error nor overrun error have occurred.
2. Checks whether it is ready for receiving data interrupts and confirms that the transmitted data is equal to the received one.
3. Checks the transmitting interrupts register and transmitting register are empty.

↓

(END)

9. **Track Ball Test**

Start
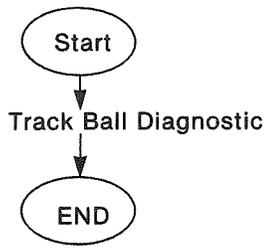
Track Ball Diagnostic   Get the track ball status and outputs this status to display.

END

10. **Battery Test**

Start
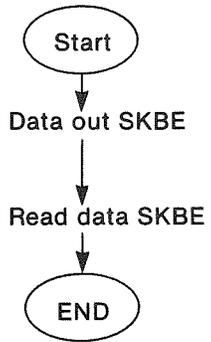
Data out SKBE   Send 0C1H data to SKBE to get 1 byte result data from SKBE and check the result
                               data.

Read data SKBE

END

2.3 Error messages

This section describes diagnostic messages:

Power-On Self Test messages and User Diagnostic messages.

Power-On Self Test Messages

Power-On Self Test and boot messages are displayed during the power-on process. There are two types of messages:

- Error messages that indicate a failure with either the hardware, software or firmware.
- Informational messages that provide important information about the power-on and boot processes, such as memory status.

However, sometimes the above messages cannot be reported on the screen.
In such cases, Beep codes are used to identify an error in the Power-On Self Test that occurs when the screen is not available.

Refer to the following lists of error messages, informational messages, and Beep codes.

Resume Function Error Messages in the Power-On Self Test

BIOS should display an error message when resuming has failed in the following three ways.

- Resume failure
  When BIOS detects resuming has failed due to an error at failing into suspended. Example: BIOS didn't get the correct IRQ5.

- Resume memory backup failure
  When BIOS detects resuming has failed due to an error at resuming. Example: DRAM checksum is bad.

Error Messages in the Power-On Self Test

Diskette Seek to track 0 failed
> Drive A has either failed or is missing.

Diskette drive reset failed
> FDC (Floppy Disk Controller) has failed.

Diskette read failure...strike F1 to retry boot
> Disk is either not formatted or defective.

Gate A20 failure
> Protected mode cannot be enabled.

Hard disk controller failure
> HDC (Hard Disk Controller) has failed.

Hard disk failure
> Hard disk has failed.

Hard disk read failure...strike F1 to retry boot
> Hard disk is defective.

Invalid configuration information...please run SETUP program
> User should run SETUP480 utility first.

Keyboard clock line failure
> Keyboard is defective.

Keyboard data line failure
> Keyboard is defective.

Keyboard controller failure
> Keyboard controller firmware has failed.

Keyboard stuck key failure
> A key(s) is(are) jammed.

Memory address line failure at xxxxxxx, read xxxxxxx expecting xxxxxxx
> Circuitry associated with the memory chips has failed.

Memory data line failure at xxxxxxx, read xxxxxxx
> One of the memory chips or associated circuitry has failed.

Memory high address line failure at xxxxxxx-xxxxxxx
> Circuitry associated with the memory chips has failed.

Memory odd/even failure at xxxxxxx, read xxxxxxx expecting xxxxxxx
> Circuitry associated with the memory chips has failed.

Memory write/read failure at xxxxxxx, read xxxxxxx expecting xxxxxxx
> One of the memory chips or associated circuitry has failed.

No boot device available...strike F1 to retry boot
> Either floppy disk drive A, hard disk, or floppy disk itself is defective.

No boot selector on hard disk...strike F1 to retry boot
> Drive C is not formatted.

No time tick interrupt
> Timer chip has failed.

Not a boot diskette...strike F1 to retry boot
> Floppy disk in drive A is not formatted as a bootable disk.

Shutdown failure
> Keyboard controller or its associated logic has failed.

Time-of-day clock stopped
> CMOS real-time clock chips have failed.

Time chip counter 2 failed
> Timer chip counter has failed.

Timer or Interrupt Controller bad
> Either timer chip or interrupt controller is defective.

Unexpected interrupt in protected mode
> Non-maskable interrupt (NMI) port can't be disabled.

Informational Messages in the Power-On Self Test

MEMORY SIZE=xxxx KB
> This amount of memory has been tested successfully.

Decreasing available memory
> Memory chips are failing.
> Followed by any memory error messages.

Memory tests terminated by keystroke
> Memory tests stopped by your hitting the <spacebar> while the memory tests were running.

Strike the F1 key to continue
> An error was found during Power-On Self Test. Attempt to boot the system hitting the F1 key.

Beep Codes

The beep codes that aren't followed by any error messages and are written to Port 80H for fatal system board errors, are listed.

Note: Beep codes on the left column in the list below indicate the pattern of beep code bursts (e.g., 1-1-3 is one beep, followed by another beep, followed by a burst of three beeps.)

none	CPU register test in progress
1-1-3	CMOS write/read failure
1-1-4	ROM BIOS checksum failure
1-2-1	Programmable interval Timer failure
1-2-2	DMA initialization failure
1-2-3	DMA page register write/read failure
1-3-1	RAM refresh verification failure
none	1st 64K RAM test in progress
1-3-3	1st 64K RAM chip or data line failure multi-bit
1-3-4	1st 64K RAM odd/even logic failure
1-4-1	Address line failure 1st 64K RAM
1-4-2	Parity failure 1st 64K RAM
2-1-1	Bit 0 1st 64K RAM failure
2-1-2	Bit 1 1st 64K RAM failure
2-1-3	Bit 2 1st 64K RAM failure
2-1-4	Bit 3 1st 64K RAM failure
2-2-1	Bit 4 1st 64K RAM failure
2-2-2	Bit 5 1st 64K RAM failure
2-2-3	Bit 6 1st 64K RAM failure
2-2-4	Bit 7 1st 64K RAM failure
2-3-1	Bit 8 1st 64K RAM failure
2-3-2	Bit 9 1st 64K RAM failure
2-3-3	Bit A 1st 64K RAM failure
2-3-4	Bit B 1st 64K RAM failure
2-4-1	Bit C 1st 64K RAM failure
2-4-2	Bit D 1st 64K RAM failure
2-4-3	Bit E 1st 64K RAM failure
2-4-4	Bit F 1st 64K RAM failure
3-1-1	Slave DMA register failure
3-1-2	Master DMA register failure
3-1-3	Master interrupt mask register failure
3-1-4	Slave interrupt mask register failure
none	Interrupt vector loading in progress
3-2-4	Keyboard controller test failure
none	CMOS power failure and checksum calculation in progress
none	CMOS config inform validation in progress
3-3-4	Screen memory test failure
3-4-1	Screen initialization failure
3-4-2	Screen retrace test failure
none	Search for video ROM in progress
none	Screen believed operable
none	Screen believed running with video ROM
none	Monochrome monitor believed operable
none	Color monitor (40 column) believed operable
none	Color monitor (80 column) believed operable
Note:	No beep code is sounded if a test is aborted while in progress.

User Diagnostic Messages

Various messages or error messages that may appear in User Diagnostics are below.

You may find also a code number in the message. By looking up the code number in the code table, the detailed status of a device can be determined.

Example: In a message of the printer port test like:
PPA Time out error occurred with parallel printer
> BIOS status: n1n2
> Character: n3n4

A hexadecimal nibble in the message consists of the following 4 bits:
> n=D3 D2 D1 D0

For example, if n1=5, a hexadecimal 5 is expressed as 0101 in binary codes, then D3=0, D2=1, D1=0, D0=1
Also,
> n1=D (1101) then D3=1, D2=1, D1=0, D0=1

Look up the number in the code table and clarify the problem.

Main Board Test

(1) System ROM checksum test
   ROM   System ROM checksum error
                           Checksum: xx

(2) CMOS RAM shutdown byte r/w test
   CRAM   Shutdown byte test failed.
                           Write data: xxxx   Read data: xxxx

(3) Programmable interrupt timer test
   PIT   Timer #2 counter r/w failed.
                           Write data: xx   Read data: xx
   PIT   Timer count failed.
                           High count value expected: 00 current data: xx

(4) Page register r/w test
   PREG   Page register r/w test failed.   (byte) xx Read data: xx
   PREG   Page register r/w test failed.   (word) xx Read data: xx

(5) DMA controller register r/w test
   DMAC   DMA controller register r/w test failed.
                           I/O address: xxxx   Write data: xxxx   Read data: xxxx

(6) Keyboard controller test
   KBCTRL   Keyboard controller input buffer full.
   KBCTRL   Keyboard line always low. (clock)
   KBCTRL   Keyboard line always high. (clock)
   KBCTRL   Keyboard line always low. (data)
   KBCTRL   Keyboard line always high. (data)
   KBCTRL   Keyboard controller output buffer empty.
   KBCTRL   Keyboard controller self test failed.
                           Return code: xx

(7) Programmable interrupt controller test
   PIC   PIC #0 interrupt mask register failed.
                           Write data: xx   Read data: xx
   PIC   PIC #1 interrupt mask register failed.
                           Write data: xx   Read data: xx
   PIC   PIC #0 handling error
                           ISR status: xx
   PIC   PIC #1 handling error
                           ISR status: xx
   PIC   PIC #0 no interrupt occurred.
   PIC   PIC #1 no interrupt occurred.

(8) Realtime clock test
   RTC   Realtime clock UIP bit always ON.
   RTC   Realtime clock UIP bit always OFF.
   RTC   Realtime clock data out of range.
                           (Second data: ss)
                           (Minute data: mm)
                           (Hour data: hh)
                           (Date data: dd)
                           (Month data: mm)
                           (Year data: yyyy)

(9) GATE Array test
   Gate Array write/read Test Error.
   SKBE ROM check sum Error.

RAM Test

(1) DRAM read/write test
    DRAM   R/W test failed.
                         Address: xxxxxx   Write Data: xxxx   Read Data: xxxx

(2) DRAM refresh test
    DRAM   Refresh test failed
                         Address: xxxxxx   Read Data: xx

(3) DRAM address test
    DRAM   Address test failed
                         Address: xxxxxx   Read Data: xx

(4) Extended RAM test
    EXTENDED RAM   Unsuccessful to enter Protect Mode.
    EXTENDED RAM   R/W test failed.
                         Address: xxxxxx   Write Data: xxxx   Read Data: xxxx
    EXTENDED RAM   Address Line test failed.
                         Address Line: xxxxxx, xxxxxx
    EXTENDED RAM   Refresh test failed.

Keyboard Test

(1) Keyboard reset test
    KEY   Keyboard failed.
(2) Keyboard data test
    KEY   Key has been hit or broken.
                      SCAN CODE: xx

Floppy Disk Drive Test

FDC   FDC failed.
                           Master status: n1n2
                           Floppy Disk Controller (FDC) master status has failed.
                           Data bus or FDC chip has failed.
                           n1n2 is FDC master status listed below.

FDC master status

Nibble	Bit	Meaning
n1	D3	1: FDC data register is ready to receive and transmit data
	D2	1: Transmit data from FDC to processor
	D1	1: Transmit in non-DMA mode
	D0	1: FDC is busy
n2	D3	———
	D2	———
	D1	1: Seek in drive B
	D0	1: Seek in drive A

FDC   Init. failed BIOS status: xx
                           Floppy Disk Controller (FDC) initialization has failed.
                           Data bus or FDC chips have failed.
                           xx is BIOS disk error status below.

BIOS disk error status

Status	Meaning
80	Time out
40	Seek out
20	FDC failed
10	CRC error
09	DMA boundary
08	DMA overrun
03	Media change line active
06	No record
04	Write protected
02	No address mark
01	Invalid command

FDC   Seek failed (max track)
        Seek has failed.
        Floppy Disk Controller (FDC) cable or FDC chip has failed.

FDC   Seek failed (0 track)
        Seek has failed.
        Floppy Disk Controller (FDC) cable or FDC chip has failed.

When an error occurs during format, verify, write and read tests for FDD, it is displayed with the following format and combination of command and error names:

(Format of Error Massage)

[Command Name] failed: [Error Name] Cylinder=xx Head=xx Sector=xx

Command Name: Read   Error Name: HDC not found (FFH)
      Write   Bad err register (E0H)
      Verify   Write fault (CCH)
      Format   Undefined error (BBH)
      Read long   Drive not ready (AAH)
      Write long   Timeout (80H)
      Command   Seek error (40H)
                         FDC or HDC error (20H)
                         Data corrected (11H)
                         CRC or ECC error (10H)
                         Bad track (0BH)
                         Bad sector mark (0AH)
                         64K boundary (09H)
                         DMA overrun (08H)
                         Parameter error (07H)
                         Reset error (05H)
                         Nor record (04H)
                         Write protected (03H)
                         No address mark (02H)
                         Invalid command (01H)

When there is a difference between write data and read data, the following error message is displayed:

   Compare error Cylinder=xx Head=xx Sector=xx

Serial Port Test

(1) Register test
RS232   Serial port failed.
                     Interrupt ID Write: xx   Read: xx
RS232   Serial port failed.
                     Divisor Write: xxxx   Read: xxxx

(2) internal loopback
RS232   Serial port data loopback failed.
                     Line & Modem status: n_1n_2, n_3n_4
                     $n_1n_2n_3n_4$: Refer to the tables of loopback line status and loopback modem status below.
RS232   Serial port data loopback failed.
                     Xmit: xx   Recv: xx
RS232   Serial port signal loopback failed.
                     Modem status: n_3n_4 Expected: $n_3'n_4'$
                     n_3n_4: result by test.   Refer to the table of modem status below.
                     $n_3'n_4'$: expected status

(3) External loopback
RS232   Serial port signal real loopback test failed.
                     Modem status: n_3n_4 Expected: $n_3'n_4'$
                     n_3n_4: Refer to the table of modem status below.
RS232   Serial port data real loopback test failed.
                     Line status: n_1n_2
                     n_1n_2: Refer to the table of line status below.
RS232   Serial port data real loopback test failed.
                     Xmit: xx   Recv: xx
RS232   Data real loopback transmit failed.
                     Line status: n_1n_2
                     n_1n_2: Refer to the table of line status below.
RS232   Data real loopback interrupt request failed.
                     Line status: n_1n_2
                     n_1n_2: Refer to the table of line status below.
RS232   Data real loopback receive failed.
                     Line status: n_1n_2
                     n_1n_2: Refer to the table of line status below.

Loopback line status

Nibble	Bit	Meaning
n_1	D3	1: Timing out
	D2	1: Transmit shift register
	D1	1: Transmit-holding register is empty
	D0	1: Break detect
n_2	D3	1: Framing error
	D2	1: Parity error
	D1	1: Overrun error
	D0	1: Data ready

Loopback modem status

Nibble	Bit	Meaning
n3	D3 D2 D1 D0	1: Carrier detect (CD) 1: Ring indicator (RING) 1: Data set ready (DSR) 1: Clear to send (CTS)
n4	D3 D2 D1 D0	——— ——— ——— ———

Printer Port Test

PPA   Time out error occurred with parallel printer
           BIOS status: n1n2   Character: xx

PPA   I/O error occurred with parallel printer.
           BIOS status: n1n2   Character: xx

PPA   Paper end occurred with parallel printer
           BIOS status: n1n2
           Character: xx
           n1n2 is a printer BIOS error status listed below.
           xx is the character sent to the printer.

Printer BIOS error status

Nibble	Bit	Meaning
n1	D3 D2 D1 D0	0: Busy 1: Acknowledge 1: Paper end 1: Printer is selected
n2	D3 D0	1: I/O error 1: Time out

Hard Disk Drive Test

- HDC RESET TEST
    HDC reset failed.
- HDC DIAGNOSTICS TEST
    HDC internal diagnostic failed.
- HDD SET PARAMETER TEST
    HDD set drive parameter failed.
    BIOS status: xx   HDC status: xx   HDC error status: xx
- HDD DRIVE READYT TEST
    HDD drive not ready.
    BIOS status: xx   HDC status: xx   HDC error status: xx
- HDD RECALIBRATE TEST
    HDD recalibrate failed.
    BIOS status: xx   HDC status: xx   HDC error status: xx
- HDD SEEK TEST
    HDD seek failed.
    BIOS status: xx   HDC status: xx   HDC error status: xx
- HDD SEEK TIME TEST
    HDD seek does not complete within some period.
    BIOS status: xx   HDC status: xx   HDC error status: xx

Get parameter error — Can not execute test program!
    BIOS status: xx   HDC status: xx   HDC error status: xx

Note: See the following tables for the status represented by xx, n1n2 and n3n4.

BIOS error status

Status	Meaning
FF	Sense status failed
E0	Bad error register
CC	Write fault
BB	Undefined error
AA	Drive not ready
80	Time out
40	Seek error
20	Controller failed
11	ECC corrected data error
0B	Bad track
09	DMA boundary
08	DMA overrun
07	Drive parameter error
05	Reset failed
04	No record
03	Write protected
02	No address mark
01	Invalid command

HDC status

Nibble	Bit	Meaning
n1	D3	1: HDC is busy
	D2	1: HD is ready
	D1	1: Write fault signal from HD
	D0	1: Seek is completed
n2	D3	1: HDC requests to transmit data
	D2	1: ECC corrected data
	D1	1: Index pulse signal
	D0	1: Error found in executed instructions

HDC error status

Nibble	Bit	Meaning
n3	D3	1: Back block
	D2	1: Non-correctable ECC error
	D1	1: ———
	D0	1: Selector not found
n4	D3	1: ———
	D2	1: HD not ready
	D1	1: No track 00 signal
	D0	1: No address mark

When an error occurs during format, write long, read long, write and read tests for HDD, it is displayed with the following format and combination of command and error names:

(Format of Error Massage)

[Command Name] failed: [Error Name] Cylinder=xx   Head=xx   Sector=xx

Command Name: Please refer to the FDD section on page 2-13.
Error Name: Please refer to the FDD section on page 2-13.

Battery Test

Battery abnormal high voltage
Battery charging current overflow
Battery temperature > 100°C
Battery temperature < −22°C and voltage > 3.3 V
Battery Status error

2.4 Diagnostic Test Procedure

1) Equipment
Required

   (1) Test Laptop Computer .... 1 unit
   (2) AC Adapter .... 1 pc.
   (3) External Printer .... 1 unit
   (4) Loopback Plug (Serial Port Test for RS232C) [P/N: DFWV95C0067] .... 1 pc.
   (5) Loopback Cable (Serial Port Test for MODEM) [P/N: DFWV95C0068] .... 1 pc.
   (6) Installation Disk 1 .... 1 pc.

2) Equipment Connection
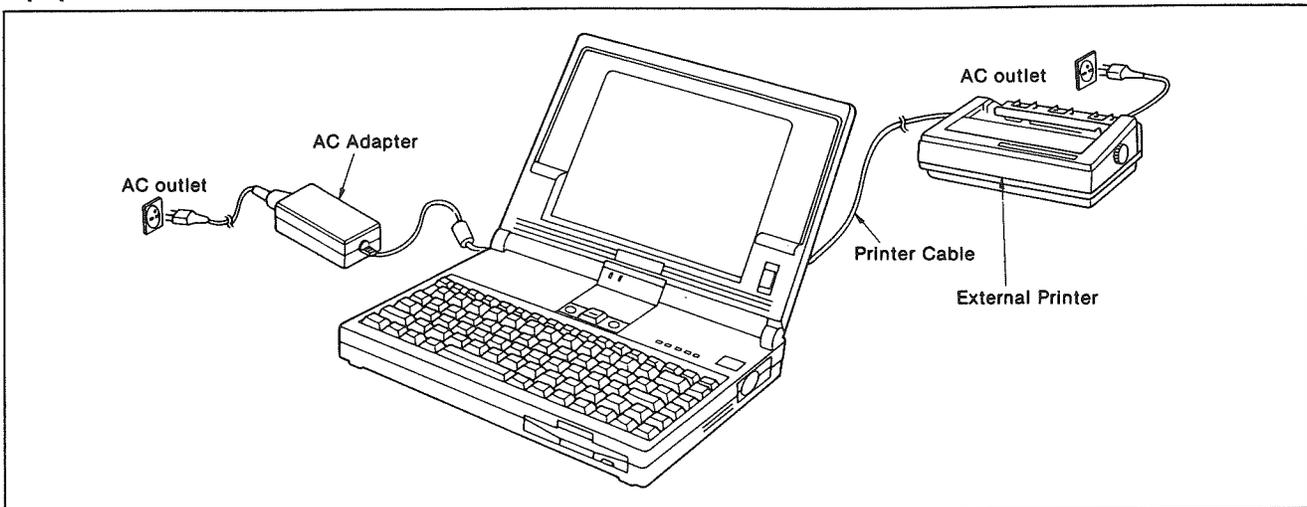
3) Preparation

(1) Be sure connections are made as shown above.

(2) Run the Setup383/Set1660 program and set all parameters to the factory settings to ensure that menu items are properly displayed.

(3) Run the Power383/Powr1660 program and enable the serial ports.

(4) Temporarily rename the CONFIG.SYS file and reboot the computer before you start the diagnostics test.

(5) Remove any optional modem.

(6) Connect the Loopback Plug and Loopback Cable as shown below.

---WARNING---

Do not connect or disconnect the Loopback Cable into/from the modem socket when the power switch of the computer is ON.
Otherwise, the internal fuse could be blown.
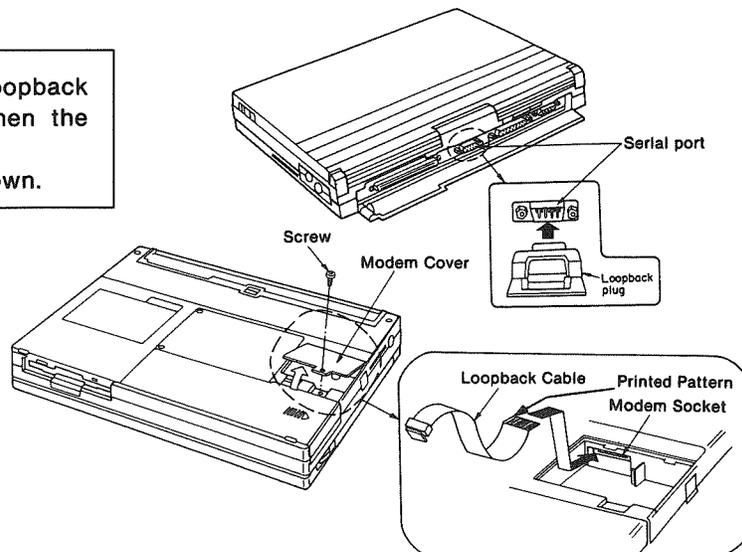
4) Test Procedure

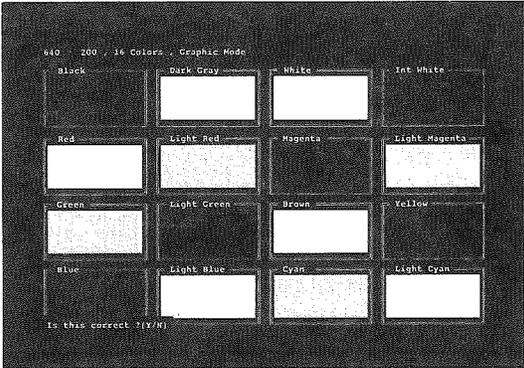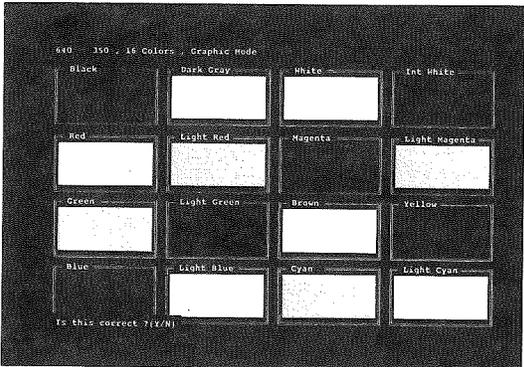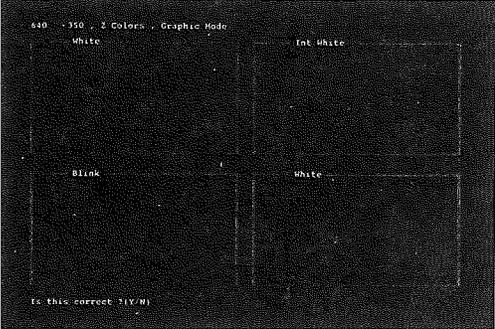| Step	Test Procedure	Screen Displays:	Criteria	Remarks
1	Insert the Installation Disk 1 into Drive [A]			
2	Turn on the main power switch of the computer. Then press the reset button of the computer.	Phoenix View/LC (TM) VGA-Compatible BIOS Version xx Ref. x x Copyright (C) 1984 – 1991 Phoenix Technologies Ltd. All Right Reserved Phoenix 80386 ROM BIOS PLUS Version xxxx Copyright (C) 1985 – 1990 Phoenix Technologies Ltd. All right Reserved 640K Base Memory, xxxx K Extended Strike the F1 key to continue SuperStor Data Compression Driver Version x.xx,xx-xx-xx Copyright (C) AddStor Inc. 1991, 1992, All rights reserved. SuperStor fixed drive C: mounted as drive D: Drive C and D swapped	Note: Preess [F1] key, when the following message is displayed. "Resume failure Strike the F1 key to continue" Note: When "Enter password:" is displayed, press [M] [S][J][C][K][L][4] ‹Enter› keys. (Refer to the CAUTION described below.)	
3		** * Your hard disk has been already installed. * * Type INSTALL and press Enter to re-installed. * ** A >	┌CAUTION:──────── The password described above is the master-password which is prepared for servicing purposes only. Thus, do not use it for other than the above purposes and handle it confidentially. Entering the master-password enables to delete the previous password and disable the system password. However, the master-password will not be registered.	
4	Press [D][I][A][G] [3][8][3] or [1][6][6][0]	A > DIAG383/DIAG1660		
5	Press [Enter] key.	Do you want printed output? (Y/N) _		
6	Press [Y] (for "Yes") if you want printed output, otherwise press [N] key.	DIAGNOSTIC MENU (Ver. x.xx) 　1. TEST ALL DEVICES (■ DEVICES) 　2. TEST AUTOMATICALLY (■ DEVICES) 　3. CHANGE MENU 　4. EXIT ■　5. MAIN BOARD ■　6. xxxx KB RANDOM ACCESS MEMORY ■　7. KEYBOARD 　8. TRACK BALL 　9. BATTERY ■ 10. 1 FLOPPY DISK DRIVE (S) ■ 11. 1 HARD DISK DRIVE (S) ■ 12. VIDEO 　13. 1 PARALLEL PORT (S) ■ 14. 2 SERIAL PORT (S) SELECT MENU : 1		
7	Press [Enter] key.	MAIN BOARD TEST -- BASE RAM TEST 　CURRENT BASE RAM SIZE = 640KB Base RAM = 640KB Check OK -- EXTENDED RAM TEST 　CURRENT EXTENDED RAM SIZE = xxx KB Extended RAM = xxx KB Check OK KEYBOARD RETURN CODE TEST FLOPPY DISK CONTROLLER TEST 1st FLOPPY DISK DRIVE (1.44MFD) TEST -- HARD DISK CONTROLLER TEST 1st HDD-DRIVE TEST Count value to get SEEK COMPLETE=0 1st HDD-SEQUENTIAL SEEK TEST Cylinder=xxx 1st HDD-RANDOM SEEK TEST Cylinder=xxx		

Step	Test Procedure	Screen Displays:	Criteria	Remarks
8		40 x 25 , 16 Colors , Text Mode VGA Test Pattern 40 x 25 16 Color (×16 arrangement) Is this correct ? (Y/N)		
9	Press Y key.	80 x 25 , 16 Colors , Text Mode Black / Dark Gray / White / Int White Red / Light Red / Magenta / Light Magenta Green / Light Green / Brown / Yellow Blue / Light Blue / Cyan / Light Cyan VGA Test Pattern 80x25, 16 Colors Is this correct ? (Y/N)		
10	Press Y key.	640 200 , 16 Colors , Graphic Mode Black / Dark Gray / White / Int White Red / Light Red / Magenta / Light Magenta Green / Light Green / Brown / Yellow Blue / Light Blue / Cyan / Light Cyan Is this correct ?(Y/N)		
11	Press Y key.	640 350 , 16 Colors , Graphic Mode Black / Dark Gray / White / Int White Red / Light Red / Magenta / Light Magenta Green / Light Green / Brown / Yellow Blue / Light Blue / Cyan / Light Cyan Is this correct ?(Y/N)		

Step	Test procedure	Screen Displays:	Criteria	Remarks
12	Press Y key.			
13	Press Y key.			
14	Press Y key.	CHARACTER SET TEST Is this correct ?(Y/N)		
15	Press Y key.	PAGE 0 DISPLAY TEST Is this correct ? (Y/N)		
16	Press Y key.	PAGE 1 DISPLAY TEST Is this correct ? (Y/N)		

Step	Test Procedure	Screen Displays:	Criteria	Remarks
17	Press Ⓨ key.	PAGE 2 DISPLAY TEST 2222222222... Is this correct ? (Y/N)		
18	Press Ⓨ key.	PAGE 3 DISPLAY TEST 3333333333... Is this correct ? (Y/N)		
19	Press Ⓨ key.	320 X 200 MODE COLOR-SET 0 TEST Is this correct ?(Y/N)		
20	Press Ⓨ key.	320 X 200 MODE COLOR-SET 1 TEST Is this correct ?(Y/N)		
21	Press Ⓨ key.	640 X 200 MODE TEST Is this correct ?(Y/N)		

Step	Test Procedure	Screen Displays:	Criteria	Criteria
22	Press Y key.	80 x 25 , 2 Colors , Text Mode VGA Test Pattern / 80x25, 2 Colors Normal VGA Test Pattern / 80x25, 2 Colors Reverse VGA Test Pattern / 80x25, 2 Colors Intensity VGA Test Pattern / 80x25, 2 Colors Underline VGA Test Pattern / 80x25, 2 Colors Blink VGA Test Pattern / 80x25, 2 Colors Intensity & Underline VGA Test Pattern / 80x25, 2 Colors Underline & Blink VGA Test Pattern / 80x25, 2 Colors Intensity & Blink VGA Test Pattern / 80x25, 2 Colors Reverse & Intensity VGA Test Pattern / 80x25, 2 Colors Reverse & Blink VGA Test Pattern / 80x25, 2 Colors Reverse & Intensity & Blink Is this correct ? (Y/N)		
23	Press Y key.	640 x 350 , 2 Colors , Graphic Mode White Int White Blink White Is this correct ?(Y/N)		
24	Press Y key.	1st serial port test (I/O address 3F8H) .... 1st serial port test (I/O address 3F8H) 2nd serial port test (I/O address 2F8H) 2nd serial port test (I/O address 2F8H) Test done!! Hit any key when ready_		
25	Press any key.	DIAGNOSTIC MENU (Ver. x.xx) 1. TEST ALL DEVICES (▮ DEVICES) 2. TEST AUTOMATICALLY (▮ DEVICES) 3. CHANGE MENU 4. EXIT ▮ 5. MAIN BOARD ▮ 6. xxxx KB RANDOM ACCESS MEMORY ▮ 7. KEYBOARD 8. TRACK BALL 9. BATTERY ▮ 10. 1 FLOPPY DISK DRIVE (S) ▮ 11. 1 HARD DISK DRIVE (S) ▮ 12. VIDEO 13. 1 PARALLEL PORT (S) ▮ 14. 2 SERIAL PORT (S) SELECT MENU : 1		
26	Press 7 keys and Enter kys.	KEYBOARD 1. TEST ALL DEVICES (▮ DEVICES) 2. TEST AUTOMATICALLY (▮ DEVICES) 3. CHANGE MENU 4. EXIT 5. PRESS KEY TEST ▮ 6. SCAN CODE RETURN TEST SELECT MENU: 1		

Step	Test Procedure	Screen Displays:	Criteria	Remarks
27	Press ⑤ and Enter keys.	PRESS KEY TEST **1. TEST ALL DEVICES (▮ DEVICES)** 　2. TEST AUTOMATICALLY (▮ DEVICES) 　3. CHANGE MENU 　4. EXIT 　5. U.S.A. 　6. GERMANY 　7. FRANCE 　8. ITALY 　9. U.K. 　10. SPAIN 　11. SWEDEN 　12. SWISS (Gr) SELECT MENU: 1		
28	Press ⑤ * and Enter keys. *Note: Press appropriate number according to the keyboard layout.	KEYBOARD TEST 　Press each key for character replacement ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ 　▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ 　▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ 　▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ 　▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ 　▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ ▮ If correct, press "Y" and "ENTER" If not correct, press "N" and "ENTER"		
29	Press all keys for keyboard test. Then press Ⓨ and Enter keys.	KEYBOARD TEST 　Press each key for character replacement 　e 1 2 3 4 5 6 7 8 9 0 1 2 n p s p 　　1 2 3 4 5 6 7 8 9 0 - = ← h 　↔ Q W E R T Y U I O P [ ] \ u 　　c A S D F G H J K L ; ' e d 　　s Z X C V B N M , . / s ↑ e 　　c .a s ' i d ← ↓ → If correct, press "Y" and "ENTER" If not correct, press "N" and "ENTER" Keyboard is OK Hit any key when ready_		
30	Press any key.	PRESS KEY TEST 　1. TEST ALL DEVICES (▮ DEVICES) 　2. TEST AUTOMATICALLY (▮ DEVICES) 　3. CHANGE MENU 　4. EXIT 　**5. U.S.A.** 　6. GERMANY 　7. FRANCE 　8. ITALY 　9. U.K. 　10. SPAIN 　11. SWEDEN 　12. SWISS (Gr) SELECT MENU: 5		
31	Press ④ and Enter keys.	KEYBOARD 　1. TEST ALL DEVICES (▮ DEVICES) 　2. TEST AUTOMATICALLY (▮ DEVICES) 　3. CHANGE MENU 　4. EXIT 　**5. PRESS KEY TEST** ▮　6. SCAN CODE RETURN TEST SELECT MENU: 5		

Step	Test Procedure	Screen Displays:	Criteria	Remarks
32	Press 4 and Enter keys.	DIAGNOSTIC MENU (Ver. x.xx) 1. TEST ALL DEVICES (■ DEVICES) 2. TEST AUTOMATICALLY (■ DEVICES) 3. CHANGE MENU 4. EXIT ■ 5. MAIN BOARD ■ 6. xxxx KB RANDOM ACCESS MEMORY ■ 7. KEYBOARD 8. TRACK BALL 9. BATTERY ■ 10. 1 FLOPPY DISK DRIVE (S) ■ 11. 1 HARD DISK DRIVE (S) ■ 12. VIDEO 13. 1 PARALLEL PORT (S) ■ 14. 2 SERIAL PORT (S) SELECT MENU : 7		
33	Press 1 3 keys and Enter kys.	1st Parallel port test (I/O address 378H) Connect printer Hit any key when ready_		
34	Press any key.	Test done!! Hit any key when ready_ Printing Sample 1st Parallel port test (I/O address 378H) !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmno !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnop "#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopq #$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqr $%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrs %&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrst &'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu '()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuv ()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvw )*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwx		
35	Press any key.	DIAGNOSTIC MENU (Ver. x.xx) 1. TEST ALL DEVICES (■ DEVICES) 2. TEST AUTOMATICALLY (■ DEVICES) 3. CHANGE MENU 4. EXIT ■ 5. MAIN BOARD ■ 6. xxxx KB RANDOM ACCESS MEMORY ■ 7. KEYBOARD 8. TRACK BALL 9. BATTERY ■ 10. 1 FLOPPY DISK DRIVE (S) ■ 11. 1 HARD DISK DRIVE (S) ■ 12. VIDEO 13. 1 PARALLEL PORT (S) ■ 14. 2 SERIAL PORT (S) SELECT MENU : 13		
36	Press 1 4 keys and Enter kys.	2 SERIAL PORT (S) 1. TEST ALL DEVICES (■ DEVICES) 2. TEST AUTOMATICALLY (■ DEVICES) 3. CHANGE MENU 4. EXIT ■ 5. 1st SERIAL PORT TEST ■ 6. 2nd SERIAL PORT TEST SELECT MENU: 1		

Step	Test Procedure	Screen Displays:	Criteria	Remarks
37	Press 5 and Enter keys.	1 SERIAL PORT TEST 　1. TEST ALL DEVICES (■ DEVICES) 　2. TEST AUTOMATICALLY (■ DEVICES) 　3. CHANGE MENU 　4. EXIT ■ 5. RS232C CONTROLLER REGISTER R/W TEST ■ 6. INTERNAL LOOPBACK TEST 　7. EXTERNAL LOOPBACK TEST SELECT MENU: 1		
38	Press 7 and Enter keys.	1st serial port test (I/O address 3F8H) Connect loopback plug Hit any key when ready_	Note: Check to be sure that loopback plug is connected.	
39	Press any key.	Test done!!　Hit any key when ready_		
40	Press any key.	1 SERIAL PORT TEST 　1. TEST ALL DEVICES (■ DEVICES) 　2. TEST AUTOMATICALLY (■ DEVICES) 　3. CHANGE MENU 　4. EXIT ■ 5. RS232C CONTROLLER REGISTER R/W TEST ■ 6. INTERNAL LOOPBACK TEST 　7. EXTERNAL LOOPBACK TEST SELECT MENU: 7	Loopback plug wiring as shown below. Note: Refer to the item (3) of 3) Preparation on page 2-18. Pin Configuration for Serial Port | Pin No.	Signal Name/ Description	Direction
---	---	---
1	CD	In
2	RXD	In
3	TXD	Out
4	DTR	Out
5	GND	—
6	DSR	In
7	RTS	Out
8	CTS	In
9	RING	In		
41	Press 4 and Enter keys.	2 SERIAL PORT (S) 　1. TEST ALL DEVICES (■ DEVICES) 　2. TEST AUTOMATICALLY (■ DEVICES) 　3. CHANGE MENU 　4. EXIT ■ 5. 1st SERIAL PORT TEST ■ 6. 2nd SERIAL PORT TEST SELECT MENU: 5		
42	Press 6 and Enter keys.	1 SERIAL PORT TEST 　1. TEST ALL DEVICES (■ DEVICES) 　2. TEST AUTOMATICALLY (■ DEVICES) 　3. CHANGE MENU 　4. EXIT ■ 5. RS232C CONTROLLER REGISTER R/W TEST ■ 6. INTERNAL LOOPBACK TEST 　7. EXTERNAL LOOPBACK TEST SELECT MENU: 1	Note: Check to be sure that loopback cable is connected into the MODEM socket. If it is not connected, refer to "WARNING" in 3) Preparation on page 2-18.	
43	Press 7 and Enter keys.	2nd serial port test (I/O address 2F8H) Confirm loopback plug Test done!!　Hit any key when ready_		
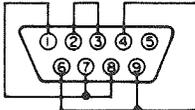
Step	Test Procedure	Screen Displays:	Criteria	Remarks
44	Press any keys.	1 SERIAL PORT TEST 1. TEST ALL DEVICES (▮ DEVICES) 2. TEST AUTOMATICALLY (▮ DEVICES) 3. CHANGE MENU 4. EXIT ▮ 5. RS232C CONTROLLER REGISTER R/W TEST ▮ 6. INTERNAL LOOPBACK TEST 7. EXTERNAL LOOPBACK TEST SELECT MENU: 7		
45	Press 4 and Enter keys.	2 SERIAL PORT (S) 1. TEST ALL DEVICES (▮ DEVICES) 2. TEST AUTOMATICALLY (▮ DEVICES) 3. CHANGE MENU 4. EXIT ▮ 5. 1st SERIAL PORT TEST ▮ 6. 2nd SERIAL PORT TEST SELECT MENU: 6		
46	Press 4 and Enter keys. Press 4 and Enter keys to complete the Diagnostic Test.	DIAGNOSTIC MENU (Ver. x.xx) 1. TEST ALL DEVICES (▮ DEVICES) 2. TEST AUTOMATICALLY (▮ DEVICES) 3. CHANGE MENU 4. EXIT ▮ 5. MAIN BOARD ▮ 6. xxxx KB RANDOM ACCESS MEMORY ▮ 7. KEYBOARD 8. TRACK BALL 9. BATTERY ▮ 10. 1 FLOPPY DISK DRIVE (S) ▮ 11. 1 HARD DISK DRIVE (S) ▮ 12. VIDEO 13. 1 PARALLEL PORT (S) ▮ 14. 2 SERIAL PORT (S) SELECT MENU : 14		

3. Troubleshooting

3.1 Troubleshooting (For Block Exchange)

Note: Before starting the following diagnostic test, refer to items of step "3) Preparation" on page 2-18.

```
                    ( Start )
                        │
                        ▼
         ┌──────────────────────┐          ┌──────────────────────┐
         │ Connect AC Adapter to │          │  Check AC Adapter.   │
         │ the Computer.         │          └──────────────────────┘
         └──────────────────────┘                     │
                        │                              ▼
                        ▼                      ╱───────────────╲      No
         ┌──────────────────────┐            ╱  Is output      ╲──────────────┐
         │ Insert Installation   │           ╲  voltage approx. ╱              │
         │ Disk 1 of this        │            ╲ 22.8 V at Plug? ╱              ▼
         │ computer into its FDD.│             ╲───────────────╱     ┌──────────────────┐
         └──────────────────────┘                     │ Yes         │ Replace AC Adapter.│
                                                        ▼            └──────────────────┘
   ┌─────────────────────────┐               ╱───────────────╲      No
   │ 1) POWER-ON SELF TEST   │              ╱  Is Rechargeable ╲─────────────┐
   └─────────────────────────┘              ╲  Battery         ╱             │
                        │                     ╲ connected?     ╱             ▼
                        ▼                      ╲──────────────╱    ┌──────────────────┐
         ┌──────────────────────┐                     │ Yes        │ Connect          │
         │ Turn on the power     │                     ▼            │ Rechargeable     │
         │ switch of the Computer.│           ┌──────────────────┐  │ Battery.         │
         └──────────────────────┘            │ Replace Main PCB. │  └──────────────────┘
                        │                     └──────────────────┘           │
                        ▼                                                     ▼
         ┌──────────────────────┐                                   ╱───────────────╲
         │ Press the reset button │                        Yes      ╱ Do POWER, BATT  ╲
         │ of the Computer.       │◄────────────────────────────────╲ and NumLK LEDs  ╱
         └──────────────────────┘                                    ╲ light?         ╱
                        │                                              ╲──────────────╱
                        ▼                                                 │ No
         ┌──────────────────────┐                                         ▼
         │ Press [F1] key        │                               ┌──────────────────┐
         │ (If necessary).       │                               │ Replace Main PCB. │
         └──────────────────────┘                               └──────────────────┘
                        │
                        ▼
                ╱───────────────╲      No
               ╱ Do POWER, BATT, ╲──────┐
               ╲ and NumLK LED    ╱      │
                ╲ light?         ╱       │
                 ╲──────────────╱        │
                        │ Yes            │
                        ▼                │
                ╱───────────────╲   Yes  │
               ╱ Is anything     ╲───────┤
               ╲ displayed on     ╱      │
                ╲ screen?        ╱       │
                 ╲──────────────╱        │
                        │ No             │
                        ▼                ▼
         ┌──────────────────────┐
         │ Check power supply    │
         │ voltage for FDD.      │
         └──────────────────────┘
                        │
                        ▼
                    ▽ 1        ▽ 2
```

3 — 1

```
  ┌─1─┐         ┌─2─┐
  └─┬─┘         └─┬─┘              ┌──────────────────────┐
    │             │                │ Replace Main PCB.    │
    │             │                └──────────────────────┘
    │         ╱───────────╲                    │
    │        ╱ Is voltage   ╲      No           │
    │       ╱  +5V at pins   ╲─────────┐        │
    │       ╲  1, 3, 5 and 7 ╱         │   ╱──────────────╲   No
    │        ╲  of CN5?     ╱          │  ╱ Does FDD       ╲──────┐
    │         ╲───────────╱            │  ╲  operate?      ╱       │
    │             │ Yes               │   ╲──────────────╱        │
    │             ▼                    │          │ Yes           │
    │   ┌──────────────────┐           │          ▼               ▼
    │   │ Replace FDD with │           │   ┌────────────┐  ┌──────────────────┐
    │   │ new one.         │           │   │ FDD failure│  │ Replace Main PCB.│
    │   └──────────────────┘           │   └────────────┘  └──────────────────┘
    │             │                    │
    │             └────────────────────┘
    │                                  │
    │                                  ▼
    │                         ┌──────────────────────┐
    │                         │ Check connector cable│
    │                         │ between LCD and Main │
    │                         │ PCB.                 │
    │                         └──────────────────────┘
    ▼                                  │
┌──────────────────┐                   ▼
│ Adjust the LCD   │          ┌──────────────────────┐
│ Contrast Control.│          │ Check supplied voltage│
└──────────────────┘          │ for LCD.             │
    │                         └──────────────────────┘
    ▼                                  │
╱──────────────╲   No                  ▼
╱ Is anything    ╲──────┐      ╱──────────────╲   No    ┌─────────────────┐
╲ displayed on   ╱      │     ╱  Are the       ╲────────│ CN308           │
 ╲ screen?*     ╱       │     ╲  voltages at    ╱        │ Pin 4 : +5V     │
  ╲──────────╱          │      ╲ CN308 correct?╱         │ Pin 5: GND      │
    │ Yes               │       ╲──────────────╱         │ Pin 6: – 22V    │
    │   *To confirm it, │              │ Yes             └─────────────────┘
    │    press Fn+F2     │              ▼
    │    3 times.        │     ┌────────────┐    ┌──────────────────┐
    │                    │     │ Adjust     │    │ Replace Main PCB.│
    │                    │     │ LCD Contrast│   └──────────────────┘
    │                    │     └────────────┘
    │                    │            │
    │                    │            ▼
    │                    │    ╱──────────────╲   No  ┌──────────────────┐
    │                    │   ╱ Is anything    ╲──────│ Replace LCD Unit.│
    │                    │   ╲ displayed on    ╱      └──────────────────┘
    │                    │    ╲ screen?       ╱
    │                    │     ╲──────────────╱
    │                    │            │ Yes
    │                    └────────────┤
    │                                 │
    └─────────────────────────────────┤
                                      ▼
                                   ┌─3─┐
                                   └───┘
```

```
            ┌─────┐
            │  3  │
            └──┬──┘
               │
               ▼
          ╱─────────────╲
         ╱ Do you have any╲      Yes
        ╱ ERROR MESSAGE?   ╲──────────────┐
        ╲ (Refer to 2. 3.) ╱              │
         ╲               ╱                ▼
          ╲─────┬───────╱          ┌──────────────────┐
                │ No              │ Replace Main PCB. │
                │                 └──────────────────┘
```

```
               │
               ▼
        ╱─────────────────╲          ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
       ╱  Screen displays  ╲         
      │   messages as shown │        │ ***************************************** │
       ╲  at right.        ╱          *Your hard disk has been already installed.   *
        ╲─────────────────╱          │ *Type INSTALL and press Enter to re-install. * │
                                      ***************************************** 
                                     │                                          │
```

2) DIAGNOSTIC TEST

```
                                     │  A >_                                    │
                                      └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘

               │
               ▼
        ┌──────────────────┐
        │  Press d i a g   │         Note: ⏎ key denotes Enter key.
        │  3 8 3 or 1 6 6 0│
        └──────────────────┘
               │
               ▼
        ╱─────────────────╲          ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
       ╱  Screen displays  ╲         │ Do you want printed output? (Y/N)_      │
      │   messages as shown │         └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
       ╲  at right.        ╱
        ╲─────────────────╱
               │
               ▼
        ┌──────────────────┐          ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
        │  Press Y or N key.│         │ DIAGNOSTIC MENU (Ver. x.xx)                     │
        └──────────────────┘          │   ▌1 TEST ALL DEVICES (▮ DEVICES)▌              │
               │                      │   2. TEST AUTOMATICALLY (▮ DEVICES)             │
               │                      │   3. CHANGE MENU                                │
               ▼                      │   4. EXIT                                       │
        ╱─────────────────╲          │ ▮ 5. MAIN BOARD                                 │
       ╱  Screen displays  ╲         │ ▮ 6. xxxx KB RANDOM ACCESS MEMORY               │
      │   messages as shown │         │ ▮ 7. KEYBOARD                                   │
       ╲  at right.        ╱          │   8. TRACK BALL                                 │
        ╲─────────────────╱          │   9. BATTERY                                    │
               │                      │ ▮ 10. 1 FLOPPY DISK DRIVE (S)                   │
               │                      │ ▮ 11. 1 HARD DISK DRIVE (S)                     │
               │                      │ ▮ 12. VIDEO                                     │
               │                      │   13. 1 PARALLEL PORT (S)                       │
               │                      │ ▮ 14. 2 SERIAL PORT (S)                         │
               │                      │                                                 │
               │                      │ SELECT MENU : 1                                 │
               ▼                       └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
          ┌─────┐
          │  4  │
          └─────┘
```
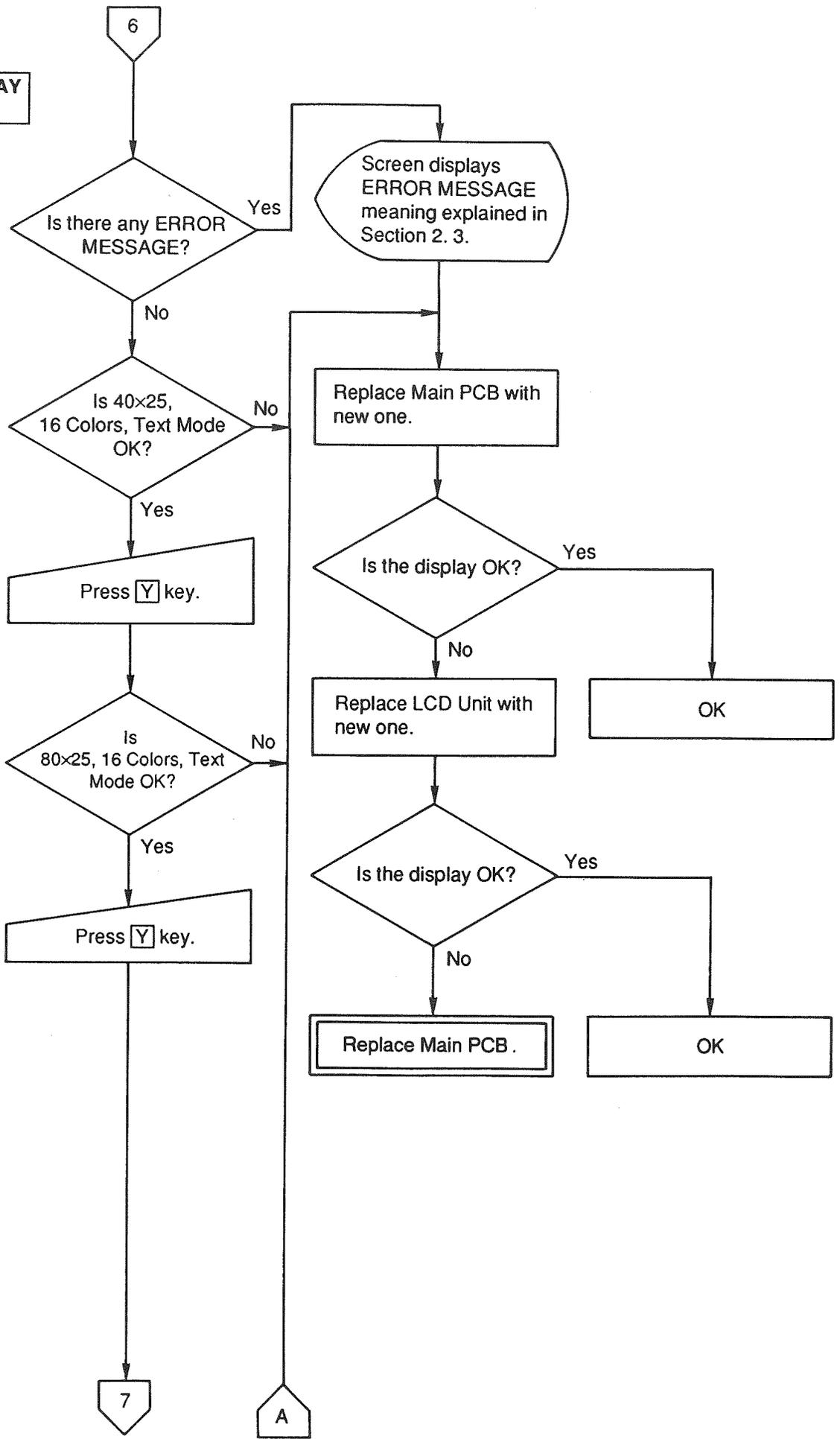
4

3) MAIN BOARD TEST

Press ⏎ key.

Screen displays message as shown at right.

MAIN BOARD TEST

Do you have any Error massege ?

Yes

Screen displays ERROR MESSAGE meaning explained in Section 2. 3.

No

Replace Main PCB.

4) DRAM TEST

Screen displays messages as shown at right.

Screen displays:

BASE RAM TEST

CURRENT BASE RAM SIZE=640 KB

Base RAM=640 KB Check OK

Is BASE RAM TEST OK?

No

Screen displays ERROR MESSAGE meaning explained in Section 2. 3.

Yes

Replace Main PCB.

5) EXTENDED RAM TEST

Screen displays messages as shown at right.

Screen displays:

EXTENDED RAM TEST

CURRENT EXTENDED RAM SIZE=XXXX KB

EXTENDED RAM=XXXX KB Check OK

Note: RAM size depends on system configuration.

Is EXTENDED RAM TEST OK?

No

Screen displays ERROR MESSAGE meaning explained in Section 2. 3.

Yes

5

Replace RAM Card and/or Main PCB.

```
                              ┌─────┐
                              │  5  │
                              └──┬──┘
┌──────────────────────┐        │
│ 6)  KEYBOARD RETURN   │        │
│     CODE TEST         │        ▼
└──────────────────────┘
```

6) KEYBOARD RETURN CODE TEST

Screen displays:
KEYBOARD RETURN
CODE TEST

Is Keyboard Return Code Test OK? — No → Screen displays ERROR MESSAGE meaning explained in Section 2. 3. → Replace Main PCB.

Yes

7) FDD TEST

Screen displays:
FLOPPY DISK
CONTROLLER TEST
1st FLOPPY DISK
DRIVE (1.44 MFD)TEST

Is FDD TEST OK? — No → Screen displays ERROR MESSAGE meaning explained in Section 2. 3. → Replace Main PCB.

Yes

8) HDD TEST

Screen displays messages as shown at right.

Screen displays:

```
┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
  HARD DISK CONTROLLER TEST
  1st HDD-DRIVE TEST
  Count value to get SEEK COMPLETE=0
  1st HDD-SEQUENTIAL SEEK TEST
  Cylinder=xxx
  1st HDD-RANDOM SEEK TEST
  Cylinder=xxx
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
```

Is HDD TEST OK? — No → Replace HDD with new one.

Yes

Is the HDD TEST OK? — Yes → 6

No

Replace Main PCB.

┌─────┐   ┌─────┐
│ 6 │   │ 6 │
└─────┘   └─────┘

9) LCD DISPLAY TEST

```
                    ┌──┐
                    │ 6│
                    └──┘
                     │
                     ▼
              ╱─────────────╲              Yes     ╭──────────────────╮
             ╱ Is there any   ╲──────────────────▶ │ Screen displays  │
             ╲ ERROR MESSAGE? ╱                    │ ERROR MESSAGE    │
              ╲─────────────╱                      │ meaning explained │
                     │                             │ in Section 2. 3. │
                     │ No                          ╰──────────────────╯
                     │                                      │
                     ▼                                      ▼
              ╱─────────────╲         No          ┌──────────────────┐
             ╱  Is 40×25,     ╲──────────────────▶│ Replace Main PCB │
             ╲ 16 Colors, Text╱                   │ with new one.    │
              ╲ Mode OK?    ╱                      └──────────────────┘
              ╲─────────────╱                              │
                     │ Yes                                 ▼
                     ▼                             ╱─────────────╲     Yes
             ┌──────────────┐                     ╱ Is the display╲───────────┐
             │ Press Y key. │                     ╲    OK?       ╱            │
             └──────────────┘                      ╲─────────────╱            │
                     │                                    │ No                │
                     ▼                                    ▼                   ▼
              ╱─────────────╲         No          ┌──────────────────┐ ┌──────────┐
             ╱   Is           ╲──────────────────▶│ Replace LCD Unit │ │    OK    │
             ╲ 80×25, 16 Colors╲                  │ with new one.    │ └──────────┘
              ╲ Text Mode OK? ╱                    └──────────────────┘
              ╲─────────────╱                              │
                     │ Yes                                 ▼
                     ▼                             ╱─────────────╲     Yes
             ┌──────────────┐                     ╱ Is the display╲───────────┐
             │ Press Y key. │                     ╲    OK?       ╱            │
             └──────────────┘                      ╲─────────────╱            │
                     │                                    │ No                │
                     │                                    ▼                   ▼
                     │                             ╔══════════════════╗ ┌──────────┐
                     │                             ║ Replace Main PCB.║ │    OK    │
                     │                             ╚══════════════════╝ └──────────┘
                     ▼                                    
                    ┌──┐                              ┌──┐
                    │ 7│                              │ A│
                    └──┘                              └──┘
```

7

Is 640×200, 16 Colors, Graphic Mode OK? — **No** →

Yes

Press Y key.

Is 640×350, 16 Colors, Graphic Mode OK? — **No** →

Yes

Press Y key.

Is 640×480, 16 Colors, Graphic Mode OK? — **No** →

Yes

Press Y key.

Is 320×200, 256 Colors, Graphic Mode OK? — **No** →

Yes

Press Y key.

Is CHARACTER SET TEST OK? — **No** →

Yes

Press Y key.

8

A

8

Is PAGE 0 DISPLAY TEST OK? — **No** →

Yes

Press Y key.

Is PAGE 1 DISPLAY TEST OK? — **No** →

Yes

Press Y key.

Is PAGE 2 DISPLAY TEST OK? — **No** →

Yes

Press Y key.

Is PAGE 3 DISPLAY TEST OK? — **No** →

Yes

Press Y key.

9

```
                    ┌─────┐                              ┌───────┐
                    │  9  │                              │   A   │
                    └──┬──┘                              └───┬───┘
                       │                                     │
                       ▼                                     │
                  ╱─────────╲                                │
                 ╱  Is 320×200 ╲          No                 │
                ╱  MODE COLOR-SET ╲────────────────────────►─┤
                ╲   0 TEST OK?   ╱                           │
                 ╲─────────────╱                             │
                       │                                     │
                       │ Yes                                 │
                       ▼                                     │
            ┌─────────────────────┐                         │
            │   Press Y key.      │                         │
            └──────────┬──────────┘                         │
                       │                                     │
                       ▼                                     │
                  ╱─────────╲                                │
                 ╱  Is 320×200 ╲          No                 │
                ╱  MODE COLOR-SET ╲────────────────────────►─┤
                ╲   1 TEST OK?   ╱                           │
                 ╲─────────────╱                             │
                       │                                     │
                       │ Yes                                 │
                       ▼                                     │
            ┌─────────────────────┐                         │
            │   Press Y key.      │                         │
            └──────────┬──────────┘                         │
                       │                                     │
                       ▼                                     │
                  ╱─────────╲                                │
                 ╱  Is 640×200 ╲         No                  │
                ╱  MODE TEST OK? ╲─────────────────────────►─┤
                ╲               ╱                            │
                 ╲─────────────╱                             │
                       │                                     │
                       │ Yes                                 │
                       ▼                                     │
            ┌─────────────────────┐                         │
            │   Press Y key.      │                         │
            └──────────┬──────────┘                         │
                       │                                     │
                       ▼                                     │
                  ╱─────────╲                                │
                 ╱  Is 80×25,  ╲         No                  │
                ╱ 2 Colors, Text Mode╲──────────────────────►┤
                ╲     OK?      ╱                             │
                 ╲─────────────╱                             │
                       │                                     │
                       │ Yes                                 │
                       ▼                                     │
            ┌─────────────────────┐                         │
            │   Press Y key.      │                         │
            └──────────┬──────────┘                         │
                       │                                     │
                       ▼                                     │
                  ╱─────────╲                                │
                 ╱ Is 640×350, ╲        No                   │
                ╱ 2 Colors, Graphic Mode╲────────────────────┘
                ╲     OK?      ╱
                 ╲─────────────╱
                       │
                       │ Yes
                       ▼
            ┌─────────────────────┐
            │   Press Y key.      │
            └──────────┬──────────┘
                       │
                       ▼
                    ┌─────┐
                    │ 10  │
                    └─────┘
```

3 — 8

10

Screen displays as shown right.

Is there any ERROR MESSAGE?

1st serial port test (I/O address 3F8H)

2nd serial port test (I/O address 2F8H)

2nd serial port test (I/O address 2F8H)

Test done!! Hit any key when ready_

Yes → Screen displays ERROR MESSAGE meaning explained in Section 2.3.

Replace Main PCB.

No

Press any key.

Screen displays DIAGNOSTIC MENU.

10) KEYBOARD TEST

Press [7] and [↵] keys. Then press [5] and [↵] keys.

Screen displays keyboard test menu as shwon at right.

Press [5] * and [↵] keys.

Screen displays key location map.

PRESS KEY TEST

1. TEST ALL DEVICES (∎ DEVICES)
2. TEST AUTOMATICALLY (∎ DEVICES)
3. CHANGE MENU
4. EXIT
5. U.S.A.
6. GERMANY
7. FRANCE
8. ITALY
9. U.K.
10. SPAIN
11. SWEDEN
12. SWISS (Gr)

SELECT MENU: 1

*Note: Press appropriate number according to the keyboard layout.

11

11

Do you have any keyboard error?

Yes →

No ↓

Screen displays ERROR MESSAGE meaning explained in Section 2.3.

Press each key for character replacement.

Replace Keyboard with new one.

Are all keys functioning normally?

No →

Yes ↓

Are all keys functioning normally?

No →

Yes ↓

Press [Y] and [↵] keys.

OK

Replace Main PCB.

Press any key. Then press [4] and [↵] keys.

Press [4] and [↵] keys. Then press [1] [0] and [↵] keys.

Press [6] and [↵] keys. Then press [6] and [↵] keys.
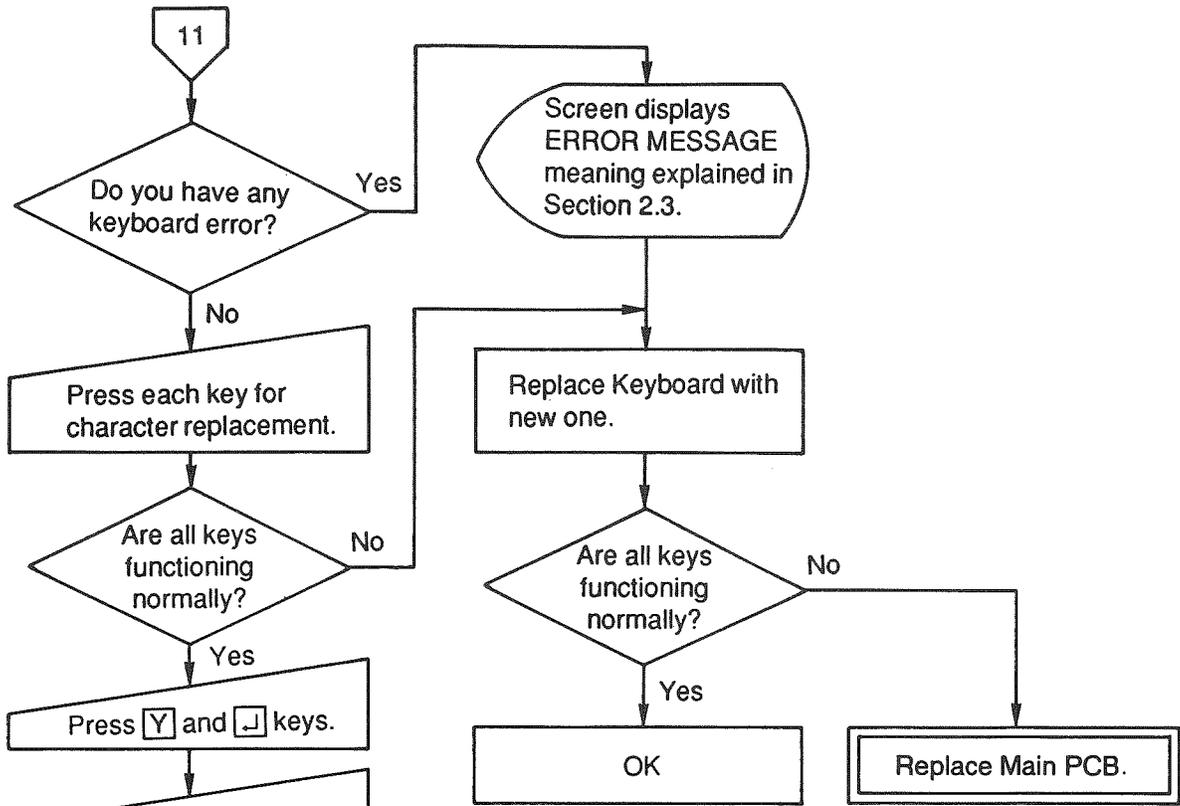
11) 2DD-MEDIA IN 1.44-FDD TEST

Screen displays messages as shown at right.

(Refer to Note shown at right.)

```
2DD-MEDIA IN 1.44-FDD TEST

*****************Warning!!!***************
CONTENTS OF DISK WILL BE DESTROYED
*****************Warning!!!***************

Insert scratch 2DD disk into the 1st drive
Hit any key when ready_
```

Note:

Remove the "Installation Disk" from the FDD. Then insert scratch 2DD disk into the FDD and press any key.

Press any key

Is DRIVE FORMATTING TEST OK?

No →

Yes ↓

Screen displays: Formatting....

Screen displays ERROR MESSAGE meaning explained in section 2.3.

12

C

D

```
        ┌──────┐                          ┌────┐                            ┌────┐
        │  12  │                          │ C  │                            │ D  │
        └──┬───┘                          └──┬─┘                            └──┬─┘
           │                                 │                                 │
           ▼                                 │                                 ▼
  ╭─────────────────────╮                    │                      ┌─────────────────────┐
  │ Screen displays:    │                    │                      │ Replace FDD with new│
  │ Read/Write test     │                    │                      │ one.                │
  ╰─────────────────────╯                    │                      └──────────┬──────────┘
           │                                 │                                 │
           ▼                                 │                                 ▼
        ◇ Is Read/Write Test ◇──── No ──────▶│        No ───────────────── ◇ Is FDD Test OK? ◇
        ◇ OK?              ◇                  │         │                      ◇
           │                                 │         │                       │
          Yes                                │         ▼                      Yes
           │                                 │  ┌─────────────────┐            │
           ▼                                 │  ╎ Replace Main PCB.╎    ┌───────────────┐
  ╭─────────────────────╮                    │  └─────────────────┘    │      OK       │
  │ Screen displays:    │                    │                         └───────────────┘
  │ Sequential seek test│                    │
  ╰─────────────────────╯                    │
           │                                 │
           ▼                                 │
        ◇ Is Sequential Seek ◇── No ────────▶│
        ◇ Test OK?          ◇                │
           │                                 │
          Yes                                │
           │                                 │
           ▼                                 │
  ╭─────────────────────╮                    │
  │ Screen displays:    │                    │
  │ Random seek test    │                    │
  ╰─────────────────────╯                    │
           │                                 │
           ▼                                 │      ┌──────────────────┐
        ◇ Is Random Seek ◇──── No ──────────▶│      │ 12) PARALLEL PORT│
        ◇ Test OK?       ◇                   │      │     TEST         │
           │                                 │      └─────────┬────────┘
          Yes                                │                │
           │                                 │                ▼
           ▼                                 │      ╱─────────────────────╲
  ╭─────────────────────╮                    │      │ Press [1] [3] and [↵]│
  │ Screen displays:    │                    │      │ keys.                │
  │ Test done!! Hit any │                    │      ╲─────────────────────╱
  │ key when ready_     │                    │                │
  ╰─────────────────────╯                    │                ▼
           │                                 │      ╭─────────────────────╮
           ▼                                 │      │ Screen displays as  │
        ◇ Is everything OK? ◇──── No ───────▶│      │ shown below.        │
           │                                 │      ╰─────────────────────╯
          Yes                                │                │
           │                                 │                ▼
           ▼                                 │      ┌─────────────────────┐
  ┌─────────────────────┐                    │      │ Connect an external │
  │ Press any key. Then │                    │      │ printer if it is not│
  │ press [4][↵][4] and  │                   │      │ connected.          │
  │ [↵] keys.           │                    │      └──────────┬──────────┘
  └─────────────────────┘                    │                 │
           │                                 │                 ▼
           ▼                                 │             ┌──────┐
  ╭─────────────────────╮                    │             │  13  │
  │ Screen displays     │                    │             └──────┘
  │ DIAGNOSTIC MENU.    │                    │
  ╰─────────────────────╯                    │
           │                                 │
           └─────────────────────────────────┘
```

┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐

  1st Parallel port test (I/O address 378H)

  Connect printer

  Hit any key when ready_

└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘

```
                    ┌──────┐
                    │  13  │
                    └──┬───┘
                       │
          ┌────────────▼────────────┐
          │      Press any key.      │
          └────────────┬────────────┘
                       │
                  ╱────▼────╲                    No      ┌──────────────────────┐
                 ╱ Is Printer ╲  ────────────────────────▶│ Screen displays      │
                ╱  printing    ╲                          │ ERROR MESSAGE        │
                ╲  out OK?      ╱                          │ meaning explained in │
                 ╲            ╱                            │ section 2.3.         │
                  ╲────┬────╱                             └──────────┬───────────┘
                       │ Yes                                         │
                       │                                            │
                  ╱────▼────╲                    Yes   ┌─────────────▼──────────────┐
                 ╱ Is there any╲ ────────────────────▶ │ Replace the external       │
                ╱ dot missing   ╲                      │ printer with new one       │
                ╲ on printed     ╱                     │ and repeat Parallel Port   │
                 ╲ output?      ╱                      │ Test.                      │
                  ╲────┬────╱                          └─────────────┬──────────────┘
                       │ No      Note:                               │
                       │         Refer to step 34 on                 │
                       │         page 2-25.                    ╱─────▼─────╲         No
                       │                                      ╱ Is Printer  ╲ ──────────────┐
          ┌────────────▼────────────┐                        ╲ printing     ╱               │
          │      Press any key.      │                        ╲ out OK?     ╱                │
          └────────────┬────────────┘                         ╲────┬────╱                   │
                       │                                           │ Yes           ┌─────────▼─────────┐
          ┌────────────▼────────────┐                             │               │ Replace Main PCB. │
          │ Screen displays:         │                            │               └───────────────────┘
          │ DIAGNOSTIC MENU.         │                            │
          └────────────┬────────────┘                            │
                       │                                         │              ┌───────────────────┐
          ┌────────────▼────────────┐          ┌─────────────────┘              │        OK         │
          │ Press 1  4 and ↵ keys.   │          │                               └───────────────────┘
          │ Then press 5 and ↵ keys. │   ┌──────▼──────────┐
          └────────────┬────────────┘   │ Press any key.   │
                       │                └──────┬───────────┘
          ┌────────────▼────────────┐          │
          │ Screen displays:         │  ┌───────▼──────────┐
          │ 1st SERIAL PORT TEST.    │  │ Screen displays: │
          └────────────┬────────────┘  │ Test done!!      │
                       │                │ Hit any key when │
                       │                │ ready_           │
                       │                └───────┬──────────┘
  ┌──────────────────────┐                      │
  │ 13) LOOPBACK TEST    │                  ╱───▼────╲              No
  └──────────────────────┘                 ╱ Is external╲ ──────────────────┐
                       │                   ╲ loopback    ╱                   │
          ┌────────────▼────────────┐      ╲ test OK?   ╱                    │
          │ Connect loopback plug    │      ╲───┬────╱                       │
          │ into DB-9 connector and  │          │ Yes            ┌───────────▼──────────┐
          │ press 7 and ↵ keys       │          │                │ Screen displays      │
          └────────────┬────────────┘          │                │ ERROR MESSAGE        │
                       │                        │                │ meaning explained in │
          ┌────────────▼────────────┐           │                │ Section 2.3.         │
          │ 1st serial port test     │          │                └───────────┬──────────┘
          │ (I/O address 3F8H)        │         │                            │
          │ Connect loopback plug    │          │                ┌───────────▼──────────┐
          │ Hit any key when ready_  │          │                │ Replace Main PCB.    │
          └─────────────────────────┘       ┌───▼───┐            └──────────────────────┘
                                            │  14   │
                                            └───────┘
```

14

Press any key.

Screen displays:
1st SERIAL PORT
TEST

Press ④ and ⏎ keys.
Then press ⑥ and ⏎ keys.

Screen displays:
2nd SERIAL PORT
TEST

Make sure that
loopback cable is
connected into the
MODEM socket.
(Refer to Note as shown
at right.)

Press ⑦ and ⏎ keys.

Screen displays:
2nd serial port test
(I/O address 2F8H)
Confirm loopback plug
Test done!! Hit any key when ready_

Is external loopback
Test OK?

No

Yes

Press any key.

15

15

System is working OK.

Set power switch to
OFF.

END

Note: If loopback cable has not
connected yet, refer to
"WARNING" in
3) Preparation on page 2-18.

Screen displays
ERROR MESSAGE
meaning explained in
section 2.3.

Replace Main PCB.

3.2 Appearance of Disassembled Block Unit

Main PCB (UPPER)	Main PCB (LOWER)
P/N: DFWV48C198Z	P/N: DL3U10510CAA
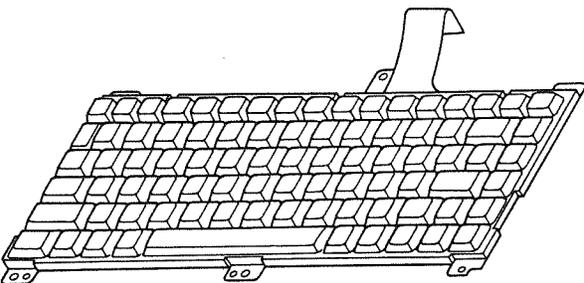
Keyboard Ass'y	LCD Unit
P/N: ESU54TM404BK	P/N: DFWV08A025ZA
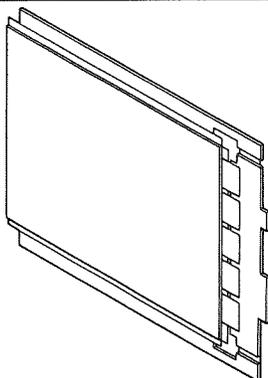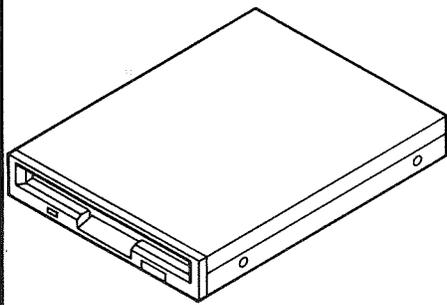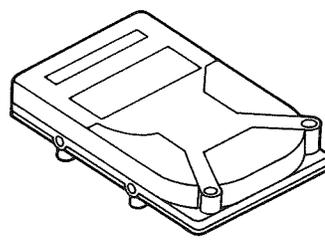
FDD Ass'y	HDD	FL Inverter PCB
P/N: DFJG052YA-M	P/N: DFJH003ZA-C	P/N: DFWV48C194Z
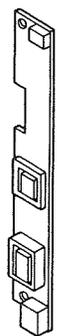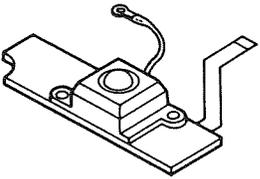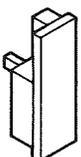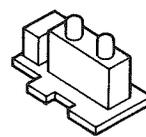
Track Ball Ass'y	Contrast Control PCB	Power/Battery LED PCB	LED/Switch PCB
P/N: EMU-15901	P/N: DL3U10484AAA	P/N: DL3U20510CAA	P/N: DL3U40510CAA
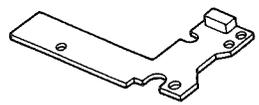
4. Disassembly/Reassembly

Note: Before disassembling, be sure to preform the following procedures first.

1. Turn the power switch off.
2. Disconnect the AC adapter and remove the battery pack described below.
3. Remove the floppy disk if it is inserted in the floppy disk drive.
4. Remove the optional RAM board and MODEM card if they are installed (Refer to "Removing RAM board" and "Removing MODEM card" described below).

Caution: Please follow directions carefully.
Do not interchange screws in any part of the system.

• Removing Battery Pack

Battery Release
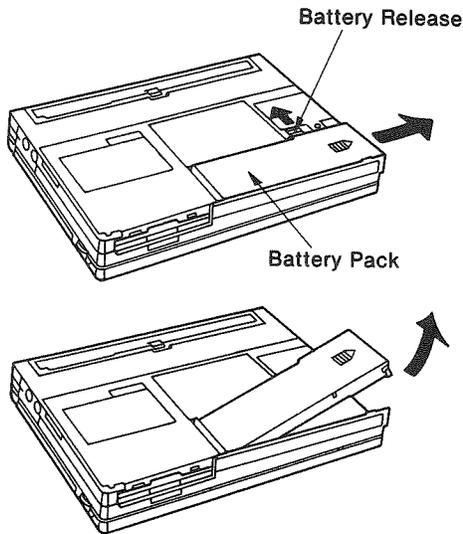
Battery Pack

Figure 1

1. Close the display panel.

2. Turn the computer upside down and place it on a flat surface.

3. While pushing the BATTERY RELEASE (in the direction of the arrow), push out the battery pack (in the direction of the arrow) by about 5mm.

4. Lift out the battery pack.

• Removing RAM Board

RAM Board Slot

RAM Board Slot Cover

Screws

Figure 2

RAM Board
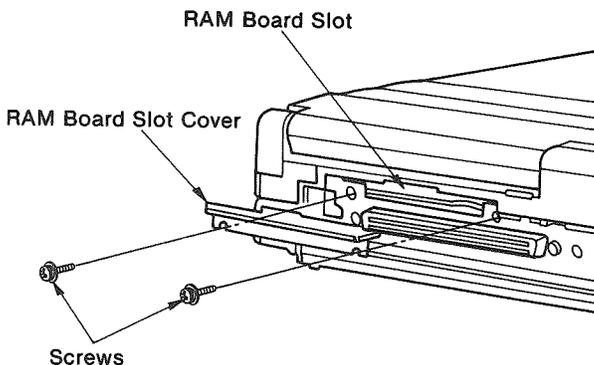
RAM Board Slot Cover
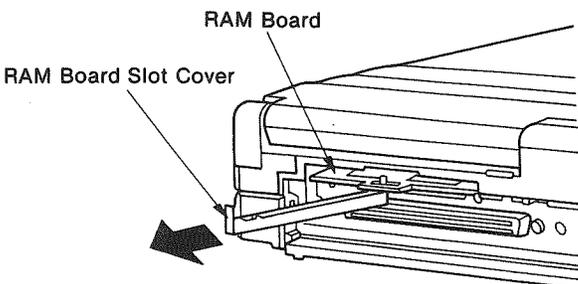
Figure 3

1. Open the rear cover, and remove the two screws on the RAM board slot cover, then remove the RAM board slot cover. (Refer to Figure 2.)

2. Insert the front edge of the RAM board slot cover that you removed into the hole in the installed RAM board, and engage the slot cover with the RAM board.
Next, keeping the slot cover horizontal, pull it slowly toward you. (Refer to Figure 3.)

• Removing Modem Card
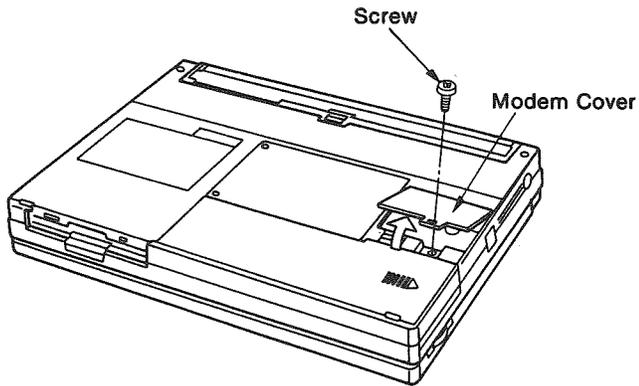
Figure 4

1. Close the display panel.

2. Turn the computer uspide down and place it on a flat surface.

3. Remove the screw on the modem cover, carefully raise the modem cover and remove it. (Refer to Figure 4.)

4. Remove the screw on the modem and carefully raise the modem. (Refer to Figure 5.)

5. Carefully remove the flat cable from the connector. (Refer to Figure 6.)
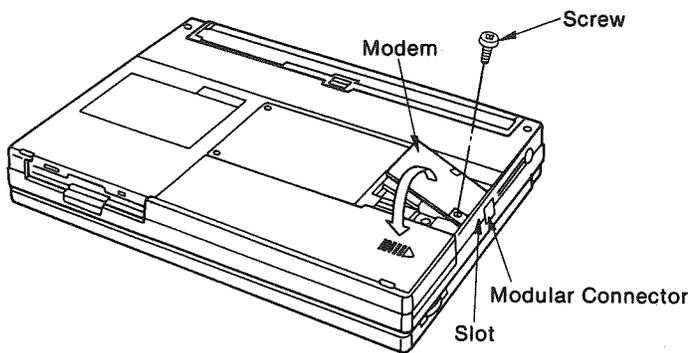
Figure 5
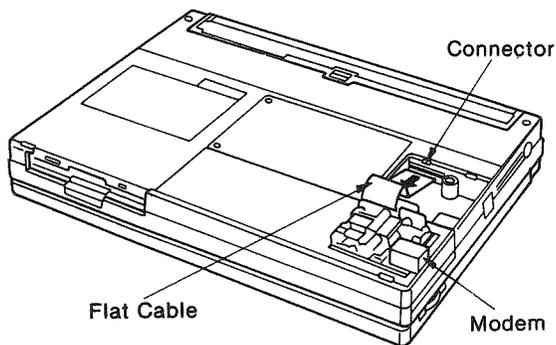
Figure 6

4.1 Top Case

〈A〉
Rubber Cover
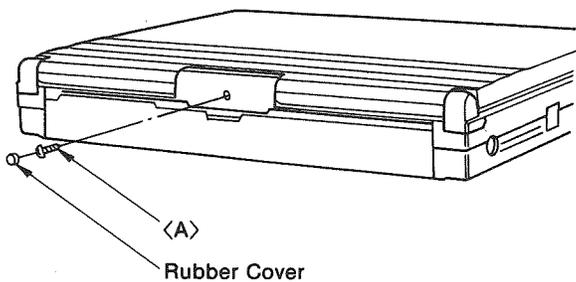
Figure 7

(1) Remove the rubber cover at the back of the computer by using something like an ice pick, then remove the screw 〈A〉 (2.6 × 4mm).

Cover

Hinge Cover
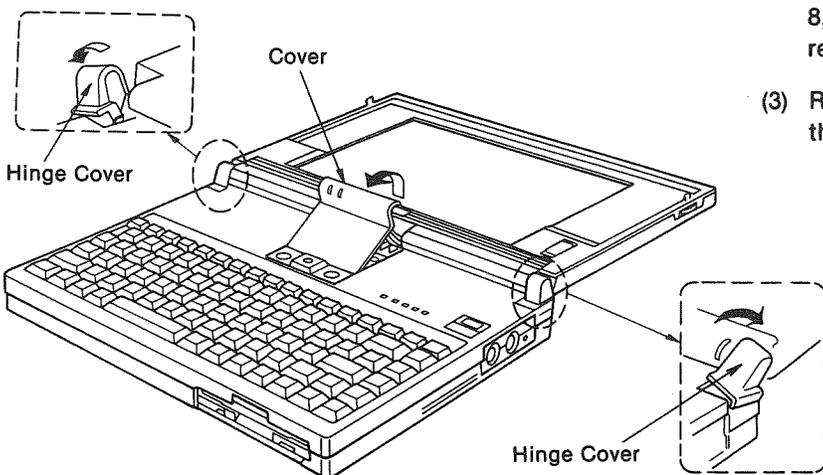
Hinge Cover

Figure 8

(2) Open the display panel fully as shown in Figure 8, slowly raise the cover obliquely upward and remove it.

(3) Remove two hinge covers by pressing them in the direction of arrows as shown in Figure 8.
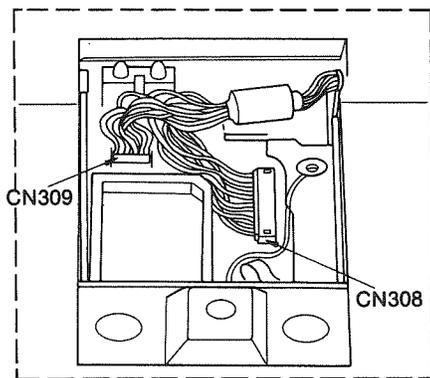
CN309

CN308

Figure 9

(4) Disconnect the LCD connectors (CN308, CN309) as shown in Figure 9.
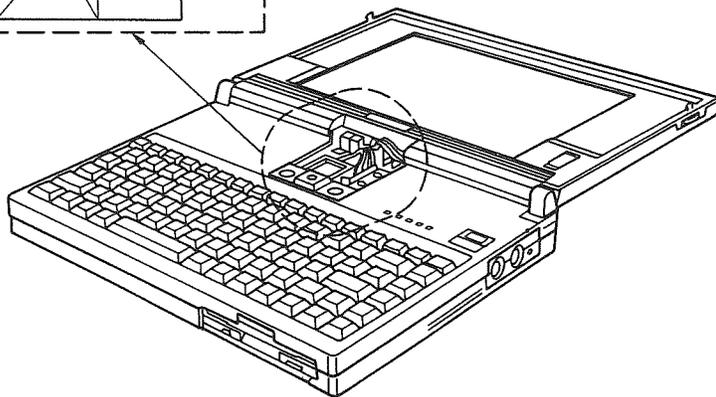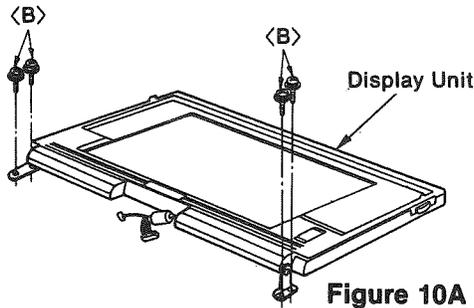
Figure 10A
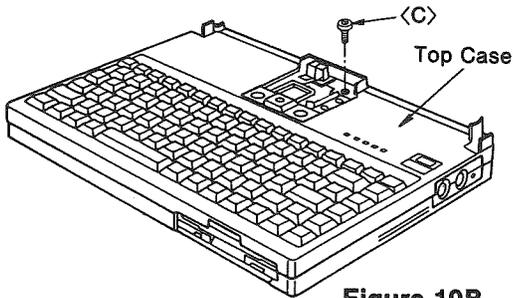
Figure 10B
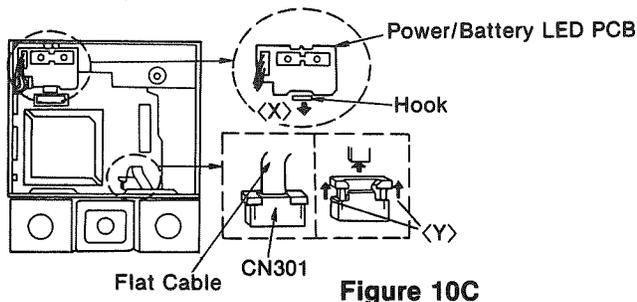
Figure 10C
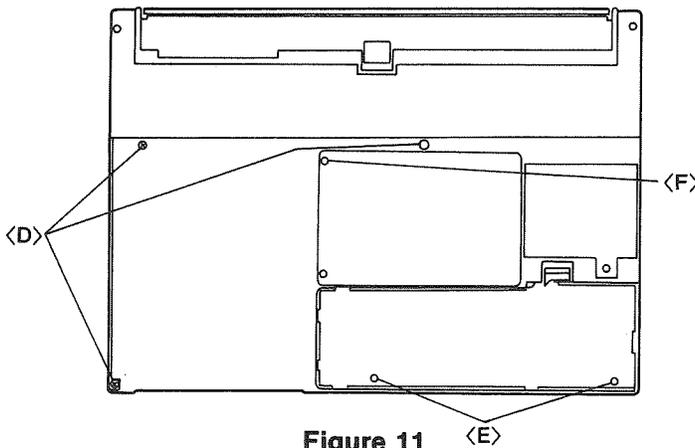
Figure 11
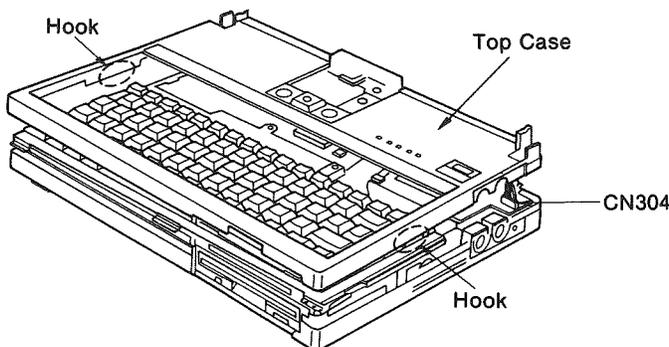
Figure 12

(5) Remove four screws ⟨B⟩ (2.6 × 12 mm), then remove the Display Unit as shown in Figure 10A.

(6) Remove the Power/Battery LED PCB from the Top Case as shown in Figure 10C.

Note: The PCB can be removed by pushing the hook in the direction of ⟨X⟩ as shown in Figure 10C.

(7) Remove the flat cable of the Track Ball from the connector (CN301).*

*Note: When handling or using the track-ball, do not get the ball dirty.
If the ball becomes soiled, it can be cleaned with water and a lintfree cloth.

Note: The flat cable can be removed by sliding its connector in the direction of ⟨Y⟩ as shown in Figure 10C.

(8) Remove one screw ⟨C⟩ (2.6 × 8 mm) as shown in Figure 10B.

(9) Turn over the computer and remove three screws ⟨D⟩ (2.6 × 8 mm), two screws ⟨E⟩ (2.6 × 6 mm), and one screw ⟨F⟩ (2.6 × 24 mm) as shown in Figure 11.

(10) Turn over the computer again. Then, carefully pull the sides of the top case outward and raise the top case to unlatch the side hooks. Disconnect the LED/Switch PCB connector (CN304) as shown in Figure 12.

* Reassemble in reverse order.

4.2 Keyboard
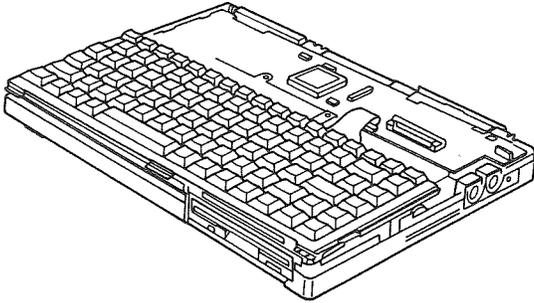
Figure 13

(1) After removing the top case (Figure 13), turn over the keyboard and then disconnect keyboard connector as shown in Figure 14.

Note: The flat cable can be removed by sliding its connector in the direction of 〈X〉 as shown in Figure 14.

∗Reassemble in the reverse order.

Keyboard Flat Cable
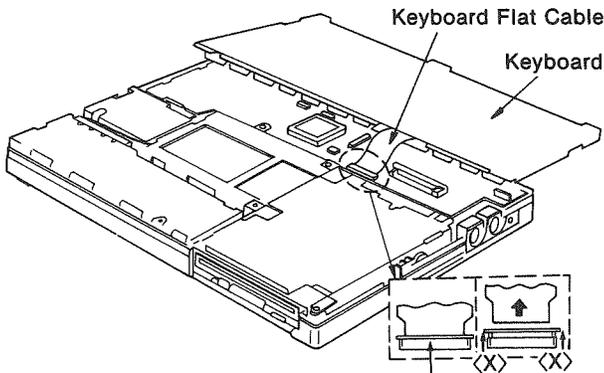
Keyboard

Figure 14 Keyboard Connector

4.3 Main PCB (Upper)

Main PCB (Upper)

CN302

CN310

〈A〉
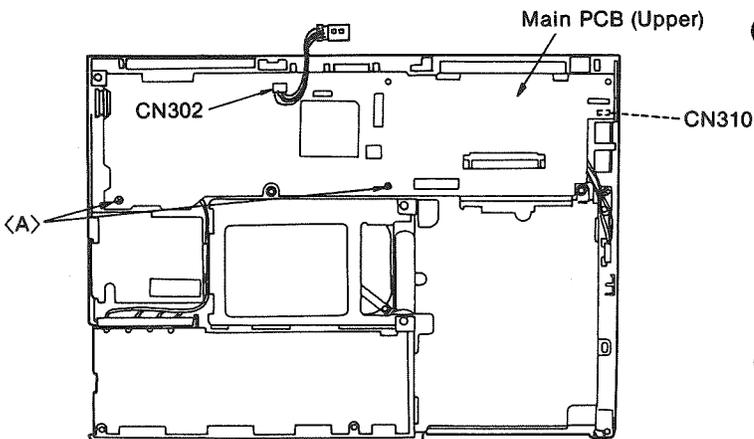
Figure 15

(1) After removing the top case and the keyboard, remove two screws 〈A〉 (3×7mm), disconnect the connector (CN302) of Power/Battery LED PCB as shown in Figure 15.

(2) Carefully disconnect PCB connectors (CN303, CN305) by using a flat head screwdriver as shown in Figure 16.

(3) Disconnect Beeper connector (CN310) as shown in Figure 15.

Caution:
• Do not use excessive force when disconnecting the connectors.
• Do not bend the Main PCB (Upper), while removing it.

∗Reassemble in the reverse order.

CN303

CN305
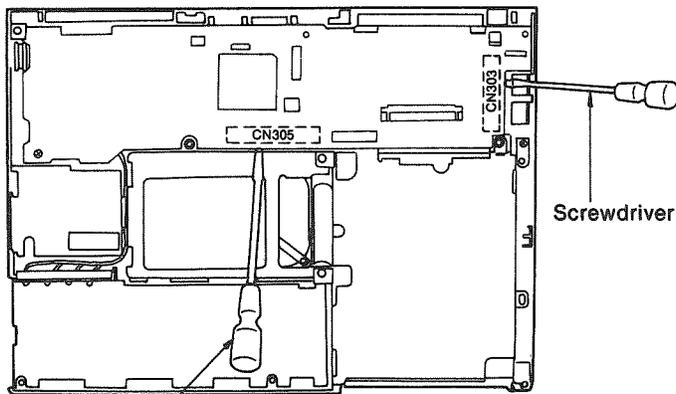
Screwdriver

Screwdriver **Figure 16**

4 — 5

4.4 Floppy Disk Drive (FDD)
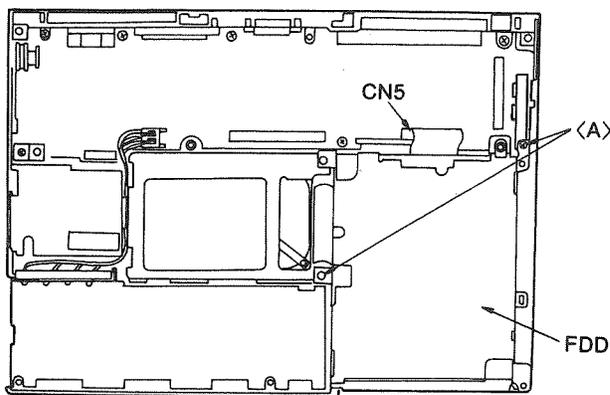
Figure 17
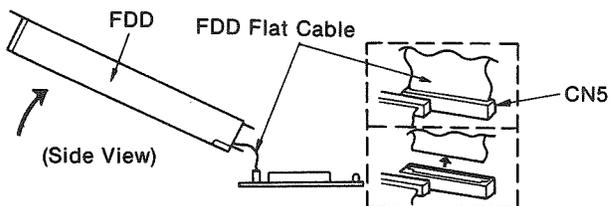
Figure 18
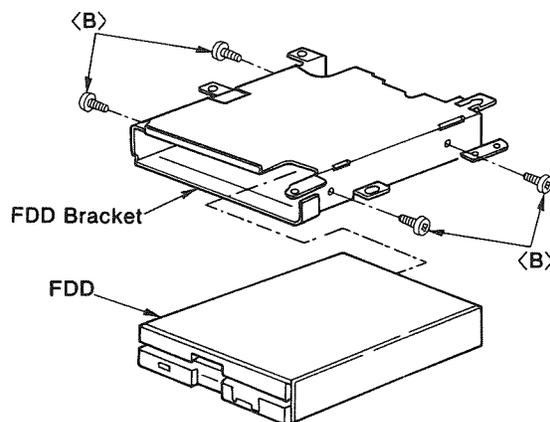
Figure 19

(1) After removing the top case, the keyboard, and the main PCB (Upper), remove two screws ⟨A⟩ (3 × 4mm) as shown in Figure 17.

(2) Gradually raise the front end of the FDD and then disconnect the FDD flat cable from connector (CN5) as shown in Figure 18.

(3) Gradually disconnect the FDD flat cable from the connector mounted on the FDD.

Note: When connecting the FDD flat cable to the connectors on the FDD and the main PCB (Lower), be sure the conductive side of the cable is facing downward.

(4) Remove four screws ⟨B⟩ (3 × 4mm) from the FDD bracket and then remove the FDD bracket as shown in Figure 19.

＊Reassemble in the reverse order.

4.5 Main PCB (Lower)
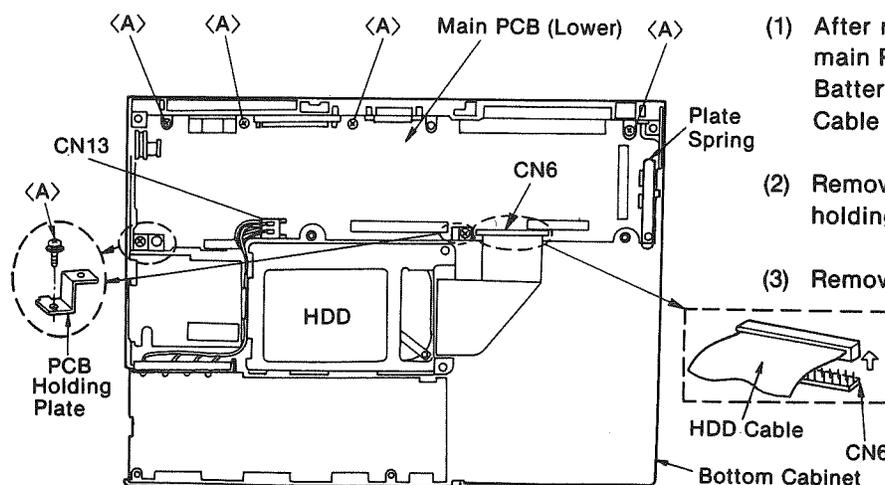
Figure 20

(1) After removing the top case, the keyboard, the main PCB (Upper), and the FDD, disconnect the Battery Pack Connector (CN13) and the HDD Cable Connector (CN6) as shown in Figure 20.

(2) Remove six screws ⟨A⟩ (3 × 7mm) and two PCB holding plates as shown in Figure 20.

(3) Remove the plate spring as shown in Figure 20.

(B) (C) (C) (D) Connector Frame
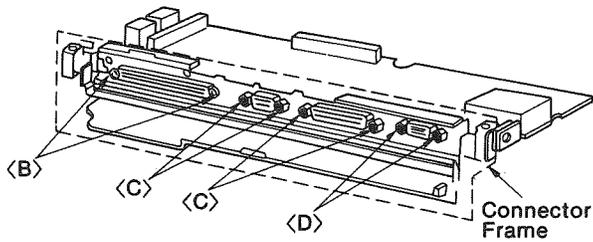
Figure 21

(4) Gradually raise the rear end of the main PCB (Lower) and remove it from bottom cabinet.

(3) Remove the connector frame from the main PCB (Lower) by removing two screws ⟨B⟩ (2.6 × 5mm), four screws ⟨C⟩, and two screws ⟨D⟩ as shown in Figure 21.

＊Reassemble in the reverse order.

4.6 Hard Disk Drive (HDD)

⟨B⟩ ⟨A⟩ HDD
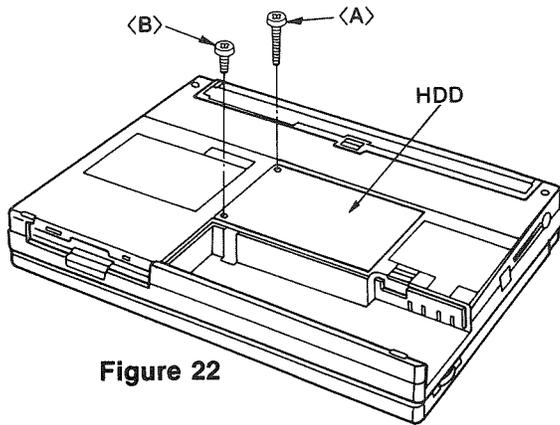
Figure 22

(1) Close the display panel.

(2) Turn the computer upside down and place it on a flat surface.

(3) Remove screws ⟨A⟩ (2.6 × 24mm) and ⟨B⟩ (2.6 × 8mm) as shown in Figure 22.
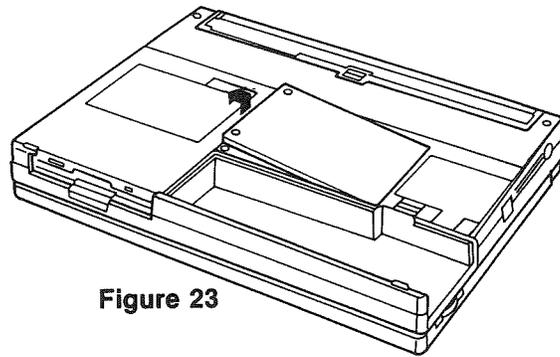
Figure 23

(4) Carefully raise the HDD and slide it over leftward about 3mm as shown in Figure 23.
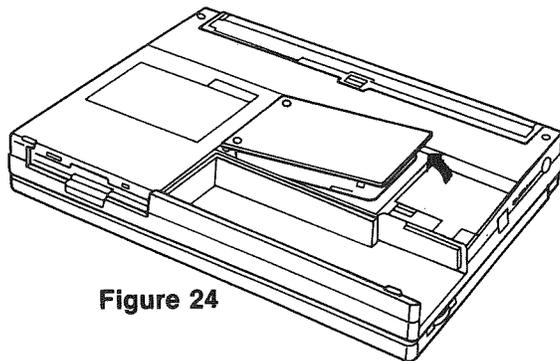
Figure 24

(5) Carefully raise the HDD as shown in Figure 24.
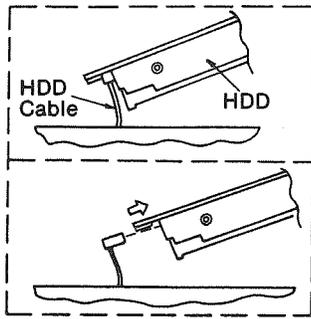
Figure 25
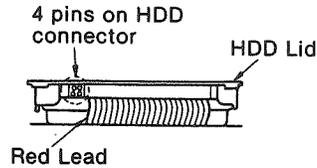
Figure 25A

Figure 26

(6) Carefully remove the HDD cable from the HDD as shown in Figure 25.

Note: When connecting the HDD cable to the connector mounted on the HDD, be sure to connect the HDD cable as shown in Figure 25A.
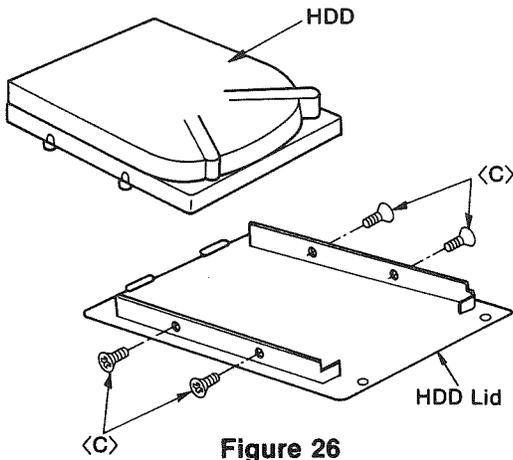
(7) Turn over the HDD and remove four screws ⟨C⟩ (3 × 4 mm) and the HDD Lid as shown in Figure 26.

∗ Reassemble in the reverse order.

4.7 LCD Unit
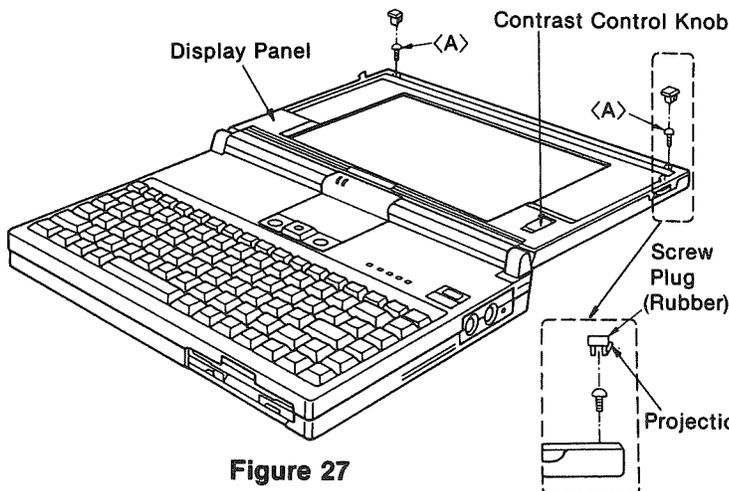
Figure 27

Figure 27A

Caution: When the display panel has been already removed from the top case, the display panel should be installed to both top and bottom cases.
Otherwise, the LCD unit could be damaged while opening the display panel.

(1) Open the display panel fully as shown in Figure 27, then gently remove two screw plugs by pressing them with a flat head screwdriver and two screws ⟨A⟩ (2.6 × 4 mm).

Notes: • The contrast control knob can not be removed from the display panel at this time. Thus, do not try to remove the contrast control knob.
• When inserting the screw plugs into the display panel, be sure the screw plugs are being inserted properly as shown in Figure 27A.
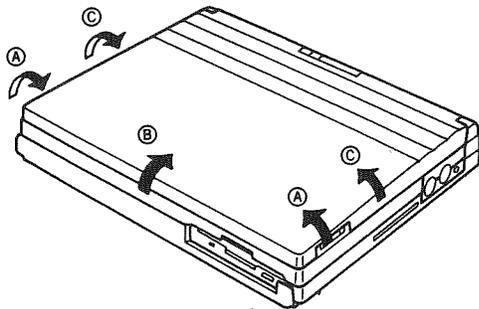
Figure 28

(2) Firmly close the display panel.
Then, gradually pull up the upper display case from the lower display case in the direction of arrows Ⓐ as shown in Figure 28 and 28A.

(3) Next, gradually pull up the upper case from the lower case in the direction of arrows Ⓑ and Ⓒ as shown in Figure 28.

Upper Display Case
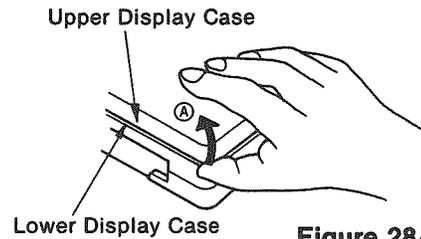
Lower Display Case
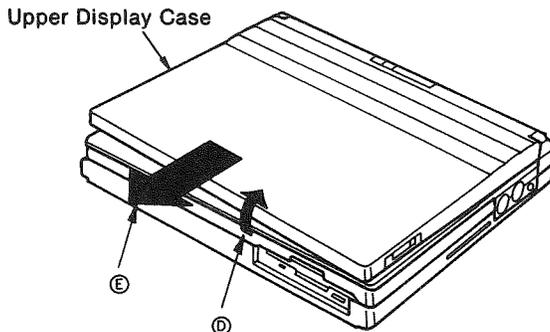
Figure 28A

(4) Raise the upper display case in the direction of arrow Ⓓ and then slide it over in the direction of arrow Ⓔ as shown in Figure 29.

Note: When reassembling, carefully latch four hooks ⟨A⟩ first and latch remaining hooks ⟨B⟩ as shown in Figure 30.

Upper Display Case

Ⓔ

Ⓓ

Figure 29

Hooks ⟨B⟩

Hooks ⟨A⟩

Hooks ⟨B⟩

Hooks ⟨B⟩

Figure 30

LCD Holding Frame ⟨B⟩

LCD Cable

Cable Clamp

Tape

CN902

Tape

FL Inverter PCB

Tape

CN901

FL LAMP

LCD Holding Frame ⟨F⟩

Contrast Control PCB

Tape

LCD Unit
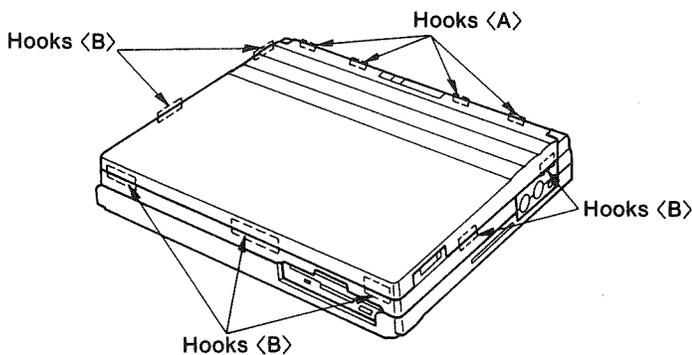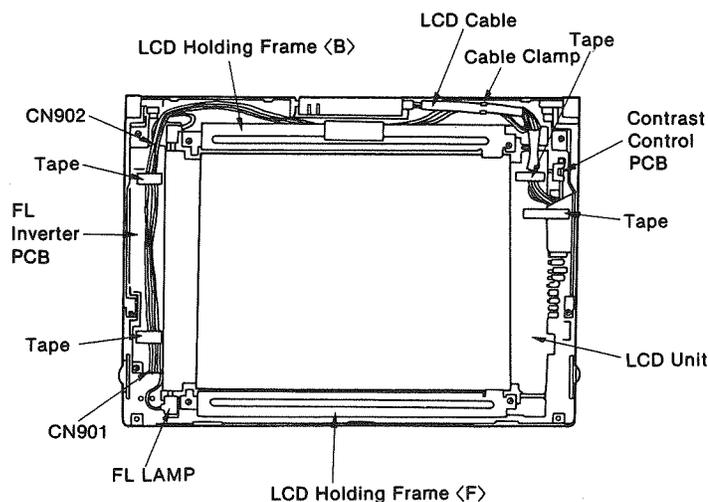
Figure 31

Figure 32A
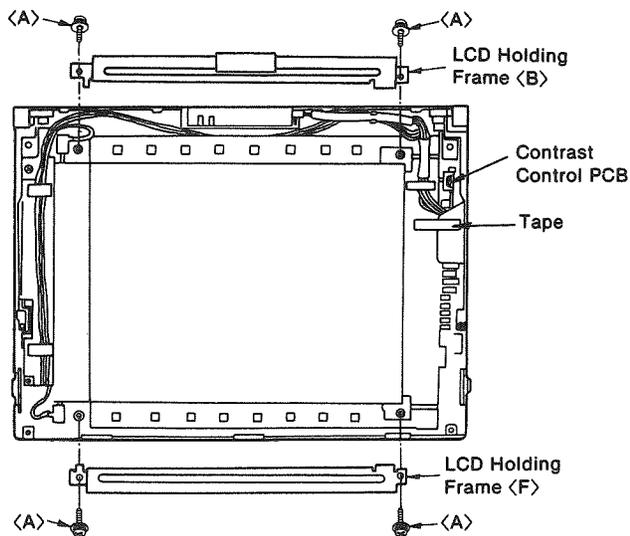
Figure 32B

Figure 33

(5) Remove four screws ⟨A⟩ and the LCD holding frames ⟨B⟩ and ⟨F⟩ as shown in Figure 32.

Note: When you need to remove the contrast control knob, take the following procedures:

　a) Peel off the tape near the contrast control PCB as shown in Figure 32A.

　b) Gradually pull out the contrast control PCB as shown in Figure 32B.

　c) Slide the contrast control knob to the "LOW" position as shown in Figure 32C.

　d) Gently pull out the contrast control knob from the LCD front panel while pushing the hook of the knob with a flat head screwdriver as shown in Figure 32C and 32D.
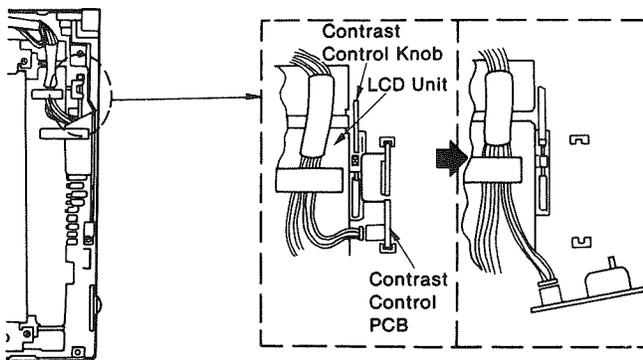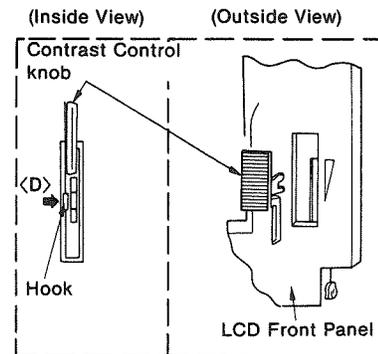
Figure 32C　　**Figure 32D**
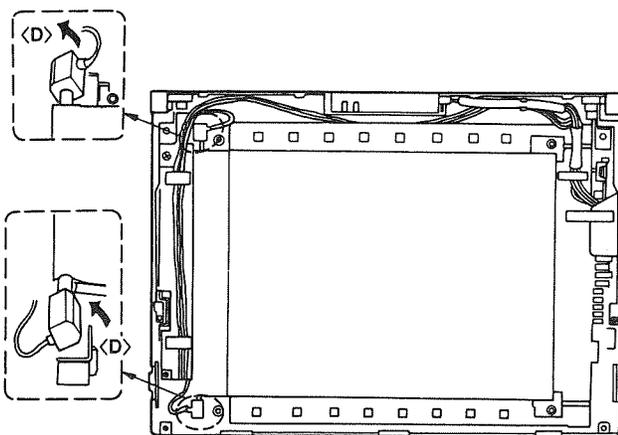
(6) Raise the FL lamp in the direction of arrows ⟨D⟩ as shown in Figure 33.

(7) Carefully turn over the light leading panel as shown in Figure 34.

Note: Do not get the light leading panel stained with fingerprints and dust.

(8) Peel off two pices of tape fixing LCD cable and insulation plate as shown in Figure 34.

Light Leading Panel

Tapes
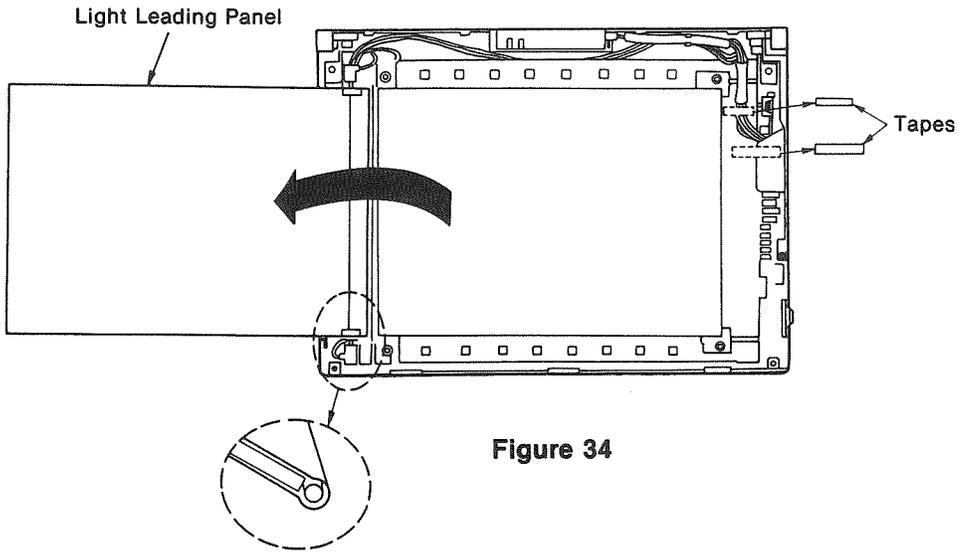
Figure 34

(9) Disconnect the LCD cable connector from the LCD unit and remove the LCD unit as shown in Figure 35.

Note: Do not get the LCD unit stained with fingerprints and dust.
When reassembling, place the LCD unit as shown in Figure 35A.

∗Reassemble in the reverse order.

LCD Cable Connector

LCD

"L" Shaped Projections

LCD
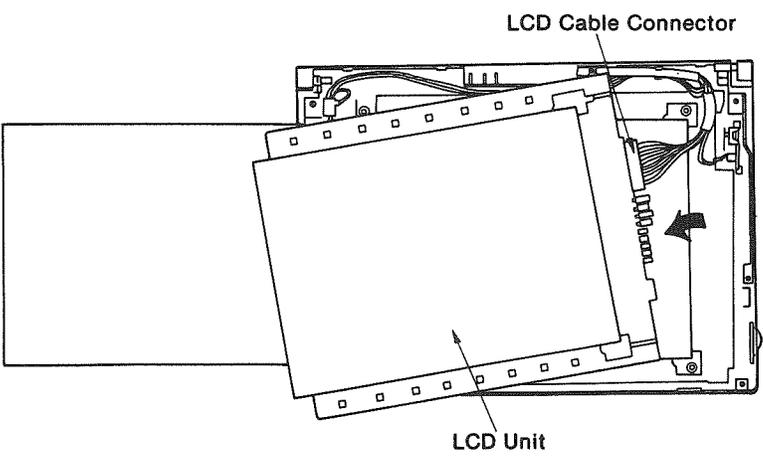
LCD Unit

Figure 35

Figure 35A

4 — 11
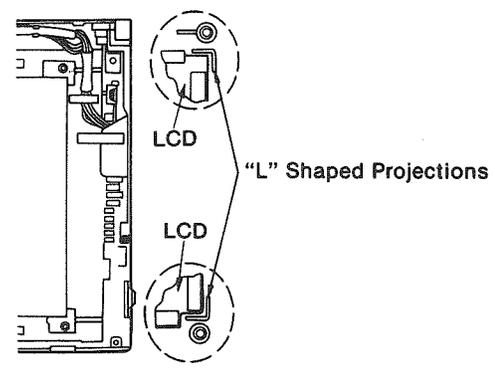
4.8 FL Lamp

(1) After the disassembly step (7) of "4.7 LCD unit" is done, open the diffusion sheet as shown in Figure 36.

Light Leading Panel
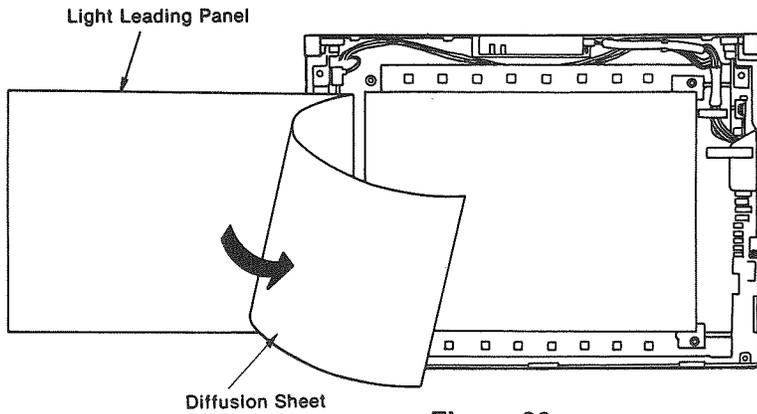
Diffusion Sheet

Figure 36

(2) Carefully slide and take out the light leading panel the diffusion sheet as shown in Figure 37.

Notes:
- Do not get the LCD unit and the light leading panel stained with fingerprints and dust.
- When reassembling, place the diffusion sheet inside the "L" shaped projections as shown in Figure 37A.

Light Leading Panel   Diffusion Sheet

LCD UNIT

FL Lamp

Figure 37

LCD

Diffusion Sheet

"L" Shaped Projection

Diffusion Sheet

"L" Shaped Projection

LCD
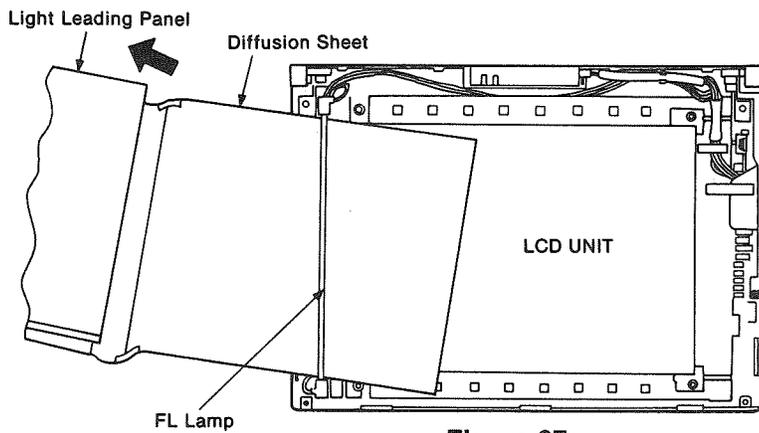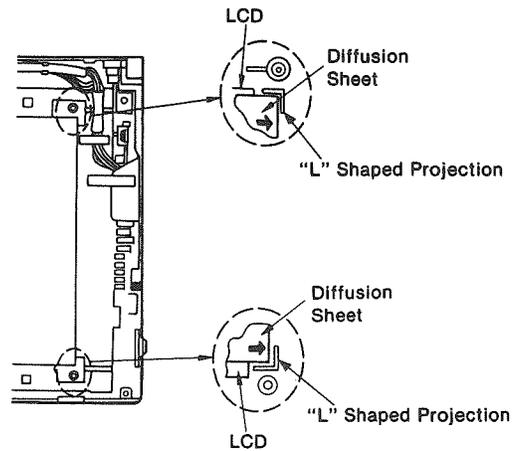
Figure 37A

(3) Remove two screws ⟨A⟩, then raise the FL inverter PCB as shown in Figure 38 and Figure 39.

⟨A⟩

FL Inverter PCB

⟨A⟩
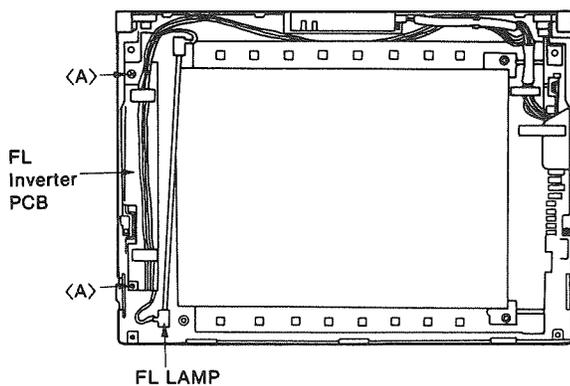
FL LAMP
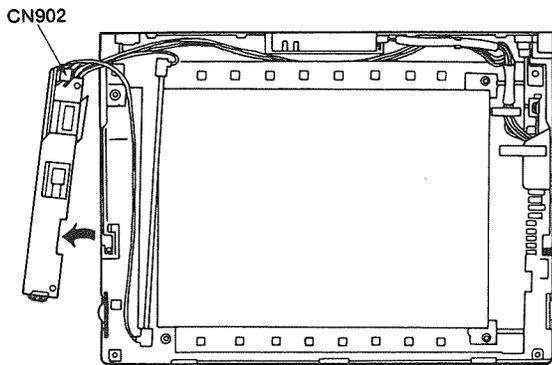
Figure 38

CN902

Figure 39

(4) Disconnect the FL lamp connector (CN902), then remove the FL lamp as shown in Figure 39.

Note: When reassembling, align the wires of the FL lamp as shown in Figure 39A.

To FL Inverter PCB

FL Lamp

Rib

LCD Unit

Rib
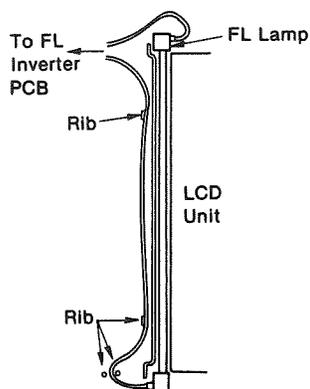
Figure 39A

4.9 Replacing Diffusion Sheet Ass'y

Diffusion Sheet Ass'y*

Reflector

Insulation Sheet

Diffusion Sheet

"WARNING" Label

Light Leading Panel
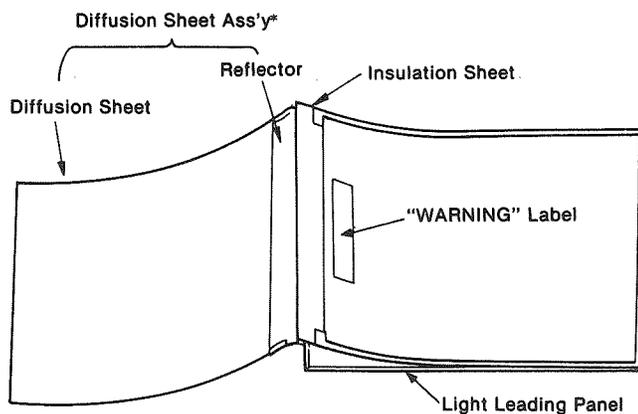
Figure 40

(1) After the disassembly step (2) of "4.8 FL Lamp" is done, carefully peel off the insulation sheet and the diffusion sheet ass'y from the light leading panel block as shown in Figure 40.

*Note: Diffusion sheet ass'y includes both diffusion sheet and refrector.

Diffusion Sheet
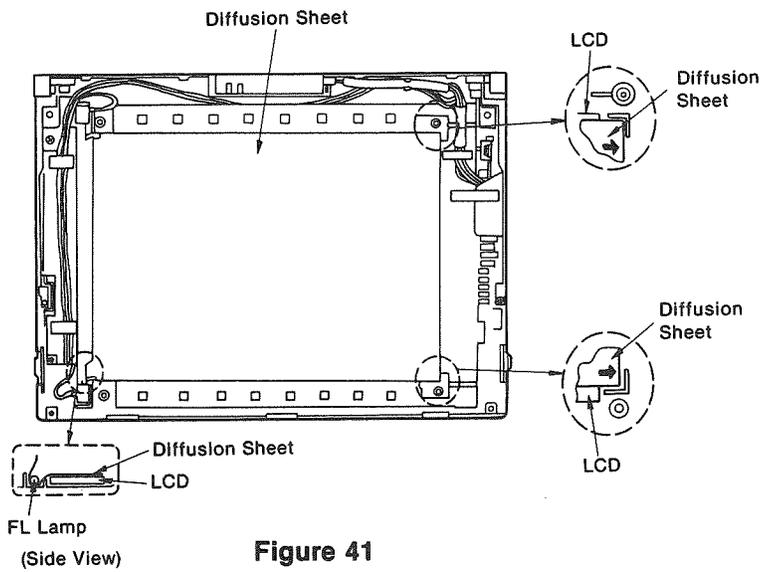
FL Lamp
(Side View)

Figure 41

(2) Place the new diffusion sheet ass'y on the LCD unit as shown in Figure 41.

Note: Refer to "Notes" described in page 4-12.

(Side View)
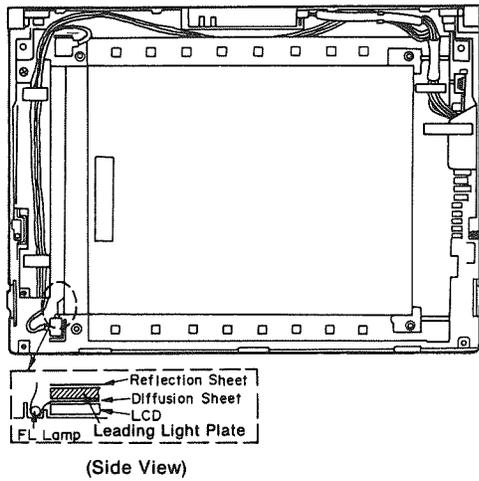
Figure 42

(3) Place the light leading panel as shown in Figure 42.
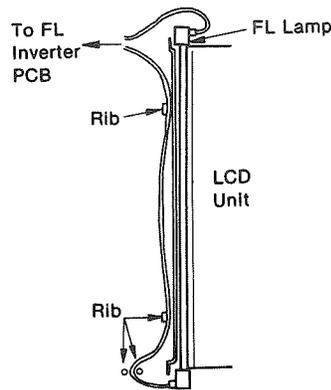
Figure 42A

(4) Place the FL lamp and align the wires of the FL lamp as shown in Figure 42 and Figure 42A.
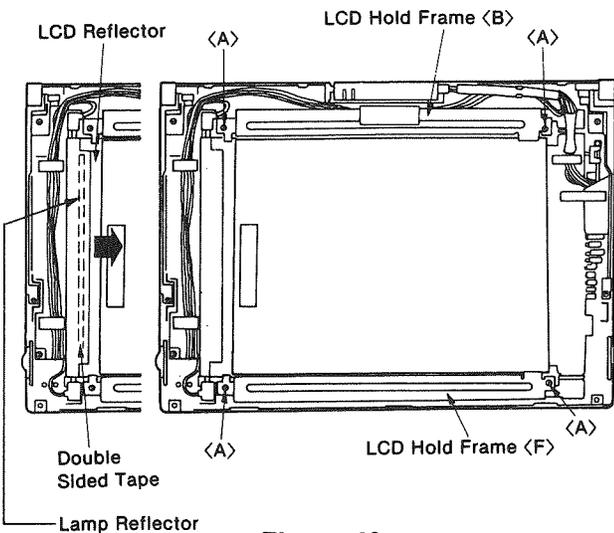
(5) Install the LCD holding frames ⟨B⟩ and ⟨F⟩ with four screws ⟨A⟩ as shown in Figure 43.

(6) Stick the lamp reflector to the LCD reflector by pulling in the direction of arrow as shown in Figure 43.

Figure 43

Double Sided Tape
Insulation Sheet
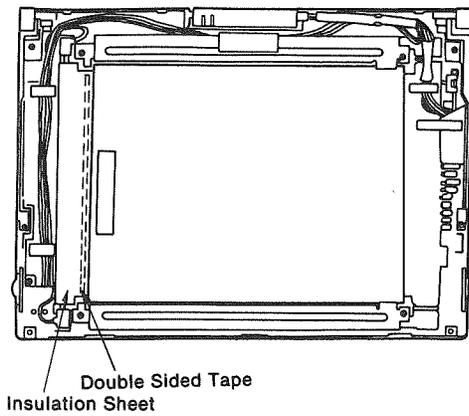
Figure 44

(7) Stick the insulation sheet as shown in Figure 44.

4.10 Track Ball

⟨A⟩
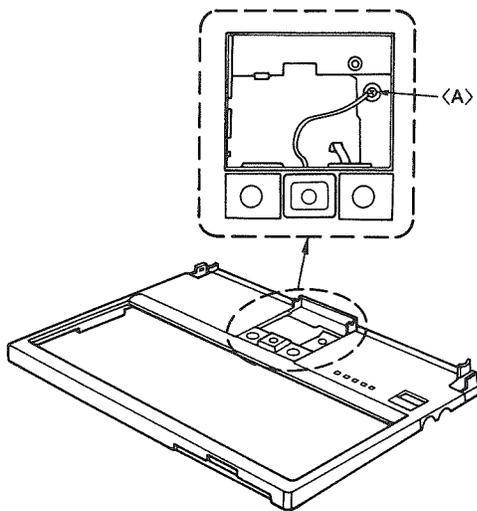
Figure 45

(1) After the disassembly step (10) of "4.1 Top Case" is done, remove screw ⟨A⟩ as shown in Figure 45.

(2) Remove two screws ⟨B⟩ as shown in Figure 45A.

⟨B⟩   Track Ball
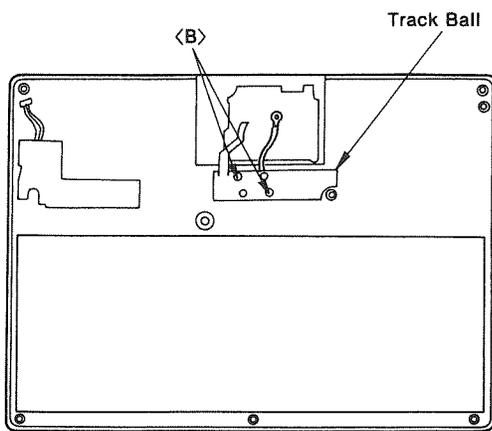
Figure 45A

5. LCD Contrast Adjustment

5.1 Test Equipment

(1) LCD Contrast Adjustment Disk (P/N: DFWV91C0005)... 1pc.
(2) AC Adapter... 1pc.
(3) Main Battery .... 1pc.
     (Note: Be sure that Main Battery Pack is fully charged.)

5.2 Adjustment Methods

Note:

The following adjustment should be performed at an environmental temperature of 77°F (25°C).

Preparation:

- Attach the fully charged battery pack.
- Connections should be made as shown in Figure 1.
- Slide the LCD contrast control knob as shown in Figure 2.

AC Adapter

AC outlet

LCD Contrast Control Knob

5mm
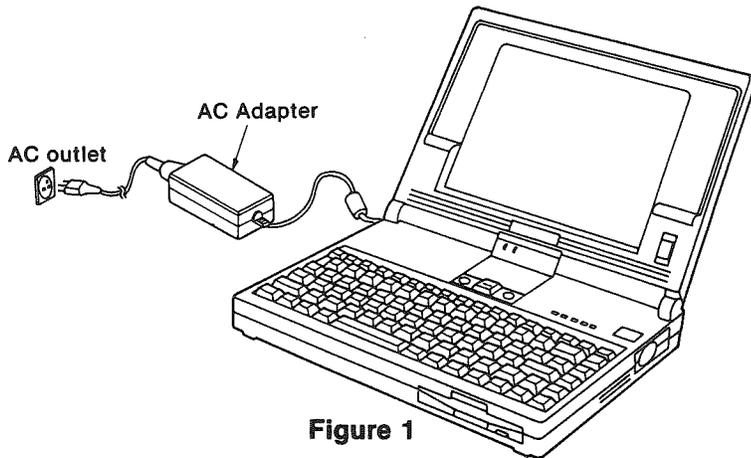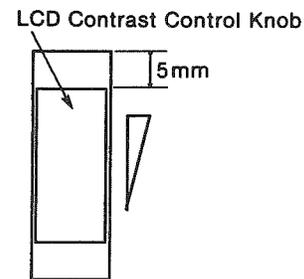
Figure 1　　　　　　　　　　　　　　　　　　**Figure 2**

Procedure:

(1) Insert the LCD contrast adjustment disk to FDD.
(2) Press the power switch to turn ON the computer and press the reset button.
(3) Set the backlight brightness into "High".
    (Select brightness by using Fn+F6 keys.)
(4) Confirm that the screen displays test graphic pattern as shown in Figure 3 on next page.
(5) Carefully adjust the screen contrast by pressing "←" and "→" keys to obtain the best contrast.
(6) Press "Space" key.
(7) Press "Y" key. (Or press "N" key if readjustment is required and repeat from step (5).)
(8) The LCD screen displays as shown in Figure 4 on next page.
(9) Press any key.
(10) The LCD screen displays as shown in Figure 5 on next page.
(11) LCD contrast adjustment is completed and the computer will be rebooted. Thus, remove the LCD contrast control disk from the FDD.

Note:

If LCD contrast adjustment fails, be sure whether a +12Vdc is supplied from pin 1 of IC7 (Regulator) or not.
The +12Vdc is output when "Any Key" is pressed at step (9) in this adjustment.

BLACK BLUE GREEN CYAN RED MAGENTA YELLOW WHITE
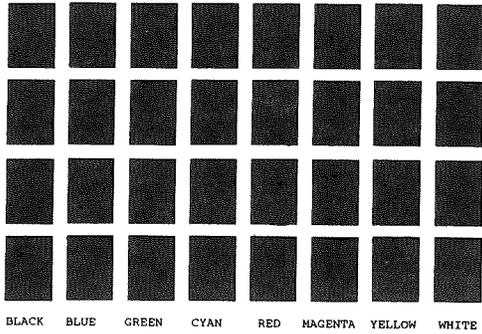
Figure 3

```
A>REM ** write to flash ROM **
A>FLASHS FLASH1.BIN

Boot block 8 KB is OK.
PMAN disabled.
Shadow and cache disabled.
Write to ROM CS enabled.
Flash BIOS ID confirmed.
12V enabled.

Ready to program. Be sure 12V is under GA2 control.
Press any key when ready
```
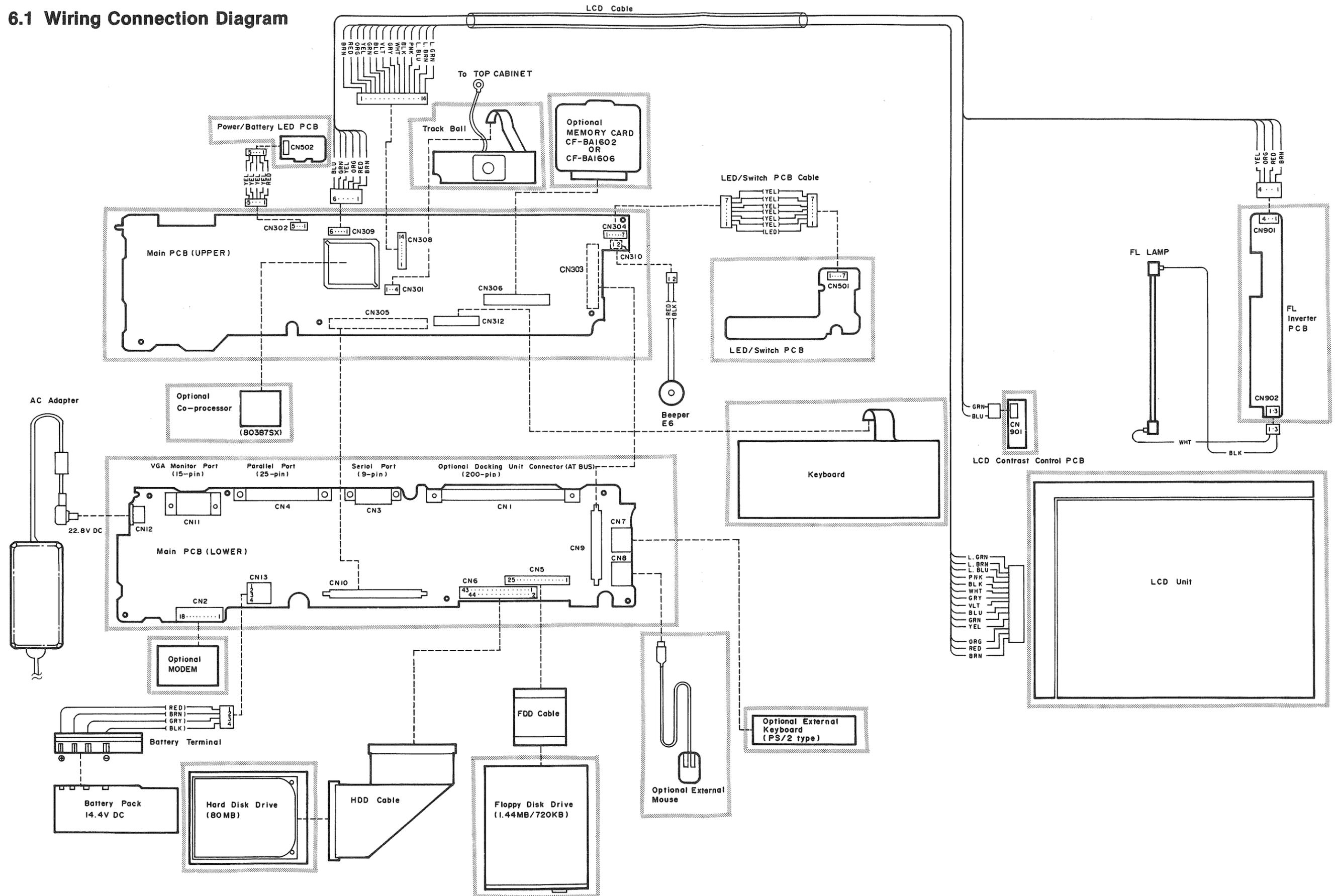
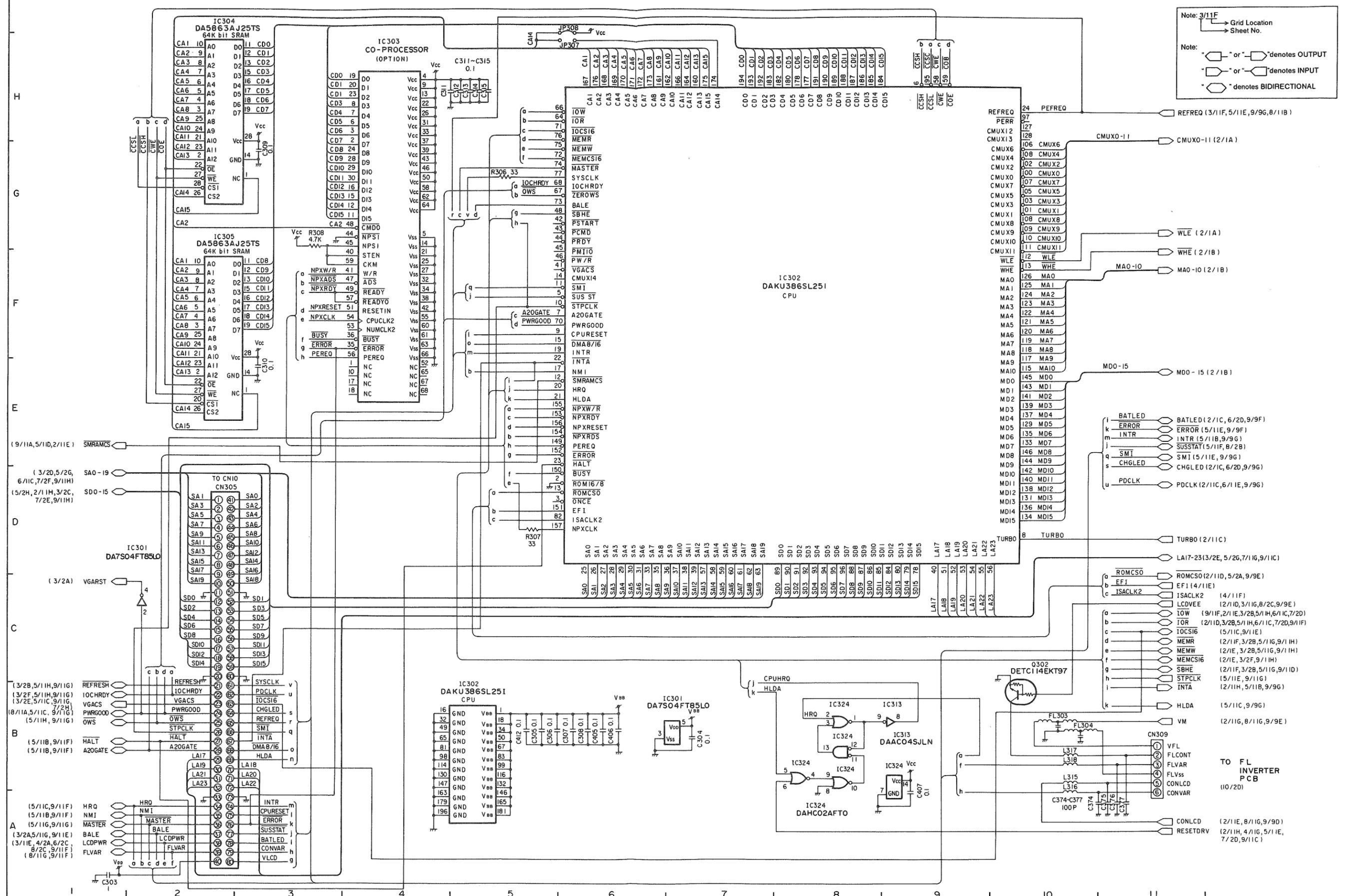**Figure 4**

```
Erasing & programming FLASH...please wait
```

Figure 5

6. Schematic Diagrams/Parts Location/Replacement Parts List
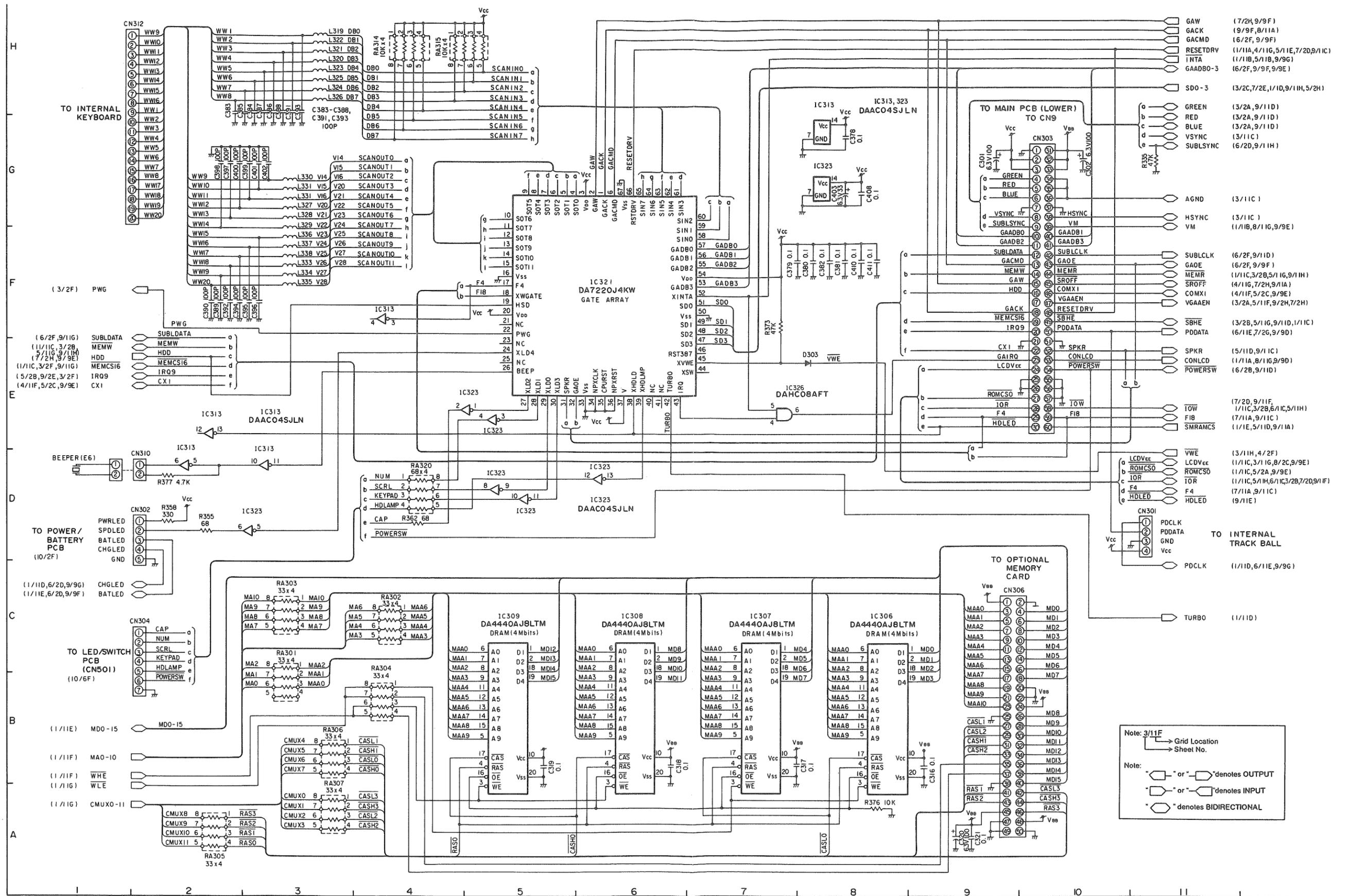
6.1 Wiring Connection Diagram

LCD Cable

To TOP CABINET

Power/Battery LED PCB

CN502

Track Ball

Optional
MEMORY CARD
CF-BA1602
OR
CF-BA1606

LED/Switch PCB Cable

FL LAMP

CN901

CN302   CN309   CN308   CN304

CN310

Main PCB (UPPER)

CN301   CN306   CN303

CN305   CN312

CN501

LED/Switch PCB

FL
Inverter
PCB

CN902

AC Adapter

Optional
Co-processor

(80387SX)

Beeper
E6

GRN
BLU

CN
901

LCD Contrast Control PCB

WHT   BLK

VGA Monitor Port
(15-pin)

Parallel Port
(25-pin)

Serial Port
(9-pin)

Optional Docking Unit Connector (AT BUS)
(200-pin)

Keyboard

22.8V DC   CN12

CN11   CN4   CN3   CN1

CN7

CN9

CN8

Main PCB (LOWER)

CN13

CN2   CN10   CN6   CN5

LCD Unit

Optional
MODEM

RED
BRN
GRY
BLK

Battery Terminal

FDD Cable

Optional External
Keyboard
(PS/2 type)

Optional External
Mouse

Battery Pack
14.4V DC

Hard Disk Drive
(80MB)

HDD Cable

Floppy Disk Drive
(1.44MB/720KB)

(4) Main PCB (Upper), VRAM and Frame Memory Circuits (Sheet No. 4 of 10)

Note: 3/11F
→ Grid Location
→ Sheet No.

Note:
" ◁— " or " —▷ " denotes OUTPUT
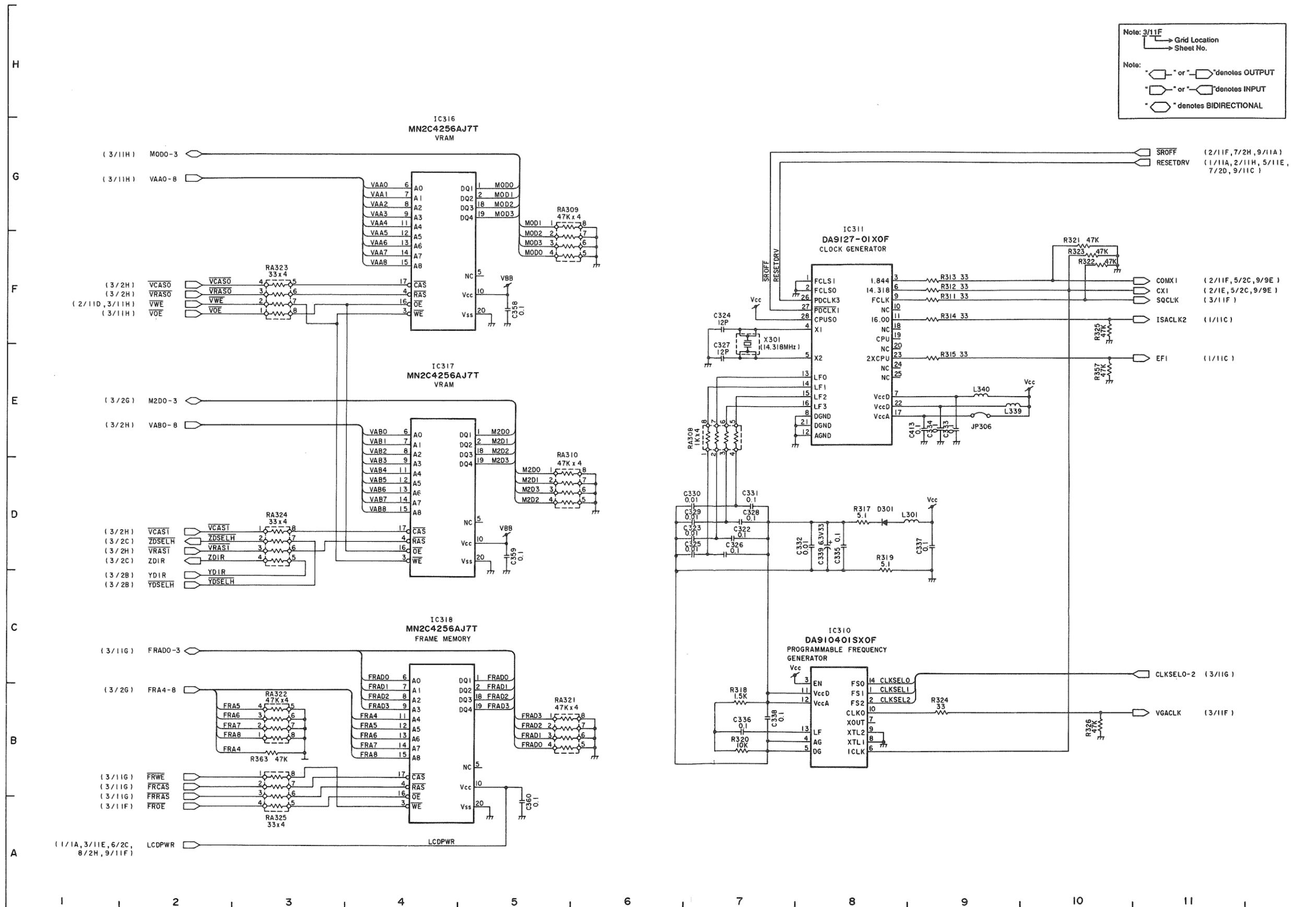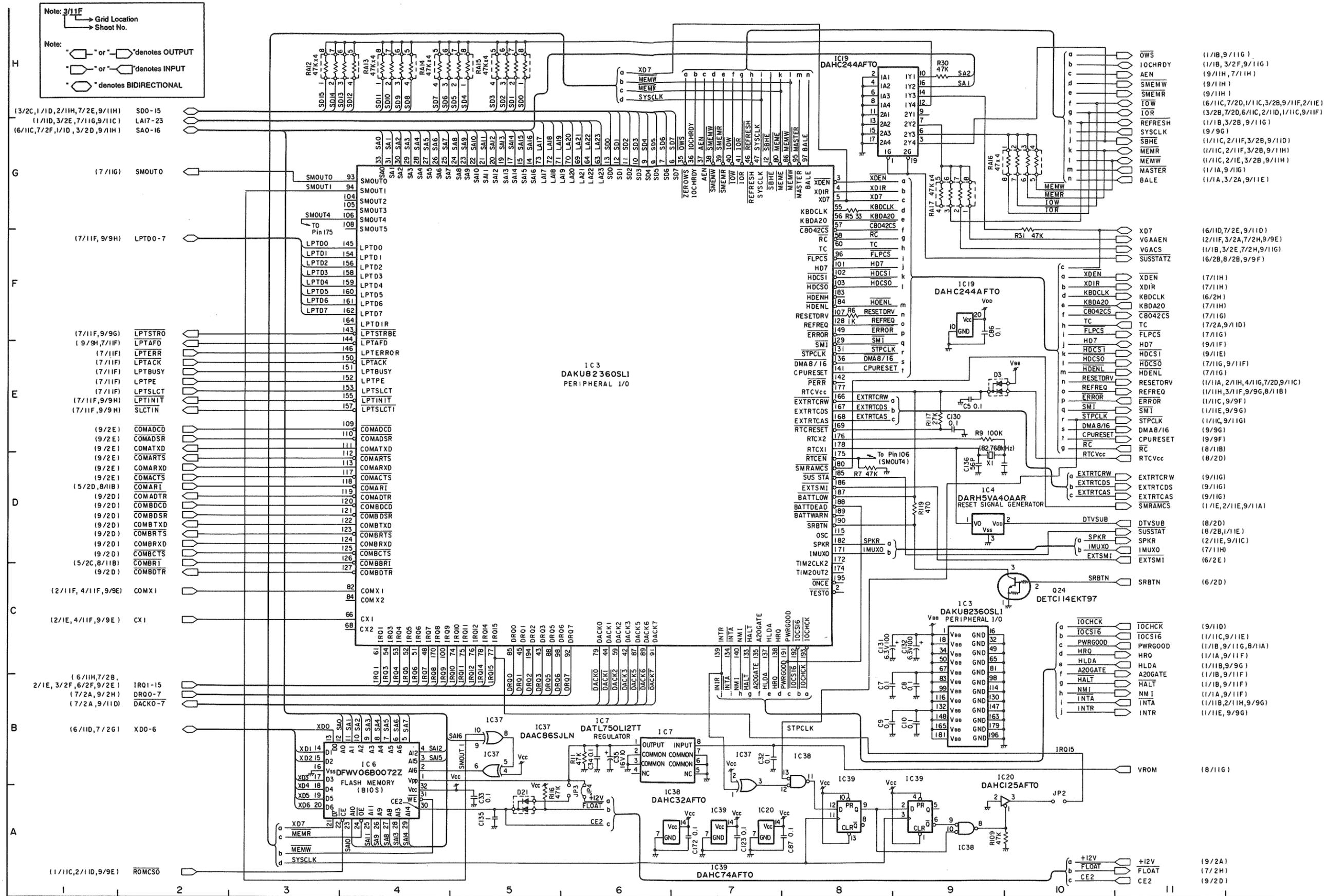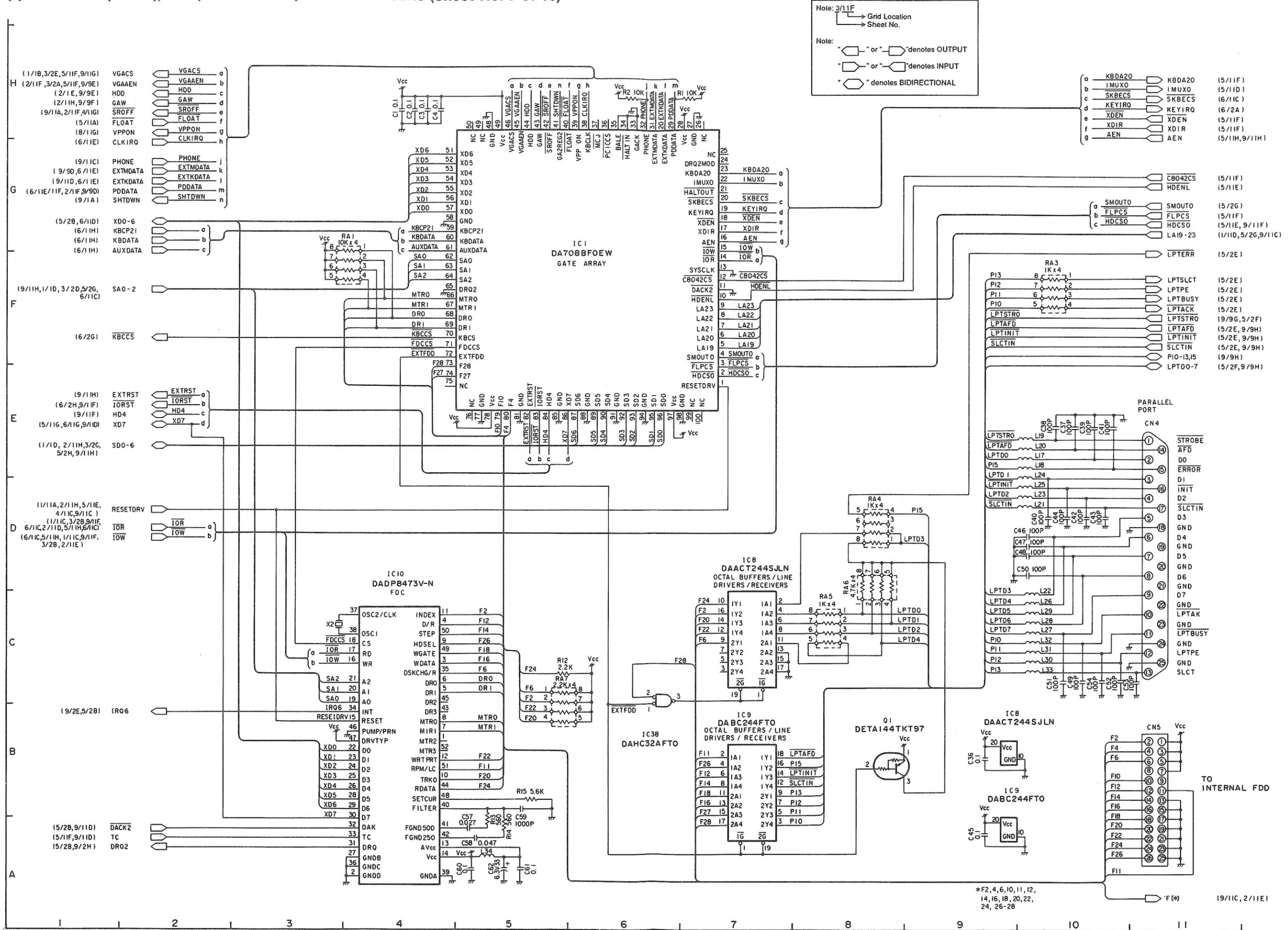" ▷— " or " —▷ " denotes INPUT
" ⬡ " denotes BIDIRECTIONAL

IC316
MN2C4256AJ7T
VRAM

(3/11H) MOD0-3
(3/11H) VAA0-8

VAA0 6 — A0   DQ1 1 — MOD0
VAA1 7 — A1   DQ2 2 — MOD1
VAA2 8 — A2   DQ3 18 — MOD2
VAA3 9 — A3   DQ4 19 — MOD3
VAA4 11 — A4
VAA5 12 — A5
VAA6 13 — A6
VAA7 14 — A7
VAA8 15 — A8

RA309
47K x 4
MOD1
MOD2
MOD3
MOD0 4

NC 5
VBB
CAS 17
RAS 4
OE 16
WE 3
Vcc 10
Vss 20
C358 0.1

RA323
33 x 4

(3/2H) VCAS0 VCAS0
(3/2H) VRAS0 VRAS0
(2/11D,3/11H) VWE VWE
(3/11H) VOE VOE

IC317
MN2C4256AJ7T
VRAM

(3/2G) M2D0-3
(3/2H) VAB0-8

VAB0 6 — A0   DQ1 1 — M2D0
VAB1 7 — A1   DQ2 2 — M2D1
VAB2 8 — A2   DQ3 18 — M2D2
VAB3 9 — A3   DQ4 19 — M2D3
VAB4 11 — A4
VAB5 12 — A5
VAB6 13 — A6
VAB7 14 — A7
VAB8 15 — A8

RA310
47K x 4
M2D0
M2D1
M2D3
M2D2 4

NC 5
VBB
CAS 17
RAS 4
OE 16
WE 3
Vcc 10
Vss 20
C359 0.1

RA324
33 x 4

(3/2H) VCAS1 VCAS1
(3/2C) ZDSELH ZDSELH
(3/2H) VRAS1 VRAS1
(3/2C) ZDIR ZDIR
(3/2B) YDIR YDIR
(3/2B) YDSELH YDSELH

IC318
MN2C4256AJ7T
FRAME MEMORY

(3/11G) FRAD0-3
(3/2G) FRA4-8

FRAD0 6 — A0   DQ1 1 — FRAD0
FRAD1 7 — A1   DQ2 2 — FRAD1
FRAD2 8 — A2   DQ3 18 — FRAD2
FRAD3 9 — A3   DQ4 19 — FRAD3
FRA4 11 — A4
FRA5 12 — A5
FRA6 13 — A6
FRA7 14 — A7
FRA8 15 — A8

RA322
47K x 4
FRA5
FRA6
FRA7
FRA8
FRA4
R363 47K

RA321
47K x 4
FRAD3
FRAD2
FRAD1
FRAD0 4

NC 5
CAS 17
RAS 4
OE 16
WE 3
Vcc 10
Vss 20
C360 0.1

RA325
33 x 4
(3/11G) FRWE
(3/11G) FRCAS
(3/11G) FRRAS
(3/11F) FROE

(1/1A,3/11E,6/2C, 8/2H,9/11F) LCDPWR   LCDPWR

SROFF (2/11F,7/2H,9/11A)
RESETDRV (1/11A,2/11H,5/11E, 7/2D,9/11C)

IC311
DA9127-01X0F
CLOCK GENERATOR

SROFF
RESETDRV

Vcc

1 — FCLS1   1.844 3 — R313 33 — COMX1 (2/11F,5/2C,9/9E)
26 — FCLS0   14.318 6 — R312 33 — CX1 (2/1E,5/2C,9/9E)
27 — PDCLK3   FCLK 9 — R311 33 — SQCLK (3/11F)
10 — PDCLK1   NC 10
28 — CPUS0   16.00 11 — R314 33 — ISACLK2 (1/11C)
4 — X1   NC 18
                CPU 19
                NC 20
                2XCPU 23 — R315 33 — EF1 (1/11C)
5 — X2   NC 24
                NC 25
C324 12P
X301 (14.318MHz)
C327 12P

13 — LF0
14 — LF1
15 — LF2
16 — LF3
8 — DGND   VccD 7
21 — DGND   VccD 17
12 — AGND   VccA 22

L340   Vcc
L339
JP306
C413 C...

RA308
1K x 4

R321 47K
R323 47K
R322 47K
R325 47K
R357 47K

C330 0.01   C331 0.1
C329 0.01   C328 0.1
C323   C322 0.1
C325   C326 0.1

R317 5.1   D301   L301 Vcc
C332 0.01
C339 6.3V33
C335 0.1
C337
R319 5.1

IC310
DA910401SX0F
PROGRAMMABLE FREQUENCY
GENERATOR

Vcc
3 — EN   FS0 14 — CLKSEL0 (3/11G)
11 — VccD   FS1 1 — CLKSEL1
12 — VccA   FS2 2 — CLKSEL2
             CLK0 10
             XOUT 7 — R324 33
13 — LF   XTL2 9
4 — AG   XTL1 8 — VGACLK (3/11F)
5 — DG   ICLK 6

R318 1.5K
C336 0.1
C338 0.1
R320 10K
R326 47K

6 — 9   6 — 10

6.3 Printed Circuit Board and Parts Locations

Main PCB (Upper)

Top View

EI-I(SOCKET FOR OPTIONAL CO-PROCESSOR IC303)

Rear Side

IC311 CLOCK GENERATOR

Socket (IC303)

Front Side

IC310 PROGRAMMABLE FREQUENCY GENERATOR

IC306-309 4M bits DRAMs

Bottom View

IC319,320 OCTAL BUS TRANSCEIVERS

Front Side

IC315 CONSTANT CURRENT GENERATOR

IC316-317 VRAMs

IC321 GATE ARRAY

Pin60

Cut Portion of Printed Pattern

IC304,305 64K bits SRAMs (CACHE)

IC302 CPU

Rear Side

IC314 VGA CONTROLLER

IC318 FRAME MEMORY

Main PCB (Lower)

Top View

IC7 REGULATOR
Rear Side
IC5 RS-232C DRIVER/RECEIVER
IC12 KEYBOARD CONTROLLER
IC1 GATE ARRAY

IC17 SKBE
Front Side
IC3 PERIPHERAL I/O
IC6 FLASH MEMORY BIOS
IC10 FDC

Bottom View

Front Side
IC4 RESET SIGNAL GENERATOR

Rear Side

Power/Battery LED PCB, LED/Switch PCB and Contrast Control PCB

Power/Battery LED PCB

Top View

CN502

LD506   LD507

POWER   BATT.

LED/SWITCH PCB

Top View

CN501

SW501   □   ← POWER SWITCH

LD505   LD501   LD502   LD503   LD504

HDD   Num LK   Key Pad

Shift LK   Scr LK
(Caps LK)
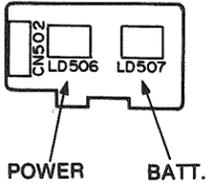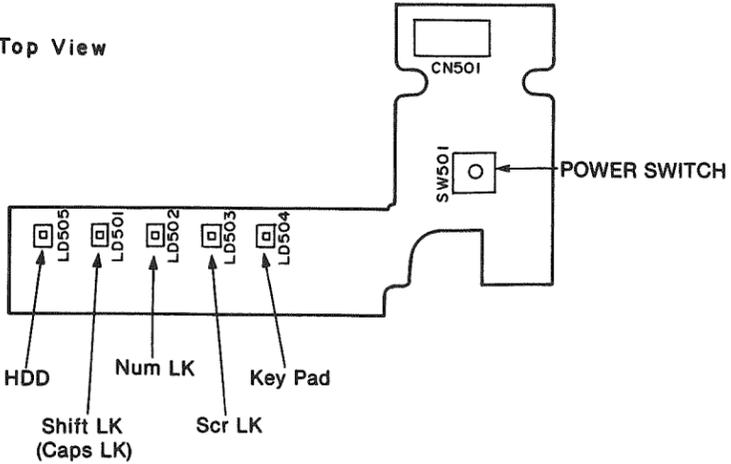
CONTRAST CONTROL PCB

Top View

VR901

TH901   R901

CN901

6.4 Exploded View

Rechargeable
Battery
(Supplied from Sales
Route only)
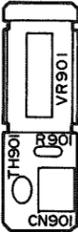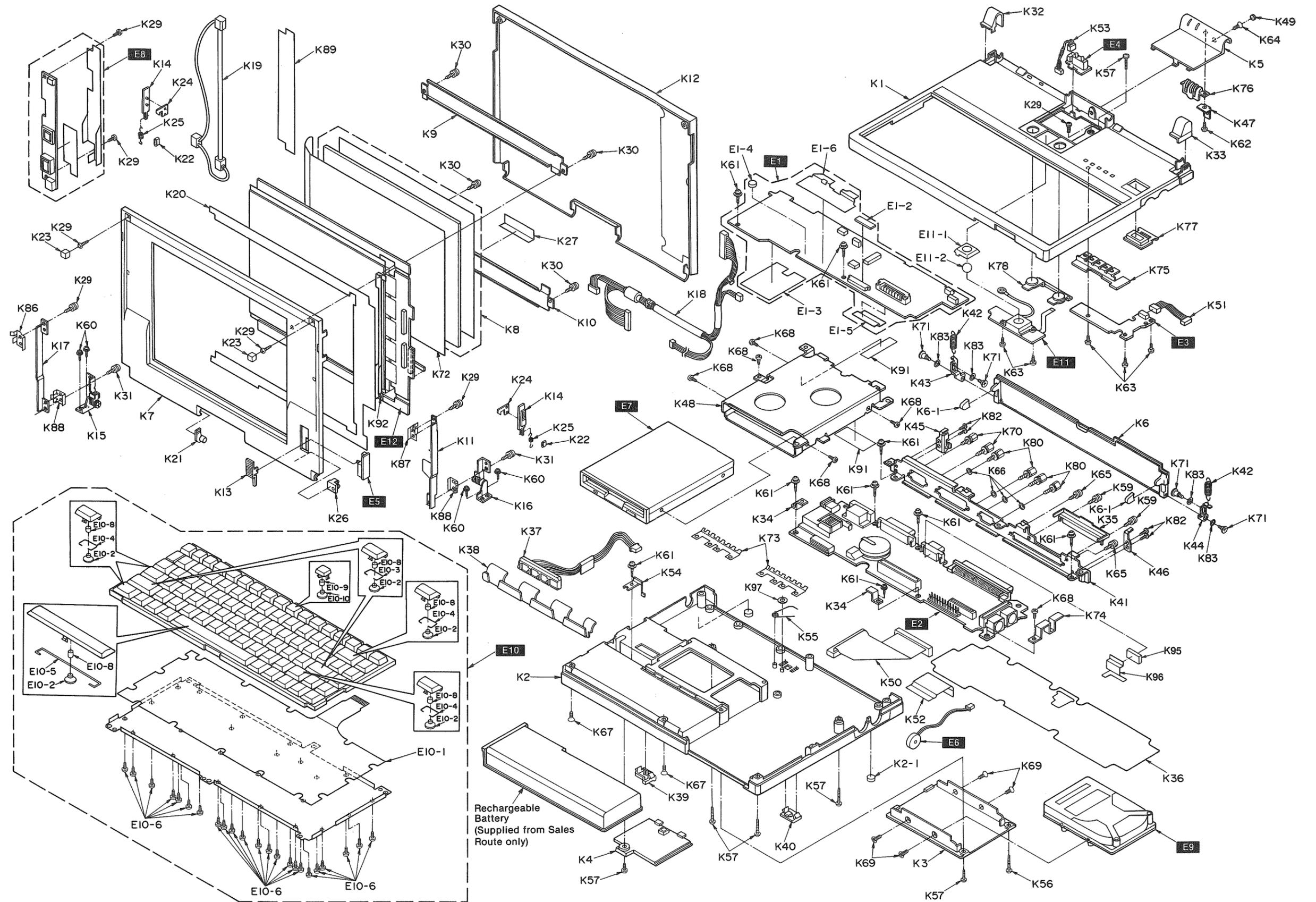
6.5 Replacement Parts List
(Mechanical, Accessories, Packing and Electrical)

NOTE: 1. Important safety notice.
Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

REF. No. AND AREA			PART NO.	DESCRIPTION	Q'TY
MAIN BLOCK UNITS					
E 1			DFWV48C198Z	Ass'y, PCB, MAIN(UPPER) NLA	1
E 1-1			DFJS68R24ZA	SOCKET, 68-PIN, PLCC IC(IC303, CO-PROCESSOR)	1
E 1-2			DFMX0281ZA	SHEET, SLIDE, KEYBOARD MEMBRANE	1
E 1-3			DFMX0278ZA	SHEET, INSULATION	1
E 1-4			DFHG333ZA	SPACER, RUBBER, TRACK BALL	1
E 1-5			DFMX0280ZA	SHEET, PROTECTOR, CABLE, FDD	1
E 1-6			DFMX0249ZB	SHEET, INSULATION, TRACK-BALL	1
E 2			DL3U10510CAA	Ass'y, PCB, MAIN(LOWER) NLA	1
E 3			DL3U40510CAA	Ass'y, PCB, LED/SWITCH NLA	1
E 4			DL3U20510CAA	Ass'y, PCB, POWER/BATT LED NLA	1
E 5			DL3U10484AAA	Ass'y, CONTRAST CONTROL, PCB NLA	1
E 6			DFAFCB17AY	BEEPER	1
E 7	⚠		DFJG052YA-M	Ass'y, FDD	1
E 8	⚠		DFWV48C194Z	Ass'y, FL INVERTER PCB	1
E 9	⚠		DFJH003ZA-C	HDD, 80MB, CP-2084	1
E10	⚠	(M)	ESU54TM404BK	Ass'y, KEYBOARD(U.S.A.)	1
		(E)	ESU54TM405BA	Ass'y, KEYBOARD(ENGLISH)	
		(F)	ESU54TM405CA	Ass'y, KEYBOARD(FRENCH)	
		(G)	ESU54TM405AA	Ass'y, KEYBOARD(GERMAN)	
		(SW)	ESU54TM405FA	Ass'y, KEYBOARD(SWEDISH)	
E11			EMU-15901	Ass'y, TRACK-BALL	1
E11-1			DFWV65C0223	LID, TRACK-BALL	1
E11-2			DFWV65C0224	BALL, TRACK-BALL	1
E12			DFWV08A025ZA	Ass'y, LCD UNIT	1
MECHANICAL PARTS					
K 1		(M)	DFWV80A0127	Ass'y, CABINET, TOP	1
		(E,SW)	DFWV80A0128		
		(F,G)	DFWV80A0129		
K 2	⚠	(M)	DFWV80C0237	Ass'y, CABINET, BOTTOM	1
		(E,F,G)	DFWV80C0241		
		(SW)	DFWV80C0244		
K 2-1			DFHG332YA	FOOT, RUBBER, BOTTOM CABINET	2
K 3			DFWV60B0005	Ass'y, LID, HDD HOUSING	1
K 4			DFWV82A0062	Ass'y, LID, MODEM HOUSING	1
K 5			DFWV82A0063	Ass'y, LID, EXTENSION	1
K 6			DFWV82A0064	Ass'y, LID, EXTERNAL CONNECTORS	1
K 6-1			DFHG954ZA-0	FOOT, RUBBER, CONNECTOR LID	2
K 7			DFWV80C0238	Ass'y, CABINET, FRONT, LCD	1
K 8			DFWV52H0004	Ass'y, PANEL, LIGHT LEADING	1
K 9			DFWV65A0196	Ass'y, FRAME, LCD HOLDING F	1
K10			DFWV65A0195	Ass'y, FRAME, LCD HOLDING B	1
K11			DFWV65A0197	Ass'y, FRAME, REINFORCEMENT, HINGE , RIGHT	1
K12			DFWV84A0081	Ass'y, CABINET, REAR, LCD	1
K13			DFBD0043ZA-1	KNOB, LCD CONTROL	1
K14			DFHR5237ZA-1	KNOB, LCD HOLD	2
K15			DFBH1025ZA	HINGE, LEFT	1
K16			DFBH1026ZA	HINGE, RIGHT	1
K17			DFMD1055ZB	FRAME, REINFORCEMENT, HINGE, LEFT	1
K18			DFJS01Z71ZAV	CABLE, LCD	1
K19			DFAC0010ZAW	LAMP, BACKLIGHT, LCD	1
K20			DFMX0254ZA	SHEET, INSULATOR-2, LCD	1
K21			DFHR9010ZA	SLEEVE, LCD	1
K22			DFHG406ZA	TUBE, STOPPER, SPRING	2
K23			DFHG944ZA-1	PLUG, SCREW, RUBBER	2
K24			DFME0074ZA-0	HOLDER, LCD	2
K25			DFUW0044ZB	SPRING, LCD LOCK	2
K26			DFHR9005ZA-K	CLAMP, CABLE	1
K27			DFMX0273YA	PLATE, FIXER, CABLE	1
K28 (NOT USED)					
K29			XSB26+4	SCREW, M2.6 x 4mm	6
K30			XYN26+C4	SCREW, M2.6 x 4mm	4

REF. No. AND AREA	PART NO.	DESCRIPTION	Q'TY
K31	XYN26+C5FN	SCREW, M2.6 x 5mm	2
K32	DFKE0217ZA-0	COVER, HINGE, LEFT	1
K33	DFKE0218ZA-0	COVER, HINGE, RIGHT	1
K34	DFMD3019ZA	FRAME, PCB HOLD	2
K35	DFMD3020ZA	FRAME, RAM CARD HOLD	1
K36	DFMX0247ZA	SHEET, INSULATION, MAIN PCB	1
K37	DFJC9911ZAC	Ass'y, BATTERY TERMINAL	1
K38	DFGX0101ZA	PLATE, ORNAMENT, BOTTOM CABINET	1
K39	DFBD0045ZA-1	KNOB, BATTERY	1
K40	DFBD0046ZA-1	KNOB, CONNECTOR LID	1
K41	DFWV65A0198	Ass'y, FRAME, CONNECTOR	1
K42	DFUW0045ZB	SPRING, UPLIFT, CONNECTOR LID	2
K43	DFMD1059ZA	STAY, CONNECTOR LID, LEFT	1
K44	DFMD1060ZA	STAY, CONNECTOR LID, RIGHT	1
K45	DFMD3017ZB	SUSTAINER, CONNECTOR LID, LEFT	1
K46	DFMD3018ZB	SUSTAINER, CONNECTOR LID, RIGHT	1
K47	DFMD3022ZA	PLATE, PROTECTION, CO-PROCESSOR	1
K48	DFMD2041ZA	FRAME, FDD HOLD	1
K49	DFHG329ZA-1	MASK, RUBBER, SCREW	1
K50	DFJS01Z70YA	CABLE, HDD	1
K51	DLJS0022A02A	CABLE, LED/SWITCH PCB	1
K52	DFJE26A038BS	CABLE, FDD	1
K53	DLJS0022A03A	Ass'y, CABLE(POWER/BATT LED)	1
K54	DFUS0146ZA	SPRING, BATTERY EJECT	1
K55	DFUW0043ZB	SPRING, LOCK, EXTERNAL CONNECTOR	1
K56	XSB26+24FZ	SCREW, M2.6 x 24mm	1
K57	XSB26+8FZ	SCREW, M2.6 x 8mm	6
K58 (NOT USED)			
K59	XYN26+C5FN	SCREW, M2.6 x 5mm	2
K60	XYN26+J12	SCREW, M2.6 x 12mm	4
K61	XYN3+J7	SCREW, M3 x 7mm	10
K62	XSB2+4	SCREW, M2 x 4	1
K63	XSB2+5FN	SCREW, M2 x 5mm	5
K64	XSS26+4FZ	SCREW, M2.6 x 4mm	1
K65	XYN26+C5FN	SCREW, M2.6 x 5mm	2
K66	XWA3BFN	WASHER	4
K67	XSS26+6FZ	SCREW, EXTERNAL CONNECTORS	2
K68	XSB3+4	SCREW, M3 x 4mm	6
K69	XSS3+4FZ	SCREW, M3 X 6mm	4
K70	DFHE5031ZA	SCREW, HEXAGONAL HEAD	2
K71	DFHE5020ZB	SCREW, LID, EXTERNAL CONNECTOR	4
K72	DFHR7180ZB	SHEET, DIFFUSION, LCD	1
K73	DFHM0115ZA	SPRING, PLATE, CONNECTOR	2
K74	DFHM0116ZA	SPRING, PLATE, CONNECTOR, SERIAL	1
K75	DFGL0019ZA	PANEL, LIGHT LEADING, FUNCTION LED	1
K76	DFGL0020ZA	PANEL, LIGHT LEADING, POWER/BATT LED	1
K77	DFBC0114ZA-1	BUTTON, POWER ON-OFF	1
K78	DFBC0115ZA-1	BUTTON, TRACK-BALL	1
K79 (NOT USED)			
K80	DFHE5027ZA	SCREW, EXTERNAL CONNECTOR	4
K81 (NOT USED)			
K82	XQNDF2+A4FZ	SCREW, M2 x 4mm	4
K83	DFNW3102YA	WASHER	4
K84 (NOT USED)			
K85 (NOT USED)			
K86	DFUS0154ZA	SPRING, HOOK, LCD L	1
K87	DFUS0155ZA	SPRING, HOOK, LCD R	1
K88	DFUS0156ZA	SPRING, HOOK	2
K89	DFMX0285ZA	SHEET, INSULATION	1
K90 (NOT USED)			
K91	DFMX0286ZA	SHEET, PROTECTION, HDD CABLE	2
K92	DFMD1066ZA	SPRING, PLATE, LCD	1
K93 (NOT USED)			
K94 (NOT USED)			
K95	DFHR9011ZA	CUSHION, FERRITE	1
K96	DFHR7206ZA	SHEET, FERRITE	1
K97	DFDR9002ZC	WASHER	1

REF. No. AND AREA			PART NO.	DESCRIPTION	Q'TY

ACCESSORIES

REF. No. AND AREA			PART NO.	DESCRIPTION	Q'TY
A 1	⚠	(M, E, F, G)	CF-AA186M1	AC ADAPTER, INPUT/110-240V, OUTPUT/23Vdc 1.25A	1
		(SW)	CF-AA186M2		
A 2	⚠	(M, SW)	DFJA0033ZAKK	AC CABLE, 125V, 1250W(for AC Adapter)	1
		(E)	DFJA04ZBKK		
		(G, F)	DFJA0032ZAKK		
A 3		(M, E, SW)	DFJN309ZA	DISK, SYSTEM (DISK1, INSTALLATION)	1
		(F)	DFJN307ZA		
		(G)	DFJN305ZA		
A 4		(M, E, SW)	DFJN310ZA	DISK, UTILITY (DISK2, INSTALLATION)	1
		(F)	DFJN308ZA		
		(G)	DFJN306ZA		
A 5		(M, E, F, SW)	DFQX2378ZA	MANUAL, USER'S GUIDE(ENGLISH)	1
		(SW)	DFQX2383ZA	MANUAL, USER'S GUIDE(SWEDISH)	
		(G)	DFQX2379ZA	MANUAL, USER'S GUIDE(GERMAN)	
		(M, F)	DFQX2380ZA	MANUAL, USER'S GUIDE(FRENCH)	
A 6			DFQX2384ZA	MANUAL, QUICK REFERENCE	1
A 7			DFQX2392ZA	MANUAL, REFERENCE GUIDE	1
A 8			DFQX2396ZA	MANUAL, USER'S GUIDE, WINDOWS	1
A 9			DFQX2400ZA	MANUAL, READ ME, FIRST	1
A10		(M, E, F, SW)	DFQX1134ZA	MANUAL, ADDENDUM (ENGLISH)	1
A11		(E)	DFQX1135ZA	LEAFLET, AC PLUG	1
A12		(M, E, SW)	DFWV91C0006	DISK, WINDOWS, DISK SET 1-5	1
		(F)	DFWV91C0007		
		(G)	DFWV91C0008		

PACKING MATERIALS

REF. No. AND AREA	PART NO.	DESCRIPTION	Q'TY
P1	DFPK0557ZA	PACKING CASE	1
P2	DFPN0445ZA	HOLDER-A	1
P3	DFPN0444ZA	CUSHION	4

REF. No. AND AREA	PART NO.	DESCRIPTION	Q'TY
MAIN PCB(UPPER)			
E 1	DFWV48C198Z	Ass'y, PCB, MAIN(UPPER) NLA	1
E 1-1	DFJS68R24ZA	SOCKET, 68-PIN, PLCC IC(IC303, CO-PROCESSOR)	1
E 1-2	DFMX0281ZA	SHEET, SLIDE, KEYBOARD MEMBRANE	1
E 1-3	DFMX0278ZA	SHEET, INSULATION	1
E 1-4	DFHG333ZA	SPACER, RUBBER, TRACK BALL	1
E 1-5	DFMX0280ZA	SHEET, SUPPORT, CABLE, FDD	1
E 1-6	DFMX0249ZB	SHEET, INSULATION, TRACK-BALL	1
C301, 302	ECEV0JV101SP	CAPACITOR, ELECTRYTIC, Chip, 100uF, +/-20%, 6.3V	2
C303	DCUG1C105ZFL	CAPACITOR, CERAMIC, CHIP, 1uF, +80/-20%, 16V	1
C304-319	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V	16
C320	ECEV0JV101SP	CAPACITOR, ELECTRYTIC, Chip, 100uF, +/-20%, 6.3V	1
C321, 322	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V	2
C323	DCUA1E103KRR	CAPACITOR, CERAMIC, CHIP, 25V, 0.01uF, +/-10%, 25V	1
C324	DCUA1H120JCR	CAPACITOR, CERAMIC, CHIP, 12PF, +/-5%, 50V	1
C325	DCUA1E103KRR	CAPACITOR, CERAMIC, CHIP, 25V, 0.01uF, +/-10%, 25V	1
C326	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V	1
C327	DCUA1H120JCR	CAPACITOR, CERAMIC, CHIP, 12PF, +/-5%, 50V	1
C328	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V	1
C329, 330	DCUA1E103KRR	CAPACITOR, CERAMIC, CHIP, 25V, 0.01uF, +/-10%, 25V	2
C331	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V	1
C332	DCUA1E103KRR	CAPACITOR, CERAMIC, CHIP, 25V, 0.01uF, +/-10%, 25V	1
C333-338	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V	6
C339	ECEV0JV330SR	CAPACITOR, ELECTRYTIC, Chip, 33uF, 6.3V	1
C349	DCUA1H511JCR	CAPACITOR, CERAMIC, CHIP, 510PF, +/-5%, 50V	1
C350-353	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V	4
C354	DCUA1E102KRR	CAPACITOR, CERAMIC, CHIP, 0.001uF, +/-10%, 25V	1
C355, 356	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V	2
C357	ECEV0JV330SR	CAPACITOR, ELECTRYTIC, Chip, 33uF, 6.3V	1
C358-362	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V	5
C363-377	DCUA1H101JCR	CAPACITOR, CERAMIC, CHIP, 100PF, +/-5%, 50V	15
C378-382	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V	5
C383-402	DCUA1H101JCR	CAPACITOR, CERAMIC, CHIP, 100PF, +/-5%, 50V	20
C403	ECEV0JV330SR	CAPACITOR, ELECTRYTIC, Chip, 33uF, 6.3V	1
C404	DCUA1H101JCR	CAPACITOR, CERAMIC, CHIP, 100PF, +/-5%, 50V	1
C405-414	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V	10
CN301	DFJS04N23ZAJ	CONNECTOR, 4-PIN, TRACK-BALL, FEMALE	1
CN302	DFJP05C78ZA0	CONNECTOR, 5-PIN, POWER INDICATOR, MALE	1
CN303	DFJS60D42ZA	CONNECTOR, 60-PIN, FEMALE	1
CN304	DFJP07C77ZA0	CONNECTOR, 7-PIN, POWER SWITCH PCB, MALE	1
CN305	DFJS80D42ZA	CONNECTOR, 80-PIN,	1
CN306	DFJS50D44ZA	CONNECTOR, 50-PIN, EXT RAM, FEMALE	1
CN308	DFJP14C78ZA0	CONNECTOR, 14-PIN, LCD, MALE	1
CN309	DFJP06C77ZA0	CONNECTOR, 6-PIN, LCD, MALE	1
CN310	DFJP02C83ZAB	CONNECTOR, 2-PIN, BUZZER, MALE	1
CN312	DFJS20N24ZAJ	CONNECTOR, 20-PIN, KEYBOARD, FEMALE	1
D301	DEDRB400DT97	DIODE, SCHOTTKY BARRIER, (2.9 x 1.6 x 1.1), RB400D	1
D302, 303	DEDDA116T97	DIODE, SWITCHING, SI EPITAXIAL PLANAR, Chip	2
FL301, 302	DEANFM41R470	FILTER,	2
FL303, 304	DEA61R0361TL	FILTER,	2
IC301	DA7S04FT85L0	IC, ONE GATE, INVERTER, TC7S04FTE85L	1
IC302	DAKU386SL25I	IC, CPU(80386SL), 25MHz, KU80386SL-25	1
IC304, 305	DA5863AJ25TS	IC, CACHE, 64K bit SRAM, 25ns, 28PIN, CXK5863AJ-25-T6	2
IC306-309	DA4440AJ8LTM	IC, 4M bit DRAM, 80ns, 20PIN, M5M4400AJ-8L-L0	4
IC310	DA910401SX0F	IC, PROGRAMMABLE FREQUENCY GENERATOR, 14-PIN, AV9104-01	1
IC311	DA9127-01X0F	IC, CLOCK GENERATOR, AV9127-01	1
IC313	DAAC04SJLN	IC, HEX INVERTERS, C-MOS, 14-PIN, 74AC04SJL	1
IC314	DAGD6410-XV	IC, VGA CONTROLLER, 160PIN, GD6410	1
IC315	DALM334MT-N	IC, CONSTAND CURRENT, LM 334M-63	1
IC316-318	MN2C4256AJ7T	IC, MN2C4256AJ7T	3
IC319, 320	DAACT245SJLN	IC, OCTAL BUS TRANCEIVER, C-MOS, TTL LEVEL OUTPUT	2
IC321	DA7220J4KW	IC, GATE ARRAY, SLA7220J4K	1
IC323	DAAC04SJLN	IC, HEX INVERTERS, C-MOS, 14-PIN, 74AC04SJL	1
IC324	DAHC02AFT0	IC, QUAD NOR GATES, CMOS, 14PIN, TC74HC02AF	1
IC325	DAHC74AFT0	IC, DUAL D-FLIP-FLOP, CMOS, 14-PIN	1
IC326	DAHC08AFT	IC, QUAD AND GATES, CMOS 14PIN	1
JP306, 308	DBJ6GMJR00VE	JUMPER, 0ohm, Chip	2
L301, 302	ELJFA101KF	FERRITE BEAD	2

REF. No. AND AREA	PART NO.	DESCRIPTION	Q'TY
L303-340	DDB5Z005-L	FERRITE BEAD	38
Q301	2SB1260T100Q	TRANSISTOR, PNP TYPE, Chip	1
Q302	DETC114EKT97	TRANSISTOR, RESISTOR BUILT-IN, CHIP, (2.9 x 1.9 x 1.1), DTC144EK	1
R306, 307	DBJ6GMJ330VE	RESISTOR, Thick Film, CHIP, 33ohm, +/-5%, 1/10W	2
R308	DBJ6GMJ472VE	RESISTOR, Thick Film, CHIP, 4.7Kohm, +/-5%, 1/10W	1
R311-315	DBJ6GMJ330VE	RESISTOR, Thick Film, CHIP, 33ohm, +/-5%, 1/10W	5
R317	DBJ6GMJ5R1VE	RESISTOR, Thick Film, CHIP, 5.1ohm, +/-5%, 1/10W	1
R318	DBJ6GMJ152VE	RESISTOR, Thick Film, CHIP, 1.5Kohm, +/-5%, 1/10W	1
R319	DBJ6GMJ5R1VE	RESISTOR, Thick Film, CHIP, 5.1ohm, +/-5%, 1/10W	1
R320	DBJ6GMJ103VE	RESISTOR, Thick Film, CHIP, 10Kohm, +/-5%, 1/10W	1
R321-323	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	3
R324	DBJ6GMJ330VE	RESISTOR, Thick Film, CHIP, 33ohm, +/-5%, 1/10W	1
R325, 326	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	2
R335, 337	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	2
R338	ERJ6GEYF200V	RESISTOR, Thick Film, CHIP, 20ohm, +/-1%, 1/10W	1
R339	DBJ6GMJ201VE	RESISTOR, Thick Film, CHIP, 200ohm, +/-5%, 1/10W	1
R340-342	DBJ6GMJ151VE	RESISTOR, Thick Film, CHIP, 150ohm, +/-5%, 1/10W	3
R353	DBJ6GMJ222VE	RESISTOR, Thick Film, CHIP, 2.2Kohm, +/-5%, 1/10W	1
R354	DBJ6GMJ103VE	RESISTOR, Thick Film, CHIP, 10Kohm, +/-5%, 1/10W	1
R355	DBJ6GMJ680VE	RESISTOR, Thick Film, CHIP, 68ohm, +/-5%, 1/10W	1
R357	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	1
R358	DBJ6GMJ331VE	RESISTOR, Thick Film, CHIP, 330ohm, +/-5%, 1/10W	1
R359	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	1
R360	DBJ6GMJR00VE	JUMPER, 0ohm, Chip	1
R362	DBJ6GMJ680VE	RESISTOR, Thick Film, CHIP, 68ohm, +/-5%, 1/10W	1
R363, 371-375	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	6
R376	DBJ6GMJ103VE	RESISTOR, Thick Film, CHIP, 10Kohm, +/-5%, 1/10W	1
R377	DBJ6GMJ472VE	RESISTOR, Thick Film, CHIP, 4.7Kohm, +/-5%, 1/10W	1
RA301-307	EXBS8V330J	RESISTOR ARRAY, 33ohm x 4	7
RA308	EXBS8V102J	RESISTOR ARRAY, 1Kohm x 4	1
RA309, 310	EXBS8V473J	RESISTOR ARRAY, 47Kohm x 4	2
RA311-313	EXBS8V101J	RESISTOR ARRAY, 100ohm x 4	3
RA314, 315	EXBS8V103J	RESISTOR ARRAY, 10Kohm x 4	2
RA318, 319	EXBS8V473J	RESISTOR ARRAY, 47Kohm x 4	2
RA320	EXBS8V680J	RESISTOR ARRAY, 68ohm x 4	1
RA321, 322	EXBS8V473J	RESISTOR ARRAY, 47Kohm x 4	2
RA323-325	EXBS8V330J	RESISTOR ARRAY, 33ohm x 4	3
X301	DECU14318L1N	CRYSTAL, 14.318MHz	1

MAIN PCB(LOWER)

| REF. No. AND AREA	PART NO.	DESCRIPTION		Q'TY
E 2	DL3U10510CAA	Ass'y, PCB, MAIN(LOWER)	NLA	1
BT1	VL3032/1HM5	BATTERY, VANADIUM, 3V, 100mAH, VL3032/1HM5, (UPPER)		1
BT2	VL3032/1HF5	BATTERY, VANADIUM, 3V, 100mAH, VL3032/1HF5, (LOWER)		1
C 1-5, 7-10	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V		9
C 11	DCUA1H680JCR	CAPACITOR, CERAMIC, CHIP, 680PF, +/-5%, 25V		1
C 12-15	DCUG1C105ZFL	CAPACITOR, CERAMIC, CHIP, 1uF, +80/-20%, 16V		4
C 16-18	DCUA1E101JCR	CAPACITOR, CERAMIC, CHIP, 100PF, +/-5%, 25V		3
C 20, 22, 23, 26, 27	DCUA1E101JCR	CAPACITOR, CERAMIC, CHIP, 100PF, +/-5%, 25V		5
C 32-34	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V		3
C 35	ECEV1CV100SR	CAPACITOR, ELECTRYTIC, Chip, 10uF, +/-20%, 16V		1
C 36	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V		1
C 37-44	DCUA1E101JCR	CAPACITOR, CERAMIC, CHIP, 100PF, +/-5%, 25V		8
C 45	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V		1
C 46-54	DCUA1E101JCR	CAPACITOR, CERAMIC, CHIP, 100PF, +/-5%, 25V		9
C 57	ECWU1C273JA5	CAPACITOR, FILM, CHIP, 0.027uF, +/-5%, 16V		1
C 58	ECWU1C473JA5	CAPACITOR, FILM, CHIP, 0.047uF, +/-5%, 16V		1
C 59	DCUA1E102KRR	CAPACITOR, CERAMIC, CHIP, 0.001uF, +/-10%, 25V		1
C 60, 61	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V		2
C 62	ECEV0JV330SR	CAPACITOR, ELECTRYTIC, Chip, 33uF, 6.3V		1
C 63, 64	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V		2
C 65	ECEV0JV101SP	CAPACITOR, ELECTRYTIC, Chip, 100uF, +/-20%, 6.3V		1
C 66-70	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V		5
C 71	DCUA1E102KRR	CAPACITOR, CERAMIC, CHIP, 0.001uF, +/-10%, 25V		1
C 72	DCUG1C105ZFL	CAPACITOR, CERAMIC, CHIP, 1uF, +80/-20%, 16V		1
C 73	DCUA1E101JCR	CAPACITOR, CERAMIC, CHIP, 100PF, +/-5%, 25V		1
C 74	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V		1
C 75	DCUA1H120JCR	CAPACITOR, CERAMIC, CHIP, 12PF, +/-5%, 50V		1
C 76	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V		1
C 77-79	DCUA1E101JCR	CAPACITOR, CERAMIC, CHIP, 100PF, +/-5%, 25V		3

REF. No. AND AREA	PART NO.	DESCRIPTION	Q'TY
C 80	DCUA1H120JCR	CAPACITOR, CERAMIC, CHIP, 12PF, +/-5%, 50V	1
C 81	DCUA1E101JCR	CAPACITOR, CERAMIC, CHIP, 100PF, +/-5%, 25V	1
C 82	DCUA1E101JCR	CAPACITOR, CERAMIC, CHIP, 100PF, +/-5%, 25V	1
C 83-87	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V	5
C 88-95	DCUA1E101JCR	CAPACITOR, CERAMIC, CHIP, 100PF, +/-5%, 25V	8
C 96	DCUA1E103KRR	CAPACITOR, CERAMIC, CHIP, 25V, 0.01uF, +/-10%, 25V	1
C 97, 98	DCUA1E102KRR	CAPACITOR, CERAMIC, CHIP, 0.001uF, +/-10%, 25V	2
C 99	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V	1
C100	DCUA1E103KRR	CAPACITOR, CERAMIC, CHIP, 25V, 0.01uF, +/-10%, 25V	1
C101	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V	1
C102	ECEV1EV100SP	CAPACITOR, ELECTROLYTIC, Chip, 10uF, +/-20%, 25V	1
C103	ECEV0JV470SP	CAPACITOR, ELECTROLYTIC, Chip, 47uF, +/-20%, 6.3V	1
C104-108	DCUG1C105ZFL	CAPACITOR, CERAMIC, CHIP, 1uF, +80/-20%, 16V	5
C109-111	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V	3
C112, 113	ECEV0JV470SP	CAPACITOR, ELECTROLYTIC, Chip, 47uF, +/-20%, 6.3V	2
C114	DCUG1C105ZFL	CAPACITOR, CERAMIC, CHIP, 1uF, +80/-20%, 16V	1
C115-118	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V	4
C119	DCU01E475ZFY	CAPACITOR, CHIP, 4.7uF, +80/-20%, 25V	1
C120	ECEV1EV330SP	CAPACITOR, ELECTROLYTIC, Chip, 33uF, +/-20%, 25V	1
C121-124	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V	4
C125-128	DCUG1C105ZFL	CAPACITOR, CERAMIC, CHIP, 1uF, +80/-20%, 16V	4
C130	DCUA1E104ZFR	CAPACITOR, CERAMIC, CHIP, 0.1uF, +80/-20%, 25V	1
C131, 132	ECEV0JV101SP	CAPACITOR, ELECTRYTIC, Chip, 100uF, +/-20%, 6.3V	2
C133	DCUA1E103KRR	CAPACITOR, CERAMIC, CHIP, 25V, 0.01uF, +/-10%, 25V	1
C134	ECEV1CV220SP	CAPACITOR, ELECTROLYTIC, Chip, 22uF, +/-20%, 16V(5.4 x 6.6 x 6.6)	1
C135	DCUG1C105ZFL	CAPACITOR, CERAMIC, CHIP, 1uF, +80/-20%, 16V	1
CN 1	DFJS200D43ZA	CONNECTOR, 200-PIN, EXTENSION BOX, FEMALE	1
CN 2	DFJS18N29ZA	CONNECTOR, 18-PIN, MODEM, FEMALE	1
CN 3	DFJP09E19ZAD	CONNECTOR, 9-PIN, RS-232C, MALE	1
CN 4	DFJS25E17ZAD	CONNECTOR, 25-PIN, PARALLEL, FEMALE	1
CN 5	DFJS26N13ZAW	CONNECTOR, 26-PIN, FDD FEMALE	1
CN 6	DFJP44C70YA	CONNECTOR, 44-Pin, HDD, MALE	1
CN 7	DFJS06G08ZBH	EXTERNAL KEYBOARD JACK, 6-PIN, FEMALE	1
CN 8	DFJS06G08ZBH	EXTERNAL KEYBOARD JACK, 6-PIN, FEMALE	1
CN 9	DFJP60D34ZA	CONNECTOR, 60-PIN, STACK2, MALE	1
CN10	DFJP80D34ZA	CONNECTOR, 80-PIN, STACK1, MALE	1
CN11	DFJS15E12XA	CONNECTOR, 15-PIN, VGA FEMALE	1
CN12	DFJJB3Z11ZAH	CONNECTOR, DC-IN	1
CN13	RJP4G9YA	CONNECTOR, 4-PIN, BATTERY	1
D 1, 2	DEDSB0703CTA	DIODE, SCHOTTKY BARRIER	2
D 3	DEDRB705DT47	DIODE, SCHOTTKY BARRIER, (2.9 x 1.6 x 1.1), RB705D	1
D 5	DEDDA116T97	DIODE, SWITCHING, SI EPITAXIAL PLANAR, Chip	1
D 6	DEDRB420DT97	DIODE, SCHOTTKY BARRIER, (2.9 x 1.6 x 1.1), RB420D	1
D 7	DEDRLZ110ATE	DIODE, ZENNER, LEADLESS, (1.4 x 3.4), RLZ11	1
D 8	DEDDA116T97	DIODE, SWITCHING, SI EPITAXIAL PLANAR, Chip	1
D 9	DEDIMN10T109	DIODE ARRAY, SWITCHIN(2.9 x 1.6 x 1.1), IMN10	1
D10	DED10QS04TR	DIODE, SCHOTTKY BARRIER,	1
D11	DED30QS04FTF	DIODE, SCHOTTKY BARRIER,	1
D12	DEDIMN10T109	DIODE, Chip, Triple, Switching, (2.9 x 1.6 x 1.1), IMN10	1
D13, 14	DEDRLZ062ATE	DIODE, ZENNER, LEADLESS, (1.4 x 3.4), RLZ6.2	2
D15	DEDRLZ200ATE	DIODE, ZENNER, LEADLESS, (1.4 x 3.4), RLZ20	1
D16	DEDRLZ110ATE	DIODE, ZENNER, LEADLESS, (1.4 x 3.4), RLZ11	1
D17, 18	DEDHZKL4BLTR	DIODE, HITACHI, EZH4ALLTC	2
D19	DEDDA116T97	DIODE, SWITCHING, SI EPITAXIAL PLANAR, Chip	1
D20	DEDRB420DT97	DIODE, SCHOTTKY BARRIER, (2.9 x 1.6 x 1.1), RB420D	1
D21	DEDRB705DT47	DIODE, SCHOTTKY BARRIER, (2.9 x 1.6 x 1.1), RB705D	1
D22	DEDHZ4ALL	DIODE, ZENNER	1
F1 ⚠	XBAD0800HFS	FUSE, FAST BLOW, 0.8A, 125V 7.5mm(L) x 2.6mm(H) WITH PIG TAIL	1
F2 ⚠	XBAD5000HFS	FUSE, FAST BLOW, 5A, 125V 7.5mm(L) x 2.6mm(H) WITH PIG TAIL	1
F4 ⚠	DFAHMCP0400T	FUSE, IC PROTECTOR,	1
F5 ⚠	XBAD0250HFS	FUSE, FAST BLOW, 250mA, 125V 7.5mm(L) x 2.6mm(H) WITH PIG TAIL	1
FL1	DEANFM41R470	FILTER	1
FL2, 3, 4	DEA61R0361TL	FILTER,	3
IC 1	DA708BF0EW	IC, GATE ARRAY, SLA708BF0E	1
IC 3	DAKU82360SLI	IC, PERIPHERAL I/O, KU82360SL	1
IC 4	DARH5VA40AAR	IC, RESET SIGNAL GENERATOR, RH5VA40AA, 4.0V	1
IC 5	DALT1137CSXU	IC, RS-232C DRIVER/RECEIVER, LT1137CS	1
IC 6	DFWV06B0072Z	IC, FLASH MEMORY, BIOS, 32PIN, N28F001BX-T-120	1
IC 7	DATL750L12TT	IC, REGULATOR, TL750L12CD	*1

REF. No. AND AREA	PART NO.	DESCRIPTION	Q'TY
IC 8	DAACT244SJLN	IC, OCTAL BUFFERS/LINE DRIVERS/RECEIVERS, 20PIN, 74ACT244SJL	1
IC 9	DABC244FT0	IC, OCTAL BUFFER, LINE DRIVER/RECEIVER, Bi-CMOS	1
IC 10	DADP8473V-N	IC, FDC, 52PIN, DP8473V	1
IC 11	DA7S04FT85L0	IC, ONE GATE, INVERTER, TC7S04FTE85L	1
IC 12	DA80C42-597D	IC, KB CONTROLLER, UPD80C42GB-597-3B4	1
IC 13	DAHC126AFT0	IC, QUAD TRI-STATE BUFFER, 14-PIN, C-MOS, TC74HC126AF(TP2)	1
IC 14	DAHC04AFT0	IC, HEX INVERTERS, C-MOS, 14-PIN, TC74HC04AF	1
IC 15	DAHC14AFT0	IC, HEX INVERTING SCHMITT TRIGGERS, 14-PIN, C-MOS	1
IC 16	DAHC27AFT0	IC, 3-INPUT NOR GATE, C-MOS, 14PIN, TC74HC27AF(TP2)	1
IC 17	DA37451E111M	IC, SKBE, 8bit-MICROPROCESSOR, M37451E8-111FP	1
IC 18	DARH5RA45AAR	IC, VOLTAGE REGULATOR, 4.5V, RH5RA45AA-T2	1
IC 19	DAHC244AFT0	IC, OCTAL BUFFERS AND LINE DRIVERS C-MOS, 20-PIN, TC74HC244AF	1
IC 20	DAHC125AFT0	IC, QUAD TRI-STATE BUFFER, 14-PIN, C-MOS, TC74HC125AF(TP2)	1
IC 21	DAHC4066AFT0	IC, QUAD BILATERAL SWITCH, C-MOS, TC4066BP	1
IC 22	DFWP0030ZAY	IC, VOLTAGE DETECTOR, HYBRID	1
IC 23, 24, 25	DAUPC358GE2D	IC, OP AMP, UPC358GE2	3
IC 26, 27	DAHC00AFT0	IC, QUAD 2-INPUT NAND GATES, C-MOS, 14-PIN, TC74HC00AF	2
IC 28	DAHC74AFT0	IC, DUAL D-TYPE POSITIVE-EDGE-TRIGGERED FLIP-FLOP, TC74HC74AF-TP2	1
IC 29	DFWP0029ZAY	IC, DC-DC CONVERTER, HYBRID	1
IC 30	DARH5RA30AAR	IC, VOLTAGE REGULATOR, 3.5V, RH5RA30AA-T2	1
IC 31, 32, 33	DARH5VA45AAR	IC, RESET SIGNAL GENERATOR, RH5VA45AA, 4.5V	3
IC 34	DAS88501AFTW	IC, REGULATOR, S-88501AF-TB	1
IC 35	DARH5RA35AAR	IC, VOLTAGE REGULATOR, 3.5V, RH5RA35AA-T2	1
IC 36	DARH5RA40AAR	IC, VOLTAGE REGULATOR, 4.0V, RH5RA40AA-T2	1
IC 37	DAAC86SJLN	IC, EXCLUSIVE OR, C-MOS, 4-GATE	1
IC 38	DAHC32AFT0	IC, QUAD 2-INPUT OR GATES, C-MOS, 14-PIN, TC74HC32AF	1
IC 39	DAHC74AFT0	IC, DUAL D-TYPE POSITIVE-EDGE-TRIGGERED FLIP-FLOP, TC74HC74AF-TP2	1
L 1-8	DDB5Z005-L	FERRITE BEAD	8
L 9-16	DDB5Z010-L	FERRITE BEAD	8
L 17-33	DDB5Z005-L	FERRITE BEAD	17
L 34	ELJFA101KF	FERRITE BEAD	1
L 35	DDB5Z005-L	FERRITE BEAD	1
L 36	DDB5Z007-L	FERRITE BEAD	1
L 37-39	DDB5Z005-L	FERRITE BEAD	3
L 40	DDB5Z007-L	FERRITE BEAD	1
L 41-48	DDB5Z005-L	FERRITE BEAD	8
L 49	ELJFA101KF	COIL,	1
L 51	DDB8Z014-Y	FERRITE BEAD	1
L 52, 53	DDB5Z007-L	FERRITE BEAD	2
L 54	DDB5Z010-L	FERRITE BEAD	1
L 55	DDB6Z015-Y	FERRITE BEAD	1
Q 1	DETA144TKT97	TRANSISTOR, RESISTOR BUILT-IN, (2.9 x 1.6 x 1.1), Chip, DTA144TK	1
Q 3	DETIMH8T109	TRANSISTOR, Inverter Driver, Dual, (2.9 x 1.6 x 1.1), Chip, IMH8	1
Q 4	DETFMC3TA-E	TRANSISTOR, Switching, (2.9 x 1.6 x 1.1), Chip, FMC3	1
Q 5	2SK1582T2	TRASISTOR, FET	1
Q 6	2SJ238TR	TRANSISTOR, FET	1
Q 7	2SA1037KT97R	TRANSISTOR, PNP TYPE, CHIP	1
Q 8	DETFMG1TA-E	TRANSISTOR, NPN TYPE, Inverter Driver, (2.9 x 1.6 x 1.1), Chip, FMG1	1
Q 9	2SK1764TR	TRANSISTOR, SI Nch MOS FET	1
Q10	2SJ238TR	TRANSISTOR, FET	1
Q11	2SJ182STR	TRANSISTOR, FET	1
Q12	2SJ214STR	MOSFET TRANSISTOR, P-ch FET	1
Q13, 14	DETFMG1TA-E	TRANSISTOR, NPN TYPE, Inverter Driver, (2.9 x 1.6 x 1.1), Chip, FMG1	2
Q15	DETIMT1T108	TRANSISTOR, Signal Amp, Dual, (2.9 x 1.6 x 1.1), Chip, IMT1	1
Q16, 17	DETIMX1TA-E	TRANSISTOR, Signal Amp, Dual, (2.9 x 1.6 x 1.1), Chip, IMX1	2
Q18	2SK1582T2	TRASISTOR, FET	1
Q19	2SD1664RTP	TRANSISTOR, NPN TYPE, CHIP	1
Q20	2SJ220STR	TRANSISTOR, SI Pch MOS FET	1
Q21	2SJ238TR	TRANSISTOR, FET	1
Q22	2SB1181FQTAE	TRANSISTOR, PNP TYPE	1
Q23	2SB1260T100R	TRANSISTOR, PNP TYPE, CHIP	1
Q24	DETC114EKT97	TRANSISTOR,	1
Q25	DETFMC3TA-E	TRANSISTOR, Switching, (2.9 x 1.6 x 1.1), Chip, FMC3	1
R 1, 2	DBJ6GMJ103VE	RESISTOR, Thick Film, CHIP, 10Kohm, +/-5%, 1/10W	2
R 3-5	DBJ6GMJ330VE	RESISTOR, Thick Film, Chip, 33ohm, +/-5%, 1/10W	3
R 6	DBJ6GMJ102VE	RESISTOR, Thick Film, CHIP, 1Kohm, +/-5%, 1/10W	1
R 7	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	1
R 9	DBJ6GMJ104VE	RESISTOR, Thick Film, CHIP, 100Kohm, +/-5%, 1/10W	1
R 11	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	1

REF. No. AND AREA	PART NO.	DESCRIPTION	Q'TY
R 12	DBJ6GMJ222VE	RESISTOR, Thick Film, CHIP, 2.2Kohm, +/-5%, 1/10W	1
R 13, 14	DBJ6GMJ561VE	RESISTOR, Thick Film, CHIP, 560ohm, +/-5%, 1/10W	2
R 15	DBJ6GF5601VE	RESISTOR, Thick Film, CHIP, 5.6Kohm, +/-1%, 1/10W	1
R 16	DBJ6GMJ103VE	RESISTOR, Thick Film, CHIP, 10Kohm, +/-5%, 1/10W	1
R 17, 18	DBJ6GMJ821VE	RESISTOR, Thick Film, CHIP, 820ohm, +/-5%, 1/10W	2
R 19	DBJ6GMJ330VE	RESISTOR, Thick Film, Chip, 33ohm, +/-5%, 1/10W	1
R 20	DBJ6GMJ103VE	RESISTOR, Thick Film, CHIP, 10Kohm, +/-5%, 1/10W	1
R 21	DBJ6GMJ474VE	RESISTOR, Thick Film, CHIP, 470Kohm, +/-5%, 1/10W	1
R 22-25	DBJ6GMJ330VE	RESISTOR, Thick Film, Chip, 33ohm, +/-5%, 1/10W	4
R 26, 27	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	2
R 28	DBJ6GMJ105VE	RESISTOR, Thick Film, Chip, 1Mohm, +/-5%, 1/10W	1
R 29	DBJ6GMJ102VE	RESISTOR, Thick Film, CHIP, 1Kohm, +/-5%, 1/10W	1
R 30, 31	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	2
R 32	DBJ6GMJ102VE	RESISTOR, Thick Film, CHIP, 1Kohm, +/-5%, 1/10W	1
R 33	DBJ6GMJ105VE	RESISTOR, Thick Film, Chip, 1Mohm, +/-5%, 1/10W	1
R 34	DBJ6GF7501VE	RESISTOR, Thick Film, Chip, 7.5Kohm, +/-1%, 1/10W	1
R 35	DBJ6GF1502VE	RESISTOR, Thick Film, Chip, 15Kohm, +/-1%, 1/10W	1
R 36	DBJ6GF1501VE	RESISTOR, Thick Film, Chip, 1.5Kohm, +/-1%, 1/10W	1
R 37	DBJ6GMJ103VE	RESISTOR, Thick Film, CHIP, 10Kohm, +/-5%, 1/10W	1
R 38	DBJ6GMJ122VE	RESISTOR, Thick Film, Chip, 1.2Kohm, +/-5%, 1/10W	1
R 40	DBJ6GMJ393VE	RESISTOR, Thick Film, Chip, 39Kohm, +/-5%, 1/10W	1
R 41	DBJ6GMJ103VE	RESISTOR, Thick Film, CHIP, 10Kohm, +/-5%, 1/10W	1
R 42	DBJ6GMJ683VE	RESISTOR, Thick Film, CHIP, 68Kohm, +/-5%, 1/10W	1
R 43	DBJ6GF2002VE	RESISTOR, Thick Film, CHIP, 20Kohm, +/-1%, 1/10W	1
R 44	DBJ6GF1203VE	RESISTOR, Thick Film, CHIP, 120Kohm, +/-10% , 1/10W	1
R 45	DBJ6GF2001VE	RESISTOR, Thick Film, CHIP, 2Kohm, +/-1%, 1/10W	1
R 46	DBJ6GMJ103VE	RESISTOR, Thick Film, CHIP, 10Kohm, +/-5%, 1/10W	1
R 47	DBJ6GF1802VE	RESISTOR, Thick Film, CHIP, 18Kohm, +/-1%, 1/10W	1
R 49	ERJ6GEYF332V	RESISTOR, Thick Film, CHIP, 3.3Kohm, +/-1%, 1/16W	1
R 50	DBJ6GMJR00VE	JUMPER, 0ohm, Chip	1
R 51	DBJ6GMJ562VE	RESISTOR, Thick Film, CHIP, 5.6Kohm, +/-5%, 1/10W	1
R 52	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	1
R 53	DBJ6GMJ273VE	RESISTOR, Thick Film, CHIP, 27Kohm, +/-5%, 1/10W	1
R 54	DBJ6GMJ102VE	RESISTOR, Thick Film, CHIP, 1Kohm, +/-5%, 1/10W	1
R 55	DBJ6GF1003VE	RESISTOR, Thick Film, CHIP, 100Kohm, +/-10%, 1/10W	1
R 56	DBJ6GMJ104VE	RESISTOR, Thick Film, CHIP, 100Kohm, +/-5%, 1/10W	1
R 57	DBJ6GMJ101VE	RESISTOR, Thick Film, CHIP, 100ohm, +/-5%, 1/10W	1
R 58	DBJ6GMJ103VE	RESISTOR, Thick Film, CHIP, 10Kohm, +/-5%, 1/10W	1
R 59	DBJ6GMJ105VE	RESISTOR, Thick Film, Chip, 1Mohm, +/-5%, 1/10W	1
R 61	DBJ6GMJ102VE	RESISTOR, Thick Film, CHIP, 1Kohm, +/-5%, 1/10W	1
R 62	DBJ6GMJ513VE	RESISTOR, Thick Film, CHIP, 51Kohm, +/-5%, 1/10W	1
R 63	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	1
R 64	DBJ6GMJ104VE	RESISTOR, Thick Film, CHIP, 100Kohm, +/-5%, 1/10W	1
R 65	DBJ6GMJ105VE	RESISTOR, Thick Film, Chip, 1Mohm, +/-5%, 1/10W	1
R 66, 67	DBJ6GMJ102VE	RESISTOR, Thick Film, CHIP, 1Kohm, +/-5%, 1/10W	2
R 68	DBJ6GMJ101VE	RESISTOR, Thick Film, CHIP, 100ohm, +/-5%, 1/10W	1
R 69	DBJ6GMJ105VE	RESISTOR, Thick Film, Chip, 1Mohm, +/-5%, 1/10W	1
R 70	DBJ6GMJ104VE	RESISTOR, Thick Film, CHIP, 100Kohm, +/-5%, 1/10W	1
R 71	DBJ6GMJ101VE	RESISTOR, Thick Film, CHIP, 100ohm, +/-5%, 1/10W	1
R 72	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	1
R 73	DBJ6GMJ102VE	RESISTOR, Thick Film, CHIP, 1Kohm, +/-5%, 1/10W	1
R 74	DBJ6GMJ104VE	RESISTOR, Thick Film, CHIP, 100Kohm, +/-5%, 1/10W	1
R 75	DBJ6GMJ101VE	RESISTOR, Thick Film, CHIP, 100ohm, +/-5%, 1/10W	1
R 76, 77	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	2
R 78	DBJ6GMJ474VE	RESISTOR, Thick Film, CHIP, 470Kohm, +/-5%, 1/10W	1
R 79	DBJ6GMJ330VE	RESISTOR, Thick Film, Chip, 33ohm, +/-5%, 1/10W	1
R 80, 81	ERJ8GEYJ1R0V	RESISTOR, Thick Film, CHIP, 1.0ohm, +/-5%, 1/8W	2
R 82	DBJ6GMJ472VE	RESISTOR, Thick Film, CHIP, 4.7Kohm, +/-5%, 1/10W	1
R 83	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	1
R 84, 85	DBJ6GMJ561VE	RESISTOR, Thick Film, CHIP, 560ohm, +/-5%, 1/10W	2
R 86	DBJ6GF1502VE	RESISTOR, Thick Film, Chip, 15Kohm, +/-1%, 1/10W	1
R 87	DBJ6GMJ104VE	RESISTOR, Thick Film, CHIP, 100Kohm, +/-5%, 1/10W	1
R 88, 89	DBJ6GMJ472VE	RESISTOR, Thick Film, CHIP, 4.7Kohm, +/-5%, 1/10W	2
R 90	DBJ6GMJ622VE	RESISTOR, Thick Film, CHIP, 6.2Kohm, +/-5%, 1/10W	1
R 91	DBJ6GMJ103VE	RESISTOR, Thick Film, CHIP, 10Kohm, +/-5%, 1/10W	1
R 92	DBJ6GMJ104VE	RESISTOR, Thick Film, CHIP, 100Kohm, +/-5%, 1/10W	1
R 93	DBJ6GMJ472VE	RESISTOR, Thick Film, CHIP, 4.7Kohm, +/-5%, 1/10W	1
R 94	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	1
R 95	DBJ6GMJ472VE	RESISTOR, Thick Film, CHIP, 4.7Kohm, +/-5%, 1/10W	1

REF. No. AND AREA	PART NO.	DESCRIPTION	Q'TY
R 96, 97	DBJ6GMJ514VE	RESISTOR, Thick Film, CHIP, 510Kohm, +/-5%, 1/10W	2
R 98	DBJ6GF5603VE	RESISTOR, Thick Film, CHIP, 560Kohm, +/-1%, 1/10W	1
R 99	DBJ6GMJ274VE	RESISTOR, Thick Film, CHIP, 270Kohm, +/-5%, 1/10W	1
R100	DBJ6GF3303VE	RESISTOR, Thick Film, CHIP, 330Kohm, +/-1%, 1/10W	1
R101	DBJ6GMJ684VE	RESISTOR, Thick Film, CHIP, 680Kohm, +/-5%, 1/10W	1
R102, 103	DBJ6GMJ750VE	RESISTOR, Thick Film, CHIP, 75ohm, +/-5%, 1/10W	2
R104	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	1
R105	DBJ6GMJ102VE	RESISTOR, Thick Film, CHIP, 1Kohm, +/-5%, 1/10W	1
R106	ERJ12YJ4R7H	RESISTOR, Thick Film, CHIP, 4.7ohm, +/-5%, 1/2W	1
R107	ERJ12YJ331H	RESISTOR, Thick Film, CHIP, 330ohm, +/-5%, 1/2W	1
R108	ERX1SZJR10P	RESISTOR, METAL FILM, 0.1 ohm, +/-5%, 1W	1
R109	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	1
R113, 114	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	2
R115	DBJ6GMJ102VE	RESISTOR, Thick Film, CHIP, 1Kohm, +/-5%, 1/10W	1
R116	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	1
R117	DBJ6GMJ273VE	RESISTOR, Thick Film, CHIP, 27Kohm, +/-5%, 1/10W	1
R118	DBJ6GMJ473VE	RESISTOR, Thick Film, CHIP, 47Kohm, +/-5%, 1/10W	1
R119	DBJ6GMJ471VE	RESISTOR, Thick Film, CHIP, 470ohm, +/-5%, 1/10W	1
R120	DBJ6GMJ472VE	RESISTOR, Thick Film, CHIP, 4.7Kohm, +/-5%, 1/10W	1
R121	DBJ6GMJ222VE	RESISTOR, Thick Film, CHIP, 2.2Kohm, +/-5%, 1/10W	1
R122	ERJ6ENF1801V	RESISTOR, Thick Film, CHIP, 1.8Kohm, +/-1%, 1/10W	1
R123	DBJ6GMJ562VE	RESISTOR, Thick Film, CHIP, 5.6Kohm, +/-5%, 1/10W	1
RA 1	EXBS8V103J	RESISTOR ARRAY, 10Kohm x 4	1
RA 2	EXBS8V330J	RESISTOR ARRAY, 33ohm x 4	1
RA 3-5	EXBS8V102J	RESISTOR ARRAY, 1Kohm x 4	3
RA 6	EXBS8V472J	RESISTOR ARRAY, 4.7Kohm x 4	1
RA 7	EXBS8V222J	RESISTOR ARRAY, 2.2Kohm x 4	1
RA 8, 9	EXBS8V103J	RESISTOR ARRAY, 10Kohm x 4	2
RA10-17	EXBS8V473J	RESISTOR ARRAY, 47Kohm x 4	8
SW1	DFSH1A21ZAXA	SWITCH, RESET	1
X1	DECU00032P1D	CRYSTAL, 32.768KHz,	1
X2	DECU24000P1H	CRYSTAL, 24MHz, FDC	1
X3	DECU10000P1H	CRYSTAL, 10MHz,	1

LED/SWITCH PCB

REF. No. AND AREA	PART NO.	DESCRIPTION		Q'TY
E 3	DL3U40510CAA	Ass'y, PCB, LED/SWITCH	NLA	1
CN501	DFJP07C78ZA0	CONNECTOR, 7-PIN, MALE		1
LD501-505	LN1361C-TR	LED, GREEN, RED		5
SW501	EVQPHP03T	SWITCH,		1

POWER/BATTERY LED PCB

REF. No. AND AREA	PART NO.	DESCRIPTION		Q'TY
E 4	DL3U20510CAA	Ass'y, PCB, POWER/BATT LED	NLA	1
CN502	DFJP05C82ZA0	CONNECTOR, 5-PIN, MALE		1
LD506, 507	LN086WP38	LED, GREEN, RED		2

CONTRAST CONTROL PCB

REF. No. AND AREA	PART NO.	DESCRIPTION		Q'TY
E 5	DL3U10484AAA	Ass'y, CONTRAST CONTROL, PCB	NLA	1
R901	DB02KF1052TE	RESISTOR, METAL, 10.5Kohm, +/-1%, 1/4W		1
VR901	DEVAI7B103A	RESISTOR, SEMI-FIXED,		1
TH901	DBT103J-U	THERMISTOR, 10Kohm, 0.3mA at 25 deg.C, TD5-031		1
CN901	DFJP02C54ZAJ	CONNECTOR, 2-PIN, MALE		1

TRACK BALL

REF. No. AND AREA	PART NO.	DESCRIPTION	Q'TY
E11	EMU-15901	Ass'y, TRACK-BALL	1
E11-1	DFWV65C0223	LID, TRACK-BALL	1
E11-2	DFWV65C0224	BALL, TRACK-BALL	1

6.6 Keyboard Parts Locations
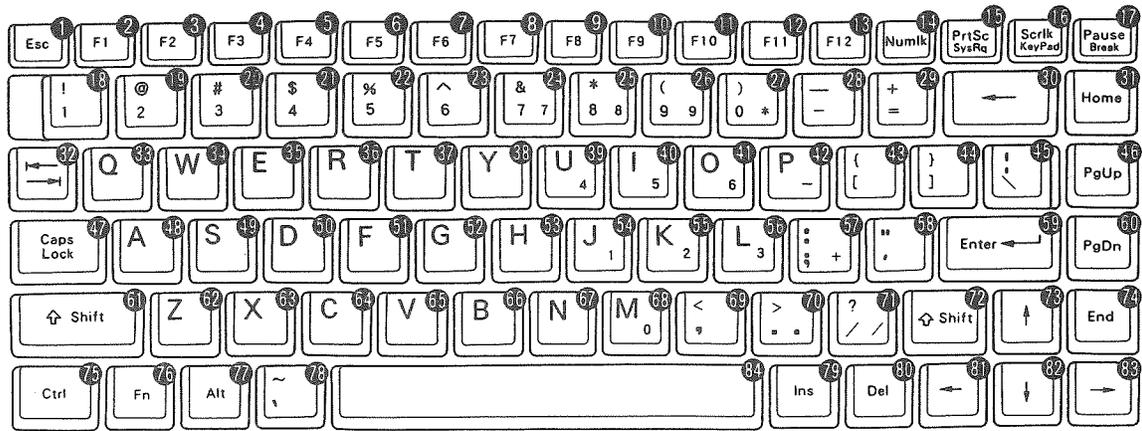
6.7 Replacement Parts List (Keyboard)

REF.	PART NO.	DESCRIPTION	Q'TY
Keyboard for (M)			
E10	ESU54TM404BK	Ass'y, KEYBOARD(M)	1
1	DFWV70C6998	KEYTOP, Esc	1
2	DFWV70C6999	KEYTOP, F1	1
3	DFWV70C7000	KEYTOP, F2	1
4	DFWV70C7001	KEYTOP, F3	1
5	DFWV70C7002	KEYTOP, F4	1
6	DFWV70C7003	KEYTOP, F5	1
7	DFWV70C7004	KEYTOP, F6	1
8	DFWV70C7005	KEYTOP, F7	1
9	DFWV70C7006	KEYTOP, F8	1
10	DFWV70C7007	KEYTOP, F9	1
11	DFWV70C7008	KEYTOP, F10	1
12	DFWV70C7009	KEYTOP, F11	1
13	DFWV70C7010	KEYTOP, F12	1
14	DFWV70C7011	KEYTOP, NumLk	1
15	DFWV70C7012	KEYTOP, PrtSc SysRq	1
16	DFWV70C7013	KEYTOP, ScrLk Key Pad	1
17	DFWV70C7014	KEYTOP, Pause Break	1
18	DFWV70C7015	KEYTOP, ! 1	1
19	DFWV70C7016	KEYTOP, @ 2	1
20	DFWV70C7017	KEYTOP, # 3	1
21	DFWV70C7018	KEYTOP, $ 4	1
22	DFWV70C7019	KEYTOP, % 5	1
23	DFWV70C7020	KEYTOP, ^ 6	1
24	DFWV70C7021	KEYTOP, & 7	1
25	DFWV70C7022	KEYTOP, * 8	1
26	DFWV70C7023	KEYTOP, (9	1
27	DFWV70C7024	KEYTOP,) 0	1
28	DFWV70C7025	KEYTOP, ¯ -	1
29	DFWV70C7026	KEYTOP, + =	1
30	DFWV70C7027	KEYTOP, ←	1
31	DFWV70C7028	KEYTOP, Home	1
32	DFWV70C7029	KEYTOP, ⇥	1
33	DFWV70C7030	KEYTOP, Q	1
34	DFWV70C7031	KEYTOP, W	1
35	DFWV70C7032	KEYTOP, E	1
36	DFWV70C7033	KEYTOP, R	1
37	DFWV70C7034	KEYTOP, T	1
38	DFWV70C7035	KEYTOP, Y	1
39	DFWV70C7036	KEYTOP, U	1
40	DFWV70C7037	KEYTOP, I	1
41	DFWV70C7038	KEYTOP, O	1
42	DFWV70C7039	KEYTOP, P	1
43	DFWV70C7040	KEYTOP, { [	1
44	DFWV70C7041	KEYTOP, }]	1
45	DFWV70C7042	KEYTOP, | \	1
46	DFWV70C7043	KEYTOP, PgUp	1
47	DFWV70C7044	KEYTOP, Caps Lock	1
48	DFWV70C7045	KEYTOP, A	1
49	DFWV70C7046	KEYTOP, S	1
50	DFWV70C7047	KEYTOP, D	1
51	DFWV70C7048	KEYTOP, F	1
52	DFWV70C7049	KEYTOP, G	1
53	DFWV70C7050	KEYTOP, H	1
54	DFWV70C7051	KEYTOP, J	1
55	DFWV70C7052	KEYTOP, K	1

REF.	PART NO.	DESCRIPTION	Q'TY
56	DFWV70C7053	KEYTOP, L	1
57	DFWV70C7054	KEYTOP, : ; +	1
58	DFWV70C7055	KEYTOP, " '	1
59	DFWV70C7056	KEYTOP, Enter	1
60	DFWV70C7057	KEYTOP, PgDn	1
61	DFWV70C7058	KEYTOP, Shift(L)	1
62	DFWV70C7059	KEYTOP, Z	1
63	DFWV70C7060	KEYTOP, X	1
64	DFWV70C7061	KEYTOP, C	1
65	DFWV70C7062	KEYTOP, V	1
66	DFWV70C7063	KEYTOP, B	1
67	DFWV70C7064	KEYTOP, N	1
68	DFWV70C7065	KEYTOP, M	1
69	DFWV70C7066	KEYTOP, < ,	1
70	DFWV70C7067	KEYTOP, > .	1
71	DFWV70C7068	KEYTOP, ? /	1
72	DFWV70C7069	KEYTOP, Shift(R)	1
73	DFWV70C7070	KEYTOP, ↑	1
74	DFWV70C7071	KEYTOP, End	1
75	DFWV70C7072	KEYTOP, Ctrl	1
76	DFWV70C7073	KEYTOP, Fn	1
77	DFWV70C7074	KEYTOP, Alt	1
78	DFWV70C7075	KEYTOP, ~	1
79	DFWV70C7076	KEYTOP, Ins	1
80	DFWV70C7077	KEYTOP, Del	1
81	DFWV70C7078	KEYTOP, ←	1
82	DFWV70C7079	KEYTOP, ↓	1
83	DFWV70C7080	KEYTOP, →	1
84	DFWV70C7081	KEYTOP, Space	1
E10-1	DFWV48C193Z	SWITCH, MEMBRANE	1
E10-2	DFWV65D0044	SPRING, RUBBER, KEYTOP	67
E10-3	DFWV71H0046	ROD, ENTER/SHIFT(L)	1
E10-4	DFWV71H0047	ROD, BACK SPACE	3
E10-5	DFWV71H0048	ROD, SPACE BAR	1
E10-6	DFWV50B0016	SCREW, KEYBOARD	23
E10-7	DFWV71H0049	ROD, Ctrl/CpLk/SHIFT(R)	3
E10-8	DFWV65C0219	PAD, KEYTOP	67
E10-9	DFWV65D0046	SPRING, RUBBER, KEYTOP, FUNCTION KEY	17
E10-10	DFWV65C0220	PAD, KEYTOP, FUNCTION KEY	17
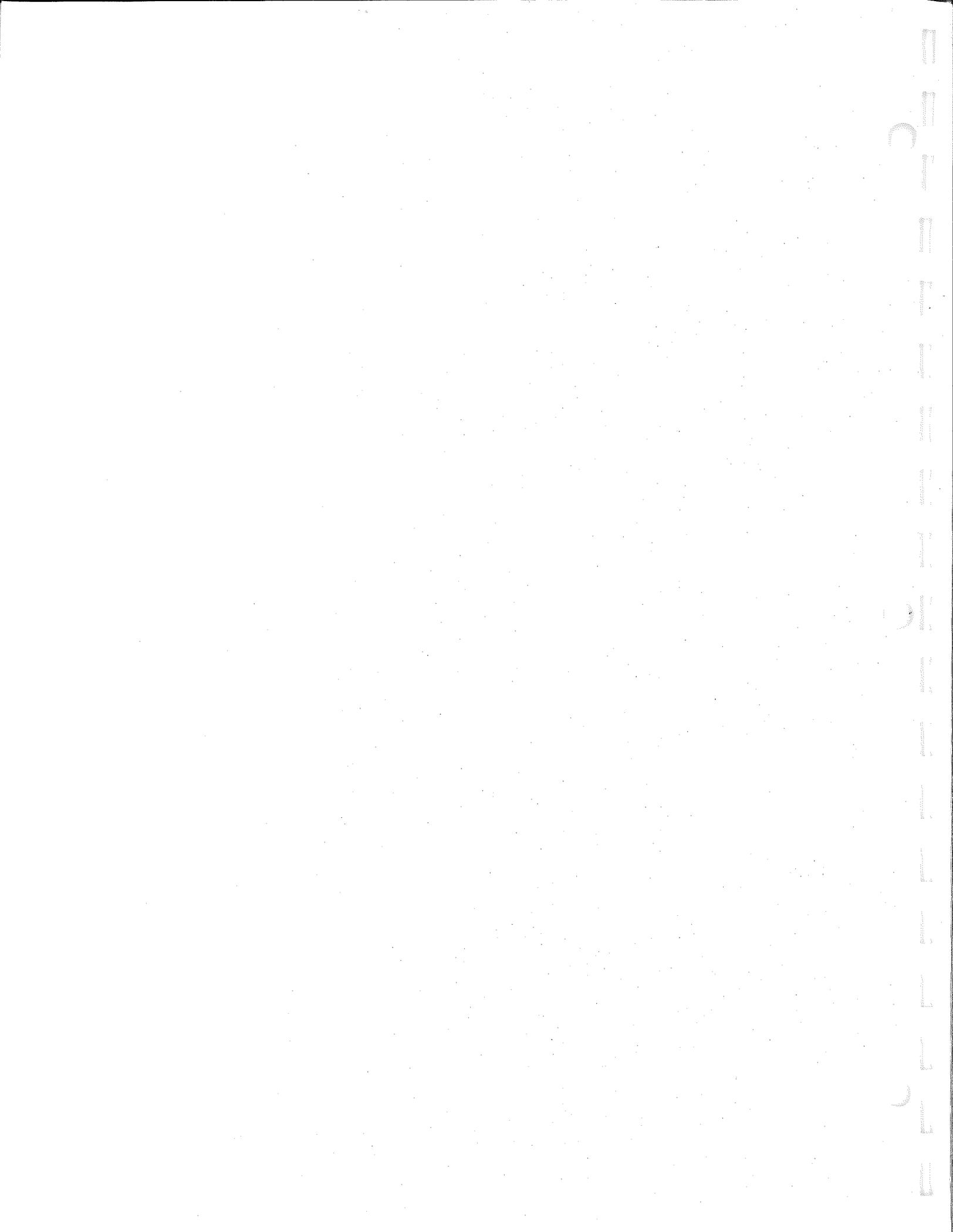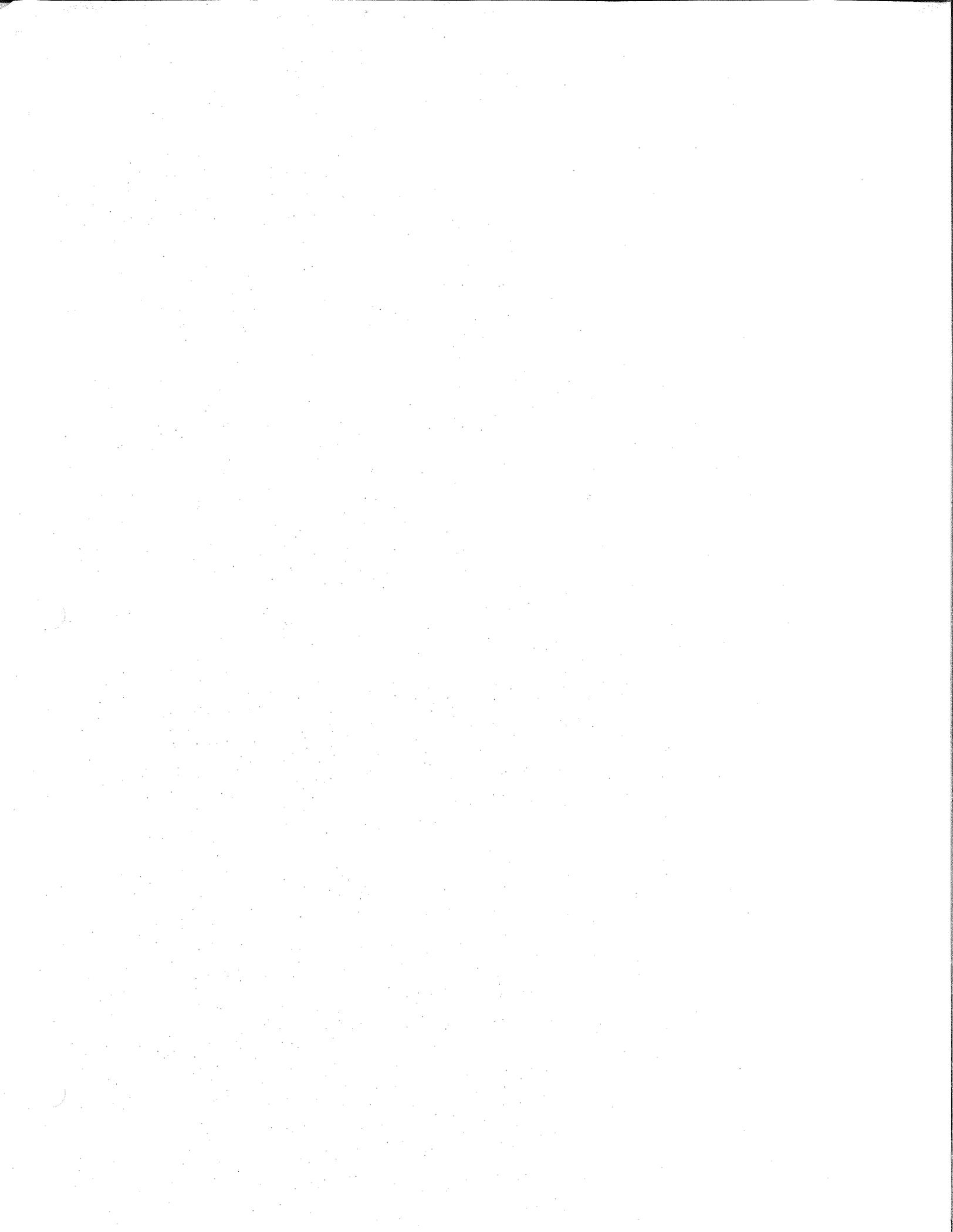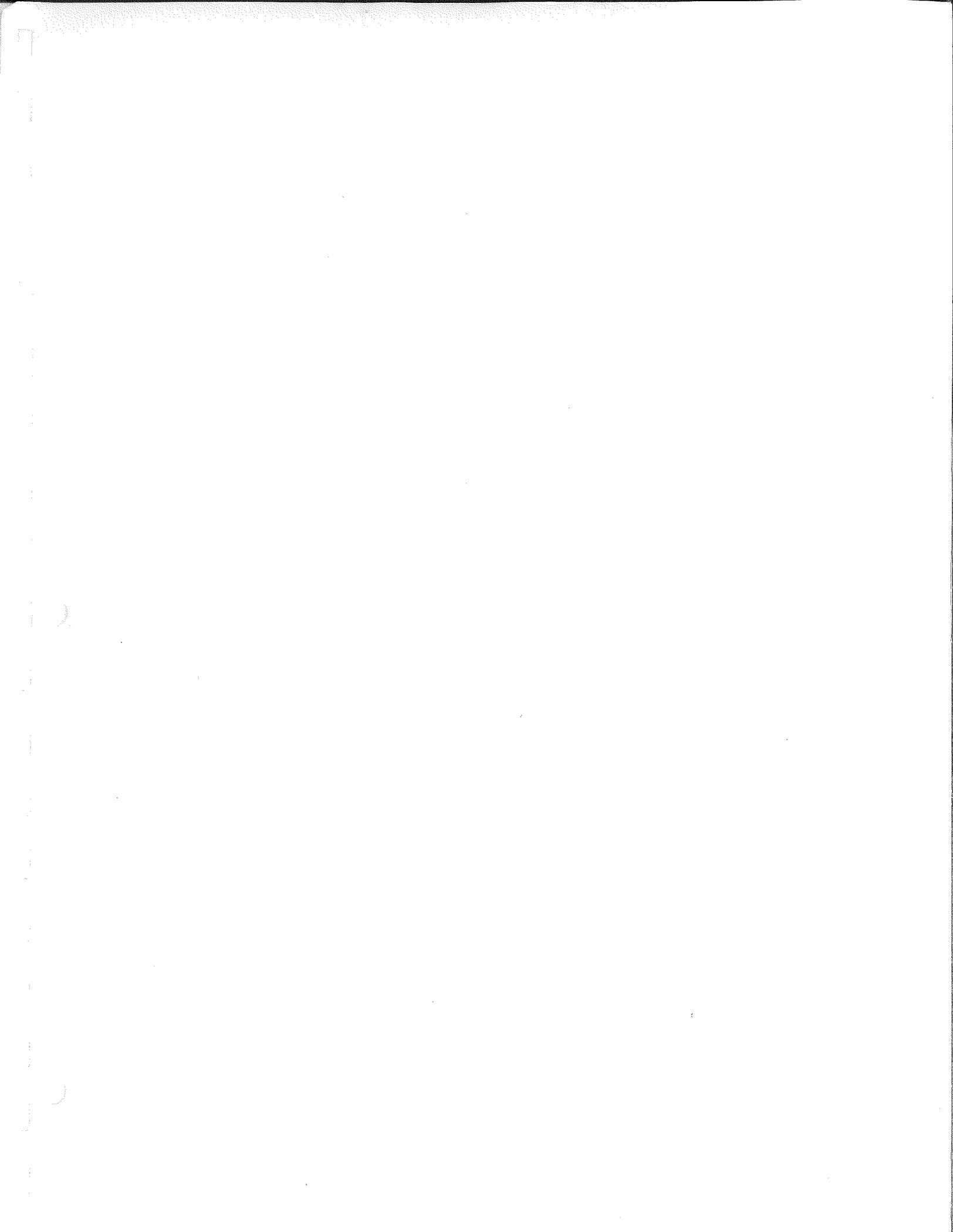
Radio Shack® unlimited℠

PURCHASER:

NAME _____

ADDRESS _____

APT. NO. _____

CITY _____

STATE _____ ZIP _____

PHONE (_____) _____

SHIP TO:

NAME _____

ADDRESS _____

APT. NO. _____

CITY _____

STATE _____ ZIP _____

PHONE (_____) _____

CATALOG NO.	DESCRIPTION	QTY.	PRICE EACH
| | | | | | | |			
| | | | | | | |			
| | | | | | | |			
| | | | | | | |			
| | | | | | | |			

Fill out this form and give to any sales associate to complete your order. Sorry, we cannot ship to a P.O. Box   FO-800

READ ME FIRST

All computer software is subject to change, correction, or improvement as the manufacturer receives customer comments and experiences. Radio Shack has established a system to keep you immediately informed of any reported problems, and the solutions. We have a customer service network including representatives in many Radio Shack Computer Centers, and a large group in Fort Worth, Texas, to help with any specific errors you may find in your use of this product. We will also furnish information on any improvements or changes that are "cut in" on later production versions.

To take advantage of these services, you must do three things:

(1) Send in the postage-paid registration card included in this manual immediately. (Postage must be affixed in Canada.)

(2) If you change your address, you must send us a change of address card (enclosed), listing your old address exactly as it is currently on file with us.

(3) As we furnish updates, and you update your software, you must keep an accurate record of the current version numbers on the logs below. (The version number will be furnished with each update.)

Keep this card in your manual at all times, and refer to the current version numbers when requesting information or help from us. Thank you.

APPLICATIONS SOFTWARE VERSION LOG			OP. SYSTEM VERSION LOG
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____