

# Notebook Computer Service Manual

*3220/3420/3620*

---

## *NOTICE*

The company reserves the right to revise this publication or to change its contents without notice. Information contained herein is for reference only and does not constitute a commitment on the part of the manufacturer or any subsequent vendor. They assume no responsibility or liability for any errors or inaccuracies that may appear in this publication nor are they in anyway responsible for any loss or damage resulting from the use (or misuse) of this publication.

This publication and any accompanying software may not, in whole or in part, be reproduced, translated, transmitted or reduced to any machine readable form without prior consent from the vendor, manufacturer or creators of this publication, except for copies kept by the user for backup purposes.

Brand and product names mentioned in this publication may or may not be copyrights and/or registered trademarks of their respective companies. They are mentioned for identification purposes only and are not intended as an endorsement of that product or its manufacturer.

First Edition      ©May, 2000

Trademarks

**Intel, Pentium and Celeron** are trademarks of Intel Corporation.

**IBM and PS/2** are trademarks of IBM Corporation.

**MS-DOS, Windows, Windows 95 and Windows NT** are trademarks of Microsoft Corporation.

Other brand and product names are trademarks and/or registered trademarks of their respective companies.



## ***ABOUT THIS MANUAL***

This manual is intended for service personnel who have completed sufficient training to undertake the maintenance and inspection of personal computers.

It is organized to allow you to look up basic information for servicing and/or upgrading components of the 3220/3420/3620 notebook computer. The following information is included:

**Chapter 1, *Introduction***, provides general information about the location of system elements and their specifications.

**Chapter 2, *Chipset***, briefly describes the computer's CPU, core logic and supporting chips.

**Chapter 3, *Disassembly***, provides step-by-step instructions for disassembling parts and subsystems and how to upgrade elements of the system.

**Chapter 4, *Troubleshooting***, provides recommendations on how to solve possible system problems.

**Appendix A, *Parts Lists***

**Appendix B, *Circuit Diagrams***

## ***RELATED DOCUMENTS***

You may also need to consult the following manuals for additional information:

### *User's Manual on CD*

This describes the notebook's features and the procedures for operating the computer and its ROM-based setup program. It also describes the installation and operation of the utility programs provided with the notebook.

### *Concise User's Manual*

This gives a quick guide to the notebook and a brief introduction to its features.



# TABLE OF CONTENTS

## Preface

Cover .....	i
Notice .....	ii
About This Manual .....	iii
Related Documents .....	iv
Table of Contents .....	v
List of Figures .....	viii
List of Tables .....	x

## Chapter 1: Introduction

System Specifications .....	1-2
CPU .....	1-2
Core Logic .....	1-2
Memory .....	1-2
BIOS .....	1-2
Video .....	1-3
Drives .....	1-3
Audio .....	1-3
I/O .....	1-4
Interface .....	1-4
Power System .....	1-4
Other Features (optional) .....	1-5
Environment .....	1-5
Physical .....	1-5
External Locator .....	1-6

## Chapter 2: Chipset

CPU - Intel Mobile Pentium III/Celeron .....	2-4
Core Logic Chipset - Intel 440ZX-M/BX AGPset .....	2-5
North Bridge, AGPset System Controller, 82443ZX-M/82443BX .....	2-5
South Bridge, PCI ISA IDE Xcelerator, 82371EB(PIIX4E) .....	2-6

Supporting Chips .....	2-8
Ricoch 5C475 PCI-CardBus Bridge .....	2-8
SMSC FDC37N869 PC 99 .....	2-10
Compliant 5V and 3.3V Super I/O Controller with Infrared Support .....	2-10
ATI RAGE LT PRO Graphics Controller .....	2-11
RealTek ALS300+ Integrated PCI Audio Accelerator .....	2-12

## Chapter 3: Disassembly

Connections .....	3-2
Maintenance Precautions .....	3-3
Battery Precautions .....	3-3
Cleaning .....	3-4
Maintenance Tools .....	3-4
General Disassembly: Removing the Keyboard & Heat Plate .....	3-5
Removing the Heat Sink Module .....	3-6
Changing the CPU .....	3-7
General Disassembly: Removing the LCD Module .....	3-8
Replacing the LCD .....	3-10
12.1" Disassembly.....	3-10
13.3" Disassembly.....	3-10
<i>Removing the Inverter Board</i> .....	3-10
General Disassembly: Top Cover Assembly .....	3-12
Separating the Top Cover Assembly .....	3-12
General Disassembly: Top Cover Components .....	3-14
<i>TouchPad</i> .....	3-14
<i>Microphone</i> .....	3-14
General Disassembly: Bottom Cover Assembly .....	3-16
HDD Bracket .....	3-16
Mainboard .....	3-16
Optional Fax/Modem Module, The Power Board, The IR Board, and the IO Bracket .....	3-18
<i>Fax/Modem Module (not shown)</i> .....	3-18
<i>The Power Board</i> .....	3-18
<i>The IR Board</i> .....	3-18
<i>The IO Bracket</i> .....	3-18



Module Disassembly: HDD Module .....	3-20
Removing the HDD Module .....	3-20
Replacing/Upgrading the HDD .....	3-21
<i>Taking it Apart</i> .....	3-21
<i>Assembling the HDD Module</i> .....	3-22
<i>Setting Up a New HDD for the First Time</i> .....	3-23
Connectors .....	3-24

## **Chapter 4: Troubleshooting**

Before You Begin .....	4-2
Tools .....	4-2
System Troubleshooting Chart .....	4-3
Pre-POST Assistant .....	4-4
AC Power LED Fails .....	4-5
<i>AC/DC Adapter</i> .....	4-5
AC Power & Charge LEDs Fail .....	4-6
<i>Checking the Power Board</i> .....	4-6
<i>Checking the Fuses</i> .....	4-6
<i>Checking the Battery Pack and its Cabling</i> .....	4-10
<i>Checking the Battery Pack</i> .....	4-10
<i>Checking the Cabling</i> .....	4-11
<i>Checking the System Board</i> .....	4-11
LCD Screen Failure to Display .....	4-12
<i>Checking the LCD to System Board Connection</i> .....	4-12
<i>Checking the Inverter Board</i> .....	4-13
<i>Checking the LCD Screen</i> .....	4-14
POST — Testing the System .....	4-15
No Errors Found During the POST .....	4-15
POST Error Beeps & Screen Messages .....	4-16
Post-POST Problems .....	4-24
PC Card Socket Malfunction .....	4-25
Sound Output Failure .....	4-26
<i>Checking the Software Configuration</i> .....	4-26

Checking the Volume .....	4-26
Checking the Speaker Cable .....	4-27
Suspend Function Failure .....	4-28
Charge LED Failure .....	4-28

## Appendix A: Parts Lists

## Appendix B: Circuit Diagrams

## LIST OF FIGURES

Fig. 1 – 1	Front View .....	1-6
Fig. 1 - 2	Bottom View .....	1-6
Fig. 1 – 3	Left View .....	1-7
Fig. 1 – 4	Right View .....	1-7
Fig. 1 – 5	Rear View .....	1-7
Fig. 2 – 1	System Block Diagram .....	2-1
Fig. 2 – 2	Chipset Site Diagrams .....	2-2,3
Fig. 3 – 1	Releasing the Keyboard & Removing the Heat Plate .....	3-5
Fig. 3 – 2	Removing the Heat Sink Module .....	3-6
Fig. 3 – 3	Changing the CPU .....	3-7
Fig. 3 – 4	Removing the LCD Module .....	3-9
Fig. 3 – 5	Separating the LCD & Frame .....	3-11
Fig. 3 – 6	Top Cover Disassembly (Bottom Screws) .....	3-12
Fig. 3 – 7	Top Cover Disassembly (Top Screws) .....	3-13
Fig. 3 – 8	Top Cover Assembly .....	3-15
Fig. 3 – 9	Bottom Cover Assembly .....	3-17
Fig. 3 – 10	Final Separation .....	3-19
Fig. 3 – 11	Removing the HDD .....	3-20
Fig. 3 – 12	HDD Module Disassembly .....	3-21
Fig. 3 – 13	HDD Module Assembly .....	3-22
Fig. 3 – 14	Ports & Connectors (top views) .....	3-24
Fig. 3 – 15	Ports & Connectors (bottom views) .....	3-25





Fig. 4 – 1	Troubleshooting Flowchart .....	4-3
Fig. 4 – 2	Adapter's Check Points .....	4-5
Fig. 4 – 3	Power Components .....	4-7
Fig. 4 - 4	Battery Circuitry .....	4-10
Fig. 4 - 5	LCD to Mainboard Connection .....	4-12
Fig. 4 - 6	Inverter Board Component Sites .....	4-13
Fig. 4 – 7	Startup Screen: The POST .....	4-15
Fig. 4 – 8	Speaker Connector on Mainboard .....	4-27
Fig. A – 1	3220 & 3620 Bottom Assembly .....	A-2
Fig. A – 2	3220 & 3620 Bottom Assembly Parts List .....	A-3
Fig. A – 3	3420 Bottom Assembly .....	A-4
Fig. A – 4	3420 Bottom Assembly Parts List .....	A-5
Fig. A – 5	3220 Top Case Assembly .....	A-6
Fig. A – 6	3220 Top Case Assembly Parts List .....	A-7
Fig. A – 7	3420 Top Case Assembly .....	A-8
Fig. A – 8	3420 Top Case Assembly Parts List .....	A-9
Fig. A – 9	3620 Top Case Assembly .....	A-10
Fig. A – 10	3620 Top Case Assembly Parts List .....	A-11
Fig. A – 11	3220/3420/3620 12.1" LCD Assembly .....	A-12
Fig. A – 12	3220/3420/3620 12.1" LCD Assembly Parts List .....	A-13
Fig. A – 13	3220/3420/3620 13.3" LCD Assembly .....	A-14
Fig. A – 14	3220/3420/3620 13.3" LCD Assembly Parts List .....	A-15
Fig. A – 15	3220/3420/3620 CD-ROM Assembly .....	A-16
Fig. A – 16	3220/3420/3620 CD-ROM Assembly .....	A-17
Fig. A – 17	3220/3420/3620 FDD Assembly .....	A-18
Fig. A – 18	3220/3420/3620 FDD Assembly Parts List .....	A-19
Fig. A – 19	3220/3420/3620 HDD Assembly .....	A-20
Fig. A – 20	3220/3420/3620 HDD Assembly Parts List .....	A-21
Fig. B – 1	Mainboard CPU: Pentium III Rev. 2 (Diagram 1 of 2).....	B-2
Fig. B – 2	CPU: Pentium III Rev. 2 (Diagram 2 of 2) .....	B-3
Fig. B – 3	GTL Pull-Up Resistors Rev. 2 .....	B-4
Fig. B – 4	CPU Power Rev. 2 .....	B-5
Fig. B – 5	CPU Power VCCT & 2.5V Rev. 2 .....	B-6
Fig. B – 6	443BX_443ZX Rev. 2 (Diagram 1 of 2).....	B-7

# Preface

Fig. B – 7	443BX_443ZX Rev. 2 (Diagram 2 of 2) .....	B-8
Fig. B – 8	VGA Mobility/LT Pro Rev. 2 .....	B-9
Fig. B – 9	VGA Memory & TV-Out Rev. 2 .....	B-10
Fig. B – 10	VGA STARP Option Rev. 2 .....	B-11
Fig. B – 11	SODIMM Rev. 2 .....	B-12
Fig. B – 12	Clock Generator Rev. 2 .....	B-13
Fig. B – 13	PIIX4 Rev. 2 (Diagram 1 of 2) .....	B-14
Fig. B – 14	PIIX4 Rev. 2 (Diagram 2 of 2) .....	B-15
Fig. B – 15	USB/ROM/PCI/ISA Pull High Rev. 2 .....	B-16
Fig. B – 16	HDD & CDROM/FDD Connector Rev. 2 .....	B-17
Fig. B – 17	Super I/O SMC869 Rev. 2 .....	B-18
Fig. B – 18	I/O Ports Rev. 2 .....	B-19
Fig. B – 19	KBC H8 Rev. 2 .....	B-20
Fig. B – 20	KBC PS/2 & FAN Rev. 2 .....	B-21
Fig. B – 21	Power Button & LED 3V H8 & LED Rev. 2 .....	B-22
Fig. B – 22	AC In Rev. 2 .....	B-23
Fig. B – 23	PCMCIA RL5C475A Rev. 2 .....	B-24
Fig. B – 24	RealTek Audio Controller ALS300+ & Conn. Rev. 2 .....	B-25
Fig. B – 25	AC 97 Rev. 2 .....	B-26
Fig. B – 26	MOdem Connector Rev. 2 .....	B-27

## *LIST OF TABLES*

Table 4 – 1	Pre-POST Problems .....	4-4
Table 4 – 2	Adapter Contacts .....	4-5
Table 4 – 3	Inverter Board Check Areas .....	4-13
Table 4 – 4	Fatal Error Messages .....	4-16
Table 4 – 5	Non-Fatal Error Messages .....	4-17,18,19
Table 4 – 6	Phoenix BIOS POST Default Test Points (displayed on debug card) .....	4-20,21,22,23
Table 4 – 7	Post-POST Problems .....	4-24
Table 4 – 8	Possible PC Card Problems & Solutions .....	4-25



# 1 Introduction

This manual covers the information you need to service or upgrade the 3220/3420/3620 Notebook Computer. Information about operating the computer (e.g. getting started, and the *Setup* utility) is in the *User's Manual*. Information about drivers (e.g. VGA & audio) is also found in *User's Manual*. That manual is shipped with the computer.

Operating systems (e.g. *DOS*, *Windows 9x*, *Windows NT 4.0*, *Windows 2000*, *UNIX*, etc.) have their own manuals as do application software (e.g. word processing and database programs). If you have questions about those programs, you should consult those manuals.

The notebook is designed to be upgradable. It supports Intel mobile Pentium™ III and Celeron CPUs of different speeds and different types of LCD screens: TFT color from a variety of manufacturers and in a variety of resolution/color configurations. See Chapter 3, “Disassembly,” for a detailed description of the upgrade procedures for each specific component. In addition, system memory, hard disk, and BIOS are also upgradable.

Please note the warning and safety information indicated by the “⚠” symbol.

The balance of this chapter reviews the computer's technical specifications and external features.

## SYSTEM

## SPECIFICATIONS

### CPU

#### mPGA2 Package

Intel Celeron: 450 ~ 650 MHz  
Intel Pentium III: 450 ~ 650 MHz  
(including CPUs with SpeedStep technology)

### CORE LOGIC

#### chipset

Intel 440ZX-M or 440BX (100MHz) AGPset

### MEMORY

#### L1 cache (in CPU)

16KB code + 16KB data

#### L2 cache (integrated with CPU)

Celeron: 128KB on die SRAM  
Pentium III: 256KB on die SRAM

#### RAM base

0MB (onboard)

#### RAM expansion

2 small outline DIMM sockets (144 pin)  
DIMM sizes: 32MB, 64MB, 128MB  
standards: TSOP package, 3.3-volt  
mode: SDRAM  
speed: 100MHz or faster  
use: singly or mixed or identical pairs  
maximum expansion: 256MB

### BIOS

512KB Flash ROM  
support: Plug 'n Play 1.0a, LBA, APM 1.2, ACPI



## VIDEO

<b>memory</b>	8MB SGRAM
<b>chipset</b>	ATI Rage LT AGP (with 3D, & AGP proprietary driver)
<b>architecture</b>	64-bit 2x AGP bus with Windows Acceleration
<b>display</b>	TFT (active matrix) 12.1" SVGA, (800x600) at 24-bit color (TrueColor) 13.3"/XGA, (1024x768) at 32-bit color (TrueColor)

## DRIVES

### HDD Bay

**HDD module** removable 2½" (9.5mm) , PCI local bus IDE interface

### Device Bay

**CD-ROM module** full size (5.25") ATAPI interface tray-loading mechanism, access time below 100ms

**or DVD<sup>†</sup> module** full size (5.25") ATAPI interface tray-loading mechanism, access time below 100ms

**or CD-RW module** full size (5.25") ATAPI interface tray-loading mechanism, access time below 100ms

**or FDD module** removable 3.5", 1.44 MB with 3-Mode support

**or LS-120 module** removable 3½" (12.7mm height), 120MB PCI local bus IDE interface

<sup>†</sup> with Software MPEG support

## AUDIO

<b>chipset</b>	RealTek ALS 300+ , proprietary driver
<b>architecture</b>	32-bit PCI bus
<b>compatibility</b>	DirectSound, DirectSound3D Sound Blaster, Sound Blaster Pro, and Sound Blaster 16 emulation
<b>sampling</b>	max. record & playback up to 48 KHz stereo (WAVE audio)

## **3D interface speakers**

QSound Q3D Positional /QEM EAX sound support  
speakers (phones), microphone, line-in  
2 built-in: 0.5W stereo amp.

## **I/O**

### **USB**

compliant with UHCI 1.1, USB 1.0 & PCI 2.1

### **Serial 1**

9-pin, 16C550 compatible

### **Serial 2**

infrared, IrDA v 1.1, FIR, SIR compatible

### **Parallel**

25-pin, ECP, EPP, output-only, bi-directional

### **CRT**

15-pin VGA

### **TV-out**

S-Video

### **PS/2**

6-pin, mini-din, mouse or keyboard

### **PC Card**

one Type I or Type II socket, PC Card 3.0 & CardBus compliant

## **INTERFACE**

### **keyboard**

87-key or 90-key (depending on the language)  
Windows 95 compliant with embedded numeric keypad

### **pointing device**

PS/2 TouchPad (built-in), MS-Mouse compatible

## **POWER SYSTEM**

### **adapters (external)**

universal, auto-sensing switching  
input: 90-240VAC @47- 63Hz  
output: 55W, 19V, 2.8A

### **battery pack(s)**

Li-Ion: smart battery with gauge circuit  
Ni-MH: dumb battery without gauge circuit

### **battery charge time**

Fast (system off) approx. 3 hours per battery, 2000mA  $\pm$  200mA  
Slow (system on) approx. 6 hours per battery, 600mA  $\pm$  50mA  
(based on a 4000mA smart battery)



### **Advanced Users**

Actual battery life per charge may differ from this figure. It will vary depending on the condition of the battery, the environment, setup, and working habits.



<b>life per charge</b>	approx. 180 minutes per battery (based on an Intel Pentium III 500 MHz CPU, running "ZD BatteryMark 2.0" software in the Windows 98 operating system)
<b>management</b>	BIOS control, APM ver 1.2 levels: full-on, standby, suspend-to-RAM/suspend-to-disk (0 volt)

## OTHER FEATURES (OPTIONAL)

**56K Fax/Data/Voice modem**

## ENVIRONMENT

<b>operating temp.</b>	0°C to 35°C (32°F to 95°F)
<b>storage temp.</b>	-10°C to 65°C (14°F to 149°F)
<b>operating humidity</b>	40% to 80%, non-condensing
<b>storage humidity</b>	10% to 90%, non-condensing
<b>altitude</b>	8000 feet
<b>shock (unpacked)</b>	5G (11 + 1 microsecond pulse)

## PHYSICAL

<b>dimensions</b>	306mm(w) x 232mm(d) x 29.8/32mm(h)
<b>weight</b>	2.28Kg (with Li-Ion battery, FDD, HDD & 12.1" LCD)

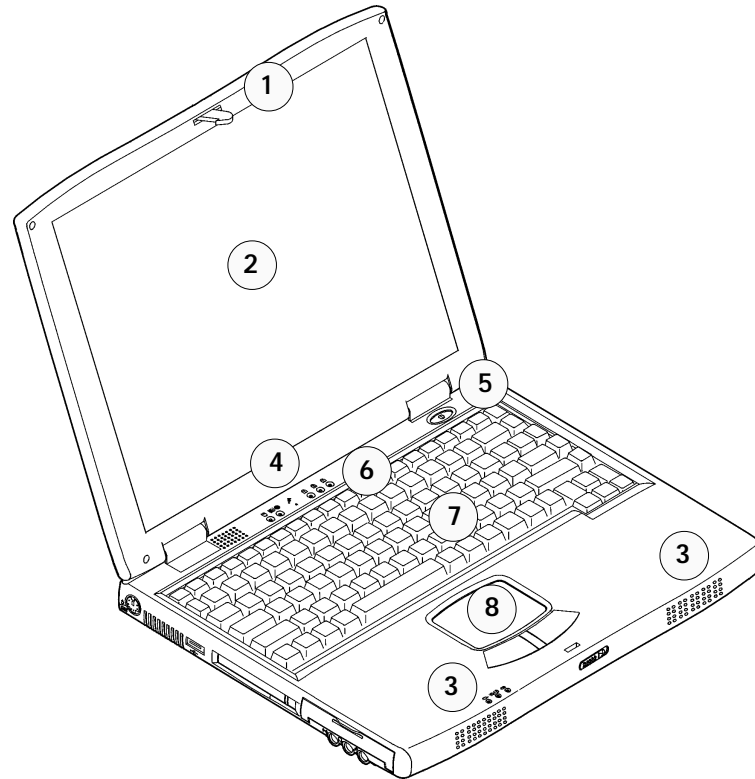
## EXTERNAL LOCATOR

The following figures show the external locations of the computer's main subsystems.

### FRONT VIEW

FIG. 1 - 1

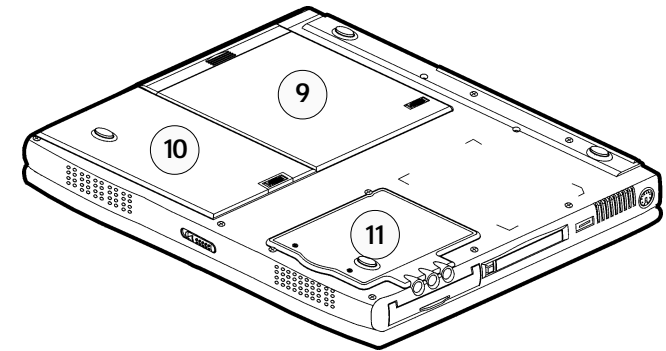
1. Cover latch
2. LCD
3. Speakers
4. Microphone
5. On/Off switch
6. LED status indicators
7. Keyboard
8. TouchPad & buttons



### BOTTOM VIEW

FIG. 1 - 2

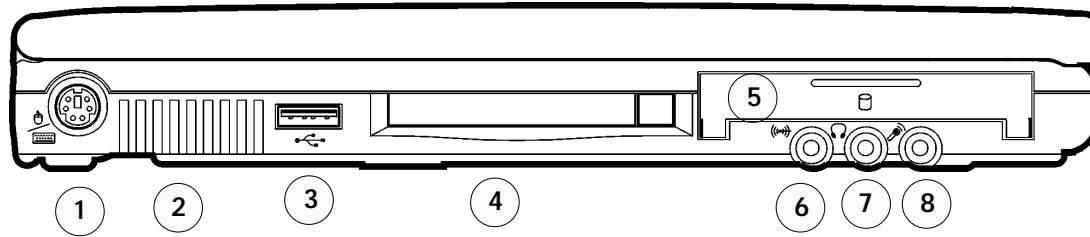
9. Device bay
10. Battery bay
11. RAM bay







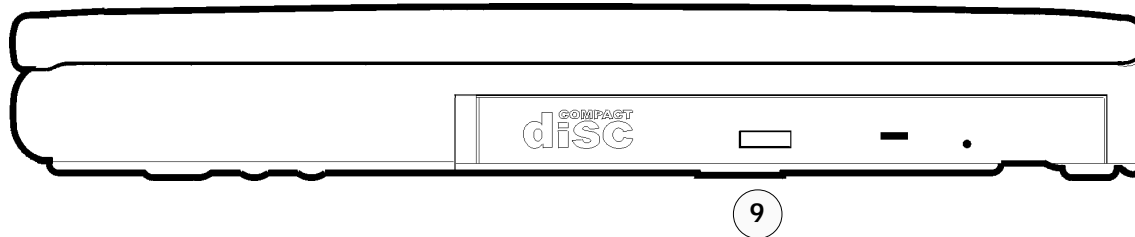
**LEFT VIEW**  
FIG. 1 - 3



1. PS/2 port
2. Fan
3. USB port
4. PC Card slot
5. HDD module
6. Audio line-in jack
7. Phone jack
8. Mic jack

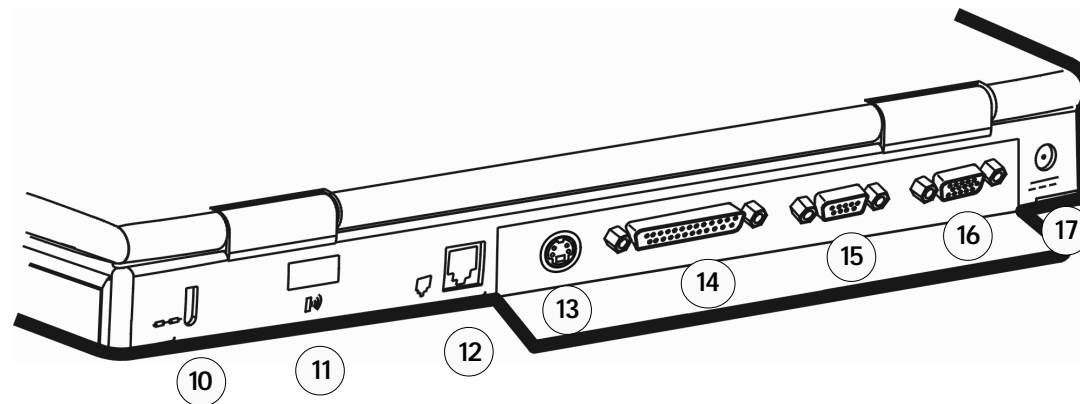
1

**RIGHT VIEW**  
FIG. 1 - 4



9. CD-ROM module (option)  
or DVD ROM module (option)  
or FDD module (option)  
or LS-120 module (option)

**REAR VIEW**  
FIG. 1 - 5

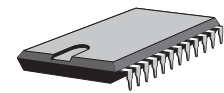


10. Kensington lock port
11. IrDA (serial 2) port
12. Fax/Modem (option)
13. S-Video TV-out port
14. Parallel port
15. COM (serial 1) port
16. External monitor port
17. Adapter port

# Introduction

*NOTES:*

1

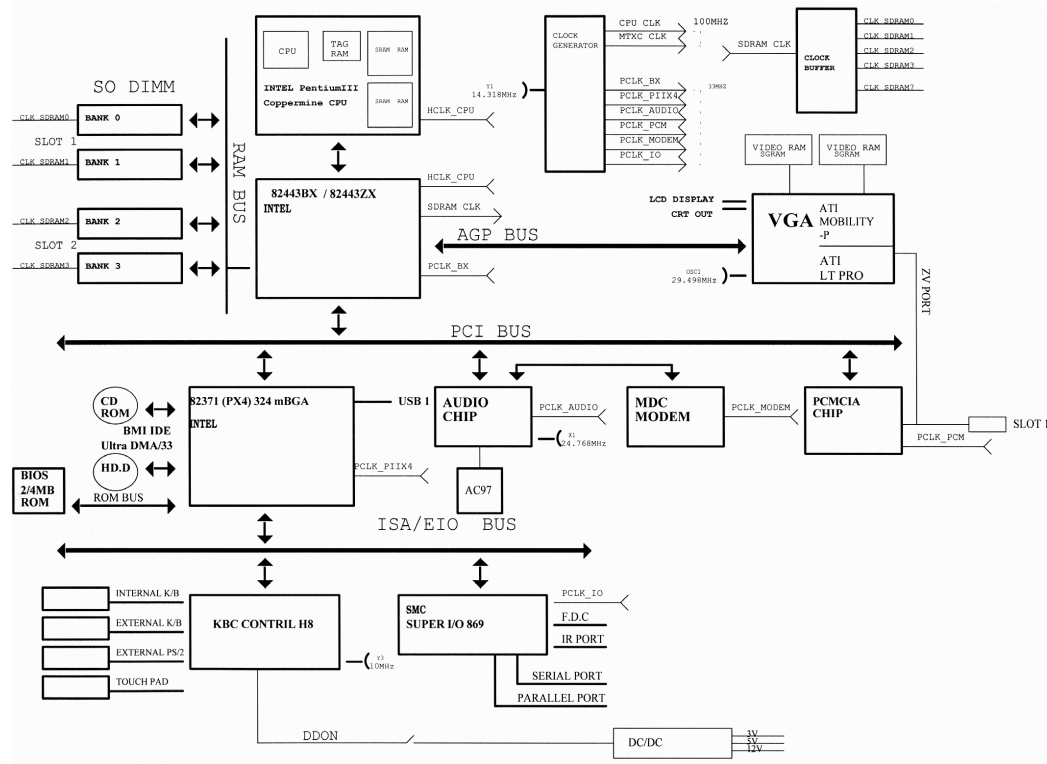


## 2 Chipset

The computer is completely AT-compatible. Its chipset supports a high-performance AGP bus video interface and state-of-the-art power management features. This chapter mainly describes the following major system components:

- CPU
- Core logic chipset
- Supporting chips

The following figures are the system block diagram and the component site diagram. These provide an overview of the computer's layout and a practical locator for chipset components.

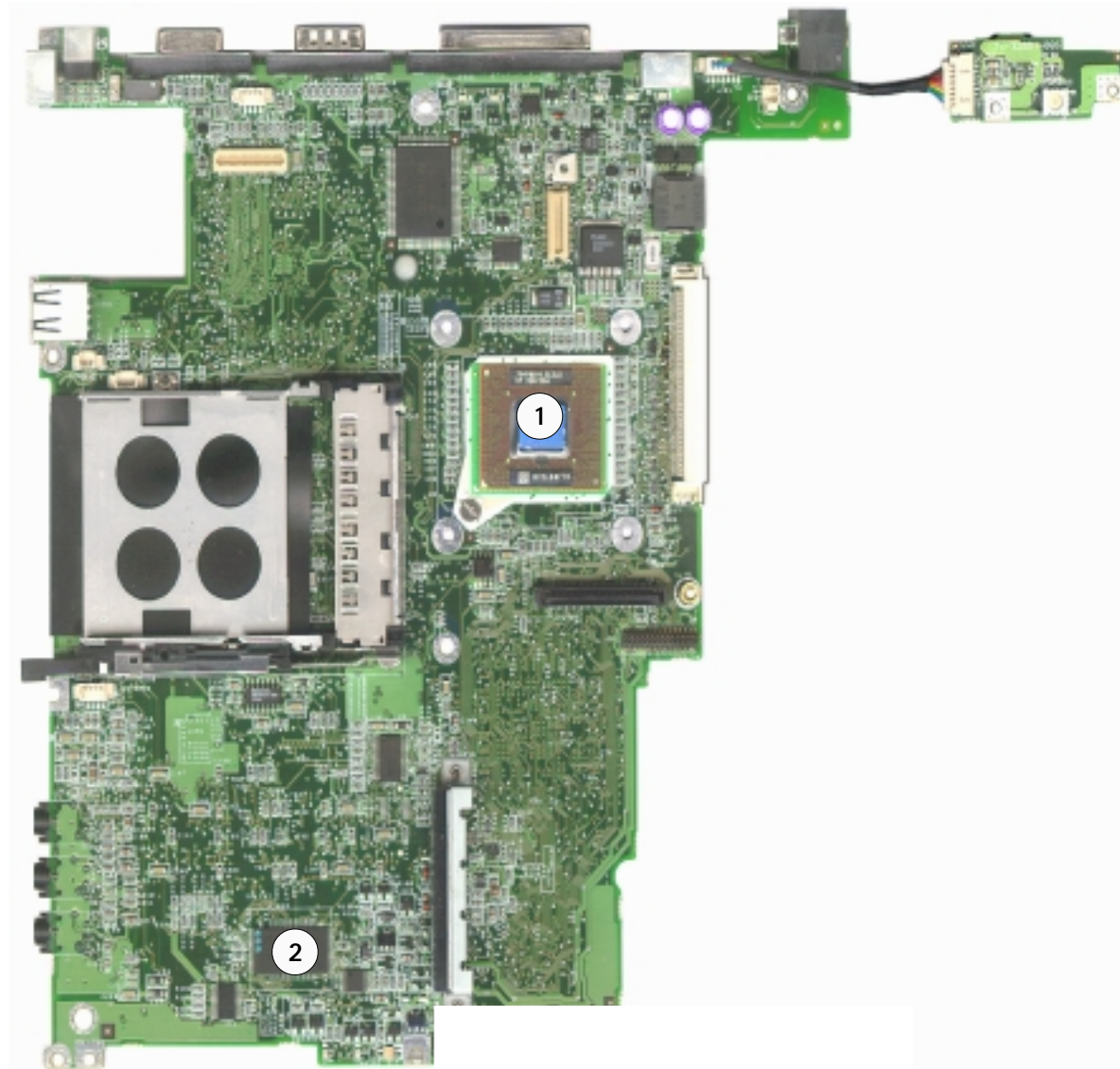


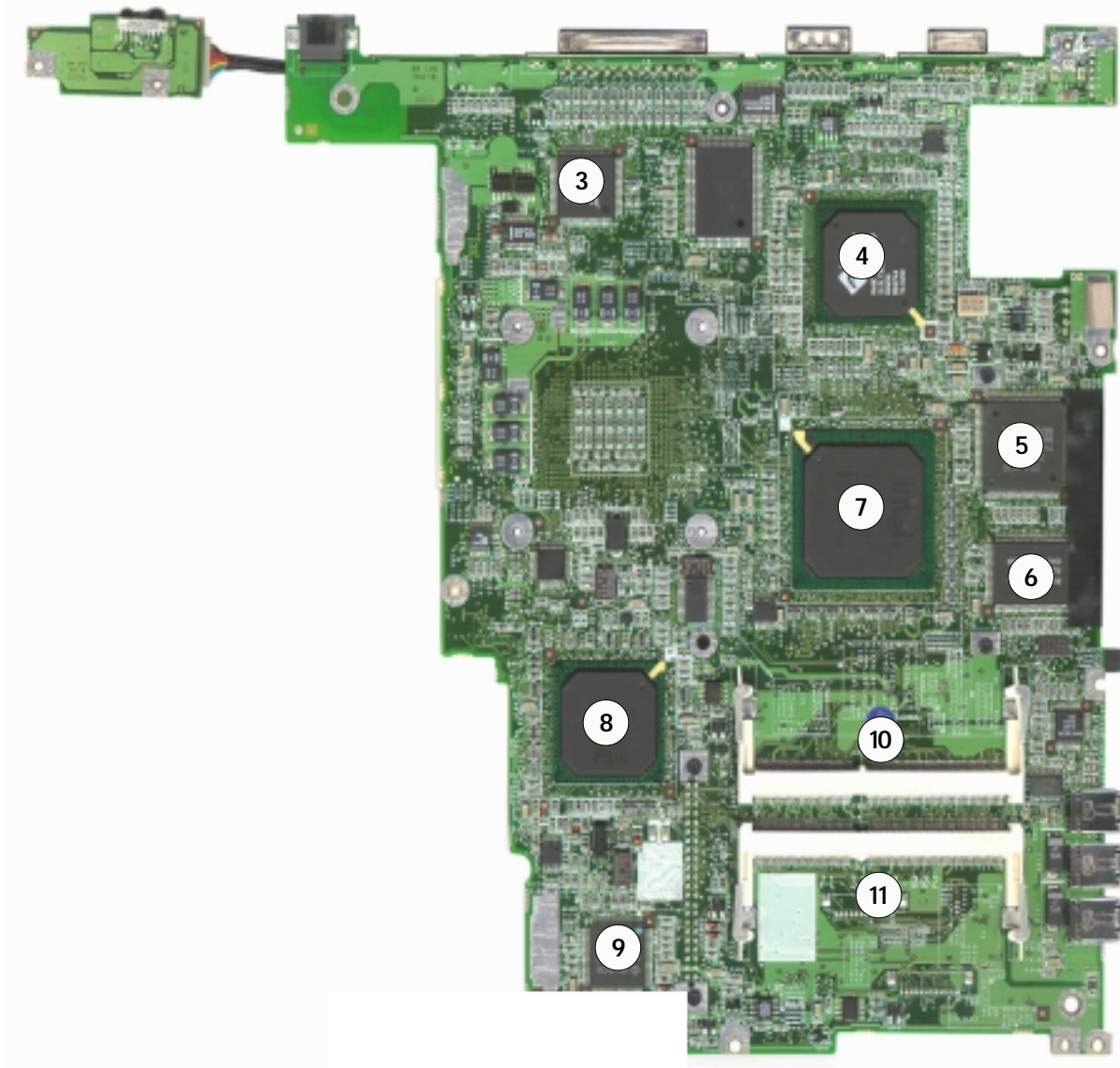
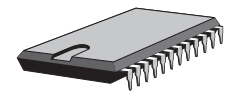
SYSTEM BLOCK DIAGRAM  
Fig. 2 - 1

# Chipset

CHIPSET SITE DIAGRAM  
FIG. 2 - 2

1. Pentium III/Celeron CPU
2. BIOS chip  
AMD AM29LV004BT





**CHIPSET SITE DIAGRAM**  
FIG. 2 - 2 (CONT.)

3. Super I/O controller  
SMSC FDC37N869
4. Video controller  
ATI RAGE LT PRO
5. PC Card controller  
Ricoh R5C475
6. Audio controller  
RealTek ALS300+
7. Core Logic chip  
82443ZX-M/B (North Bridge)
8. Core Logic chip  
82371EB (South Bridge)
9. Keyboard controller  
H8/3434
10. SDRAM DIMM socket
11. SDRAM DIMM socket

2

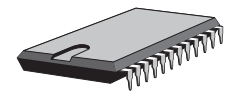
## *CPU - INTEL MOBILE PENTIUM III/CELERON*

The Notebook uses the Intel Mobile Pentium III/Celeron processor in a microPGA2 package. The Intel Mobile Pentium III/Celeron processor features an integrated L2 cache (256KB for Pentium III and 128KB for Celeron) and a 64-bit high performance system bus.

The Mobile Pentium III/Celeron processor's 64-bit wide Low Power Gunning Transceiver Logic system bus is compatible with the 440BX AGPSet and provides a glue-less, point-to-point interface for an I/O bridge/memory controller.

The Intel Mobile Pentium III and Celeron processors are fully compatible with all software written for the Pentium processor with MMX technology, Pentium processor, Intel486 microprocessor, and Intel386 microprocessor. In addition, they provide improved multimedia & communications performance. They feature:

- Performance improved over existing mobile processors
  - Supports the Intel Architecture with Dynamic Execution
  - Supports the Intel Architecture MMX technology
- Integrated primary (L1) instructions and data caches
  - 4-way set associative, 32-byte line size, 1 line per sector
  - 16-Kbyte instruction cache and 16-Kbyte writeback data cache
  - Cacheable range programmable by processor programmable registers
- Integrated second level (L2) cache
  - 4-way set associative, 32-byte line size, 1 line per sector
  - Operated at full core speed
  - 256-Kbyte, ECC protected cache data array
- Low Power GTL+ system bus interface
  - 64-bit data bus, 66-MHz operation
  - Uniprocessor, two loads only (processor and I/O bridge/memory controller)
  - Short trace length and low capacitance allows for single ended termination
- Voltage reduction technology
- Pentium II processor clock control
  - Quick Start for low power, low exit latency clock "throttling"
  - Deep Sleep mode for extremely low power dissipation
- Thermal diode for measuring processor temperature



## CORE LOGIC CHIPSET - INTEL 440ZX-M/440BX AGPSET

The Intel 440ZX-M/BX AGPset consists of the BX System Controller (443ZX-M/443BX) and the PCI ISA IDE Xcelerator (PIIX4E). The AGPset forms a Host-to-PCI bridge and provides the second level cache control and a full function 64-bit data path to main memory.

### NORTH BRIDGE, AGPSET SYSTEM CONTROLLER, 82443ZX-M/82443BX

The BX System Controller (443ZX-M/BX) integrates the cache and main memory DRAM control functions and provides bus control to transfer between the CPU, cache, main memory, AGP bus and the PCI Bus.

#### Features

- Supports the Pentium II processor family host bus at 100MHz and 66 MHz at 3.3V
- PCI 2.1 compliant
- Integrated Data Path
- Integrated DRAM controller
  - 8Mbytes to 256Mbytes main memory
  - 64Mbit DRAM/SDRAM technology support
  - EDO and SDRAM DRAM support
  - Integrated programmable-strength for DRAM interface
  - CAS-Before-RAS refresh, extended CBR and self refresh for EDO
  - CAS-Before-RAS and self refresh for SDRAM
- Fully synchronous, minimum latency 30/33 MHz PCI bus interface
  - Five PCI bus masters (including PIIX4)
  - 10 DWord PCI-to-DRAM read prefetch buffer
  - 18 DWord PCI-DRAM post buffer
  - Multi-Transaction timer to support multiple short PCI transactions
- AGP Features
  - AGP 1.0 compliant
  - 66/133 MHz data transfer capability
  - Supports concurrent CPU, AGP and PCI transactions
- Power Management Features
  - Dynamic stop clock support
  - Suspend to RAM (STR)
  - Suspend to Disk (STD)
  - Power On Suspend (POS)
  - Internal clock control
  - SDRAM and EDO self refresh during suspend
  - ACPI support
  - Compatible SMRAM (C\_SMRAM) and Extended SMRAM (E\_SMRAM)
  - SMM write-back cacheable in E\_SMRAM mode up to 1MB
- Supports the Universal Serial Bus (USB)
- 492 Pin BGA 440BX AGPset with integrated data paths

## ***SOUTH BRIDGE, PCI ISA IDE XCELERATOR, 82371EB (PIIX4E)***

The PCI ISA IDE Xcelerator (PIIX4E) is a multi-function PCI device implementing a PCI-to-ISA bridge function, a PCI IDE function, a Universal Serial Bus host/hub function, and an Enhanced Power Management function. As a PCI-to-ISA bridge, the PIIX4E integrates many common I/O functions found in ISA-based PC systems - a seven channel DMA Controller, two 82C59 Interrupt Controllers, an 8254 Timer/Counter, and a Real Time Clock. In addition to compatible transfers, each DMA channel supports Type F transfers. The PIIX4E also contains full support for both PC/PCI and Distributed DMA protocols implementing PCI based DMA. The Interrupt Controller has Edge or Level sensitive and programmable inputs and fully supports the use of an external I/O Advanced Programmable Interrupt Controller (APIC) and Serial Interrupts. Chip select decoding is provided for BIOS, Real Time Clock, Keyboard Controller, second external Microcontroller, as well as 2 Programmable Chip Selects. The PIIX4 provides full Plug and Play compatibility. The PIIX4E can be configured as a Subtractive Decode bridge. This allows the use of a subtractive decode PCI-to-PCI bridge such as the 82380 chipset which implements a PCI/ISA docking station environment.

The PIIX4E supports two IDE connectors for up to four IDE devices providing an interface for IDE hard disks and ROMs. Up to four IDE devices can be supported in Bus Master mode. The PIIX4E contains support for “Ultra DMA” synchronous DMA compatible devices.

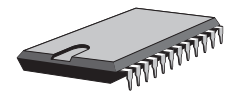
The PIIX4E contains a Universal Serial Bus (USB) Host Controller that is Universal Host Controller Interface (UHCI) compatible. The Host Controller’s root hub has two programmable USB ports.

The PIIX4E supports Enhanced Power Management, including full Clock Control, Device Management for up to 14 devices, and Suspend and Resume logic with Power On Suspend, Suspend to RAM or Suspend to Disk. It fully supports Operating System Directed Power Management via the Advanced Configuration and Power Interface (ACPI) specification. The PIIX4E integrates both a System Management Bus (SMBus) Host and Slave interface for serial communication with other devices.

### **Features**

- Supports Pentium and Pentium II Microprocessors
  - 440BX ISA kit
- Power Management Logic
  - Global and local device management
  - Suspend/resume logic
  - Supports thermal alarm
  - Support for external microcontroller
  - Full support for Advanced Configuration and Power Interface (ACPI) Specification and OS Directed Power Management





- Multifunction PCI to ISA Bridge
  - Supports PCI at 30 MHz and 33 MHz
  - Supports PCI Rev 2.1 specification
  - Supports Full ISA or Extended I/O (EIO) Bus
  - Supports full positive decode or subtractive decode of PCI
  - Supports ISA/EIO at 1/4 of PCI frequency
- Supports both mobile and desktop deep green environments
  - 3.3 V operation with 5 V tolerant buffers
  - Ultra-low power for mobile environments
  - Power-On Suspend and Soft-OFF for desktop environment
  - All registers readable/restorable for proper resume from 0 V suspend
- Integrated IDE Controller
  - Independent Timing of up to 4 drives
  - PIO Mode 4 transfers up to 14 Mbytes/s
  - Supports "Ultra 33" Synchronous DMA mode transfers up to 33 MBytes/sec
  - Integrated 8 x 32-bit buffer for IDE PCI Burst
  - Supports glue-less "Swap-Bay" option with full electrical isolation
- Enhanced DMA Controller
  - Two 8237 DMA controllers
  - Supports PCI DMA with 3 PC/PCI channels and Distributed DMA protocols (simultaneously)
  - Fast Type-F DMA for reduced PCI bus usage
- Interrupt Controller based on two 82C59
  - 15 interrupt support
  - Independently programmable for Edge/Level sensitivity
  - Supports optional external I/O APIC
  - Serial interrupt input
- Timers based on 82C54
  - System Timer, Refresh Request, Speaker Tone Output
- USB
  - Two USB 1.0 ports for serial transfers at 12 or 1.5 Mbit/sec
  - Supports legacy keyboard and mouse software with USB-based keyboard and mouse
  - Supports UHCI Design Guide Revision 1.1 Interface
- SMBus
  - Host interface allows CPU to communicate via SMBus
  - Slave interface allows external SMBus master to control resume events
- Real-Time Clock
  - 256 Byte Battery-Pack CMOS SRAM
  - Includes Date Alarm
  - Two 8-byte Lockout Ranges
- Microsoft Win95/98 compliant

## SUPPORTING CHIPS

The following subsections describe major supporting chips:

- Ricoh 5C475 PCI-CardBus Bridge
- SMSC FDC37N869 PC 99 Compliant 5V and 3.3V Super I/O Controller with Infrared Support
- ATI RAGE LT PRO Graphics Controller
- RealTeck ALS300 + Audio Controller

### ***RICOH 5C475 PCI-CARDBUS BRIDGE***

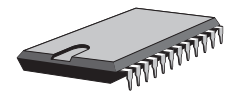
The 5C475 is a PC card controller offering a single chip solution as a bridge between PCI bus and CardBus. The 5C475 includes a PC Card 95 compliant socket interface and a bridge function to the PCI bus of 33MHz. The 5C475 can support the 32-bit CardBus (Card-32) and the 16-bit PC card (Card-16) without external buffers.

Concerning the card control interface, the 5C475's register is compatible with the Intel 82365SL and Ricoh's RF5C396/366 in order to maintain backward compatibility with the existing 16-bit PC Card compliant with PCMCIA2.1/JEIDA4.2. All PC card interface signals are individually buffered to allow direct connection to CardBus and Hot insertion/removal without external buffers. The 5C475 also allows direct connection to PCI bus.

The PCI interface and PC card socket interface have their own power supply terminals that can be powered at either 3.3V or 5V for compatibility with 3.3V and 5V signaling environments. The core logic is powered at 3.3V.

The 5C475 allows the system to be equipped with the high performance multimedia PC cards like the Video capture card. It features:

- PC98 compliant
  - PC98 Design Guide compliant (Subsystem ID, Subsystem Vendor ID)
  - ACPI 1.0 and PCI Bus Power Management 1.0 compliant
- Low Power consumption
  - Hardware Suspend
  - CLKRUN#, CCLKRUN# support
- High-performance
- Single Chip PCI-CardBus Bridge
  - PCMCIA PC-Card 95 socket support
  - CardBus (Card-32) Card and 16-bit (PCMCIA2.1/JEIDA4.2) Card support

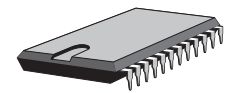


- PCI Bus Interface
  - Compliant with PCI Local Bus Specification 2.1
  - The maximum frequency 33MHz
  - PCI Master/Target protocol support
  - Direct connection to PCI bus
- CardBus PC card Bridge
  - Compliant with PCMCIA PC Card 95/CardBus Standard Specification
  - Compliant with Yenta register set Rev2.2
  - The maximum frequency 33MHz
  - CardBus Master/Target protocol support
  - Transfer transactions
    - All memory read/write transaction (bi-direction)
    - I/O read/write transaction (bi-direction)
    - Configuration read/write transaction (PCI-Card)
    - 2 programmable memory windows
    - 2 programmable I/O windows
- PC Card-16 Bridge
- Compliant with PCMCIA PC Card 95 CardBus (PC Card-16) Standard Specification
  - 5 programmable memory windows
  - 2 programmable I/O windows
  - Compliant with i82365SL compatible register set / ExCA TM
- System Interrupt
  - INTA# support for PCI system interrupt
  - IRQn support for ISA system interrupt (Non shared IRQn pins)
  - Serialized IRQ support
- 3.3V/5V Mixed Voltage Operation at 33Mhz
- GPIO support
- Posting Write and Prefetching Read support
- Plug and Play support
- 16-bit Legacy mode (3E0/3E2 I/O port) support
- PCIway Legacy DMA support

## SMSC FDC37N869 PC 99 COMPLIANT 5V AND 3.3V SUPER I/O CONTROLLER WITH INFRARED SUPPORT

The FDC37N869 features:

- 5 volt and 3.3 volt operation
- Intelligent auto power management
- 16 bit address qualification
- 2.88MB Super I/O Floppy Disk Controller
  - Licensed CMOS 765B Floppy Disk Controller
  - Software and register compatible with SMSC proprietary 82077AA compatible core
  - Supports one Floppy Drive directly
  - Configurable Open Drain/Push-Pull Output Drivers
  - Supports Vertical Recording Format
  - 16 byte data FIFO
  - 100% IBM compatibility
  - Detects all overrun and underrun conditions
  - Sophisticated Power Control Circuitry (PCC) including multiple power-down modes for reduced power consumption
    - DMA enable logic
    - Data rate and drive control registers
    - Swap drives A and B
    - Non-burst mode DMA option
    - 48 Base I/O address, 15 IRQ and 4 DMA options
    - Forceable write protect and disk change controls
- Floppy disk available on parallel port pins ACPI compliant
- Enhanced digital data separator
  - 2Mbps, 1Mbps, 500 Kbps, 300 Kbps, 250 Kbps data rates
  - Programmable precompensation modes
- Serial ports
  - Two high speed NS16C550 compatible UARTs with send/receive 16 Byte FIFOs
  - Supports 230k and 460k baud
  - Programmable baud rate generator
  - Modem control circuitry
- Infrared communications controller
  - IrDA v1.2 (4Mbps), HPSIR, ASKIR, Consumer IR Support
  - 2 IR Ports
  - 96 base I/O address, 15 IRQ options and 4 DMA options
- Multi-mode parallel port with ChiProtect
  - Standard Mode
  - IBM PC/XT PC/AT and PS/2 compatible bi-directional parallel port
    - Enhanced Parallel Port (EPP) compatible
    - EPP 1.7 and EPP 1.9 (IEEE 1284 compliant)
    - Enhanced Capabilities Port (ECP) compatible (IEEE 1284 compliant)
    - Incorporates ChiProtect Circuitry for Protection Against Damage Due to Printer Power-On
    - 192 base I/O address, 16 IRQ and 4 DMA options
- Game port select logic
  - 48 base I/O addresses
- General Purpose Address Decoder
  - 16-byte block decode



## ATI RAGE LT PRO GRAPHICS CONTROLLER

The RAGE LT Pro is a highly integrated graphics accelerator with superior support for 3D and motion video – ideal for notebooks and LCD desktops. It incorporates comprehensive support for Intel's Accelerated Graphics Port (AGP), including 1X or 2X mode with sidebands.

Delivering superior 3D acceleration and comprehensive 3D support, the RAGE LT Pro includes a triangle set-up engine, single-pass trilinear filtering, six perspective correct texturing modes, video texturing, Gouraud and specular shading, and a host of 3D special effects.

The best choice for DVD notebooks and LCD desktops, the RAGE LT Pro's DVD features include motion compensation, acceleration for soft DVD, integrated TV-out with Macrovision and support for third-party MPEG-2 decoders via the ATI Multimedia Channel (AMC).

Using Tri-View™ the RAGE LT Pro can output to LCD, CRT, and TV simultaneously. It also includes two output controllers so that any two display devices can have different images and/or refresh rate.

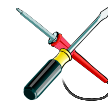
It has the following main features:

- First mobile accelerator to use AGP 2X (133MHz) in AGP Texturing with sideband signals to realize all the benefits of AGP.
- First mobile accelerator to deliver full motion soft DVD using motion compensation circuitry.
- First mobile accelerator with integrated LVDS transmitter.
- Innovative Dynamic Power Management with ACPI compliance.
- Superior 3D performance achieved through a hardware setup engine and a 4KB on-chip texture cache.
- Superior 2D performance with support of 100MHz SGRAM.
- TFT and DSTN panel interface support for up to 1280x1024 resolutions.
- Integrated ImpacTV2-quality TV output provides optimal image quality via programmable 6 tap flicker filter, resolution modes scale down from 1024x768 and 16:9 wide mode support. Direct YUV422 mode, Macrovision 7.01 and CGMS support.
- Support for 2, 4, or 8MB frame buffers, and integrated 230MHz DAC.
- High quality ratiometric expansion that fits source images to any panel resolution.
- Flexible graphics memory configurations: 4MB up to 8MB SDRAM/SGRAM.
- Memory upgrade via industry standard SGRAM SO-DIMM, for reduced board area and higher memory speeds.
- DDC1 and DDC2B+ for plug and play monitors.
- External Spread Spectrum chip support to reduce EMI on digital interface.
- Power management with full VESA DPMS and EPA Energy Star compliance.
- Integrated hardware diagnostic tests performed automatically upon initialization.
- High quality components through built-in SCAN, IDDQ, CRC and chip diagnostics.
- Single chip solution in 0.25um, 2.5V CMOS technology.
- Comprehensive HDKs, SDKs and utilities augmented by full engineering support.
- Fully compliant with relevant sections of PC 98 and PC 99.

## **REALTEK ALS300+ INTEGRATED PCI AUDIO ACCELERATOR**

The ALS300+ Integrated PCI Audio Accelerator brings forth a new age of highly integrated, single chip sound products. It provides cost-efficient audio solutions for motherboard and add-in card and notebook implementations. The ALS300+ fully supports the PCI Plug and Play standard. Its main features are as follows:

- High performance VLSI sound ASIC
- Compatible with DirectSound, DirectSound3D Sound Blaster, Sound Blaster Pro, and Sound Blaster 16 emulation
- 64-Voice Wavetable Synthesis w/ DLS-1 support
- Built-in ALSFM Synthesizer
- Supports Dual AC-97 CODECs/4-channel speakers
- I<sup>2</sup>S & S/PDIF Digital In/Out
- Host Modem support
- Legacy/DOS compatibility
- QSound Q3D Positional/QEM EAX Sound Support
- Supports Sound Blaster ADPCM decompression
- MPU-401 MIDI controller with FIFO
- Enhanced normal & digital game port support
- 16-bit full-duplex for concurrent recording and playback
- ACPI/PCI Bus Power Management Interface Specification 1.1
- 5.0/3.3V dual power mode
- 128-Pin PQFP package



## 3 Disassembly

This chapter provides step-by-step instructions for disassembling parts and subsystems. When it comes to reassembly, reverse the procedures (unless otherwise indicated).

We suggest you completely review any procedure before you take the computer apart.

The computer comes in three (3) versions: 3220, 3420 and 3620. The principal differences between them are cosmetic and minor structural variations of the top and bottom covers. As appropriate, these differences are noted in the side-bars. Additional component information is available in *Appendix A: Parts Lists* or in *Appendix B: Circuit diagrams*.

### CPU Upgrades:

You need to remove the keyboard and heat plate.

**Note:** When re-assembling, make sure the heat plate is not "distorted" and is fastened securely.

### LCD Upgrades:

You need to remove the keyboard and heat plate.

Changing the LCD module itself, only requires minimal deconstruction.

**Note:** When re-assembling, make sure the heat plate is not "distorted" and is fastened securely.

### Illustrations:

To enhance procedural clarity, the illustrations in this chapter do not include all components. Mylar insulation and adhesive attachments are not shown unless they are critical to the disassembly process. For information about these parts, please refer to *Appendix A: Parts Lists*.

The disassembly procedures appear in the following order:

## General Disassembly

- Keyboard and heat plate
- LCD module
- Top cover assembly
- Bottom cover assembly

## Module Disassembly

- HDD module

All disassembly procedures assume that the system is turned OFF, and disconnected from any power supply (the battery is removed too). We also assume that the CD device (CD-ROM/DVD-ROM/CD-RW) or the FDD device (FDD/LS-120) is removed as well as the HDD. All of these procedures are described in the *User's Manual* which accompanies the system.

## CONNECTIONS

Connections within the computer are one of four types:

Locking collar sockets for ribbon connectors

To release these connectors, use a small flat-head screwdriver to gently pry the locking collar away from its base. When replacing the connection, make sure the connector is oriented in the same way. The pin1 side is usually *not* indicated.

Pressure sockets for multi-wire connectors

To release this connector type, grasp it at its head and gently rock it from side to side as you pull it out. *Do not pull on the wires themselves.* When replacing the connection, do not try to force it. The socket only fits one way.

Pressure sockets for ribbon connectors

To release these connectors, use a small pair of needle-nose pliers to gently lift the connector away from its socket. When replacing the connection, make sure the connector is oriented in the same way. The pin1 side is usually *not* indicated.

Board-to-board or multi-pin sockets

To separate the boards, gently rock them from side to side as you pull them apart. If the connection is very tight, use a small flat-head screwdriver - *use just enough force to start the separation.*





## MAINTENANCE PRECAUTIONS

The following precautions are a reminder.

To avoid personal injury or damage to the notebook while performing a removal and/or replacement job, take the following precautions:

1. **Don't drop it.** Perform your repairs and/or upgrades on a stable surface. If the computer falls, the case and other components could be damaged.
2. **Don't overheat it.** Note the proximity of any heating elements. Keep the computer out of direct sunlight.
3. **Avoid interference.** Note the proximity of any high capacity transformers, electric motors, and other strong magnetic fields. These can hinder proper performance and damage components and/or data. You should also monitor the position of magnetized tools (i. e. screwdrivers).
4. **Keep it dry.** This is an electrical appliance. If water or any other liquid gets into it, the computer could be badly damaged.
5. **Be careful with power.** Avoid accidental shocks, discharges or explosions.
  - Before removing or servicing any part from the notebook, turn the notebook off and detach any adapters (AC/DC or car adapter).
  - To prevent the notebook from being turned on accidentally, remove the battery pack *before* you start a removal or replacement procedure.
  - Only use a power adapter approved for use with this computer.
  - Make sure the AC adapter has a steady, uninterrupted power supply and is grounded.
  - When you want to unplug the power cord or any cable/wire, be sure to disconnect it by the plug head. Do not pull on the wire.
  - Be sure the socket and any extension cord(s) you use can support the total current load of all connected devices.
6. **Peripherals/Modules** – Turn off and detach any peripherals. Remove all modules and power units.
7. **Beware of static discharge.** ICs, such as the CPU and main supporting chips, are vulnerable to static electricity. Before handling any part in the notebook, discharge any static electricity inside the notebook. When handling a printed circuit board, do not use gloves or other materials which allow static electricity buildup. We suggest that you use an anti-static wrist strap instead.
8. **Beware of corrosion.** As you perform your job, avoid touching any connector leads. Even the cleanest hands produce oils which can attract corrosive elements.
9. **Keep your work environment clean.** Tobacco smoke, dust or other air-born particulate matter is often attracted to charged surfaces, reducing performance.
10. **Keep track of the components.** When removing or replacing any part, be careful not to leave small parts, such as screws, loose inside the notebook.

## BATTERY PRECAUTIONS

**Only use batteries designed for this computer.** The wrong battery type may explode, leak or damage the computer.

**Recharge the battery using an approved system.** Incorrect recharging may make the battery explode.

**Always dispose of batteries carefully.** Batteries may explode or leak if exposed to fire, or improperly handled or discarded.

**Do not try to repair a battery.** Damaged or defective batteries should be replaced.

### *CLEANING*

Do not apply cleaner directly to the computer, use a soft clean cloth.

Do not use volatile (petroleum distillates) or abrasive cleaners on any part of the computer.

### *MAINTENANCE TOOLS*

The following tools are recommended when working on the notebook:

M3 Phillips-head screwdriver

M2.5 Phillips-head screwdriver (magnetized)\*

M2 Phillips-head screwdriver

Small flat-head screwdriver

Pair of needle-nose pliers

Anti-static wrist-strap

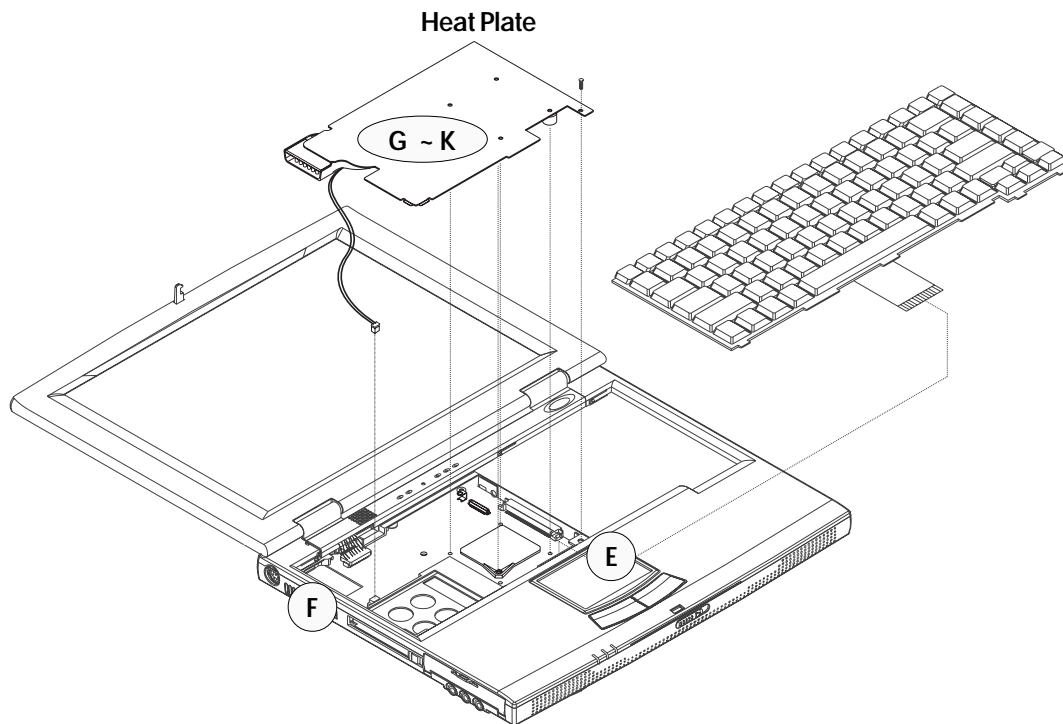
\* note Maintenance Precaution #3.



## GENERAL DISASSEMBLY: REMOVING THE KEYBOARD & HEAT PLATE

1. Use a flat-head screwdriver to release the keyboard catches at points **A ~ D**.
2. Carefully slide and lift the keyboard slightly up and towards the LCD. Use the flat-head screwdriver to disconnect the keyboard cable from the locking collar socket (**E**) on the mainboard. Set the keyboard aside until re-assembly.
3. With a Phillips-head screwdriver, remove screws **G ~ K**.

Stop here if you only need to replace /upgrade the CPU.



RELEASING THE KEYBOARD &  
REMOVING THE HEAT PLATE  
FIG. 3 - 1



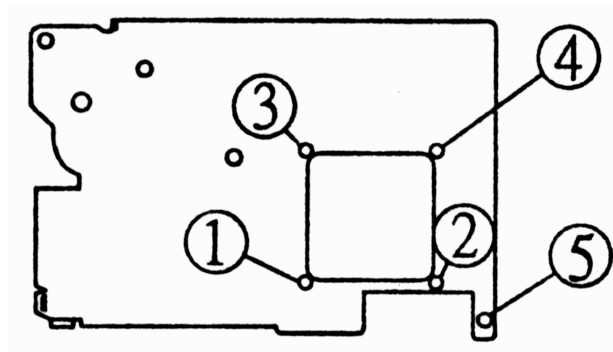
**Tip**

This procedure involves:  
screws        5  
connectors:  2

### REMOVING THE HEAT SINK MODULE

The heat sink module which includes the fan is attached to the reverse side of the heat plate.

1. Remove the heat plate (page 3-5).
2. Remove the five screws which secure the heat sink module to the heat plate according to the sequence shown in the following figure.



REMOVING THE HEAT SINK MODULE  
FIG. 3-2



## *CHANGING THE CPU*

The removable CPU fits into a FoxConn microPGA2 socket.

### *REMOVING THE CPU*

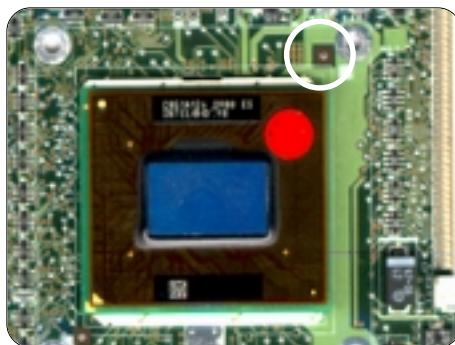
Loosen the socket screw using a flat-head screwdriver to disengage the CPU and the socket.

### *INSERTING THE CPU*

Place the CPU in the center of the socket.

Fasten the socket screw using a flat-head screwdriver to lock the CPU in the socket.

3



**CPU IN MICROPGA2 SOCKET**

FIG. 3 - 3

### GENERAL DISASSEMBLY: REMOVING THE LCD MODULE

The LCD module can be removed with only a little more disassembly after you've removed the keyboard and heat plate:

1. Using a flat-head screwdriver, pry the status panel (**A**) forward slightly.
2. Lift the status panel up and set it aside.
3. Remove the hinge covers (**B** & **C**). Use the flat-head screwdriver to flex the cover up and back slightly.
4. Disconnect the LCD controller cable from connector **JLCD1** (**D** from **E**) and the inverter cable from connector **JINV1** (**F** from **G**).
5. Remove the four (4) hinge screws (**H** ~ **K**), set them aside and lift the LCD module away from the body.

**Note:** The LCD's ground connector (**L**).

If you are upgrading the LCD module to different *size*, stop here. The *entire* module should be replaced, including the rear panel and frame. The new module uses different components, but connects in the same way as the original. Refer to *Appendix A* for specific part numbers.

If you are *replacing* the LCD panel with one of the same size, continue to page 3-10.

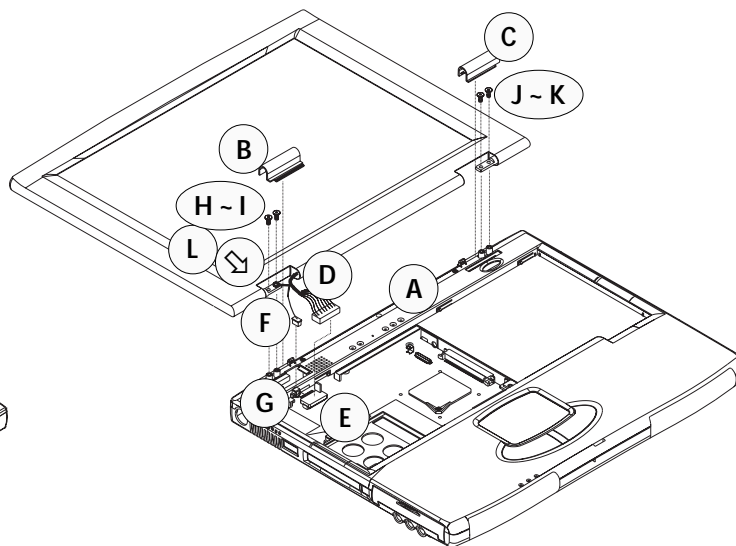
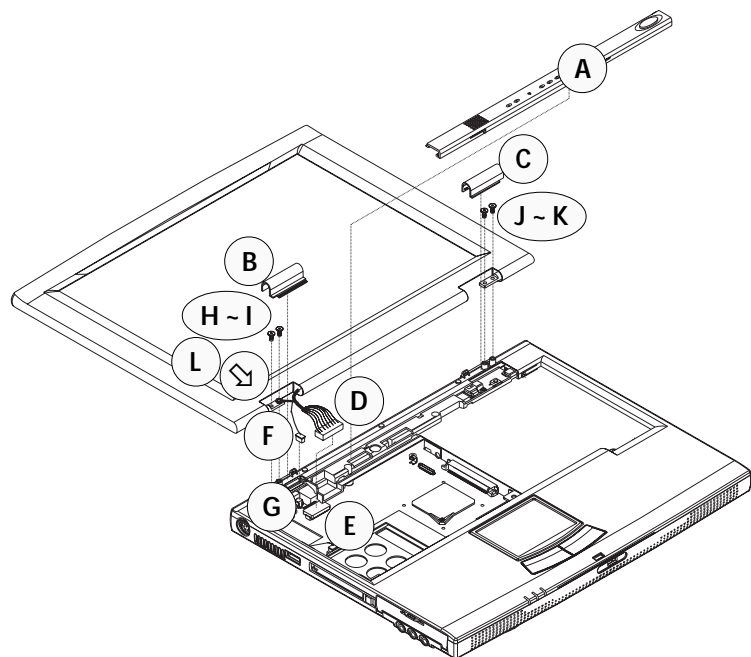
#### MODEL 3420 NOTE:

The status panel is integrated into the top cover. However, removing hinge cover **B** opens a space large enough to pull through the LCD controller and inverter cables.



models 3220 & 3620

model 3420



3

REMOVING THE LCD MODULE  
FIG. 3 - 4



**Tip**

This procedure involves:  
screws 4  
connectors: 2

## REPLACING THE LCD

The LCD module has two main elements, the **LCD** itself, and its **inverter board**.

First separate the LCD module from the main body of the computer as described on pages 3-8 and 3-9.

### 12.1" DISASSEMBLY

This LCD is attached directly to the rear panel of the LCD module.

1. Remove the 4 rubber caps (**A ~ D**) and frame screws under them.
2. Snap off the LCD frame (**E**). As you do this, make sure the cover latch (**F**) doesn't spring out. There are snaps on all sides.
3. Disconnect the panel (**G**) from the inverter board (**H**).
4. Remove the 4 LCD anchor screws (**I ~ L**), and lift the LCD (**M**) away from the rear panel (**N**).
5. Disconnect the LCD controller cable (**O**).

### 13.3" DISASSEMBLY

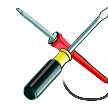
This LCD is mounted in a frame, which in turn attaches to the rear panel of the module.

1. Remove the 4 rubber caps (**A ~ D**) and frame screws under them.
2. Snap off the LCD frame (**E**). As you do this, make sure the cover latch (**F**) doesn't spring out. There are snaps on all sides.
3. Disconnect the panel (**G**) from the inverter board (**H**).
4. Disconnect the LCD power cable (**P**) from the inverter board (**Q**). Note: this cable is wrapped with the LCD controller cable (**R**).
5. Remove the frame anchor screws (**S & T**) and lift the LCD panel (**U**) and frame away from the rear panel (**V**).
6. Remove the frame screws (**W ~ Z**).
7. Disconnect the LCD controller cable (**R**).

## REMOVING THE INVERTER BOARD

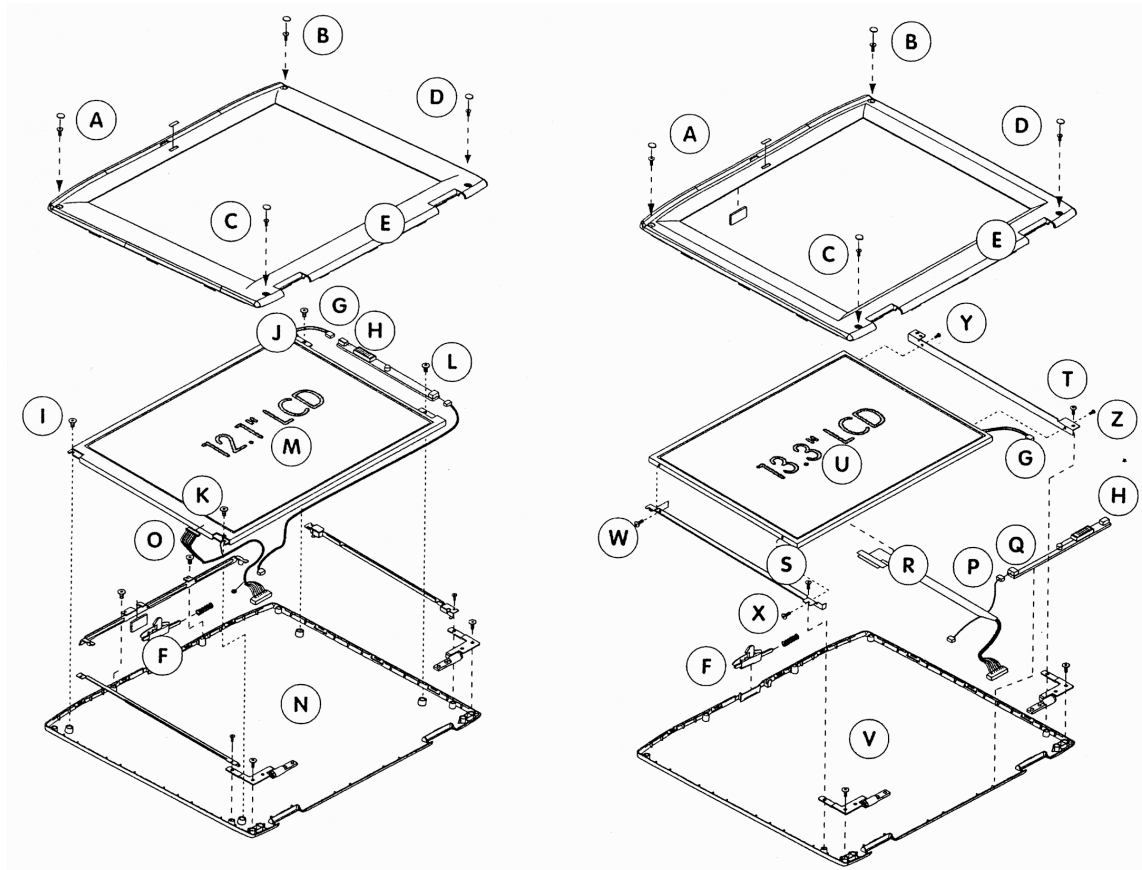
The inverter board is anchored to the rear panel of the LCD module with adhesive. If you need to remove it for testing or replacement, make sure the system is disconnected from all power sources (including batteries). You should disconnect all leads from the inverter before removing it from the LCD module. The inverter board itself is housed in protective mylar. This package is itself may be glued together, so separate it carefully to avoid tearing.





### 12.1" LCD module

### 13.3" LCD module



3

SEPARATING THE LCD & FRAME  
FIG. 3 – 5



*Tip*

This procedure involves:

	12.1"	13.3"
screws	8	10
connectors:	2	3

## GENERAL DISASSEMBLY: TOP COVER ASSEMBLY

The top cover assembly also contains the TouchPad assembly and daughterboards for the status panel LEDs and the power switch. However, other components are only accessible after the top cover assembly is removed. Remove the keyboard and heat plate and the LCD module and status panel (3220 & 3620) as described respectively on pages 3-5 & 3-9.

### SEPARATING THE TOP COVER ASSEMBLY

1. If you haven't already done so, remove the battery and the CD device/FDD device.
2. Turn the notebook body upside-down. Remove 13 screws (A ~ M).
3. Remove the four (4) screws on the rear panel (N ~ Q).
4. Return the notebook to its upright position and remove the two (2) screws in the status-panel area (R & S) and the three (3) screws on the back edge (T ~ V).
5. Disconnect the on-board microphone at **JINTMIC1 (W)**.  
**Note:** This connection is anchored with tape to conform to heat-sink spacing.
6. Disconnect the TouchPad connector at **CN3 (X)**.

#### MODEL 3420 NOTE:

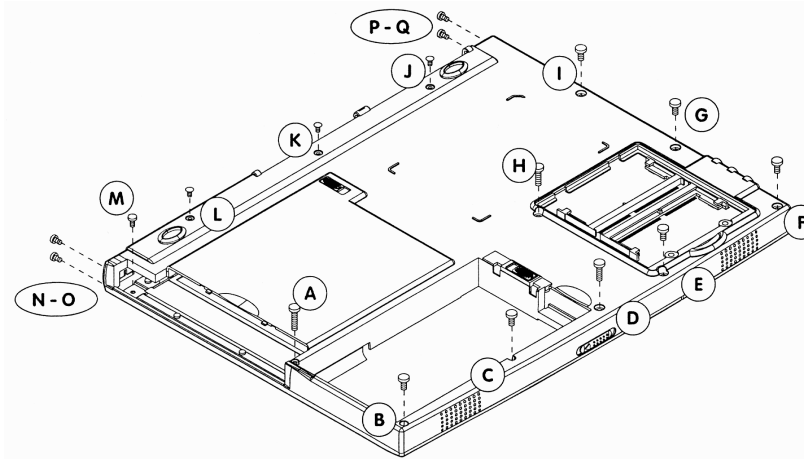
The equivalents of screws R & S are located on the underside of the notebook (roughly between screws J & K and K & L respectively).

TOP COVER DISASSEMBLY  
(BOTTOM SCREWS)  
FIG. 3 - 6



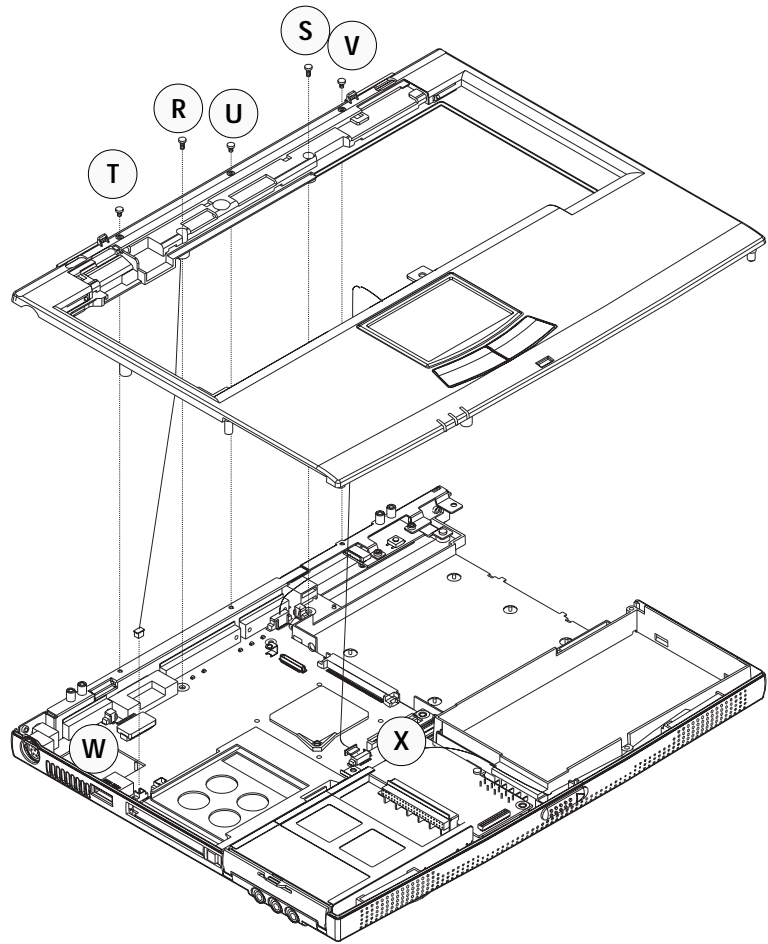
Tip

This procedure involves:  
screws 17

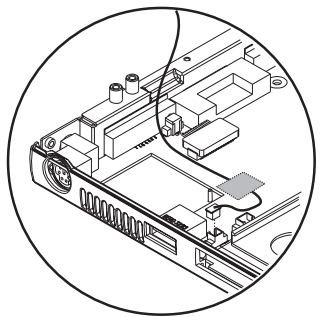




TOP COVER DISASSEMBLY  
(TOP SCREWS)  
FIG. 3 – 7



**Note for re-connecting the microphone cable**  
The following illustration shows how the microphone cable should be placed. Please note the cable should be in a straight line, aligned with the left edge of the LCD connector (JLCD1) and fixed to the mainboard with adhesive tape.



**Tip**  
This procedure involves:  
screws 5  
connectors 2

### GENERAL DISASSEMBLY: TOP COVER COMPONENTS

The two (2) TouchPad daughterboards in this assembly are unlikely to require any service.

#### TOUCHPAD

The TouchPad module is in 2 parts: the TouchPad itself and the “mouse” buttons.

To take them out of the top cover assembly, first separate the top cover assembly as described on pages 3-12 and 3-13.

1. Disconnect the ribbon connector at **J1 (A)** on the mouse button board or **J1 (B)** on the TouchPad board. **Note:** These connector sockets flip up to release the ribbon.
2. Remove the four (4) screws (**C ~ F**) on the mouse button board.
3. The TouchPad is held in place by a collar (**G**) on the outer surface of the top cover. To remove this collar, we recommend using a flat-head screwdriver to gently free the collar’s tabs which extend to the underside (seen in the accompanying graphic).

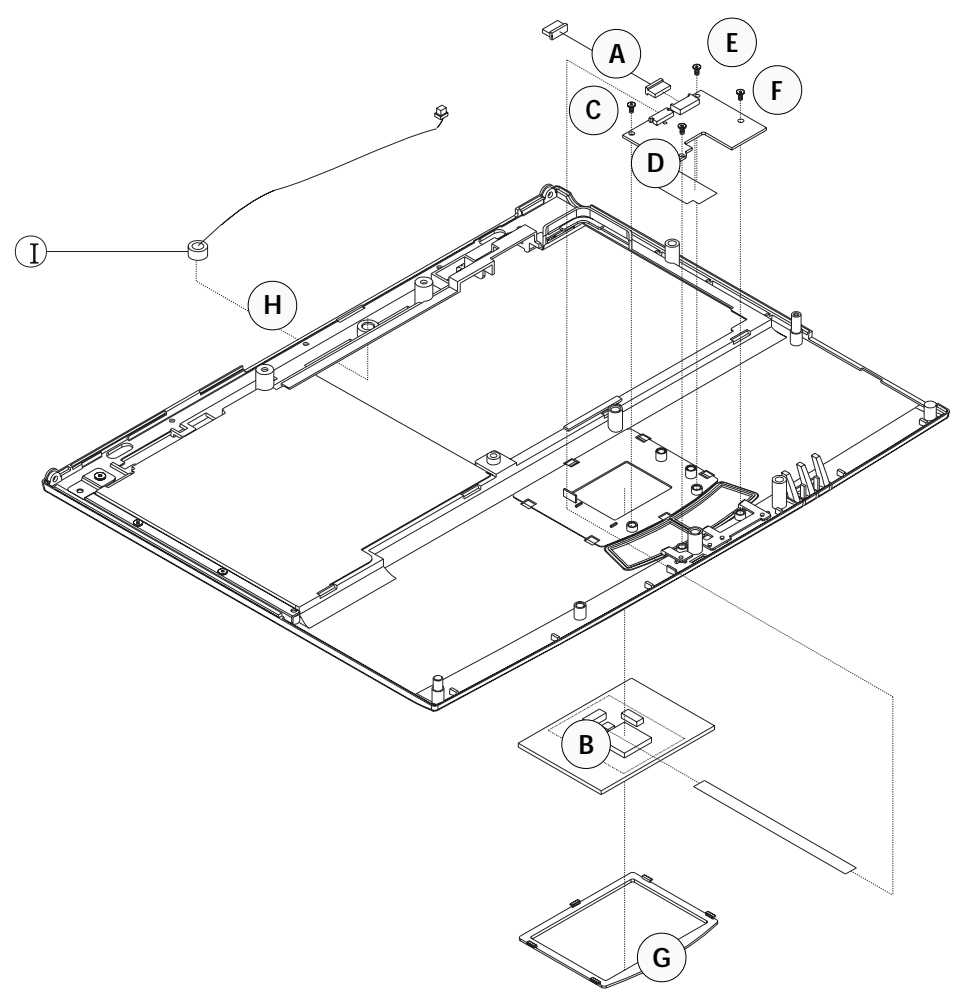
#### MICROPHONE

The on-board microphone (**H**) is anchored in place with tape.

No special tools are needed to remove it.

#### NOTE FOR MODELS 3420 & 3620:

To remove the TouchPad board, remove the two (2) screws anchoring its bracket. Slide the bracket either towards the keyboard space (3620) or to the left (3420) to release it.



TOP COVER ASSEMBLY  
FIG. 3 – 8

3



Tip

The TouchPad module has:

buttons	Pad
board	board
screws	4
connectors	2
	2 (for 3420 & 3620)
	1

### *GENERAL DISASSEMBLY: BOTTOM COVER ASSEMBLY*

The bottom cover assembly includes the mainboard, HDD bracket, IR board, power board, PCMCIA socket, and optional fax/modem module (not shown).

#### *HDD BRACKET*

The HDD bracket is held in place with a single screw.

1. Remove the HDD module anchor screw (**A**).
2. Lift the HDD bracket & HDD door assembly away from the mainboard.

**Note:** The mylar insulation between the bottom of the bracket and the mainboard should remain attached to the bracket- there are only two strips of adhesive tape holding it to the mainboard.

#### *MAINBOARD*

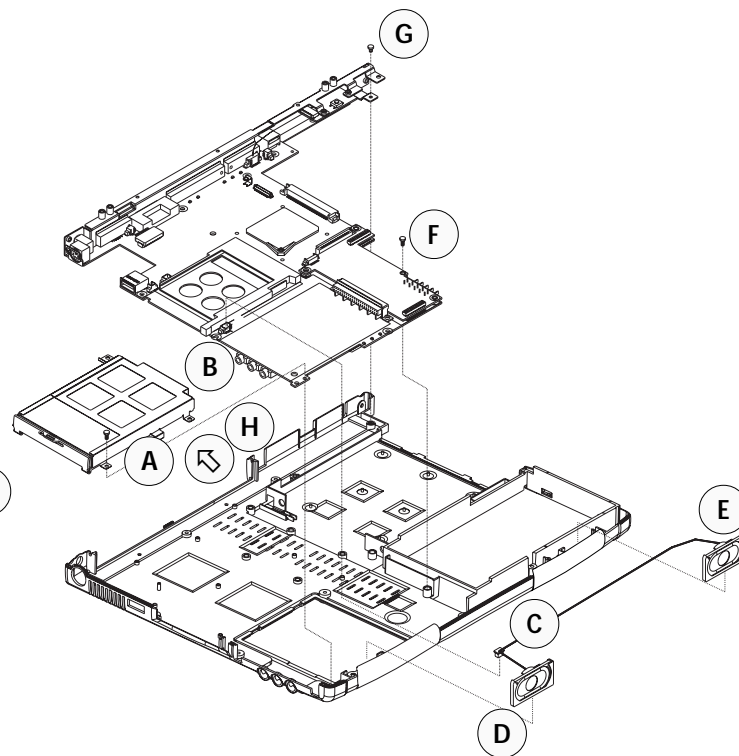
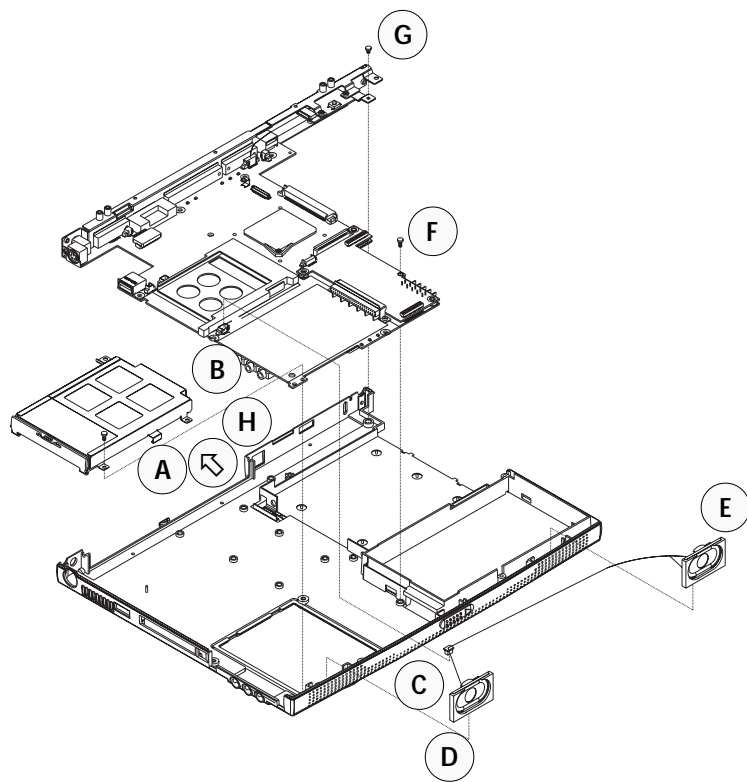
The lines connecting some of these components are taped in position. As you disconnect/remove them, note how this is done. This is especially important in the area close to the CPU.

3. Disconnect the speaker cable (**C**) from connector **JINTSPK1 (B)**.
4. Remove screws **F** & **G**.
5. Angle the mainboard up from the right side. As you do so, flex the bottom of the case near the fax/modem port (**H**).



models 3220 & 3620

model 3420



**BOTTOM COVER ASSEMBLY**  
FIG. 3 - 9



**Tip**

Separating the mainboard from the bottom cover includes:

screws 3  
connectors 1

### *OPTIONAL FAX/MODEM MODULE, THE POWER BOARD, THE IR BOARD AND THE IO BRACKET*

These are the remaining components which can be separated from the mainboard. None of these parts are serviceable. If any develop problems, the entire daughterboard should be replaced.

**Note:** The PC Card socket is soldered directly to the mainboard and so is not removable.

#### *FAX/MODEM MODULE (NOT SHOWN)*

This daughterboard connects to the mainboard through the surface mounted socket **JMDC1 (A)** and then to the fax/modem port through cable connector **B**. It is held in place with a single screw at point **C**.

#### *THE POWER BOARD*

This daughterboard (**D**) connects to the mainboard through two multi-pin sockets **JDD1 & JDD2 (E & F)**. To separate the daughterboard, gently rock it from side to side as you pull it up from the mainboard. The underside of the power board also has a strip of mylar insulation which should not be removed.

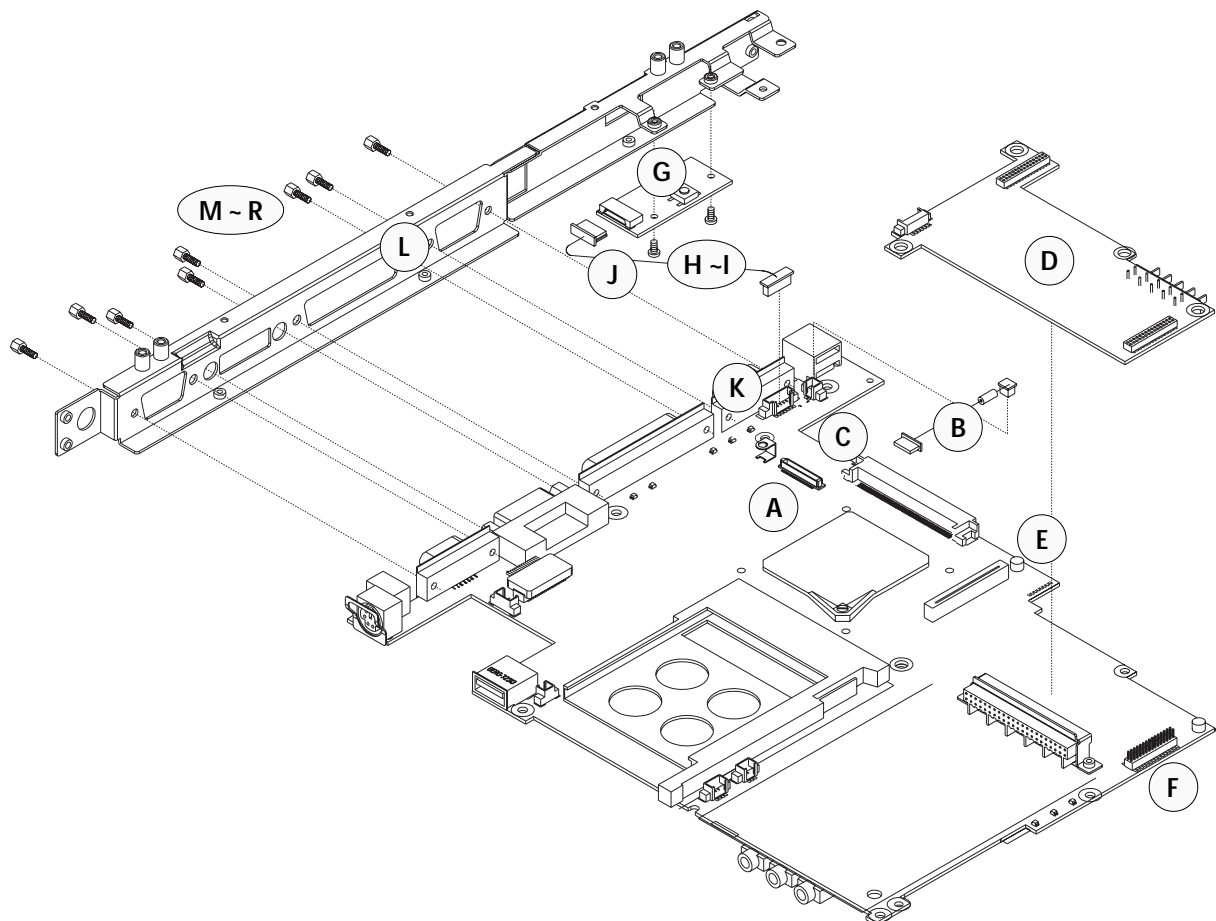
#### *THE IR BOARD*

This small daughterboard (**G**) contains the IrDA port and the ON/OFF switch. It is attached to the IO Bracket with two (2) screws, **H & I**. It connects to the mainboard through cable **J** to socket **JIR1 (K)**.


#### *THE IO BRACKET*

This bracket (**L**), is held to the mainboard by six nuts (**M ~ R**).





FINAL SEPARATION  
FIG. 3 - 10

  
**Tip**  
This procedure involves:  
screws 9  
connectors 4

## MODULE DISASSEMBLY: HDD MODULE

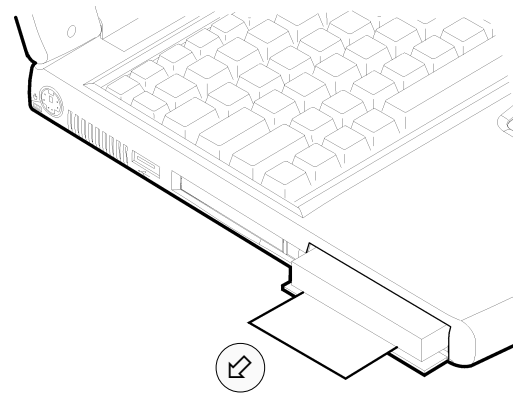
We are not including specific instructions for the CD device (CD-ROM/DVD-ROM/CD-RW) and the FDD device (FDD/LS-120). If any upgrade or replacement is required, the *entire* module should be replaced. If for some reason a specific part must be replaced, refer to the “exploded” drawings in *Appendix A* for the position and part number.

### REMOVING THE HDD MODULE

A detailed description of how to disassemble this module is included in the *User’s Manual Chapter 6: Extras*. We strongly recommend reviewing that document. It includes information on how to setup the hard disk for use. Those instructions may be more current than those provided here.

The section which follows is “lifted” from the 1st edition of the *User’s Manual*.

1. Make sure the computer is turned OFF.
2. Open the HDD bay door.
3. Unfurl the mylar pull-tab and use it to pull the HDD module out.



#### Removal Warning

Don't try to remove the hard disk (HDD) while the system is ON. This will make the system “crash”, resulting in data loss or damage.

#### REMOVING THE HDD

FIG. 3 – 11

#### Warranty Warning

Under some warranty conditions, the user may not remove the hard disk. If this applies, note any indications that the warranty has been violated.



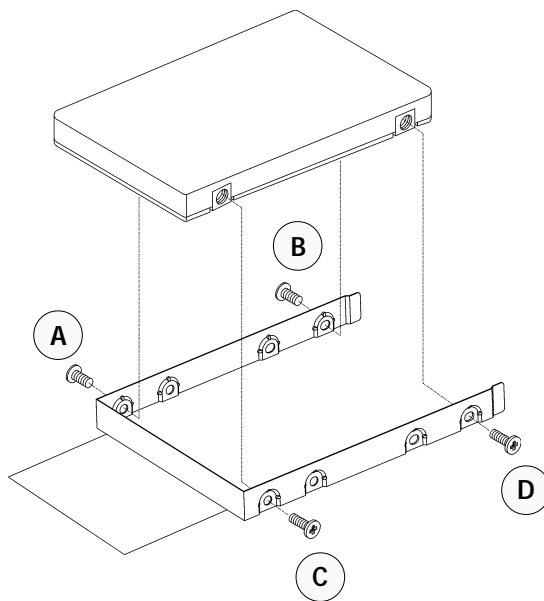
## REPLACING/UPGRADING THE HDD

You can replace the HDD with another 2.5", 9.5mm high IDE HDD.

### TAKING IT APART

After you've removed the HDD module,

1. Remove the four (4) bracket screws (A~D), and set them aside.
2. Carefully flex the bracket to release the HDD. (Do Not Shake it!)



### Contamination Warning

*Do not touch the HDD's connector pins or the electronic components. Even the cleanest hands have oils which may attract corrosive particles.*

3

HDD MODULE DISASSEMBLY

FIG. 3 - 12

## ASSEMBLING THE HDD MODULE

When you're ready to install a new hard disk,

1. Hold the HDD by its edges and orient it so that the connector pins side faces the open end of the bracket.
2. Settle the bracket around the HDD. In the correct position, the holes in the bracket's sides line up with the module's screw holes. (To fit into the HDD bay, the HDD's sides must not extend outside the bracket.)
3. Fasten the four (4) bracket screws (A ~ D) removed in step 1 in the section, "Taking it Apart", described on page 3-21.



**HDD**

### Jumper Warning

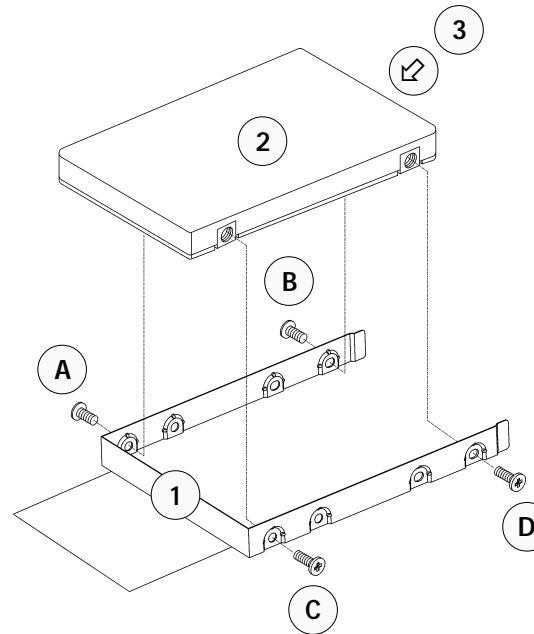
Some (usually older) HDDs have a small jumper switch. It must be set to "master" or the system may not correctly recognize the drive. Check your drive's documentation.

### HDD MODULE ASSEMBLY

FIG. 3 - 13

1. bracket
2. HDD (electronics face-down)
3. connector

Refer to the text for the accompanying instructions.





## SETTING UP A NEW HDD FOR THE FIRST TIME

Before you can use a new HDD for the first time, you have to do two things:

- tell the computer about the HDD (refer to the *User's Manual Chapter 4: Firmware*).
- prepare the HDD to accept data (refer to your operating system manual).

Use the following directions to prepare the new HDD for use.

### HARDWARE

After you replace or upgrade the HDD, turn the system on and configure it for the newly-installed HDD using *Setup*. Refer to the *User's Manual Chapter 4: Firmware*.

### 528MB OR LARGER HDDs & LBA MODE

The notebook automatically assumes any HDD 528MB or larger uses LBA Mode. If the HDD was formatted on an older system which did not use LBA mode, use the *Setup* utility to manually adjust the LBA setting for the Primary Master. If you don't, the system will not "see" it correctly.

The default, "Auto" type setting uses LBA mode. Use this if you're preparing a "fresh" HDD.

### SOFTWARE

A hard disk must be partitioned, and formatted before use.

### PARTITIONING

To partition the HDD, use the utility from your operating system (e.g. Microsoft's *fdisk* command) to do this.

**Note:** If you want to use the *Save to Disk Partition* feature, refer to the *User's Manual's Chapter 5: Power* before you partition the HDD.

### FORMATTING

To format, use the utility from your operating system (e.g. Microsoft's *format/s* command). Consult your operating system's manual for more information on its partitioning and formatting utilities.



### Save to Disk Warning

Whenever you install a different hard disk that has a *Save to Disk* partition on it, make sure you follow the procedures detailed in the *User's Manual Chapter 4: Firmware* and *Chapter 5: Power*.

# Disassembly

## PORTS & CONNECTORS

(TOP VIEWS)

FIG. 3 - 14

### Mainboard

1. PS/2 port
2. DC-in 19V
3. VGA port
4. Serial (COM1) port
5. Parallel port
6. TV-out port
7. Fax/Modem port
8. JINV1 to #23 (inverter)
9. JLCD1 to LCD
10. JMDC1 to Fax/Modem
11. JIR1 to #25 (IR Board)
12. JMODEM2 to Fax/Modem
13. USB port
14. JINTMIC1 to onboard mic
15. JFAN1 to fan
16. PCMCIA connection
17. JINTKB1 to Keyboard
18. JBAY1 to modules
19. JDD1 to #33 (Power)
20. JINTSPK1 to speakers
21. JHDD1 to Hard Disk Drive
22. JDD2 to #35 (power)

### Inverter Board

23. CN2 to #8 (Mainboard)
24. CN1 to LCD power

### IR Board

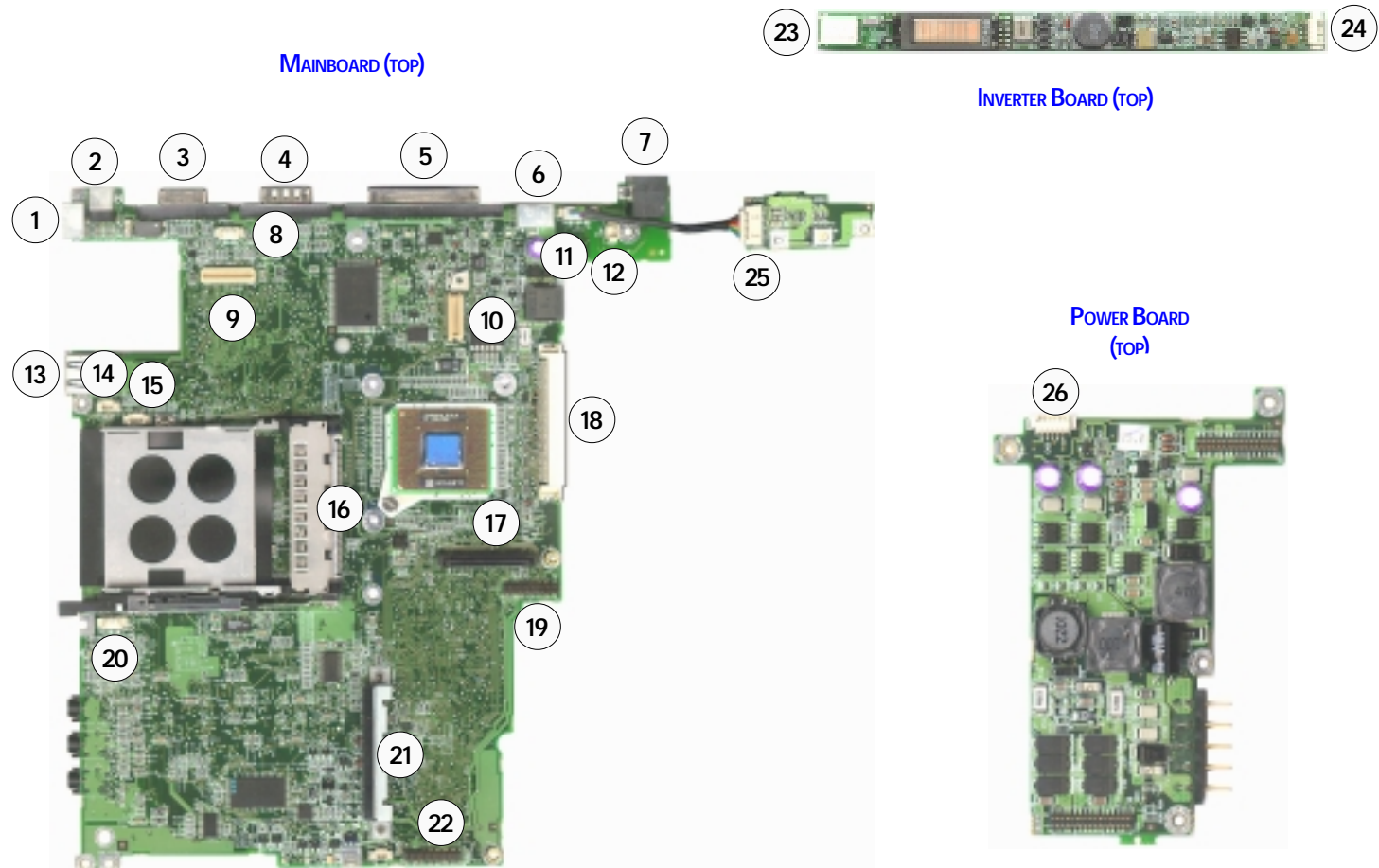
25. JIR1 to #11 (Mainboard)

### Power Board

26. CN3 to TouchPad

## CONNECTORS

These figures show the locations of the mainboard and principal daughterboard's connectors.





## PORTS & CONNECTORS (BOTTOM VIEWS)

FIG. 3 – 15

### Mainboard

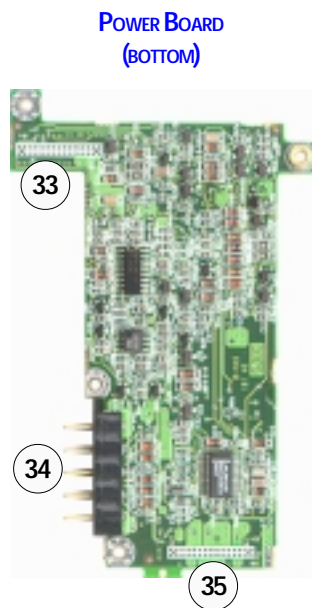
- 27. IrDA port
- 28. JDIM1 RAM bay 1
- 29. JDIM2 RAM bay 2
- 30. Jack1 audio line-in
- 31. Jack2 phones
- 32. Jack3 ext. microphone

### Power Board

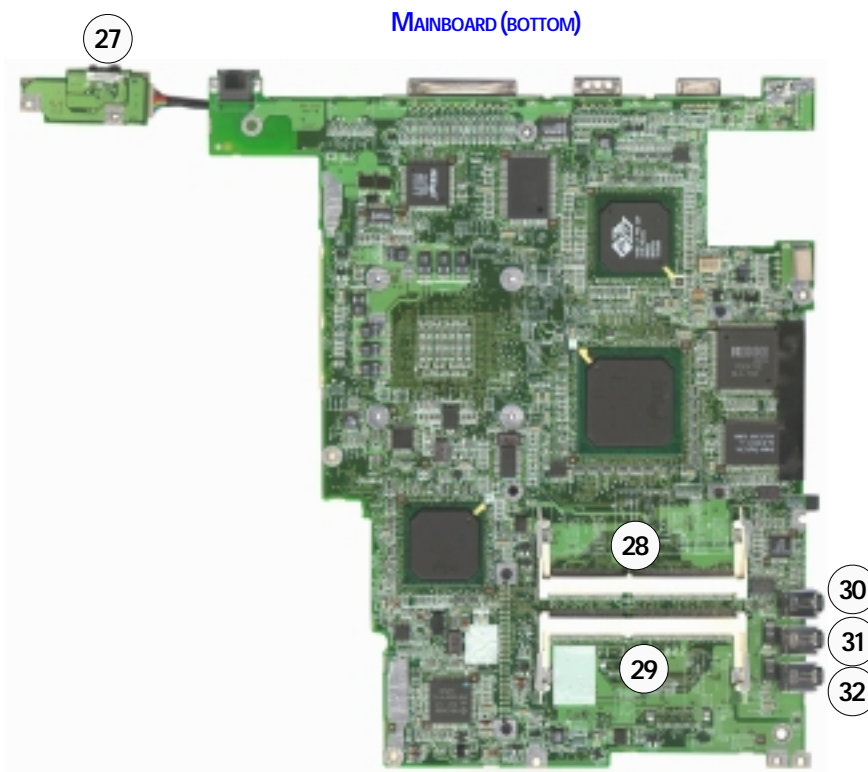
- 33. CN1 to #19 (Mainboard)
- 34. CN4 to main battery pack
- 35. CN2 to #22 (Mainboard)



INVERTER BOARD (BOTTOM)



POWER BOARD  
(BOTTOM)



MAINBOARD (BOTTOM)

3

# Disassembly

*NOTES:*

3





## 4 Troubleshooting

4

If you are having trouble diagnosing and solving problems, this chapter has several tools which should help:

- Troubleshooting chart - a system flow chart indicating the location of possible system abnormalities.
- Pre-POST assistant - a rundown of possible problems before the POST and solutions.
- POST assistant - a listing of beeps and error messages and their definitions.
- Post-POST assistant - a rundown of possible problems after the POST and solutions.

This chapter does not tell you how to disassemble the notebook. For those procedures, go back to *Chapter 3: Disassembly*.

### ***BEFORE YOU BEGIN***

Before you start a troubleshooting job, be sure that:

- All peripheral devices are disconnected from the notebook. (They should be tested separately.)
- You have reviewed the safety precautions in the beginning of *Chapter 3: Disassembly*.

### ***TOOLS***

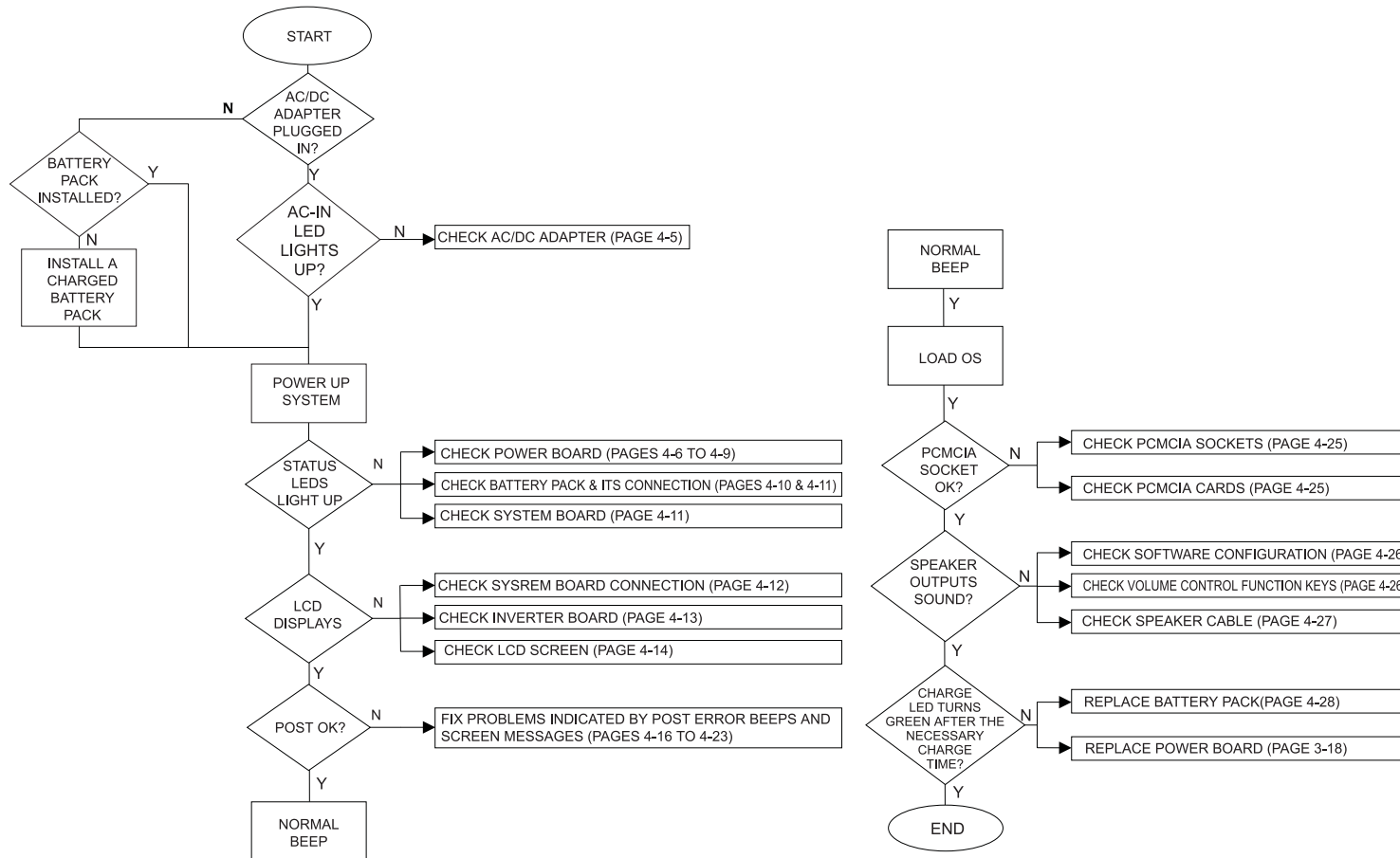
In addition to the tools listed in *Chapter 3*, troubleshooting jobs may call for some additional devices:

- Multimeter
- Transistor checker
- Oscilloscope (100 MHz)
- Soldering/de-soldering station (30W)



# SYSTEM TROUBLESHOOTING CHART

Use the following troubleshooting flow chart to locate the problem areas systematically.



TROUBLESHOOTING FLOWCHART  
FIG. 4 - 1

## PRE-POST ASSISTANT

This section describes possible problems before the Power-On-Self-Test (POST) and ways to solve them.

TABLE 4 – 1  
PRE-POST PROBLEMS

Possible Problems	Possible Causes
AC power LED fails	The AC/DC adapter has malfunctioned.
AC power & charge LEDs fail	<ol style="list-style-type: none"> <li>1. The power board has failed.</li> <li>2. The battery pack has malfunctioned or its connection to the power board is bad.</li> <li>3. There is a short circuit in the system board.</li> </ol>
LCD screen fails to display	<ol style="list-style-type: none"> <li>1. There is a bad connection between the LCD screen and the system board.</li> <li>2. The inverter board has failed.</li> <li>3. The LCD screen has malfunctioned.</li> </ol>



## AC POWER LED FAILS

Under normal conditions, plugging in the AC/DC adapter makes the AC Power LED light up. If it fails to light up, it is possible that the AC/DC adapter is malfunctioning. If you think this is the case, try the following:

- Make sure the power cord to the adapter is securely plugged into a properly grounded socket.
- Make sure the adapter is completely connected to the adapter port on the computer.
- Check the adapter's contacts.

## AC/DC ADAPTER

The AC/DC adapter serves as both the system power source and the battery pack charger. Check the adapter's contacts to see if the AC/DC adapter has failed. (Figure 4-2)

Contact	Assignment	Description
inner ring (Pin 1)	20V	+20V/2.8A The adapter is in CV (constant voltage mode).
outer ring (Pin 2)	GND	

TABLE 4 – 2  
ADAPTER CONTACTS



ADAPTER'S CHECK POINTS  
FIG. 4 – 2

### *AC POWER & CHARGE LEDs FAIL*

There may be other problems responsible for a system status LED's failure to appear:

- The power board failed.
- The battery pack malfunctioned or its connection with the power board is bad.
- There is a short circuit in the system board.

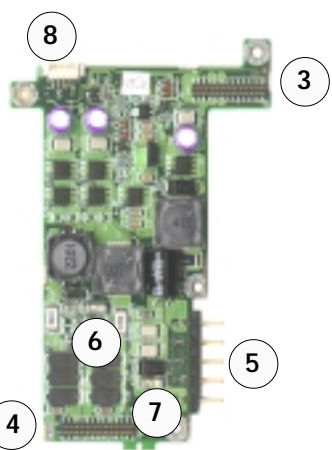
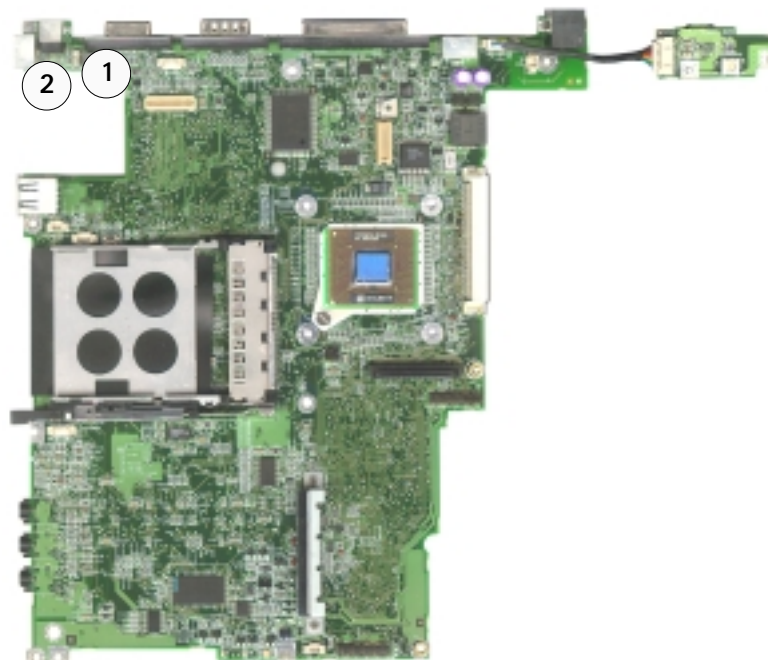
Try the following troubleshooting procedures.

#### *CHECKING THE POWER BOARD*

A blown fuse or an incorrect output voltage on the power board may cause the system status LEDs' malfunction.

#### *CHECKING THE FUSES*

If the fuses are blown, replace them. See the figures on the next page for the location of the fuses on the power board. Each fuse is stamped with a rating.



Power Board  
top

Power Board  
bottom

### POWER COMPONENTS

FIG. 4 - 3

1. F1 fuse for adapter's output
2. JAC1 for AC adapter plug
3. CN1 to Mainboard
4. CN2 to Mainboard
5. CN4 for primary battery
6. F1 fuse for +12V
7. F2 fuse for primary battery
8. CN3 for TouchPad switch

4

### CN1 Power Board to M/B (on the Power Board)

Pin	Signal	Pin	Signal
1	VIN	2	VIN
3	GND	4	VIN
5	GND	6	GND
7	VA	8	VA
9	VA	10	VA
11	GND	12	GND
13	GND	14	GND
15	SHUTDOWN	16	SMBCLK
17	SMBDATA	18	BATVOLT
19	CHAGEN	20	CURSEN
21	DDON	22	BATFULL
23	BATTEMP	24	BATTYPE
25	N.C.	26	SUSB#
27	GND	28	CPU-ONL
29	GND	30	N.C.

### CN3 TouchPad Switch Connector (on the Power Board)

Pin	Signal
1	+5VS
2	TPADCLK
3	TPADDATD
4	LID-RSUM
5	GND





### CN2 Power Board to M/B (on the Power Board)

Pin	Signal	Pin	Signal
1	TPADCLK	2	TPADDATA
3	+5VS	4	LID-RSUM#
5	+5V	6	+5V
7	+5V	8	+5V
9	+5VH8	10	GND
11	GND	12	GND
13	GND	14	+12V
15	GND	16	GND
17	GND	18	GND
19	GND	20	+3.3V
21	+3.3V	22	+3.3V
23	+3.3V	24	+3.3V
25	GND	26	3S2P_ON
27	GND	28	GND
29	N.C.	30	+2.5VS

### CN4 Power Board to Battery Connector on the Power Board)

Pin	Signal
1	GND
2	BATTEMP
3	BDATA
4	BCLK
5	VB

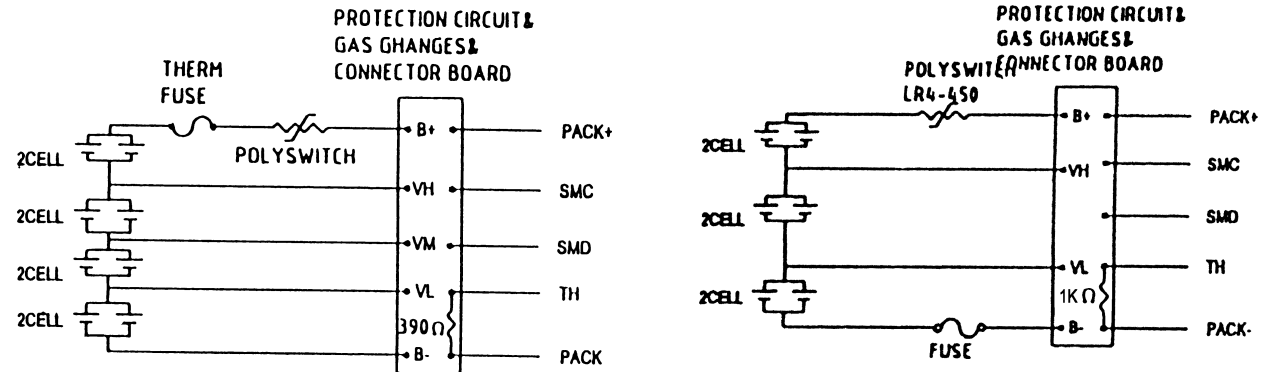
## CHECKING THE BATTERY PACK AND ITS CABLING

A malfunctioning battery pack or a bad connection between the battery pack and the power board may be the cause of the LEDs' failure.

### CHECKING THE BATTERY PACK

Whether the battery pack functions well or not can be checked by measuring the voltage across battery contacts BAT and GND. Figure 4-3, on page 4-7, shows the battery pack connector's location and its associated fuse. Figure 4-4 below is the battery circuit diagram. The measured voltage should be between 9V to 16.8V. (The voltage for a fully charged Ni-MH battery pack is around 9.6V while Li-Ion battery is around 10.8V for 3S2P or 14.4V for 4S2P.) If the supply voltage is still not in the correct range, replace the faulty battery pack.

BATTERY CIRCUITRY  
FIG. 4 - 4



Li-Ion Battery



### *CHECKING THE CABLING*

If the battery pack is functioning properly, check if the measured voltage across pins 1 to 5 of connector CN4 on the power board (Fig. 4-3) is the same as the voltage measured for the battery pack. If the measured voltages are not the same, check if the fuse on the power board has been damaged.

### *CHECKING THE SYSTEM BOARD*

*Automatic short-circuit protection* may have been activated by a short circuit occurring in the system. The system cannot be turned on with automatic short-circuit protection activated. If you detect a short circuit in the system board, fix the problem accordingly.

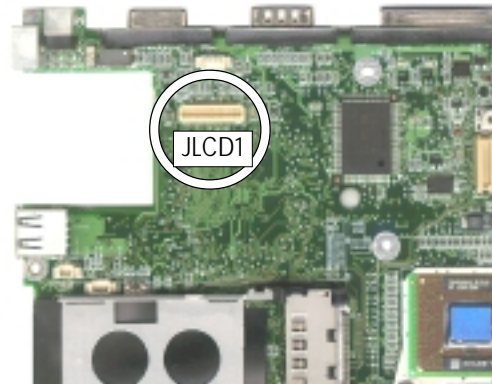
### *LCD SCREEN FAILURE TO DISPLAY*

The LCD screen's inability to display may be due to any of the following problems:

- There is bad connection between the LCD screen and the system board
- The inverter board has malfunctioned
- The LCD screen has malfunctioned

### *CHECKING THE LCD TO SYSTEM BOARD CONNECTION*

A bad connection between the LCD screen and the system board may be the cause of the LCD screen's failure to display. If the LCD control signal cable is frayed or is not properly plugged into connector JLCD1 on the system board (Figure 4-5), either situation may have caused the LCD not to display. Replace the cable if it is frayed or plug it in if it is loose. If the problem still persists, proceed with the rest of the checking job.




LCD TO MAINBOARD  
CONNECTION  
FIG. 4 - 5



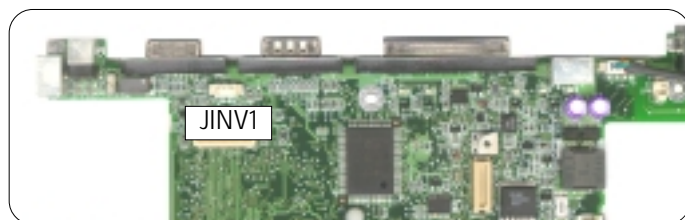
## CHECKING THE INVERTER BOARD

Table 4-3 suggests areas where problems may occur and provides corresponding corrective actions. The component sites of the inverter board are shown in Figure 4-6.

  
**Warning**  
 Inverter boards have high-voltage areas. To prevent electrical shock, do not touch the board when the system is on.

Area to Check	Action
Fuse 1.0A (F1)	Check the fuse and replace it if necessary.
Connector CN1	Check if the voltages of all the pins of this connector are correct. (see the following figure). If any of the pins presents an incorrect voltage, check if the connection between the inverter board and the system board is OK. If the connecting cable is loose or frayed, plug it in or replace it. If the problem still persists, replace the inverter board.
Connector CN2	Check if the cable connecting the LCD lamp to the inverter board is well plugged into connector CN2. If there is no connection problem, replace the inverter board.

TABLE 4 – 3  
INVERTER BOARD  
CHECK AREAS



CN1 Inverter to JINV1 on  
M/B

Pin	Signal
1	VIN DC
2	BRGHT
3	ON/OFF
4	GND

INVERTER BOARD  
COMPONENT SITES  
FIG. 4 - 6

### *CHECKING THE LCD SCREEN*

If you found no problems with the inverter board and its connection to the system board and the LCD lamp, and the LCD still doesn't work, it is possible that the LCD screen itself may have malfunctioned. Replace the LCD screen to see if the problem can be solved. If the problem persists, send the notebook to the nearest service center for repair.



## POST – TESTING THE SYSTEM

Each time the system is powered on, it automatically performs a Power-On-Self-Test (*POST*). The *POST* tests major system hardware and checks the system configuration.

Error beeps and messages If the system can't pass the *POST*, an error beep or message may be issued or displayed. This will indicate the problem with the system.

If any major component malfunctions, send the notebook to the nearest service center for replacement.

### No ERRORS FOUND DURING THE POST

The BIOS will initialize the video, sound a single short beep, and show a message if the system passes the *POST*. The system then will attempt to boot. If there is a problem which prevents the system from booting, it will tell you to run *Setup*. A sample screen message is shown below.

```
Phoenix BIOS 4.0 Release 6.0
Copyright 1985-1999 Phoenix Technologies Ltd.
All Rights Reserved. } 1

Notebook Computer Version 1.01.19
03.01a-01

CPU = Intel(R) Mobile Pentium(R) III Processor 650 MHZ } 2
640K System RAM Passed } 3
63M Extended RAM Passed }
0256K Cache SRAM Passed }
System BIOS shadowed
Video BIOS shadowed
Mouse initialized
Fixed Disk 0: FUJITSU MHH2032AT } 4
ATAPI CD-ROM: TOSHIBA 1902-B
WARNING } 5
ERROR
Parallel Port configuration changed

Press <F2> to enter SETUP, <F12> to enter BOOT MENU } 6
```

#### STARTUP SCREEN: THE POST

FIG. 4 – 7

If you choose the Quiet Boot option (not available for all models) in the Setup utility, you will only see an abbreviated version of this screen.

1. BIOS information
2. CPU type
3. memory status
4. HDD identification notice
5. error notice (example)
6. Enter *Setup* cue - appears only during POST

**Note:** your POST may identify different components.

4

## POST ERROR BEEPS & SCREEN MESSAGES

Errors, fatal or non-fatal, can occur during the *POST*. All fatal errors and some non-fatal errors are communicated through a series of audible beeps. Table 4-4 below lists the error beep messages. Fatal errors do not allow the system to continue the boot process.

TABLE 4 – 4  
FATAL ERROR MESSAGES

Error Code	Beep Sequence	Description
16	1-2-2-3	BIOS ROM checksum
20	1-3-1-1	Test DRAM refresh
22	1-3-1-3	Test 8742 Keyboard controller
2C	1-3-4-1	RAM failure on address line xxxx
2E	1-3-4-3	RAM failure on DATA bits xxxx of low byte of memory bus
30	1-4-1-1	RAM failure on DATA bits xxxx of high type of memory bus
46	2-1-2-3	Check ROM copyright notice
58	2-2-3-1	Test for unexpected interrupts

each beep group is separated by a pause

Most displayed errors as listed in Table 4-5 (pages 4-17 to 4-19) and Table 4-6 (pages 4-20 to 4-23), allow the system to continue the boot process. The system will halt after one of the screen messages and cannot usually be rebooted until a physical change is made in the system.

For most errors there will be only one message displayed. However, a second message may appear: RUN SETUP. If this message occurs, press **F2** to run *Setup*.





Message	Description & Suggested Solution
<i>nnnn</i> Cache SRAM Passed	description: Where <i>nnnn</i> is the amount of system cache in kilobytes successfully tested.
Diskette drive A error or Diskette drive B error	description: Drive A: or B: is present but fails the BIOS POST diskette tests. solution: Check to see that the drive is defined with the proper diskette type in <i>Setup</i> and that the diskette drive is attached correctly.
Entering SETUP...	description: Starting <i>Setup</i> Program.
Extended RAM failed at offset: <i>nnnn</i>	description: The extended memory is either not working, or is improperly configured. solution: Enter the <i>Setup</i> and allow the system to redetect the memory. Check that any DIMM modules are properly seated in their sockets. Try restarting the system. If the problem persists, remove the DIMMs and reboot. Replace any faulty DIMMs.
<i>nnnn</i> Extended RAM Passed	description: Where <i>nnnn</i> is the amount of RAM in kilobytes successfully tested.
Failing Bits: <i>nnnn</i>	description: Where hex number <i>nnnn</i> is a map of the bits at the RAM address (in System, Extended, or Shadow memory) which failed the memory test. Each 1 (one) in the map indicates a failed bit. solution: Turn off the system and remove any DIMMs. Restart the system. If the problem disappears, replace the DIMMs one at a time to identify the defective module. Replace any defective DIMMs.
Fixed Disk 0 Failure or Fixed Disk 1 Failure or Fixed Disk Controller Failure	description: The hard disk is not working, or is not properly configured. solution: Check that the HDD is properly attached. Run <i>Setup</i> to make sure the HDD is correctly configured.
Incorrect Drive A type - run SETUP	description: Type of floppy drive A: not correctly identified in <i>Setup</i> .
Invalid NVRAM media type	description: Problem with NVRAM (CMOS) access.
Keyboard Controller Error	description: The keyboard controller failed test. solution: You may have to replace keyboard or controller.

TABLE 4 – 5  
NON-FATAL ERROR MESSAGES

TABLE 4 – 5 (CONT.)  
NON-FATAL ERROR MESSAGES

Message	Description & Suggested Solution
Keyboard Error	description: The keyboard is not working. solution: Reboot the computer. If the problem persists, replace the computer.
Keyboard Error <i>nn</i>	description: The BIOS discovered a stuck key and displays the scan code <i>nn</i> for the stuck key. solution: Try toggling the keys. Reboot the computer. If the problem persists, replace the keyboard.
Keyboard Locked - Unlock Key Switch	description: Unlock the system to proceed.
Monitor type does not match CMOS- run <i>SETUP</i>	description: The monitor type is not correctly identified in <i>Setup</i> .
Operating system not found	description: The operating system cannot be found on either drive A: or drive C:. solution: Enter <i>Setup</i> and make sure the HDD and drive A: are properly identified.
Parity Check 1	description: A parity error was found in the system bus. The BIOS attempts to locate the address and display it on the screen. If it cannot locate the address, it displays ????.
Parity Check 2	description: A parity error was found in the system bus. The BIOS attempts to locate the address and display it on the screen. If it cannot locate the address, it displays ????.
Press <F1> to resume, <F2> to <i>Setup</i>	description: Displayed after any recoverable error message. Press <F1> to start the boot process or <F2> to enter <i>Setup</i> and change any settings.
Press <F2> to enter <i>SETUP</i> , <F12> to enter Boot Menu	description: Optional message displayed during POST. Can be turned off in <i>Setup</i> .
Previous boot incomplete-Default configuration used	description: The previous POST did not complete successfully. The POST loads default values and offers to run <i>Setup</i> . If the failure was caused by incorrect values and they are not corrected, the next boot will likely fail. On systems with control of wait states, improper <i>Setup</i> can also terminate POST and cause this error on the next boot. solution: Run <i>Setup</i> and verify the wait-state configuration is correct. This error is cleared the next time the system is booted.



Message	Description & Suggested Solution
Real time clock error	description: The on-board clock fails the BIOS test. solution: May require board repair.
Shadow RAM failed at offset: <i>nnnn</i>	description: The shadow RAM failed at the offset <i>nnnn</i> of the 64K block at which the error was detected. solution: Try to restart the system. Check that the DIMMs are properly seated.
<i>nnnn</i> Shadow RAM Passed	description: Where <i>nnnn</i> is the amount of shadow RAM in kilobytes successfully tested.
System battery is dead - Replace and run <i>SETUP</i>	description: The CMOS clock battery indicator shows the battery is dead. solution: Replace the battery and run <i>Setup</i> to reconfigure the system.
System BIOS shadowed	description: System BIOS copied to shadow RAM.
System cache error - Cache disabled	description: RAM cache failed the BIOS test and has been disabled.
System CMOS checksum bad - run <i>SETUP</i>	description: The CMOS has been corrupted or incorrectly modified, perhaps by an application program that changes data stored in the CMOS. solution: Run <i>Setup</i> to reconfigure the system either by getting the Default Values and/or making your own selections.
System RAM failed at offset: <i>nnnn</i>	description: The system RAM failed at the offset <i>nnnn</i> of the 64K block at which the error was detected.
<i>nnnn</i> System RAM passed	description: Where <i>nnnn</i> is the amount of system RAM in kilobytes successfully tested.
System timer error	description: The timer test failed. solution: Go to <i>Setup</i> and reset the Date and Time fields.
UMB upper limit segment address: <i>nnnn</i>	description: Displays the address <i>nnnn</i> of the upper limit of Upper Memory Blocks, indicating released segments of the BIOS which may be reclaimed by a virtual memory manager.
Video BIOS shadowed	description: Video BIOS successfully copied to shadow RAM.

TABLE 4 – 5 (CONT.)  
NON-FATAL ERROR MESSAGES

TABLE 4 – 6  
PHOENIX BIOS POST  
DEFAULT TEST POINTS  
(DISPLAYED ON DEBUG CARD)

Error Code	Definition
02	Verify real mode
04	Get CPU type
06	Initialize system hardware
08	Initialize chipset registers with initial POST values
09	Set in POST flag
0A	Initialize CPU registers
0B	Enable CPU cache
0C	Initialize caches to initial POST values
0E	Initialize I/O
0F	Initialize the local bus IDE
10	Initialize Power Management
11	Load alternate registers with initial POST values
12	Restore CPU control word during warm boot
14	Initialize keyboard controller
16	BIOS ROM checksum (beep code 2-2-3)
18	8254 timer initialization
1A	8237 DMA controller initialization
1C	Reset programmable interrupt controller

Error Code	Definition
20	Test DRAM refresh code 3-1-1
22	Test 8247 keyboard controller (beep code 3-1-3)
24	Set ES segment register to 4GB
28	Autosize DRAM
2A	Clear 512K base DRAM
2C	RAM failure on address line xxxx' (beep code 3-4-1)
2E	RAM failure on data bits xxxx' of low byte of memory bus (beep code 3-4-3)
30	RAM failure on data bits xxxx' of high byte of memory bus (beep code 4-1-1)
32	Test CPU bus clock frequency
34	Test CMOS RAM
35	Initialize alternate chipset registers
36	Warm start shutdown
37	Reinitialize the chipset (MB only)
38	Shadow system BIOS ROM
39	Reinitialize the cache (MB only)
3A	Autosize cache
3C	Configure advanced chipset registers



Error Code	Definition
3D	Load alternate registers with CMOS values
40	Set initial CPU speed
42	Initialize interrupt vectors
44	initialize BIOS interrupts
46	Check ROM copyright notice (beep code 2-1-2-3)
47	Initialize manager for PCI option ROMs
48	Check video configuration against CMOS
49	Initialize PCI bus and devices
4A	Initialize all video adapters in system
4B	Display QuietBoot™ screen
4C	Shadow video BIOS ROM
4E	Display copyright notice
50	Display CPU type and speed
51	Initialize EISA board
52	Test keyboard
54	Set key click if enabled
56	Enable keyboard
58	Test for unexpected interrupts (beep code 2-2-3-1)
5A	Display prompt "Press F2 to enter Setup"
5C	Test RAM between 512 and 640K

Error Code	Definition
60	Test extended memory
62	Test extended memory address lines
64	Jump to UserPatch1
66	Configure advanced cache registers
68	Enable external and CPU caches
6A	Display external cache size
6C	Display shadow message
6E	Display non-disposable segments
70	Display error messages
72	Check for configuration errors
74	Test real-time clock
76	Check for keyboard errors
7A	Test for Keylock on
7C	Test for hardware interrupt vectors
7E	Test coprocessor if present
80	Disable onboard I/O ports
82	Detect and install external RS232 ports
84	Detect and install external parallel ports
85	Initialize PC-compatible PnP ISA devices
86	Re-initialize onboard I/O ports
88	Initialize BIOS Data area

TABLE 4 – 6 (CONT.)  
**PHOENIX BIOS POST**  
**DEFAULT TEST POINTS**  
(DISPLAYED ON DEBUG CARD)

TABLE 4 – 6(CONT.)  
**PHOENIX BIOS POST**  
*DEFAULT TEST POINTS*  
 (DISPLAYED ON DEBUG CARD)

Error Code	Definition
8A	Initialize Extended BIOS Data area
8C	Initialize floppy controller
90	Initialize hard disk controller
91	Initialize local-bus hard disk controller
92	Jump to UserPatch2
93	Build MPTABLE for multi-processor boards
94	Disable A20 address line
95	Install CD-ROM for boot
96	Clear huge ES segment register
98	Search for option ROMs
9A	Shadow option ROMs
9C	Set up Power Management
9E	Enable hardware interrupts
A0	Set time fo day
A2	Check Keylock
A4	Initialize typematic rate
A8	Erase F2 prompt
AA	Scan for F2 keystroke
AC	Enter SETUP
AE	Clear on-POST flag
B0	Check for errors

Error Code	Definition
B2	POST done - prepare to boot operating system
B4	One beep
B5	Display MultiBoot™ menu
B6	Check password (optional)
B8	Clear global descriptor table
BC	Clear parity checkers
BE	Clear screen (optional)
BF	Check virus and backup reminders
C0	Try boot with INT 19
D0	Interrupt handler error
D2	Unknown interrupt error
D4	Pending interrupt error
D6	Initialize option ROM error
D8	Shutdown error
DA	Extended block move
DC	Shutdown 10 error



The table below is for the boot block in the Flash ROM.

Error Code	Definition
E2	Initialize the chipset
E3	Initizlize refresh counter
E4	Check for Forced Flash
E5	Check HW status of ROM
E6	BIOS ROM is OK
E7	Do a complete RAM test
E8	Do OEM initialization
E9	Initialize interrupt controller
EA	Read in the bootstrap code
EB	Initialize all vectors
EC	Boot the Flash program
ED	Initialize the boot device
EE	Boot code was read OK

TABLE 4 – 6(CONT.)  
**PHOENIX BIOS POST**  
*DEFAULT TEST POINTS*  
(DISPLAYED ON DEBUG CARD)

## POST-POST PROBLEMS

This section describes possible problems the user might encounter after the POST and suggests problem-solving methods. Possible problems and possible causes leading to them are outlined below.

Problems	Possible Causes
PCMCIA socket fails to work	<ol style="list-style-type: none"> <li>1. Something wrong with the socket.</li> <li>2. Something wrong with the card in use.</li> </ol>
Speakers fail to output sound	<ol style="list-style-type: none"> <li>1. The audio driver is not properly installed.</li> <li>2. The volume control key combinations are not properly adjusted.</li> <li>3. The speaker cables are loose or frayed.</li> </ol>
Charge LED fails to display	<ol style="list-style-type: none"> <li>1. The battery pack has malfunctioned.</li> <li>2. The AC/DC adapter has malfunctioned.</li> </ol>

TABLE 4 – 7  
POST-POST PROBLEMS





## PC CARD SOCKET MALFUNCTION

The faulty conditions the user might encounter when using the PC Card socket are listed below along with corresponding solutions.

Possible faulty condition	Solution
Failure to insert the card into the socket	If the card cannot be inserted into the socket, check for obstructions. If the system was reassembled, recheck if there is anything wrong with the reassembly procedures, or send the notebook to the nearest service center for repair.
Failure to read from an inserted card	<ol style="list-style-type: none"><li>1. Check if the card is properly inserted.</li><li>2. Check if the card is configured with appropriate drivers. (For software installation, see the User's Manual.)</li><li>3. Check with the card vendor to see if the card is damaged.</li><li>4. If the card is still not readable, send the notebook to the nearest service center for repair.</li></ol>
Data reading error (SRAM card)	<ol style="list-style-type: none"><li>1. Replace the SRAM card's battery if necessary.</li><li>2. Check with the card vendor to see if the card is damaged.</li><li>3. If the problem persists, send the notebook to the nearest service center for repair.</li></ol>

TABLE 4 – 8  
POSSIBLE PC CARD PROBLEMS &  
SOLUTIONS

### *SOUND OUTPUT FAILURE*

The notebook's internal audio unit consists of the audio circuitry, built-in speakers, and built-in microphone. If the user cannot receive sound from the notebook's internal speakers, it may be due to any of the following problems:

- The audio chip is not configured with the supplied audio driver.
- The volume control key combinations (Fn + F3, Fn + F5 & Fn + F6) are not properly adjusted.
- The speaker cables are loose or frayed.

### *CHECKING THE SOFTWARE CONFIGURATION*

To work, the audio unit should be configured with the audio driver on *the Device Drivers and Tools CD-ROM* supplied with the notebook. The audio driver installation is described in the *User's Manual*. Install the driver if the user failed to do so. If the problem persists, continue checking.

### *CHECKING THE VOLUME*

The sound cannot be heard if the volume control key combinations are not properly adjusted. Adjust the volume to the point you will be able to receive sound. If you still cannot hear any sound from the speaker, check the speakers' cable connections.

If you are using earphones or self-powered speakers, make sure they are properly set up.

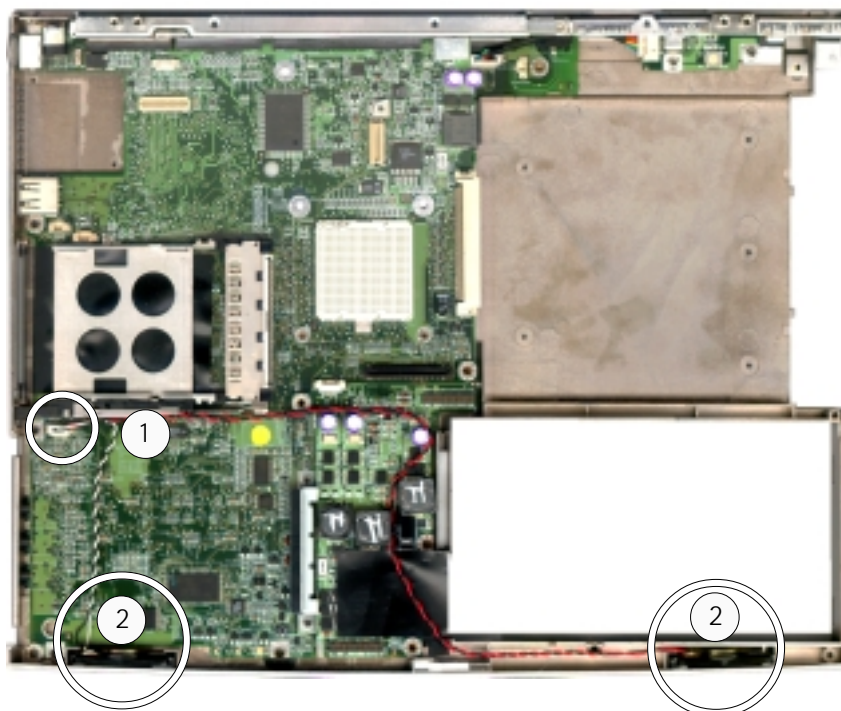


## CHECKING THE SPEAKER CABLE

If the speaker cables are not properly plugged into their connector, or they are frayed, the speakers may not work. First locate connector JINTSPK1 on the mainboard, then check if the speaker cables are loose or frayed. Replace each cable if it is frayed or plug it in if it is loose.

## LOCATING SPEAKER CONNECTOR IN THE BOTTOM COVER

1. Dissassemble the bottom cover. (See *Chapter 3: Disassembly*.)
2. The figure below shows how the speakers are connected.



### SPEAKER CONNECTOR ON MAINBOARD

FIG. 4 - 8

1. JINTSPK1 for both speakers
2. speakers

### ***SUSPEND FUNCTION FAILURE***

Pressing the suspend key combination will enable the system to enter *Suspend* mode after few seconds. The power status LED will not light if the system is in Save to Disk mode. If the system can't enter *Suspend* mode it may be because the Power Savings in your BIOS setup are not set properly. If any of the current settings are wrong, change them.

### ***CHARGE LED FAILURE***

If the Charge LED doesn't turn green after the battery pack has been recharged for about 3 hours with power off or 6 hours with power on, there are several possible explanations:

- The battery pack is malfunctioning.
- The AC/DC adapter is malfunctioning.
- The Charge LED is malfunctioning.

Replace the battery pack and recharge the new one. If the Charge LED still does not turn green after the necessary recharge time, check or replace the AC/DC adapter. If the problem persists with the new AC/DC adapter, check the Charge LED or send the notebook to the nearest service center for repair.



## Appendix A Parts Lists

This appendix breaks down the notebook's construction into a series of "exploded" illustrations. The component part numbers are indicated in the drawings.

Note: The illustrations indicate the *manufacturer's* part numbers. Your organization may use a different system, so be sure to cross-check any relevant documentation.

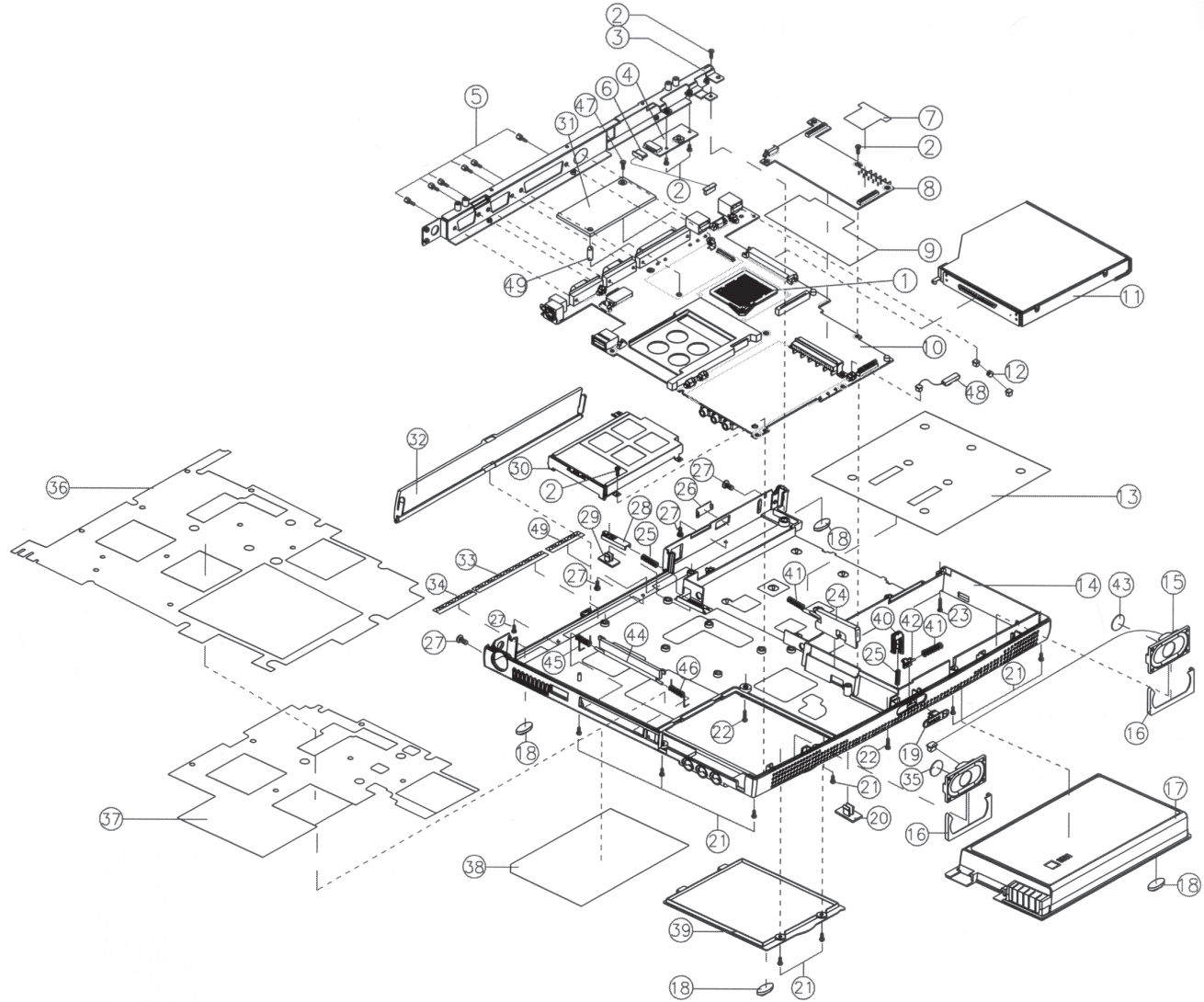
Note: Some assemblies may have parts in common (especially screws). Multiple occurrences of a part in an illustration are indicated by an asterisk. (e.g. Screw M2\*5L indicates 5 units of this screw.)

Note: Be sure to check any update notices. The parts shown in these illustrations are appropriate for the system at the time of publication. Over the product life, some parts may be improved or re-configured, resulting in *new* part numbers.

A

# Parts

**3220 & 3620**  
**BOTTOM ASSEMBLY**  
FIG. A - 1



A



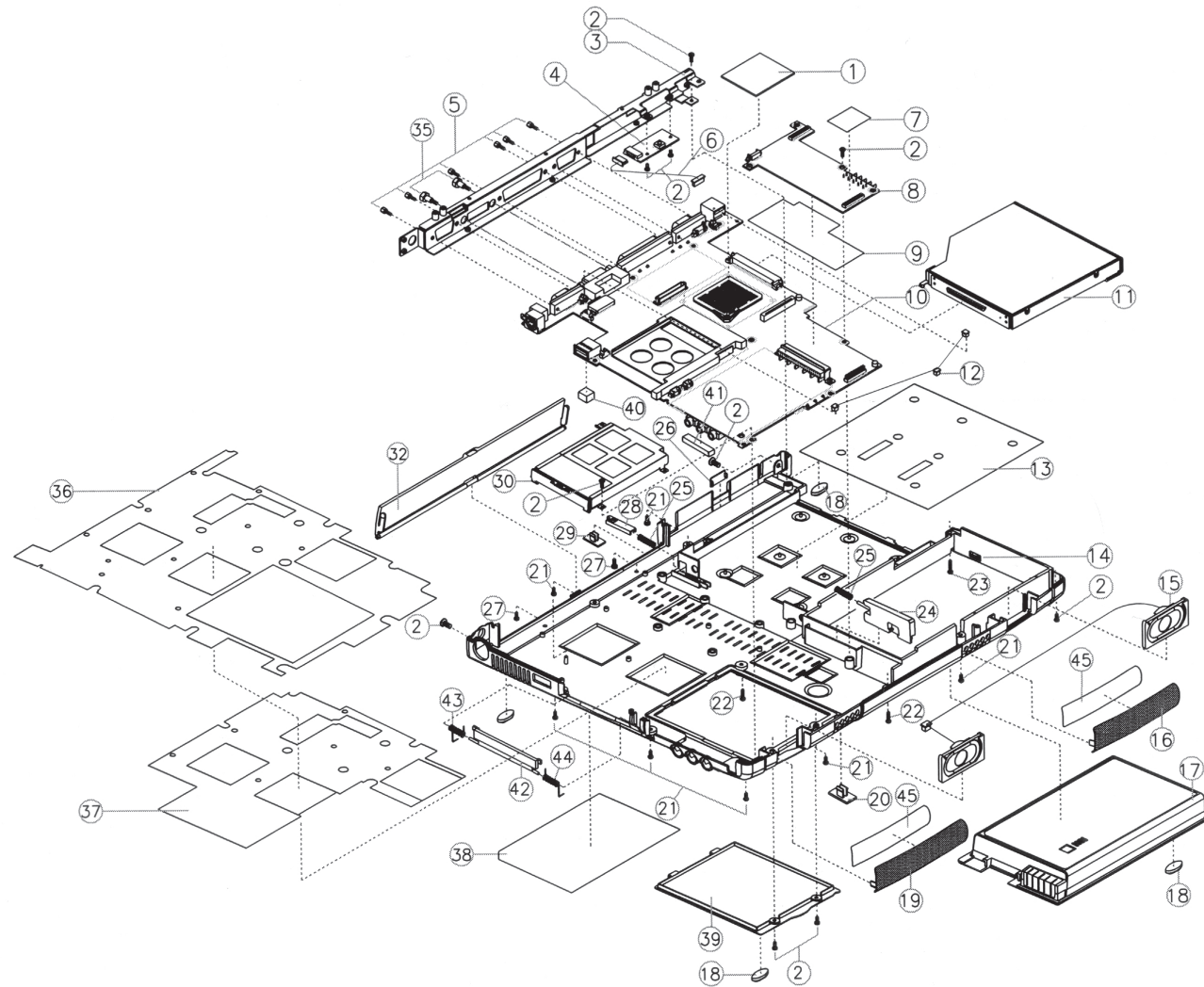
ITEM	PART NAME	PART NO	REMARK
1	CPU W/MPGA2 PACKAGE		
2	SCREW M2*4L K1 BZ ICT	35-B6120-4R0	
3	I/O BRACKET, SUS 320	33-32201-001	
4	IR BOARD ASS'Y V6.0 320	77-32004-006	
5	HEX STUD SUM22 NI-PL 10mm	34-96002-000	
6	CABLE FOR IR TO W/B V1.0 320	43-32008-001	
7	BATTERY CONN. MYLAR 320	40-32008-000	
8	POWER BOARD ASS'Y V5.0 320	77-32001-005	
9	POWER BOARD MYLAR, MYLAR 320	40-32003-000	
10	MAIN BOARD ASS'Y V2.0 320	77-32200-002	
11	CD-ROM ASS'Y TOS 24X 320	79-3200C-2T0	
12	CABLE FOR MODEM TO W/B V2.0 320	43-32201-003	
13	FILE BAY SHIELDING PLATE,SUS 320	33-32014-001	
14	BOTTOM CASE	39-32006-010	3220
14	BOTTOM CASE	39-36013-01A	3620
15	SPEAK ASS'Y V3.0 320	79-3200S-042	
16	SPEAKER RUBBER,PVC V3.0 320 (L)	47-32001-030	
17	LI-ION BATTERY PACK	79-3202B-012	
18	RUBBER FOOT,SILICONE 320	47-32001-010	
19	LCD LOCK BUTTON PC+ABS 320	39-32017-000	
20	BATTERY LOCK KNOB	39-32014-000	
21	SCREW M2*5L K1 BZ ICT NY	35-B6120-5R0	
22	SCREW M2*9L K1 BZ ICT	35-B2120-9R0	
23	SCREW M2*17L R BNI ICT	35-19120-170	
24	BATTERY LOCK ,POM 320	39-32010-001	
25	SPRING 0.25MM SUS 320	38-32001-000	
26	IRDA LENS, GEPC 960A	39-96A31-000	
27	SCREW M2*2.6L K1 BZ ICT	35-B6120-2R5	
28	CD-ROM LOCK ,POM 320	39-32009-000	
29	CD-ROM LOCK KNOB	39-32013-000	
30	HDD BRACKET ASS'Y 320	79-3200H-032	
31	MODEM MDC	76-32200-001	
32	I/O DOOR	39-32016-010	
33	EMI FINGER 72X5.8X0.8mm	33-32029-000	
34	EMI FINGER 29X5.8X0.8mm	33-32030-000	
35	SPEAKER (R) SPONGE 320	47-32001-070	
36	BOTTOM CASE MYLAR	40-32001-000	
37	BOTTOM HEAT SINK AL 320	33-32013-010	
38	PRODUCT LABEL FOR DIST	45-32202-001	
39	RAM COVER ASS'Y	79-3200R-031	
40	LCD HOOK PUSH. POM 320	39-32012-000	
41	SPRING $\phi$ 3.0 SUS 320	38-32002-000	
42	LCD LOCK. POM 320	39-32011-001	
43	SPEAKER (L) SPONGE 320	47-32001-080	
44	PCMCIA DOOR PC+ABS 320	39-32015-002	
45	PCMCIA (B) SPRING 0.2mm,SUS 990H	38-99H03-000	
46	PCMCIA (T) SPRING 0.2mm,SUS 990H	38-99H02-000	
47	SCREW M2*4L K1 BZ ICT	35-B6120-4R0	
48	BAT. 13.5mm 2.4V 40mAh 071798P VARTA	23-21302-9B0	
49	MDC SPACER	47-32203-010	

3220 & 3620  
BOTTOM ASSEMBLY PARTS LIST  
FIG. A - 2

A

# Parts

3420 BOTTOM ASSEMBLY  
FIG. A - 3



A





ITEM	PART NAME	PART NO	REMARK
1	IC CPU DIXON 366MHZ UPGA 615P	03-DIXON-740	
2	SCREW M2*4L KI BZ ICT	35-B6120-4R0	
3	I/O BRACKET, SUS 320	33-32006-002	
4	IR BOARD ASS'Y V4.0 320	77-32004-00X	
5	HEX STUD SUM22 NI-PL 10mm	34-96002-000	
6	CABLE FOR IR TO M/B V1.0 320	43-32008-001	
7	BATTERY CONN. MYLAR 320	40-32008-000	
8	POWER BOARD ASS'Y V3.0 320	77-32001-00X	
9	POWER BOARD MYLAR, MYLAR 320	40-32003-000	
10	MAIN BOARD V4.0 320	77-32000-10X	
11	CD-ROM ASS'Y TEAC 24X 340	79-3200C-110	
12	CABLE FOR MODEM TO M/B V2.0 320	43-32007-002	
13	FILE BAY SHIELDING PLATE SUS 320	33-32014-001	
14	BOTTOM CASE	39-34013-01A	
15	SPEAKER ASSY V3.0 320	79-3200S-042	
16	SPEAKER NER (R)	33-3400T-010	
17	LI-ION BATTERY PACK	7B-3402M-100	
18	RUBBER FOOT,SILICONE 320	47-32001-010	
19	SPEAKER NER (L)	33-3400T-020	
20	BATTERY LOCK KNOB	39-32014-000	
21	SCREW M2*5L K1 BZ ICT NY	35-B6120-5R0	
22	SCREW M2*10L KI BNI ICT	35-B9120-100	
23	SCREW M2*17L R BNI ICT	35-19120-170	
24	BATTERY LOCK ,POM 320	39-32010-001	
25	SPRING Ø0.3MM SUS 320	38-32002-000	
26	IRDA LENS, GEPC 960A	39-96A31-000	
27	SCREW M2*2.6L K1 BZ ICT	35-B6120-2R5	
28	CD-ROM LOCK ,POM 320	39-32009-000	
29	CD-ROM LOCK KNOB	39-32013-000	
30	HDD BRACKET ASS'Y 340	79-34021-010	
32	I/O DOOR	39-32016-000	
35	HEX STUD M3.0*6.0L(F)#4-40	34-32003-000	
36	BOTTOM CASE MYLAR	40-32001-000	
37	BOTTOM HEAT SINK AL 320	33-32013-000	
38	PRODUCT LABEL 340	45-34003-020	
39	RAM COVER	33-32001-000	
40	CONDUCTIVE GASKET (L10*W5*H5.5)mm 32	47-32002-050	
41	CONDUCTIVE GASKET (L35*W7*H0.5)mm 32	47-32002-040	
42	PCMCIA DOOR PC+ABS 320	39-32015-002	
43	PCMCIA (B) SPRING 0.2mm,SUS 990H	38-99H03-000	
44	PCMCIA (T) SPRING 0.2mm,SUS 990H	38-99H02-000	
45	HIMILON FOR SPEAKER NET	47-34003-010	

### 3420 BOTTOM ASSEMBLY PARTS LIST

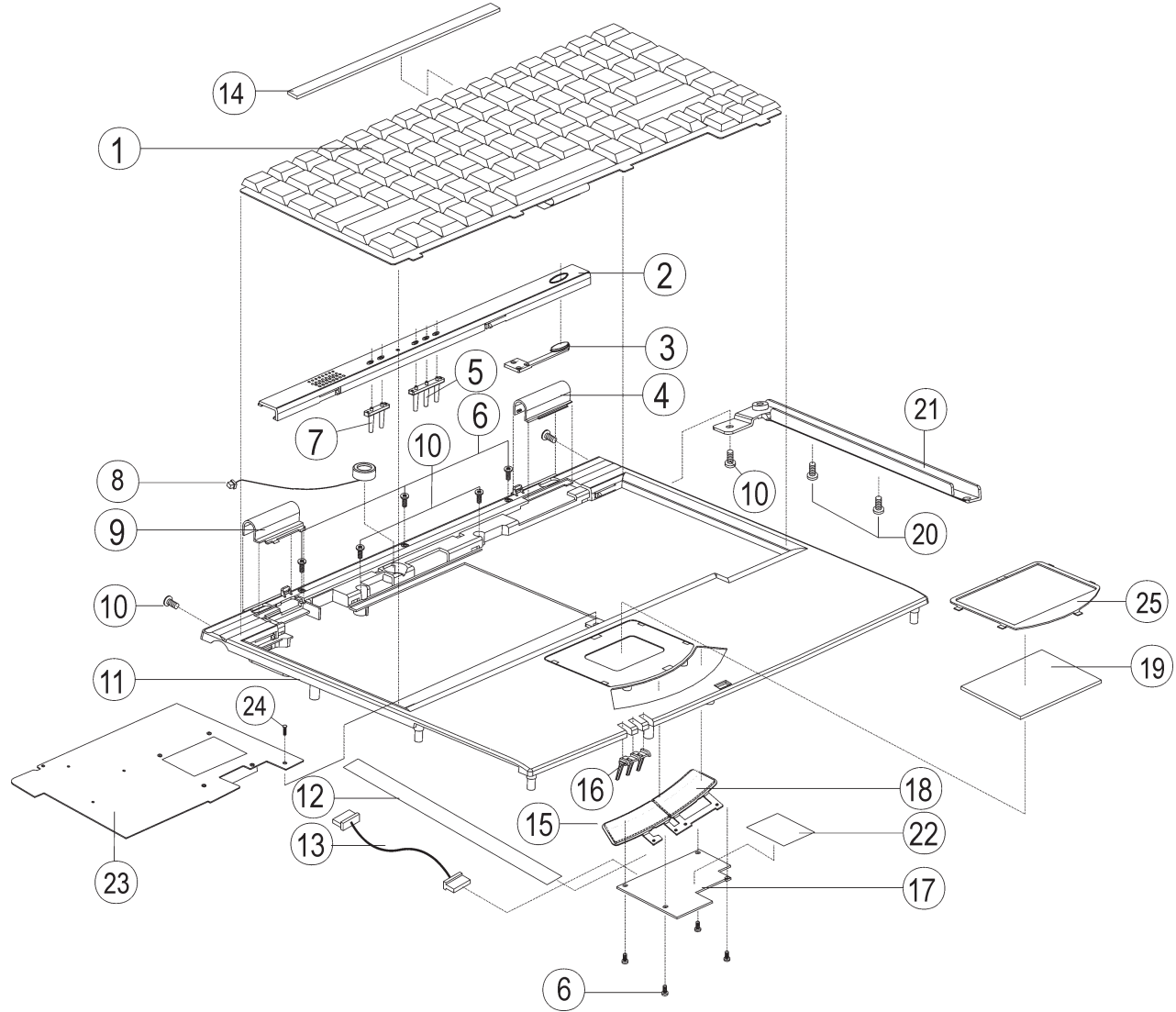
FIG. A - 4

A

# Parts

3220 TOP CASE ASSEMBLY  
FIG. A - 5

A





ITEM	PART NAME	PART NO	REMARK
1	KEYBOARD(WIN95)	80-32000-013-3	
2	LED COVER	39-32031-011	
3	POWER KNOB	39-32018-000	
4	HINGER COVER (R)	39-32019-002	
5	LED TOP LENS (R)	39-32025-011	
6	SCREW M2*2.6L K1 BZ ICT	35-B6120-2R5	
7	LED TOP LENS (L)	39-32025-001	
8	MICRO PHONE	79-32001-052	
9	HINGER COVER (L)	39-32029-002	
10	SCREW M2*4L K1 BZ ICT	35-B6120-4R0	
11	TOP CASE	39-32005-003	
12	CABLE FOR CLICK BOARD	43-32016-001	
13	CABLE FOR POWER TO T/P V1.0 320	43-32009-001	
14	K/B SPONGE	47-32001-120	
15	TOUCHPAD BUTTOM (L)	39-32008-001	
16	LED FRONT LENS	39-32026-001	
17	CLICK BOARD ASS'Y V4.0	77-32003-004	
18	TOUCHPAD BUTTOM (R)	39-32008-011	
19	TOUCH PAD	49-32202-010	
20	SCREW M2*5L F BZ TAP	35-26720-5R0	
21	CD-ROM BRACKET 320	33-32007-000	
22	CLICK BOARD HIMILON	47-32001-050	
23	TOP HEAT SINK	79-3220K-010	
24	SCREW M2*12.5L F NI KT	35-21120-125	
25	TOUCH PAD COVER	39-32007-002	

### 3220 TOP CASE ASSEMBLY PARTS LIST

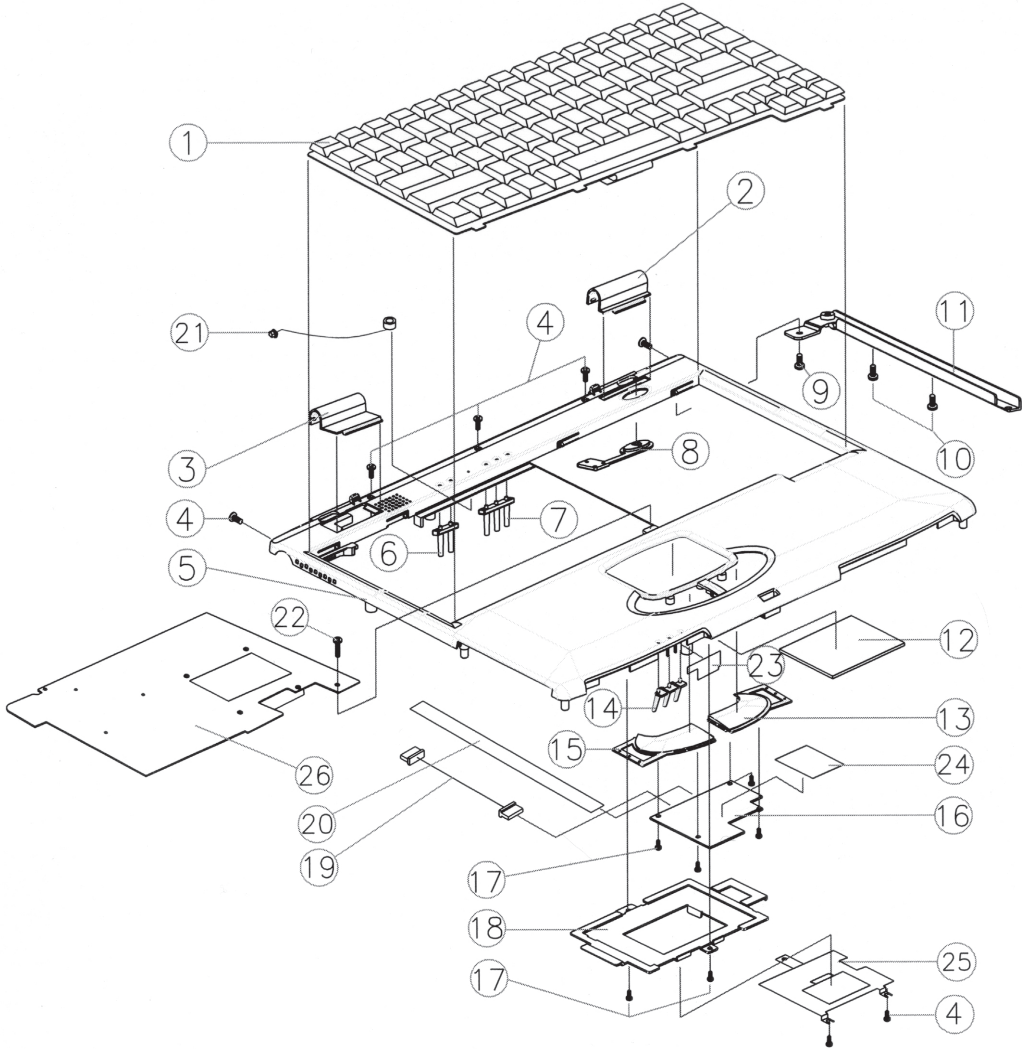
FIG. A - 6

A

# Parts

3420 TOP CASE ASSEMBLY  
FIG. A - 7

A





ITEM	PART NAME	PART NO	REMARK
1	KEYBOARD	80-34008-7G0	
2	HINGER COVER (R)	42-34072-020	
3	HINGER COVER (L)	42-34072-120	
4	SCREW M2*2.6L K1 BZ ICT	35-B6120-2R5	
5	TOP CASE	39-34012-01B	
6	LED FRONT LENS (L)	39-34092-030	
7	LED FRONT LENS (R)	39-34092-020	
8	POWER KNOB	39-32018-000	
9	SCREW M2*4L K1 BZ ICT	35-B6120-4R0	
10	SCREW M2*5L F BZ TAP	35-26720-5R0	
11	CD-ROM BRACKET SUS 320	33-32007-000	
12	TOUCH PAD	49-66000-021	
13	TOUCH PAD BUTTON (R)	42-34072-010	
14	LED FRONT LENS	42-34092-010	
15	TOUCH PAD BUTTON (L)	42-34072-110	
16	CLICK BOARD ASS'Y V4.0 320	77-32003-014	
17	SCREW M2*2.6L K1 BZ ICT	35-B6120-2R5	
18	BRACKET FOR T/P	33-3400T-030	
19	CABLE FOR CLICK BOARD	43-32016-001	
20	CABLE FOR POWER TO T/P V1.0 320	43-32009-001	
21	MICRO PHONE ASS'Y 340	79-3400I-050	
22	SCREW M2*17L R BNI ICT	35-19120-170	
23	MYLAR FOR TOP CASE	40-34052-011	
24	CLICK BOARD HIMILON	47-32001-050	
25	G/P SHIFLDING PLATF	33-36001-000	
26	TOP HEAT SINK	79-3220K-010	

### 3420 TOP CASE ASSEMBLY PARTS LIST

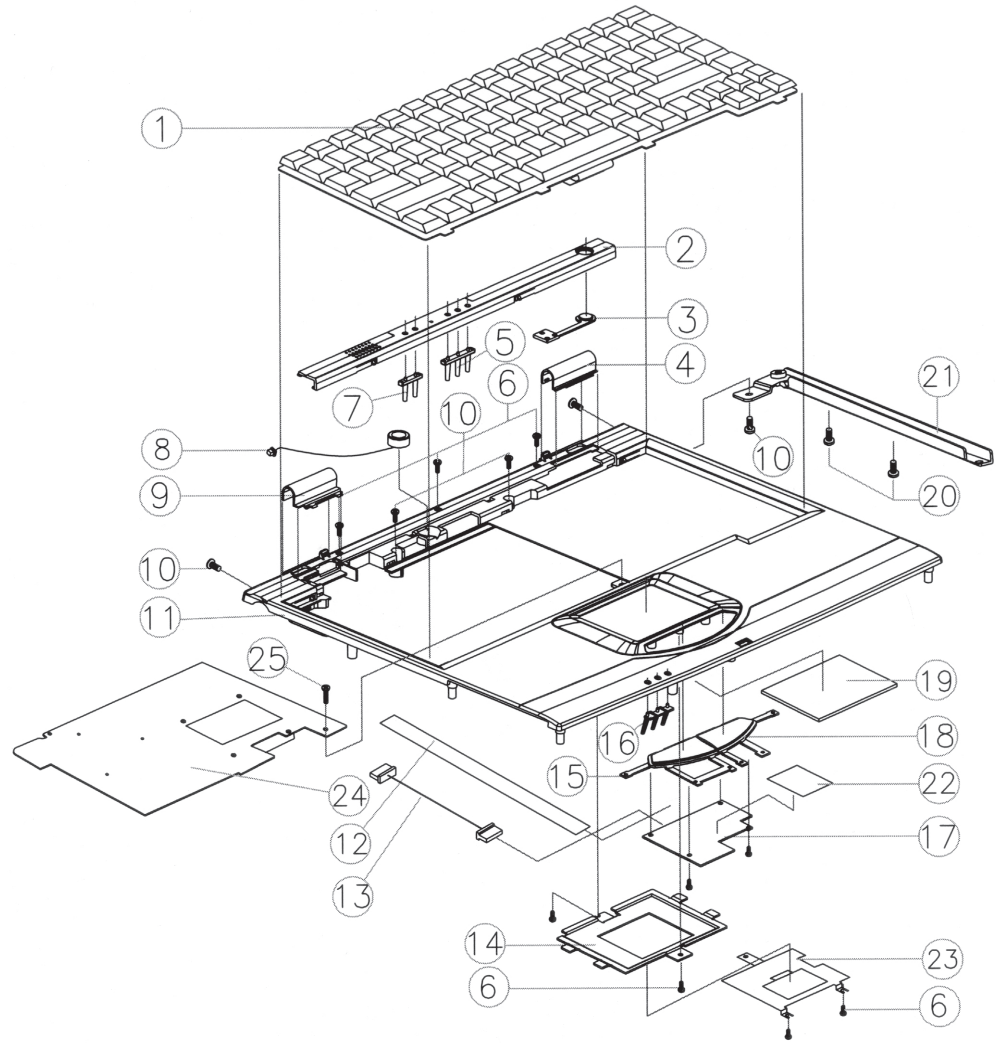
FIG. A - 8

A

# Parts

3620 TOP CASE ASSEMBLY  
FIG. A - 9

A





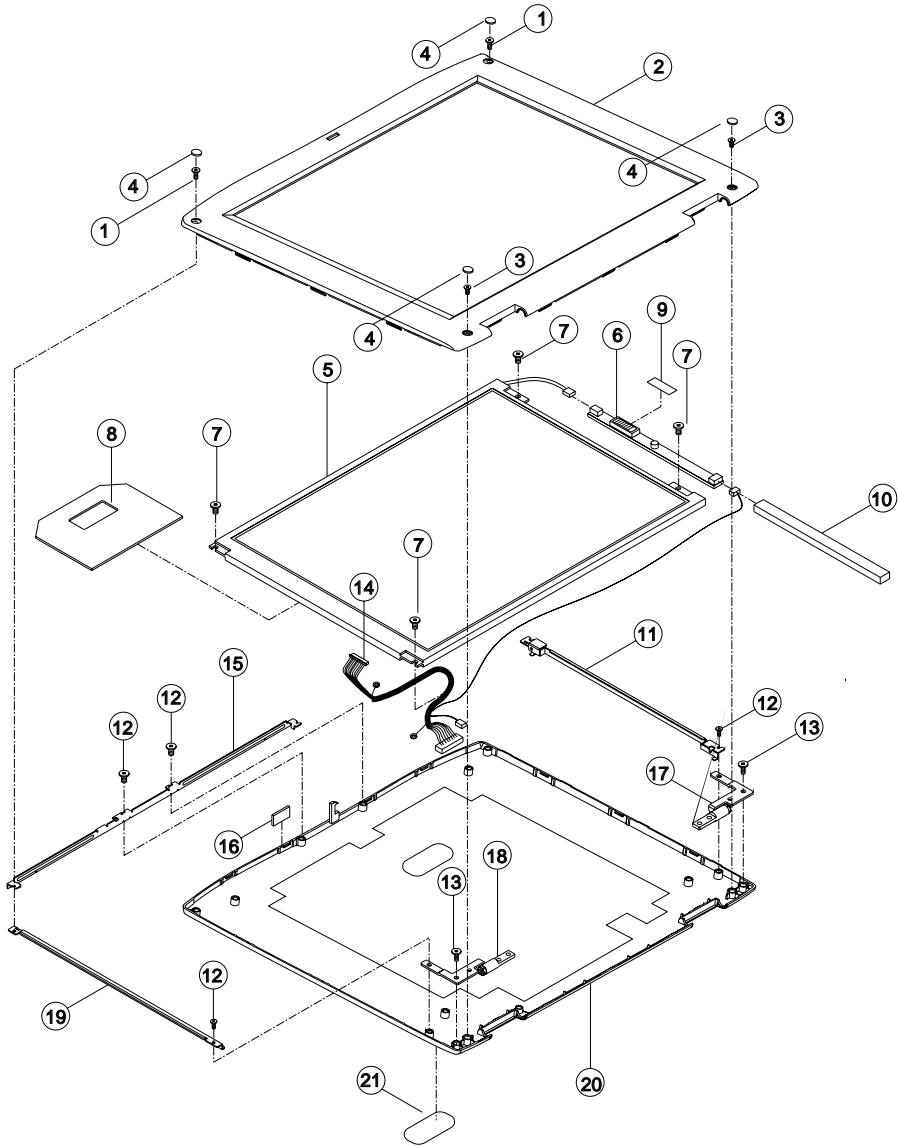
ITEM	PART NAME	PART NO	REMARK
1	KEYBOARD	80-34000-020	
2	LED COVER	42-36072-011	
3	POWER KNOB	42-36084-010-A	
4	HINGER COVER (R)	39-36072-030	
5	LED TOP LENS (R)	39-34092-020	
6	SCREW M2*2.6L K1 BZ ICT	35-B6120-2R5	
7	LED TOP LENS (L)	39-34092-030	
8	MICRO PHONE	77-34001-050	
9	HINGER COVER (L)	42-36072-040	
10	SCREW M2*4L K1 BZ ICT	35-B6120-4R0	
11	TOP CASE	39-36012-01B	
12	CABLE FOR CLICK BOARD	43-32016-001	
13	CABLE FOR POWER TO T/P V1.0 320	43-32009-001	
14	360 G/P HOLDEER	33-36002-011	
15	G/P KNOB (L)	42-36082-111	
16	LED FRONT LENS	42-34092-010	
17	CLICK BOARD ASS'Y V4.0 34/36	77-32003-014	
18	G/P KNOB (R)	42-36082-011	
19	TOUCH PAD	49-66000-021	
20	SCREW M2*5L F BZ TAP	35-26720-5R0	
21	CD-ROM BRACKET 320	33-32007-000	
22	CLICK BOARD HIMILON	47-32001-050	
23	G/P SHIELDING PLATE	33-36001-000	
24	TOP HEAT SINK	79-3220K-010	
25	SCREW M2*12.5L F NI KT	35-21120-125	

3620 TOP CASE ASSEMBLY PARTS LIST  
FIG. A - 10

A

# Parts

3220/3420/3620  
12.1" LCD A SSEMBLY  
FIG. A - 11



A





ITEM	PART NAME	PART NO	REMARK
1	SCREW,M2.0*6.0L,K1,BZ,ICT	35-B6120-6R0	
2	LCD FRONT COVER 12.1"	39-32001-002	
3	SCREW,M2.5*0.45P*6L,K1,BN,ICT,NY	35-B9125-6R0	
4	LCD F-CVR RUBBER	47-32001-020	SILICONE 320
5	LCD SAN./TM121SV-02L07 S-TFT	50-F1255-S01	12.1
6	INVERTER CARD ASS'Y V3.0 320	77-32002-003	
7	SCREW,M3*4L,K1,NI,ICT	35-B1130-4RB	
8	LCD SAN. 12.1 SPONGE 320	47-32001-100	
9	INVERTER KAPTON,KAPTON 320	40-32011-000	
10	INVERTER MYLAR 320	40-32006-002	
11	LCD BRACKET(R) FOR 12.1	33-32002-001	SECC 320
12	SCREW,M2.0*4.0L,K1,BZ,ICT	35-B6120-4R0	
13	SCREW,M2.5*4L,K1,BNI,ICT,NY	35-B9125-4RA	
14	CABLE FOR SAN.121 AND INVERTER	43-32021-002	V1.0
15	LCD BRACKET(FRONT) SUS320	33-32004-002	
16	MAGNET NI-COATIONG	25-90002-003	
17	HINGE(R) ASS'Y 320	79-3200Y-013	
18	HINGE(L) ASS'Y 320	79-3200Y-023	
19	LCD BRACKET(L) FOR 12.1	33-32003-001	SECC 320
20	LCD BACK COVER for SANYO	39-32003-002	TM121SV-02L04
21	DISPLAY LABEL FOR BACK COVER	by customer	

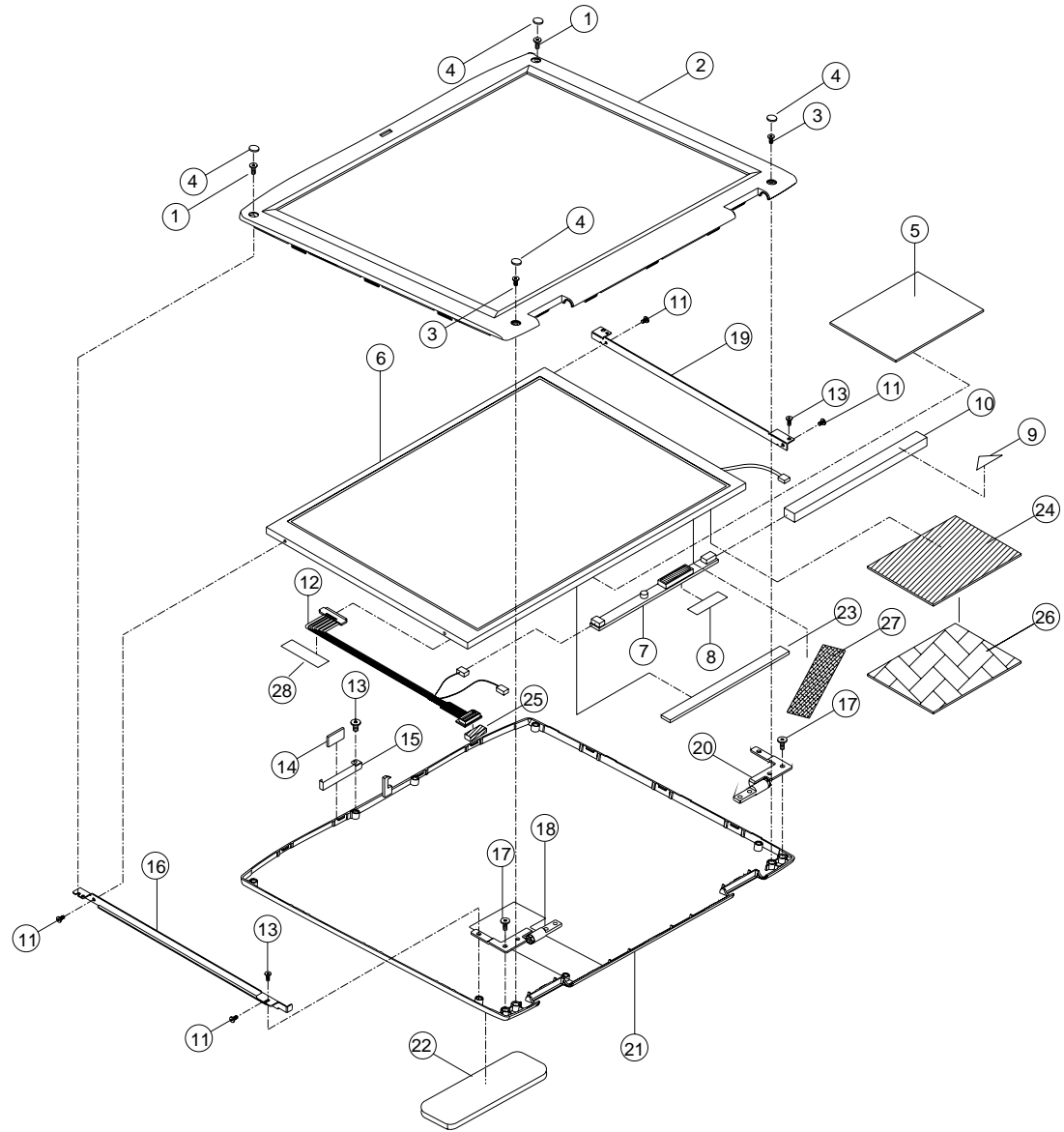
3220/3420/3620  
12.1" LCD A SSEMBLY PARTS LIST  
FIG. A - 12

A

# Parts

3220/3420/3620  
13.3" LCD A SSEMBLY  
FIG. A - 13

A





ITEM	PART NAME	PART NO	REMARK
1	SCREW,M2.0*5L,K1,BZ,ICT,NY	35-B6120-5RO	
2	LCD FRONT COVER 13.3"	39-32002-002	
3	SCREW,M2.5*0.45P*6L,K1,BN,ICT,NY	35-B9125-6RO	
4	LCD F-CVR RUBBER	47-32001-020	SILICONE 320
5	LCD HYU.13.3" SPONGE	47-32001-090	
6	LCD,T,HY,HT13X14 ,13.3 XGA	50-G2257-H01	
7	INVERTER CARD ASS'Y V3.0 320	77-32002-003	
8	INVERTER KAPTON, KAPTON 320	40-32011-000	
9	ELECTRIC SHOCK CAUTION 82H	45-82004-000	
10	INVERTER MYLAR 320	40-32006-002	
11	SCREW,M2*3L,K1,BZ,ICT,NY	35-B6120-3RO	
12	COAXIAL CABLE FOR HYU.	43-32202-001	13.3 LCD
13	SCREW,M2.0*4.0L,K1,BZ,ICT	35-B6120-4RO	
14	MAGNET NI-COATIONG	25-90002-003	
15	LCD MAGNET BRACKET	33-32023-001	SECC 320
16	LCD BRACKET(L) FOR 13.3"	33-32024-000	
17	SCREW,M2.5*4L,K1,BNI,ICT,NY	35-B9125-4RA	
18	HINGE(L) ASS'Y 320	79-3200Y-023	
19	LCD BRACKET FOR 13.3"	33-32202-000	
20	HINGE(R) ASS'Y 320	79-3200Y-013	
21	LCD BACK COVER	39-32051-000	
22	DISPLAY LABEL FOR BACK COVER	by customer	
23	LCD 13.3" BOTTOM SPONGE	47-32001-110	
24	EMI RUBBER	47-32004-060	
25	EMI GASKETS	47-32004-070	
26	CONDUCTIVE CLOTH TYPE L60*50	47-26804-000	
27	CONDUCTIVE CLOTH TYPE L80*30	47-32004-050	
28	LCD KAPTON FOR HYU 13.3"	40-32015-000	

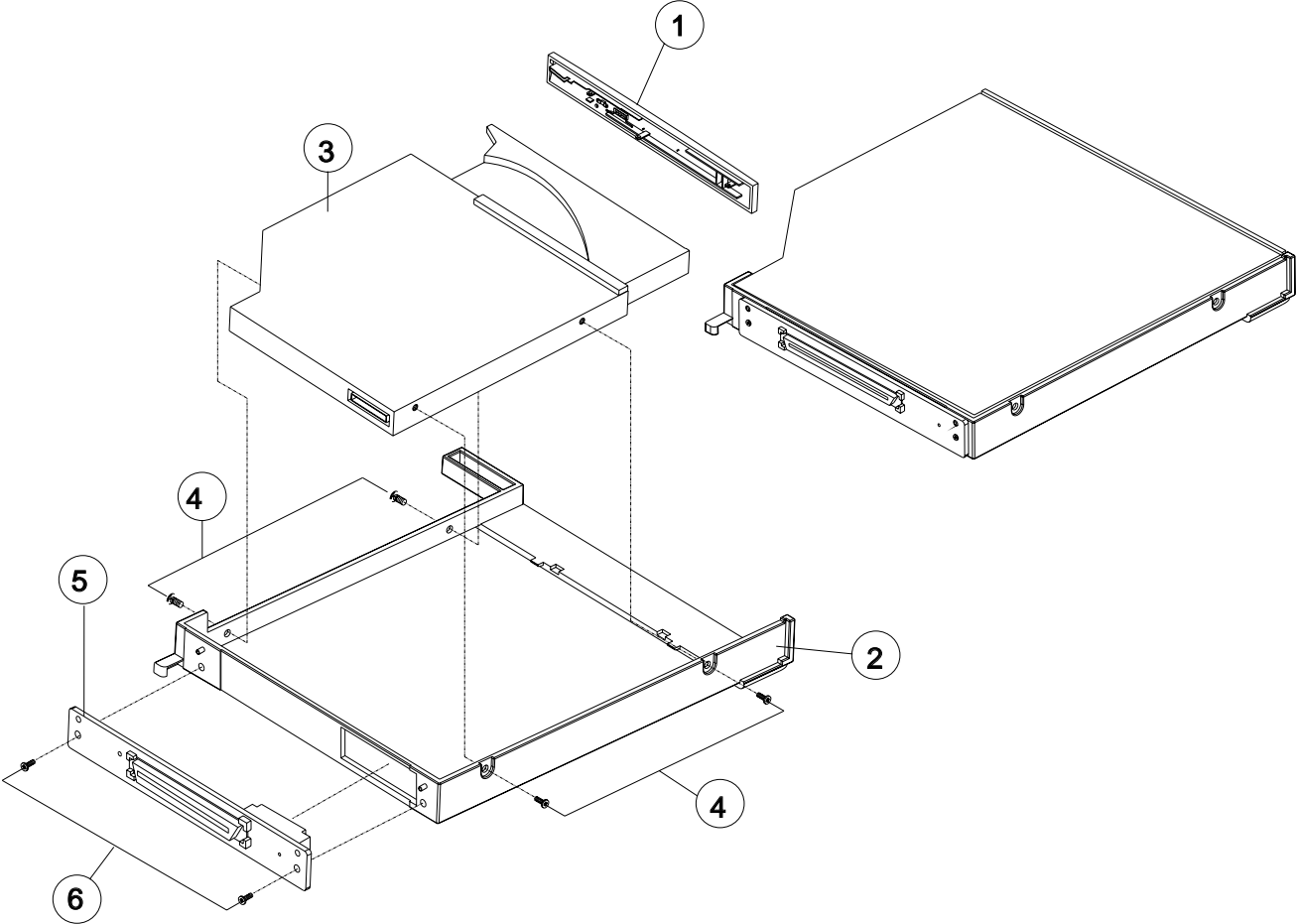
3220/3420/3620  
13.3" LCD A SSEMBLY PARTS LIST  
FIG. A - 14

A

# Parts

3220/3420/3620  
CD-ROM ASSEMBLY  
FIG. A - 15

A





ITEM	PART NAME	PART NO	REMARK
1	CD-ROM BEZEL ASSY FOR TOS.	79-3200C-220	
2	CD-ROM HOUSING	39-32021-001	
3	CD-ROM 5.25" 24X 12.7MM XM-1902B	85-6050X-T03	
4	SCREW M2.0*2.6L K1 BZ ICT	35-B6120-2R5	
5	CD/DVD-ROM CVT BOARD	77-32005-003	
6	SCREW M2.0*5L K1 BZ ICT NY	35-B6120-5R0	

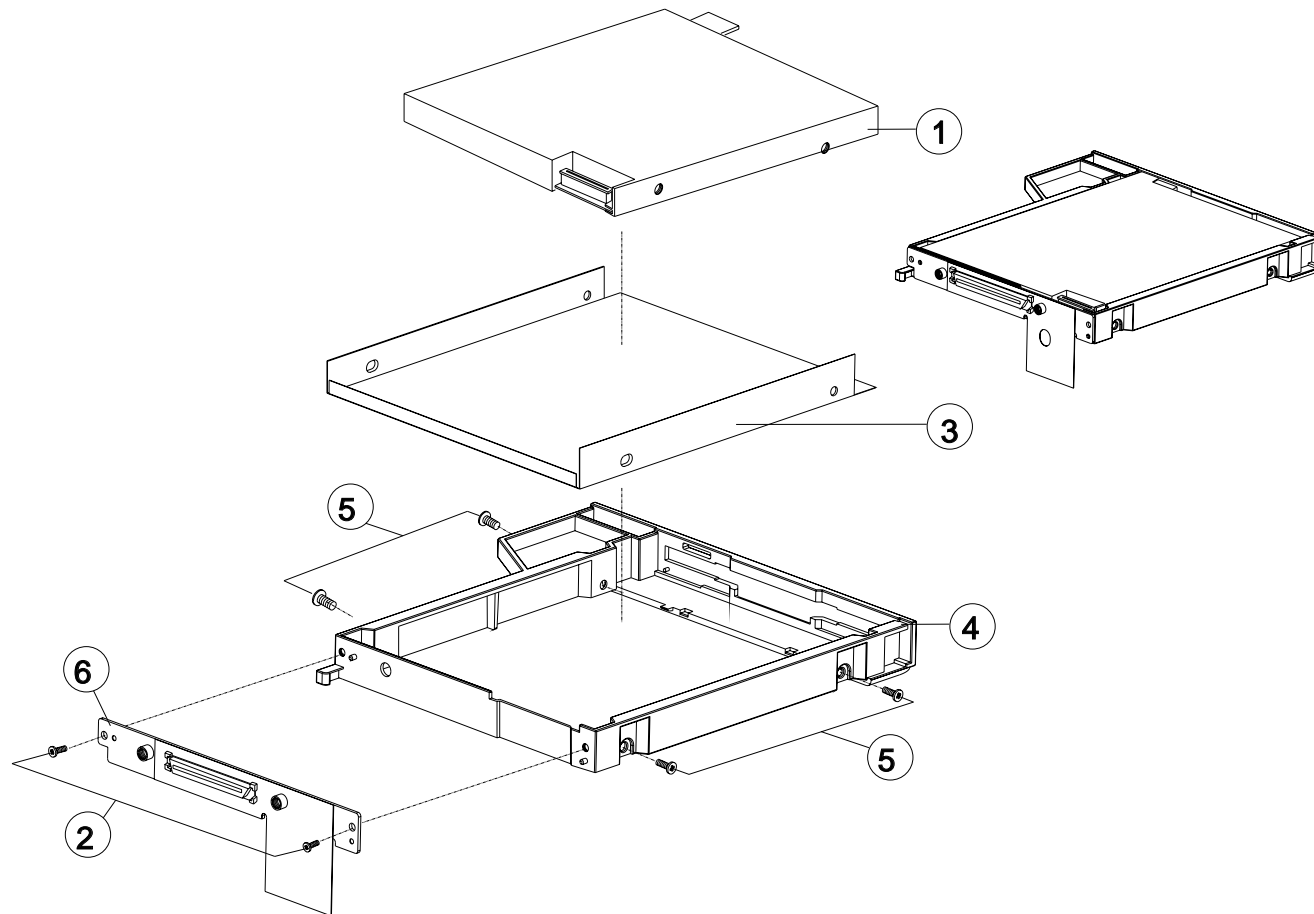
3220/3420/3620  
CD-ROM ASSEMBLY PARTS LIST  
FIG. A - 16

A

# Parts

3220/3420/3620  
FDD ASSEMBLY  
FIG. A - 17

A



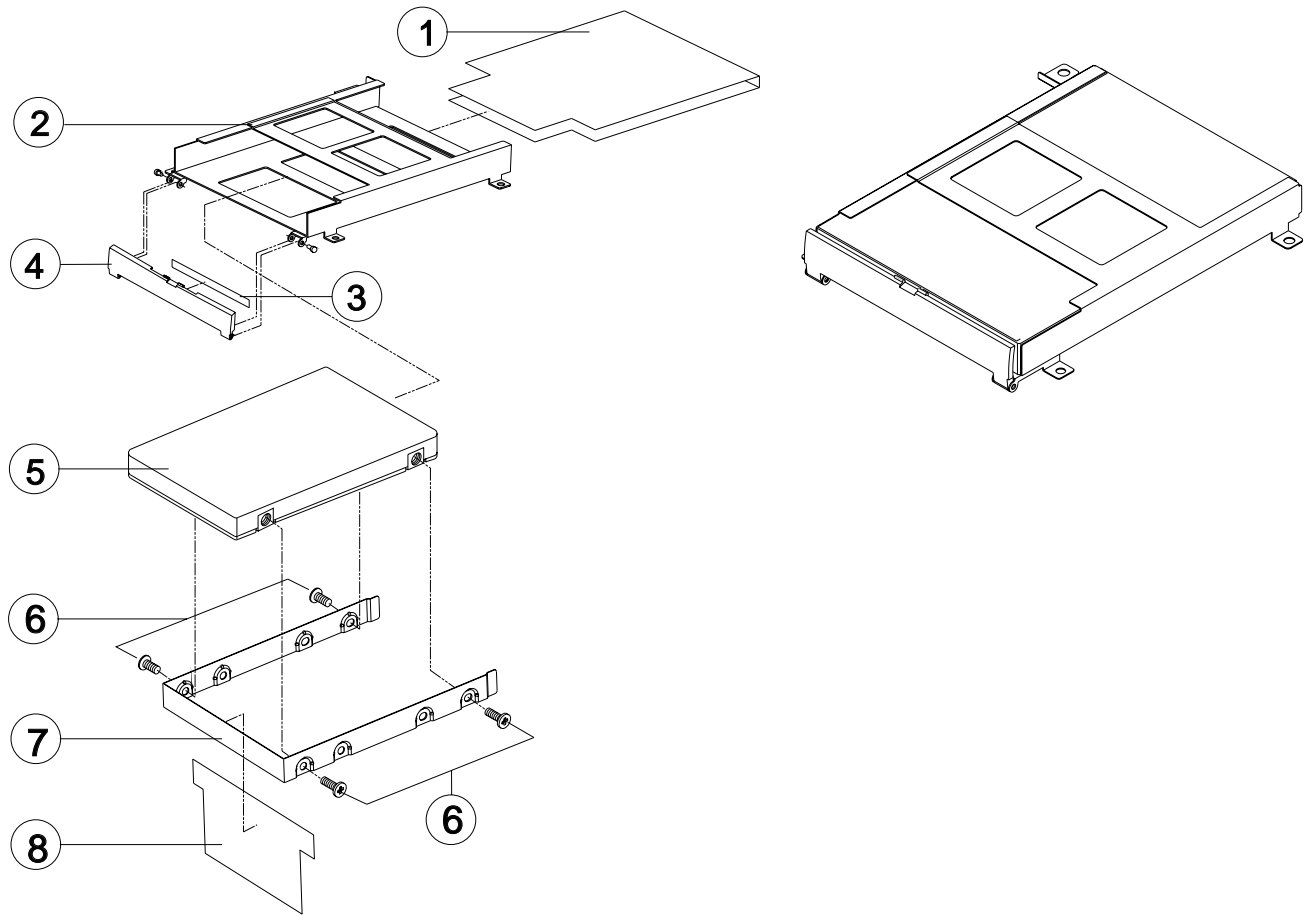


ITEM	PART NAME	PART NO	REMARK
1	3.5 FDD 12.7mm YD-702J-6637J Y-E DA	85-11700-Y01	
2	SCREW M2.0*4.0L K1 BZ ICT	35-B6120-4R0	
3	FDD SHIELDING PLATE SUS 320	33-32022-000	
4	FDD HOUSING	39-32022-010	
5	SCREW M2.6*3.5L F NI ICT	35-21126-350	
6	FPC CABLE FOR FDD V3.0	43-32002-003	

3220/3420/3620  
FDD ASSEMBLY PARTS LIST  
FIG. A - 18

A

# Parts



3220/3420/3620  
HDD ASSEMBLY  
FIG. A - 19

A





ITEM	PART NAME	PART NO.	QTY/SET	REMARK
1	HDD BRACKET MYLAR 320	40-32002-002	1	
2	HDD FRAME	79-3200H-021	1	
3	LABEL FOR HDD DOOR 320	45-32006-000	1	
4	HDD DOOR PC+ABS 320 HDD DOOR 3420	39-32027-002 42-3407I-011	1 1	
5	2.5" HDD 4.34GB ATA-4 9.5MM	85-00284-741	1	
6	SCREW M3*4L KI NI ICT	35-B1130-4RB	4	
7	HDD BRACKET	33-32008-001	1	
8	HDD HANDLE,MYLAR 320	40-32005-000	1	

**3220/3420/3620**  
**HDD ASSEMBLY PARTS LIST**  
FIG. A – 20

**A**

P a r t s

*NOTES:*

A



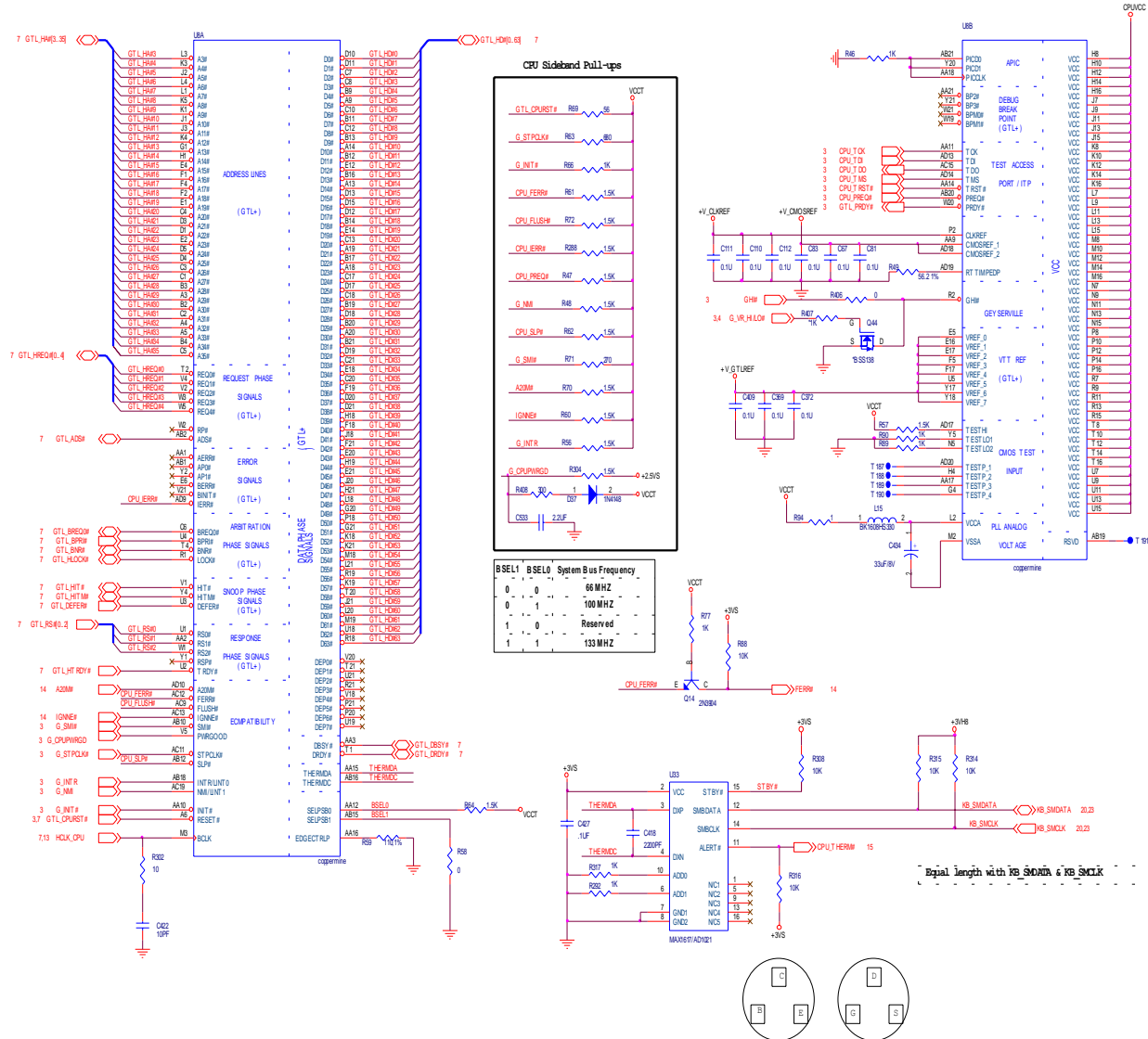
## Appendix B Circuit Diagrams

This appendix has schematic circuit diagrams of the major parts of the notebook's mainboard. Unless otherwise indicated, this reference has circuit diagrams for mainboard version 2. If the mainboard you are repairing is a different version, consult the manufacturer for the appropriate diagrams.

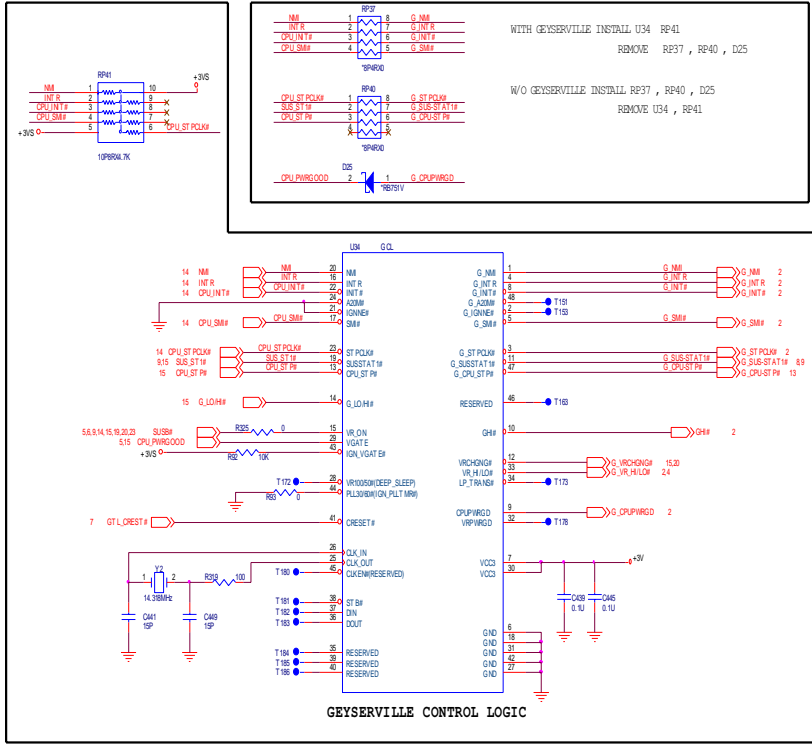
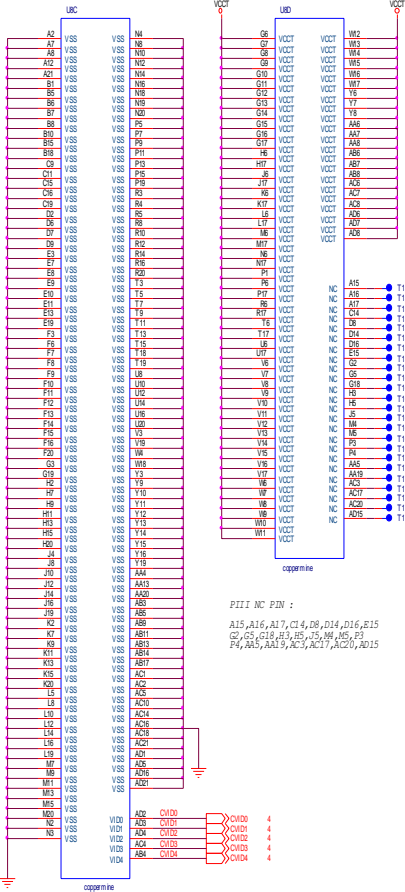
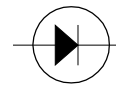
# Diagrams

## MAINBOARD

MAINBOARD  
CPU:PENTIUM III  
REV. 2  
(DIAGRAM 1 OF 2)  
FIG. B – 1

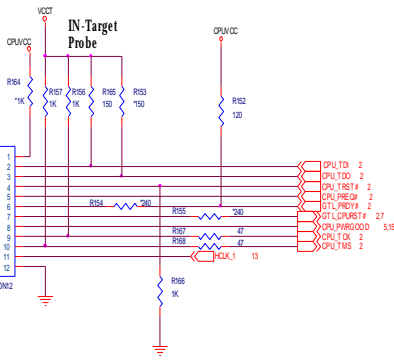
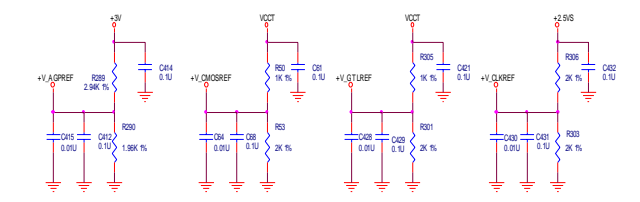


B



GEYSERVILLE CONTROL LOGIC

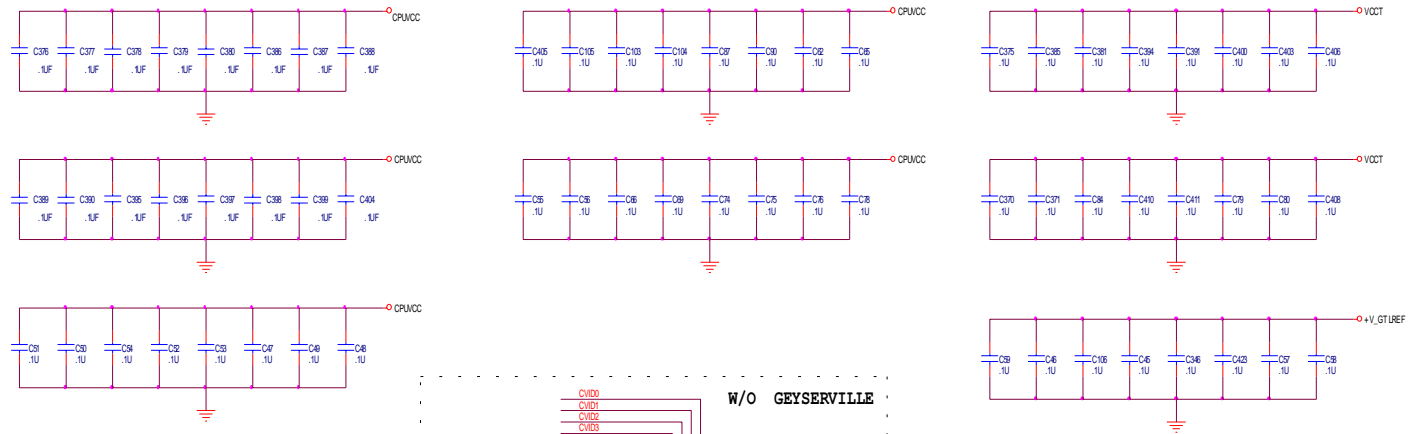
CPU: PENTIUM III  
Rev. 2  
(DIAGRAM 2 OF 2)  
FIG. B - 2



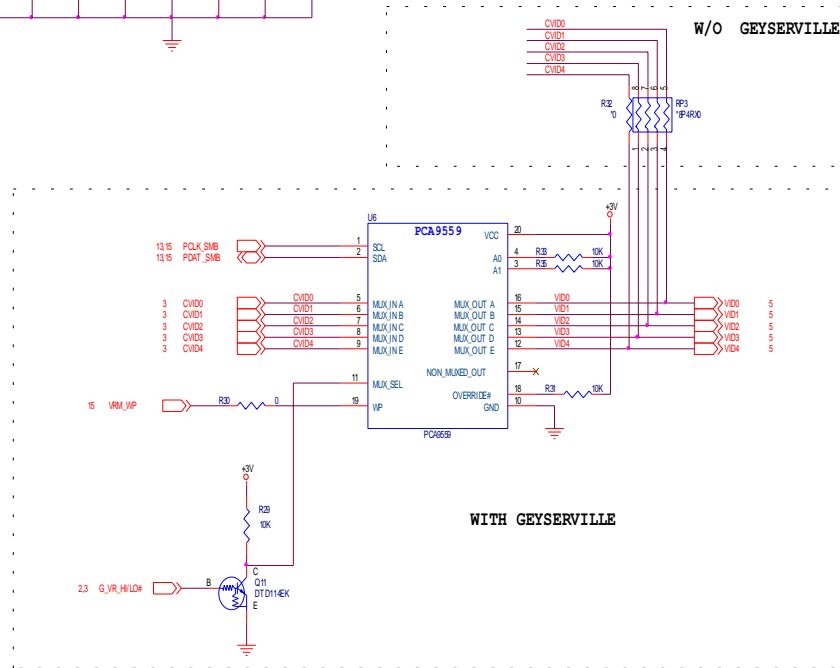
B

# Diagrams

## CPU Decoupling



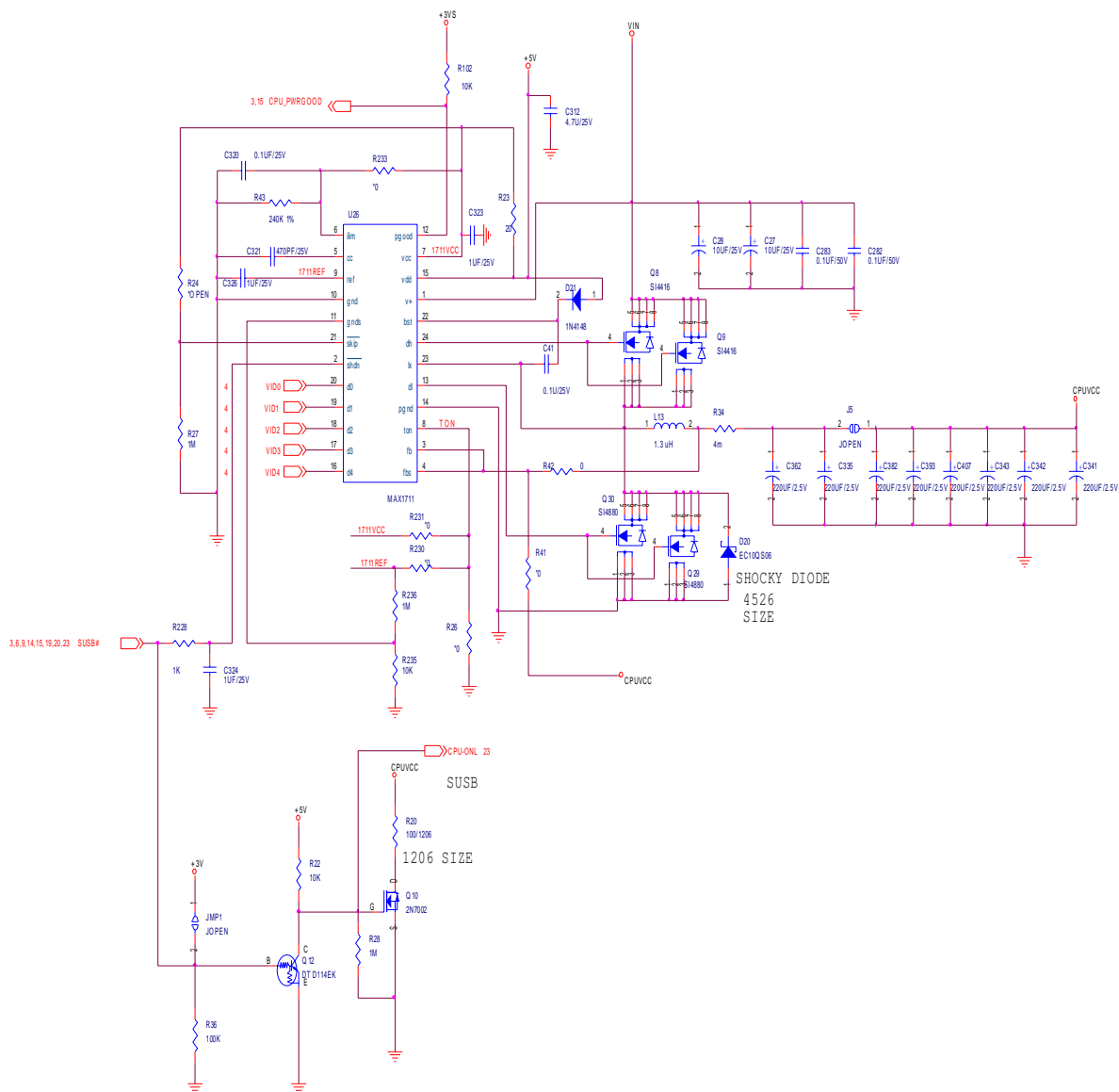
GTL PULL-UP RESISTORS  
REV. 2  
FIG. B - 3



VID4	VID3	VID2	VID1	VID0	CPUVCC
HIGH	HIGH	HIGH	HIGH	HIGH	NO CPU
HIGH	HIGH	HIGH	HIGH	LOW	0.925V
HIGH	HIGH	HIGH	LOW	HIGH	0.950V
HIGH	HIGH	HIGH	LOW	LOW	0.975V
HIGH	HIGH	LOW	HIGH	HIGH	1.000V
HIGH	HIGH	LOW	HIGH	LOW	1.025V
HIGH	HIGH	LOW	LOW	HIGH	1.050V
HIGH	HIGH	LOW	LOW	LOW	1.075V
HIGH	LOW	HIGH	HIGH	HIGH	1.100V
HIGH	LOW	HIGH	HIGH	LOW	1.125V
HIGH	LOW	HIGH	LOW	HIGH	1.150V
HIGH	LOW	HIGH	LOW	LOW	1.175V
HIGH	LOW	LOW	HIGH	HIGH	1.200V
HIGH	LOW	LOW	HIGH	LOW	1.225V
HIGH	LOW	LOW	LOW	HIGH	1.250V
HIGH	LOW	LOW	LOW	LOW	1.275V

LOW	HIGH	HIGH	HIGH	HIGH	NO CPU
LOW	HIGH	HIGH	HIGH	LOW	1.30V
LOW	HIGH	HIGH	LOW	HIGH	1.35V
LOW	HIGH	HIGH	LOW	LOW	1.40V
LOW	HIGH	LOW	HIGH	HIGH	1.45V
LOW	HIGH	LOW	HIGH	LOW	1.50V
LOW	HIGH	LOW	LOW	HIGH	1.55V
LOW	HIGH	LOW	LOW	LOW	1.60V
LOW	LOW	HIGH	HIGH	HIGH	1.65V
LOW	LOW	HIGH	HIGH	LOW	1.70V
LOW	LOW	HIGH	LOW	HIGH	1.75V
LOW	LOW	HIGH	LOW	LOW	1.80V
LOW	LOW	LOW	HIGH	HIGH	1.85V
LOW	LOW	LOW	HIGH	LOW	1.90V
LOW	LOW	LOW	LOW	HIGH	1.95V
LOW	LOW	LOW	LOW	LOW	2.00V

B

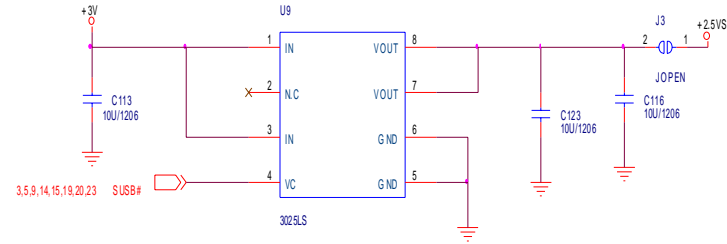
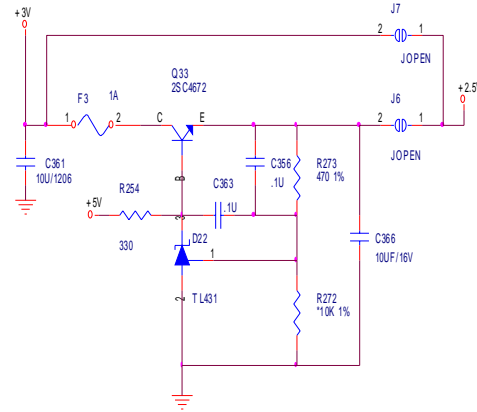


CPU POWER  
REV. 2  
FIG. B - 4

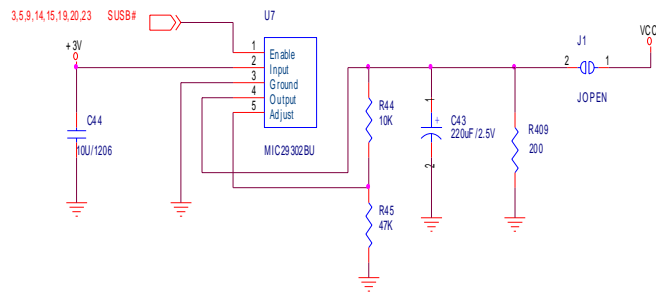
B

# Diagrams

FOR LT-PRO "+2.5V POWER" USE J7 JUMP OFFER +3.3V  
 FOR MOBILITY-P "+2.5V POWER" USE J6 JUMP OFFER +2.5V



CPU POWER VCCT & 2.5V  
 REV. 2  
 FIG. B - 5



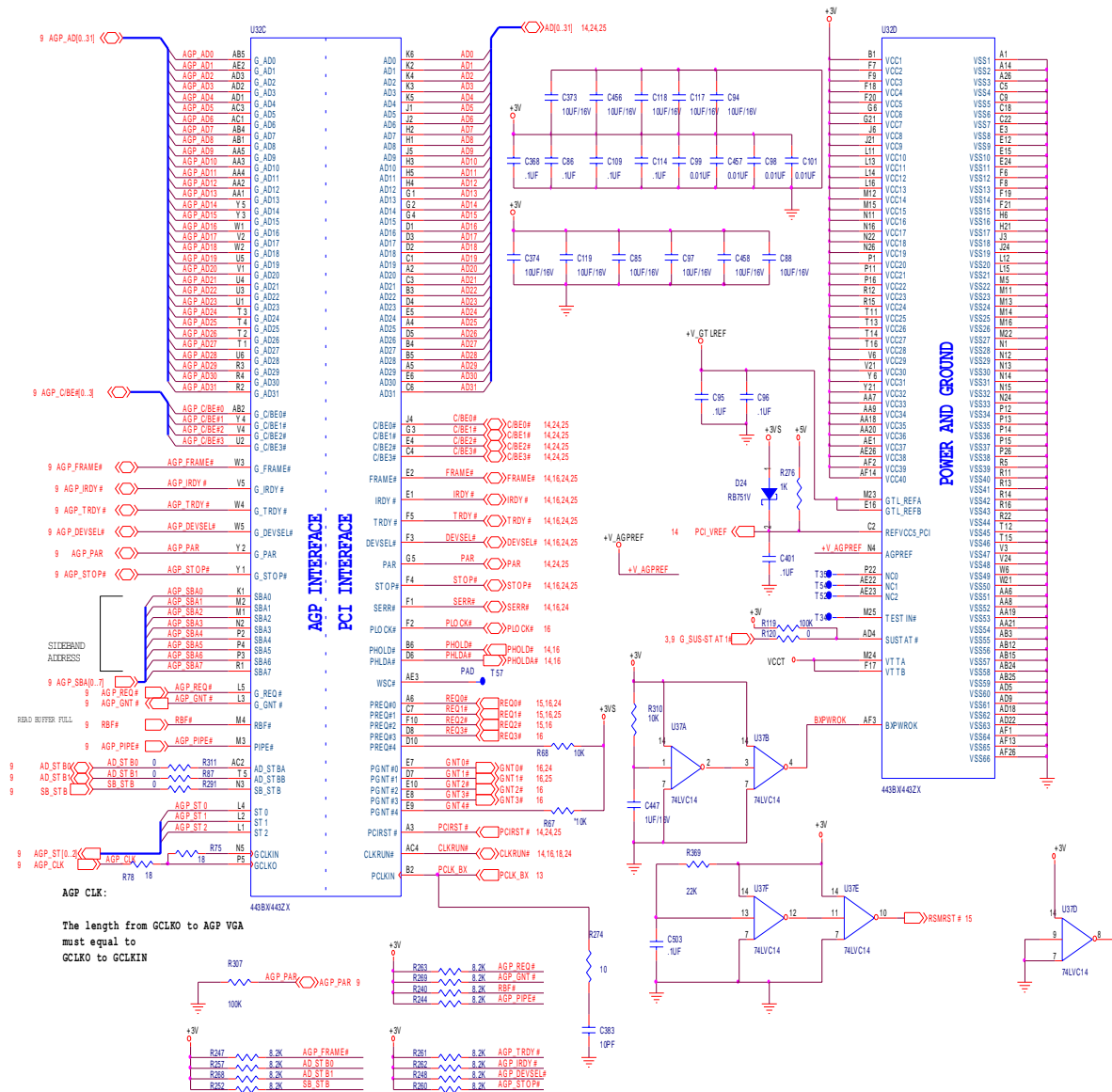
B

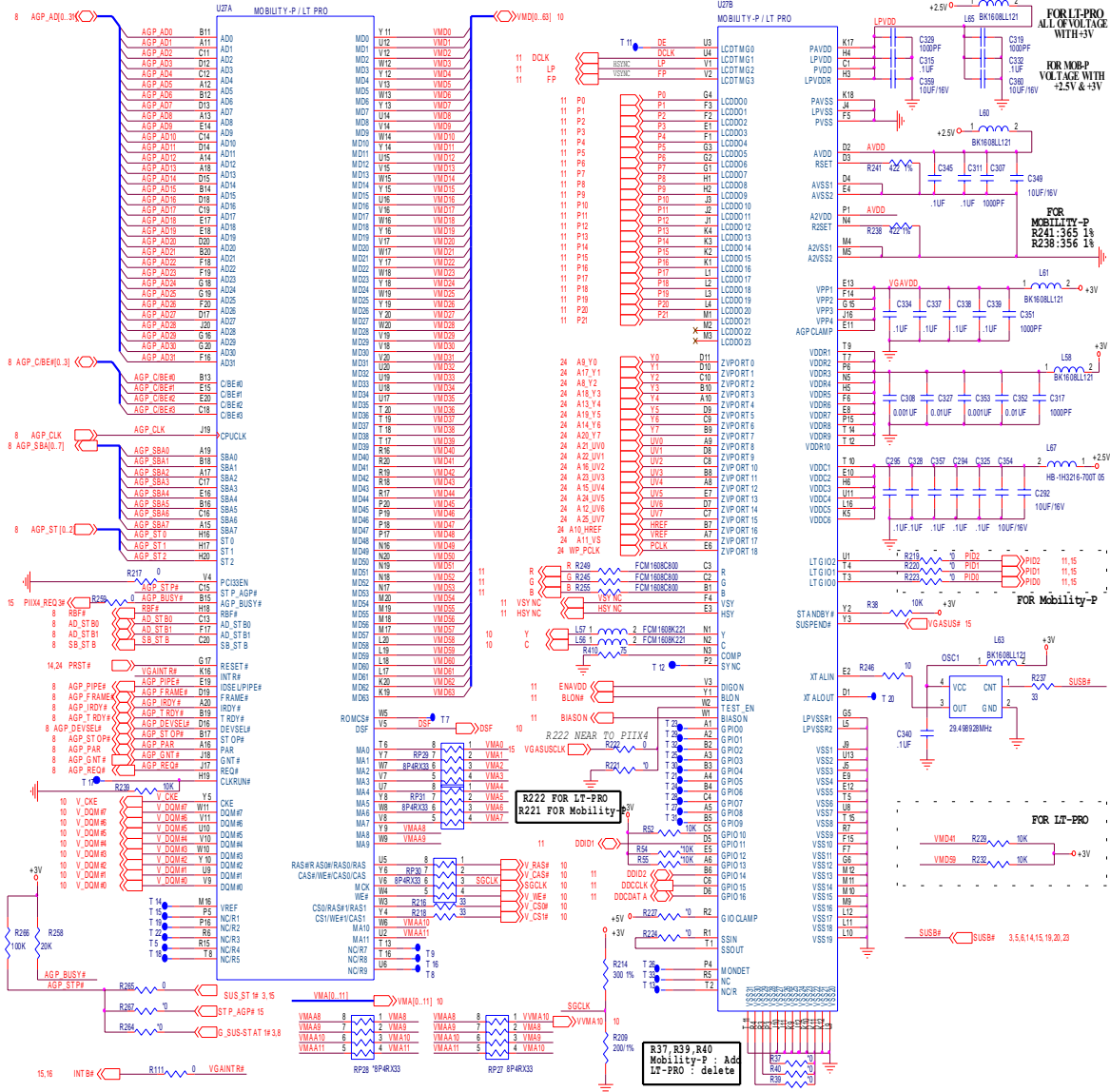
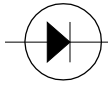




# Diagrams

443BX\_443ZX  
Rev. 2  
(DIAGRAM 2 OF 2)  
FIG. B - 7



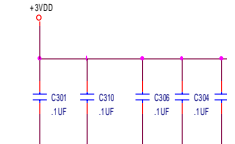
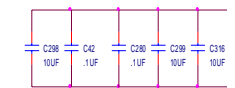
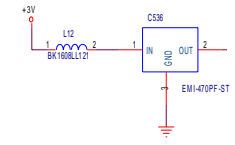
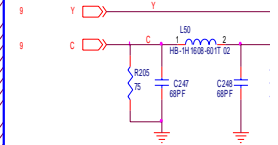
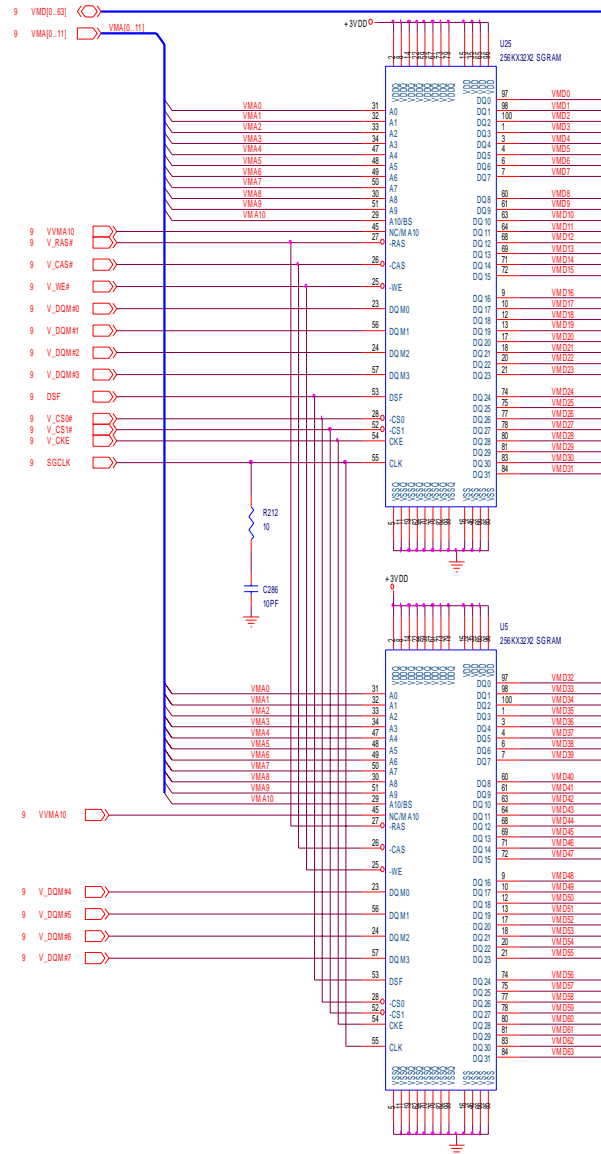


VGA Mobility/LT Pro  
Rev. 2  
FIG. B - 8

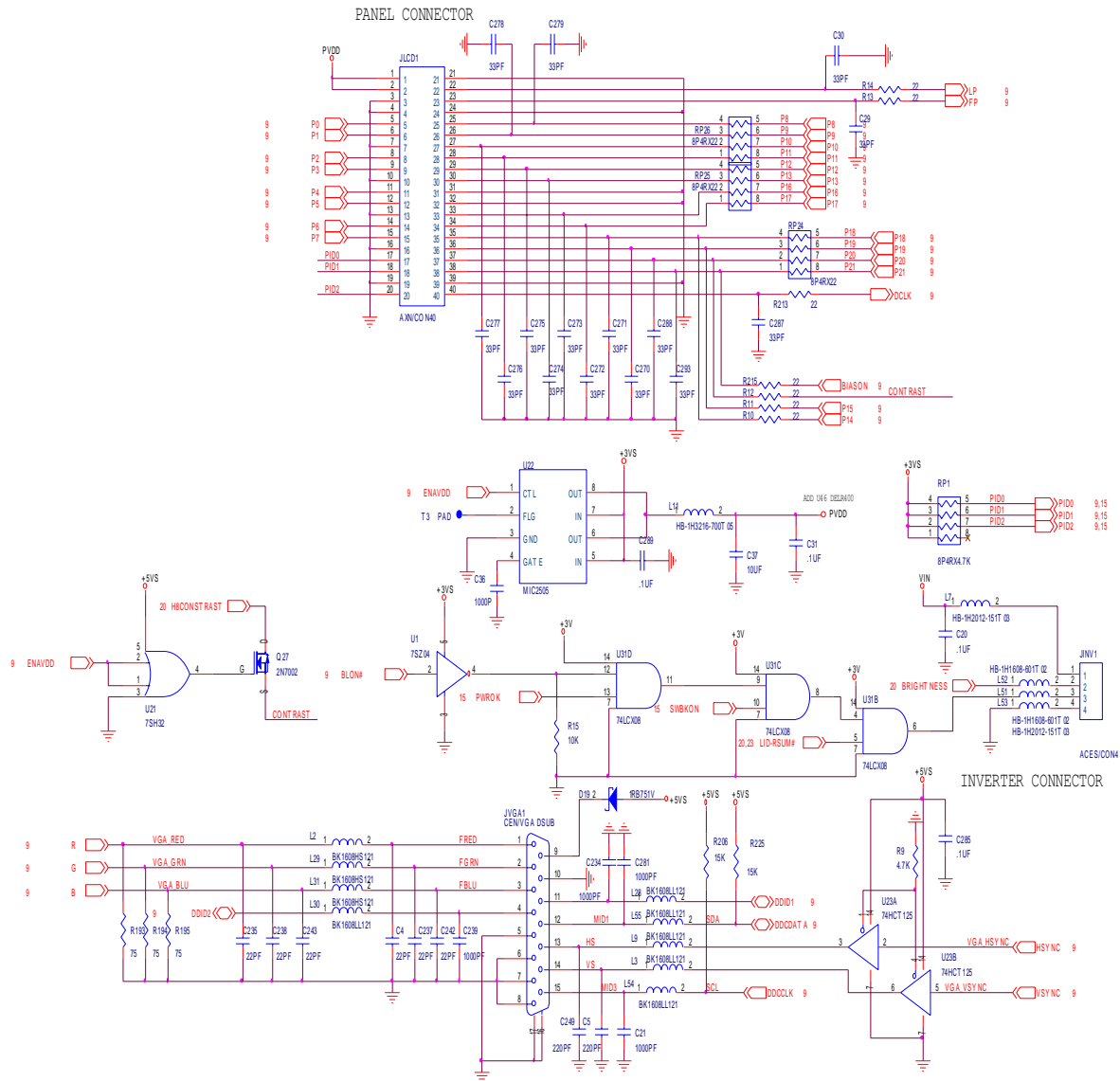
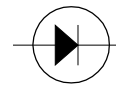
B

# Diagrams

VGA MEMORY & TV-OUT  
REV. 2  
FIG. B - 9



B

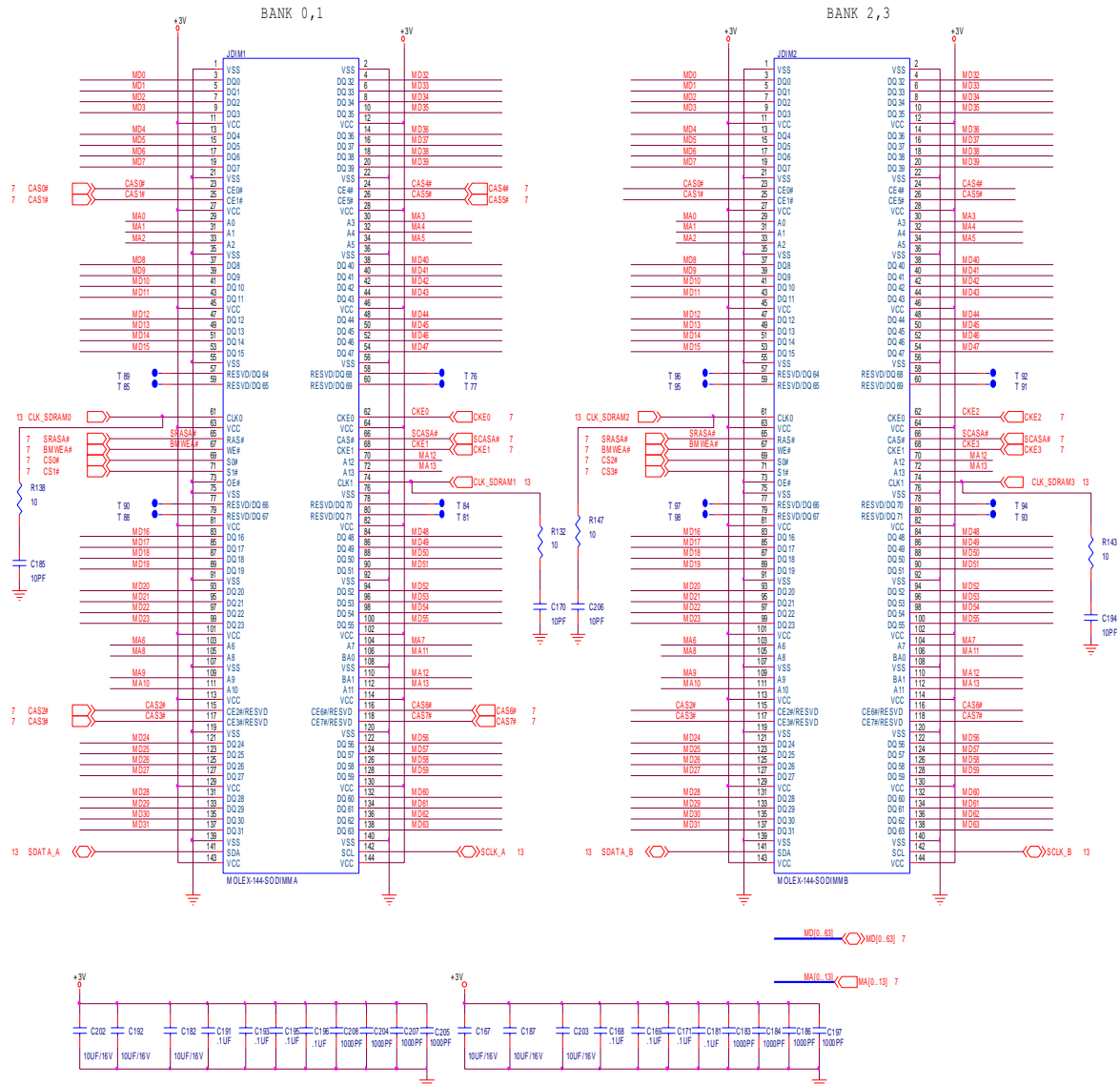


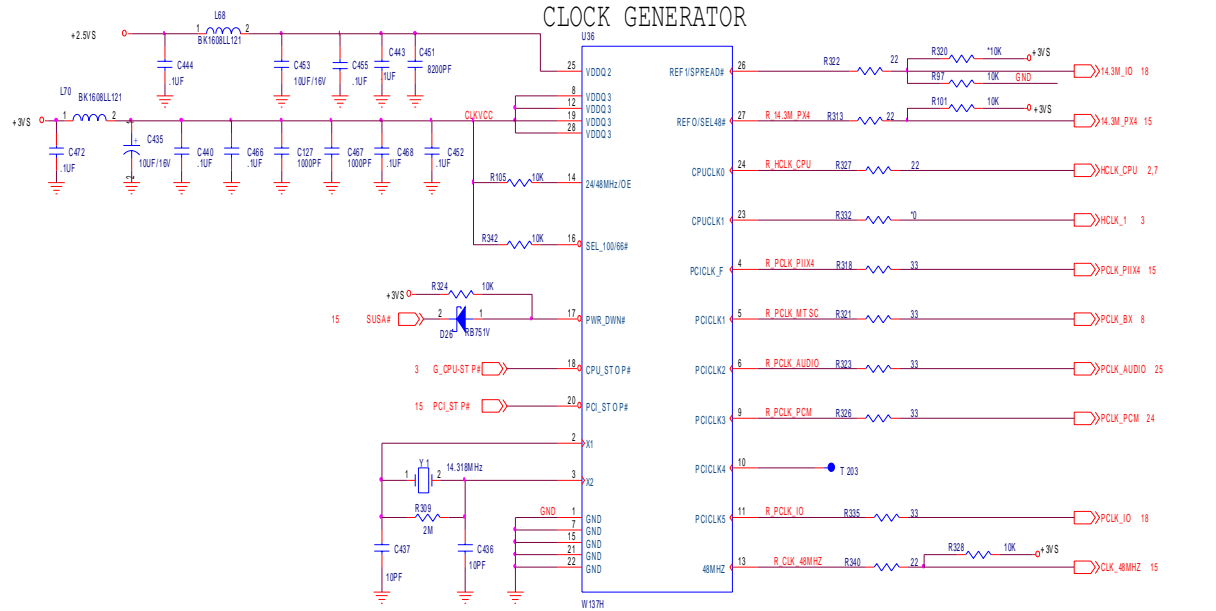
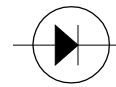
VGA STARP OPTION  
Rev. 2  
FIG. B - 10

B

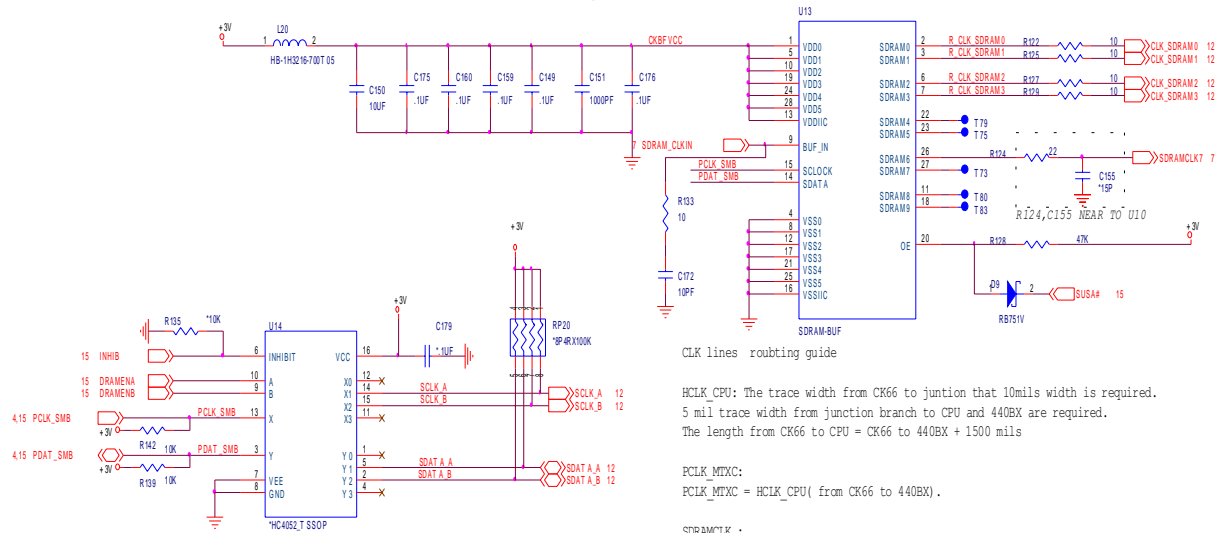
# Diagrams

SODIMM  
Rev. 2  
FIG. B – 11





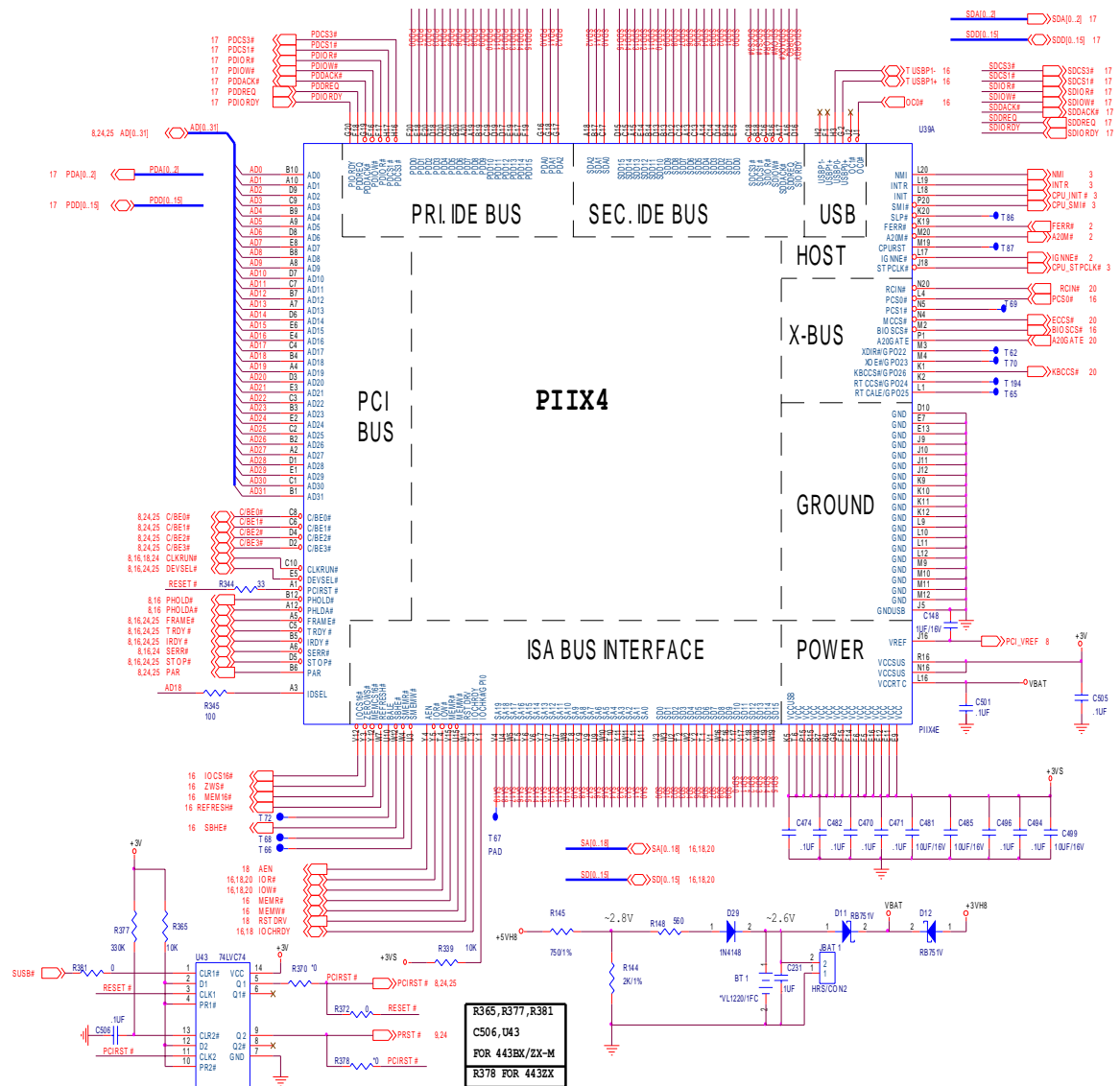
**CLOCK GENERATOR**  
**REV. 2**  
**FIG. B – 12**



B

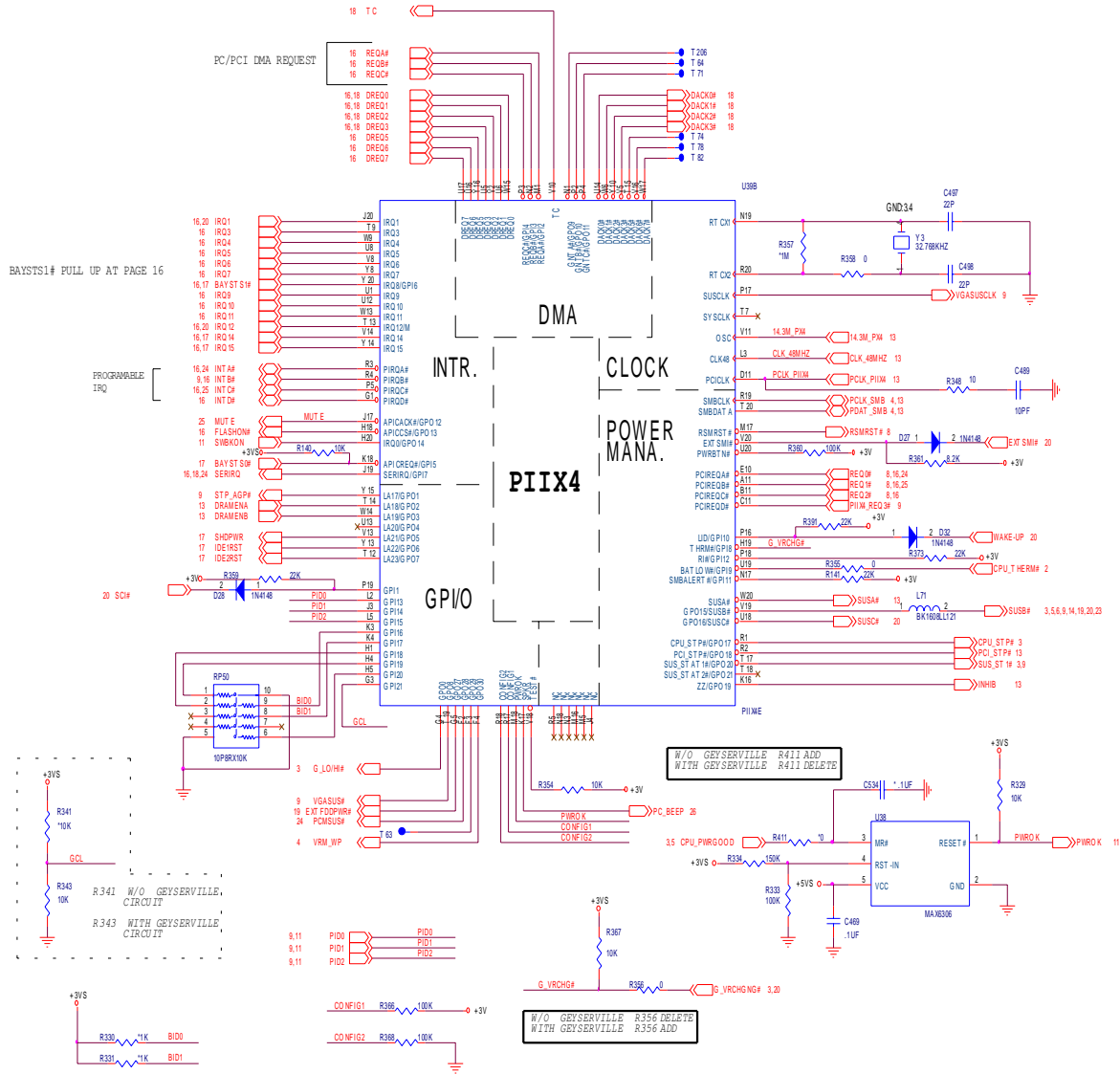
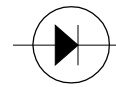
# Diagrams

**PIIX4  
REV. 2  
(DIAGRAM 1 OF 2)  
FIG. B - 13**



**B**

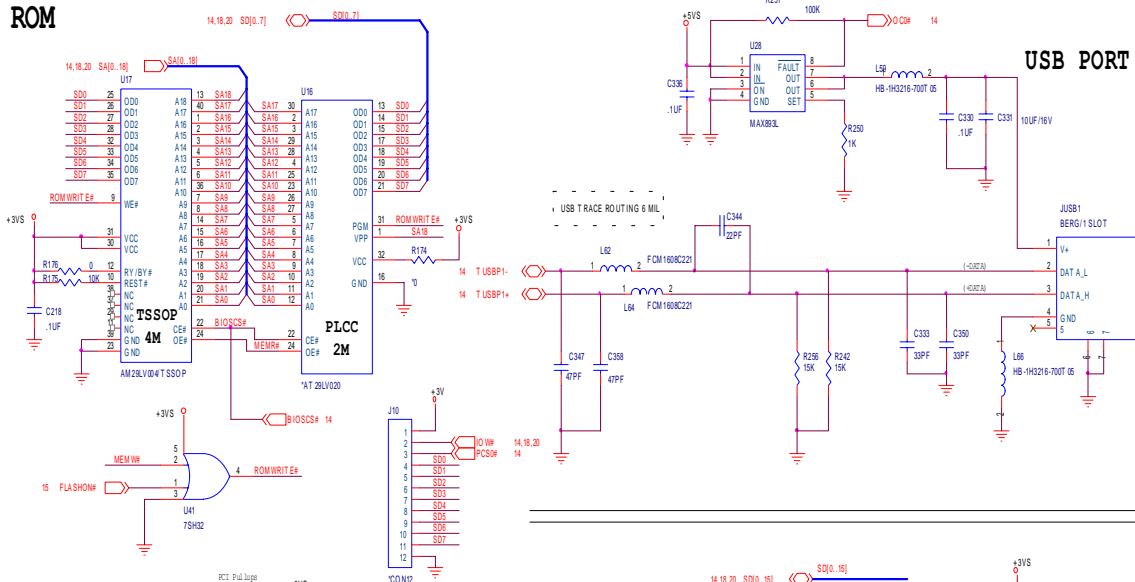




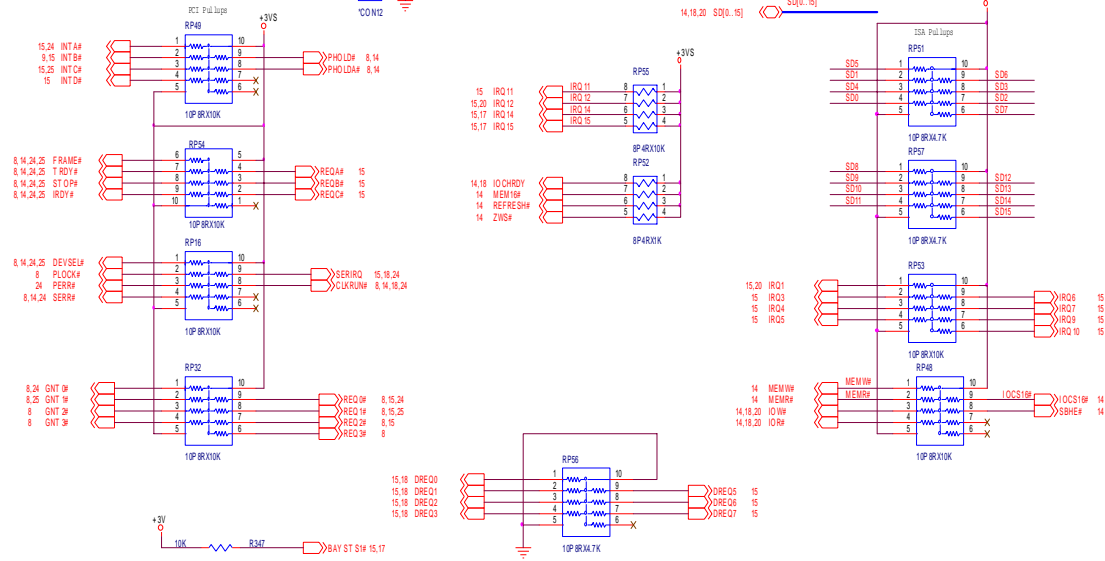
**PIIX4**  
**Rev. 2**  
**(DIAGRAM 2 OF 2)**  
**FIG. B - 14**

**B**

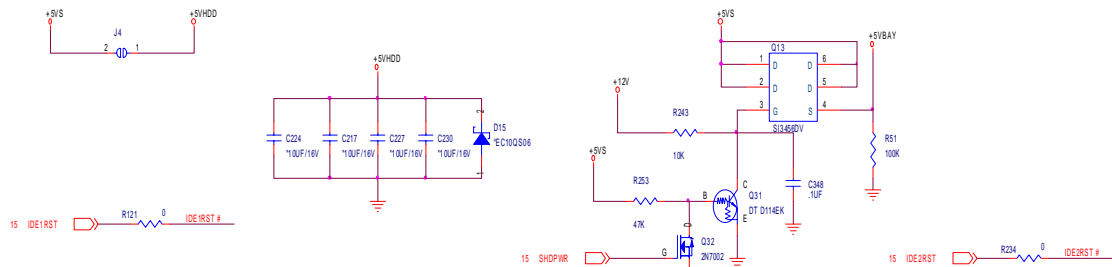
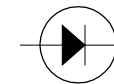
# Diagrams



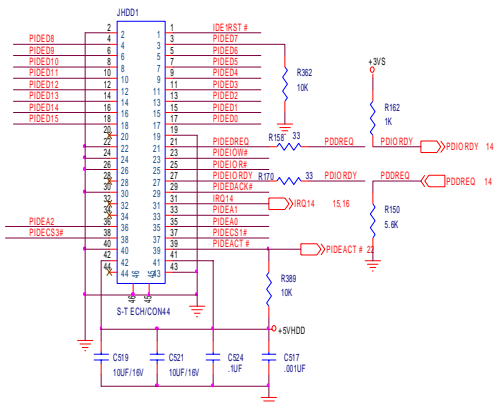
USB/ROM/PCI/ISA Pull High  
Rev. 2  
FIG. B - 15



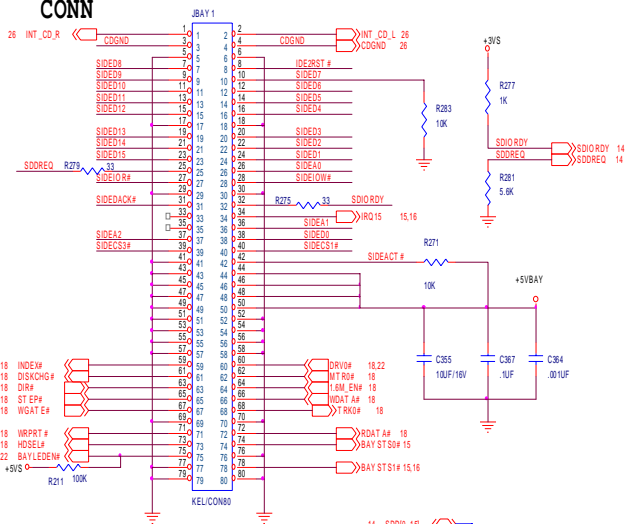
B



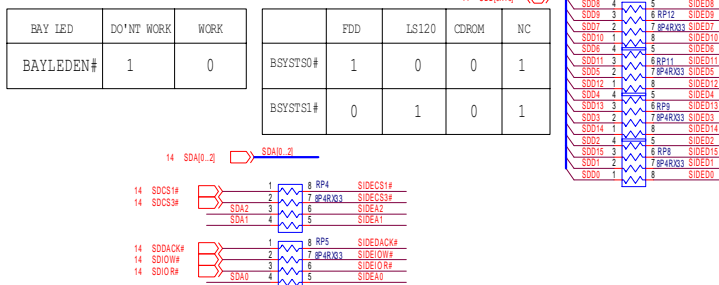
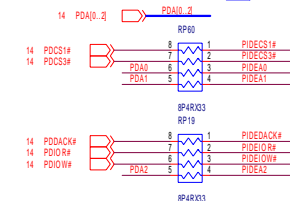
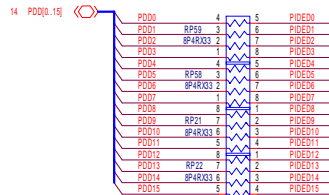
**HDD CONNECTOR**



**CDROM/FDD CONN**



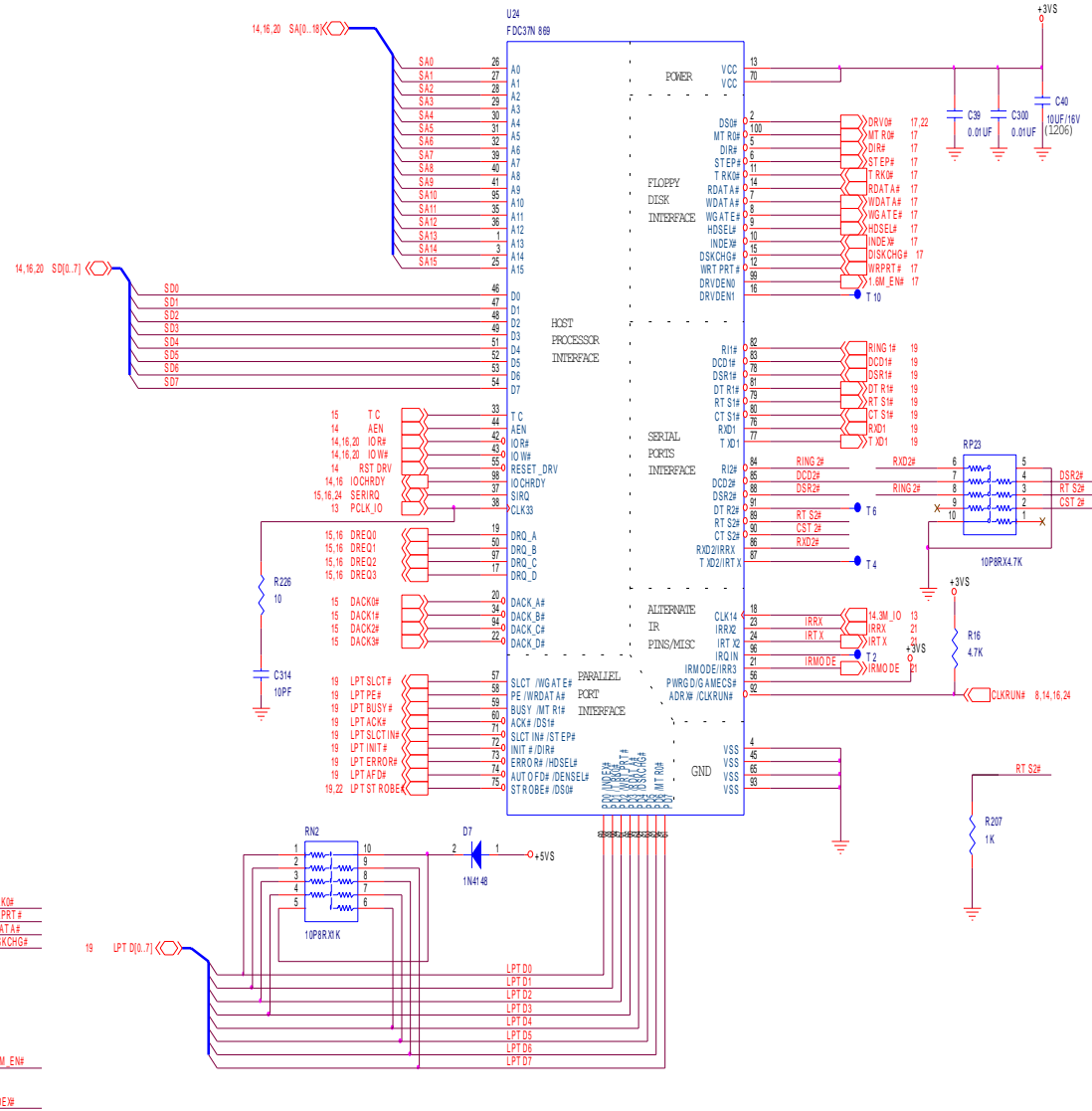
**HDD & CDROM/FDD  
CONNECTOR  
Rev. 2  
FIG. B – 16**



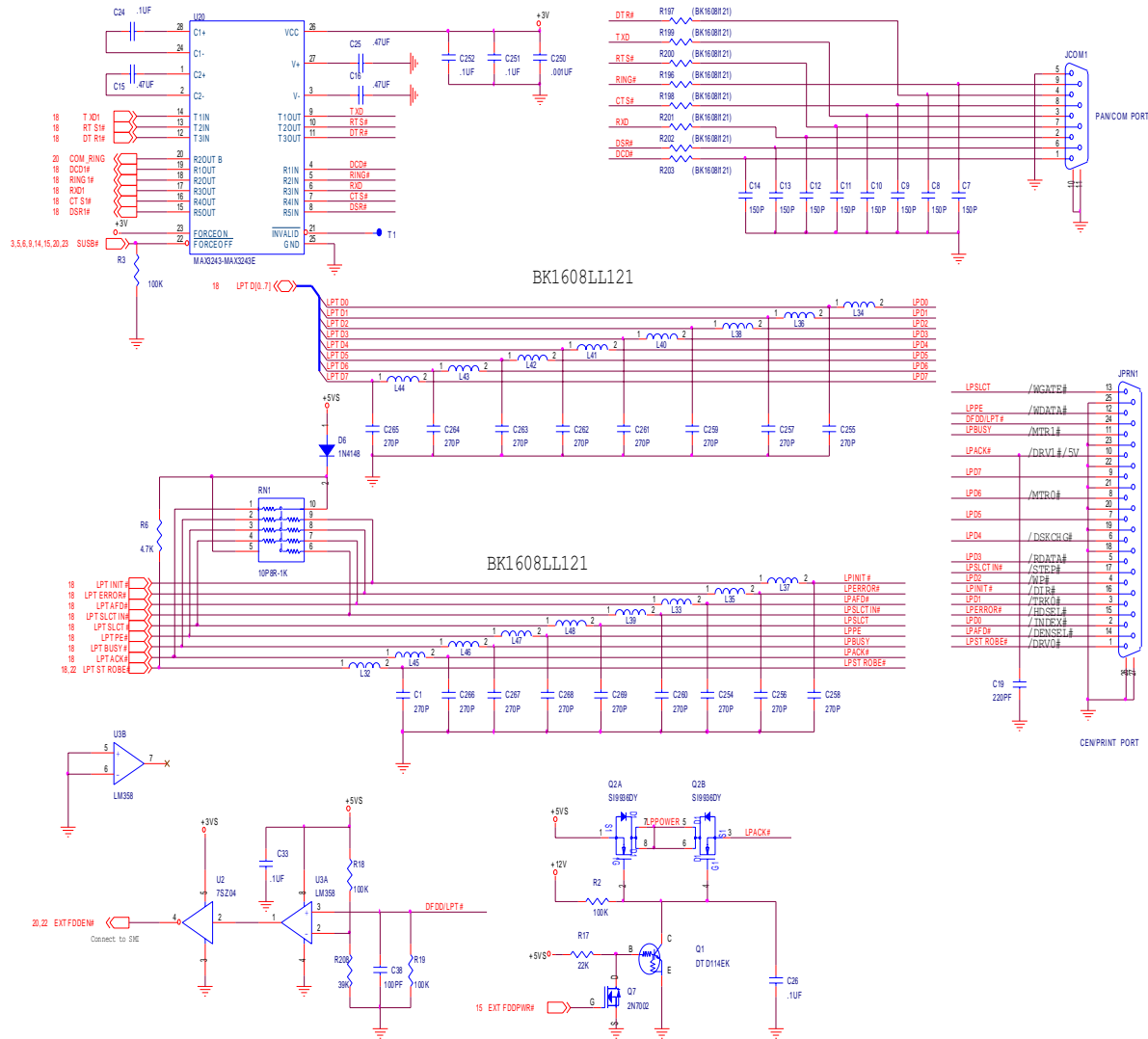
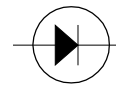
**B**

# Diagrams

**SUPER I/O SMC869**  
**REV. 2**  
**FIG. B - 17**



**B**

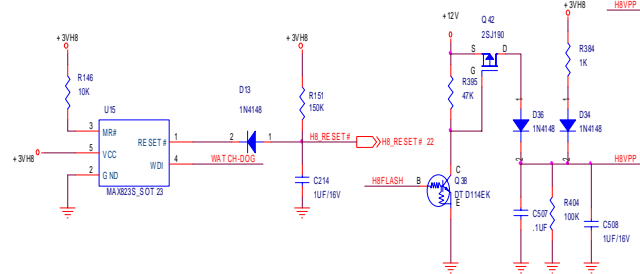
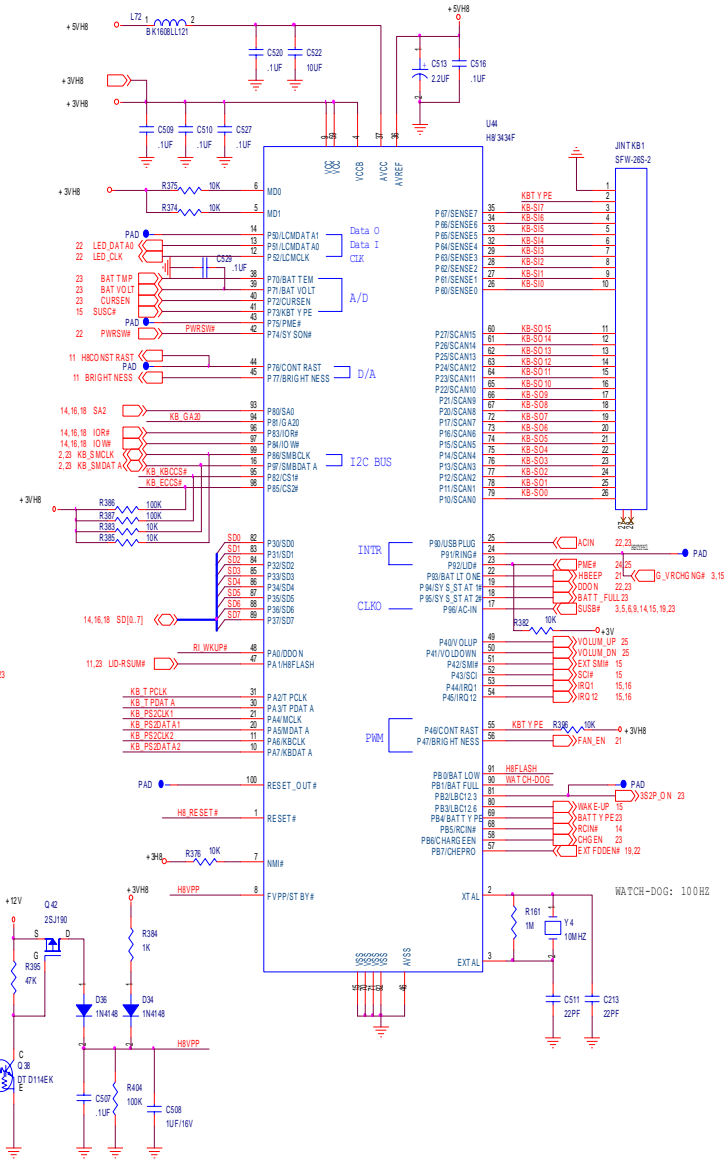
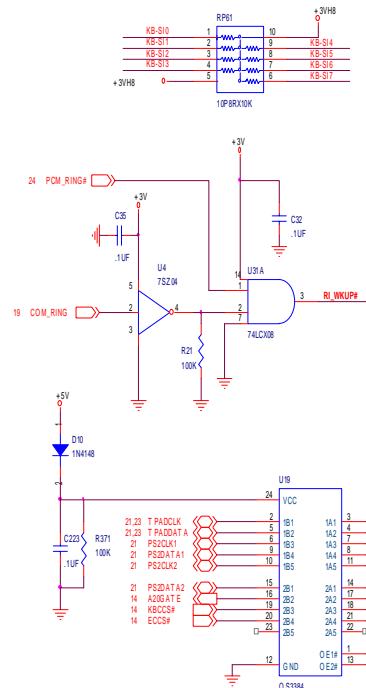


I/O PORTS  
REV. 2  
FIG. B - 18

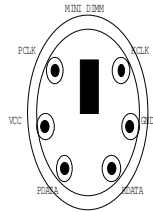
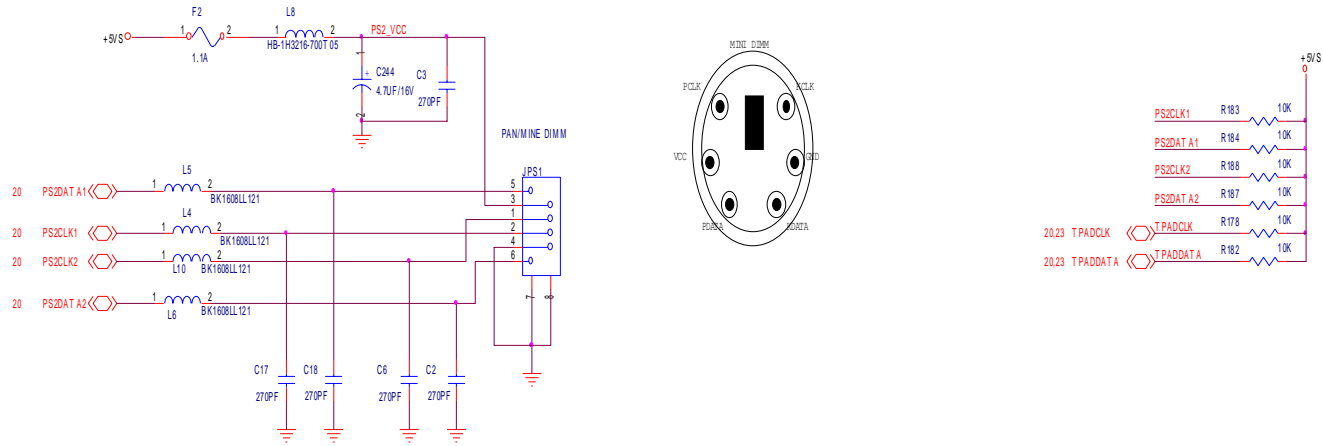
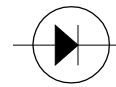
B

# Diagrams

KBC H8  
Rev. 2  
FIG. B - 19

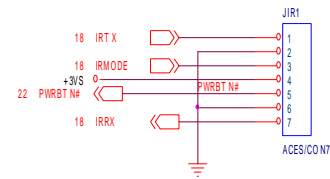
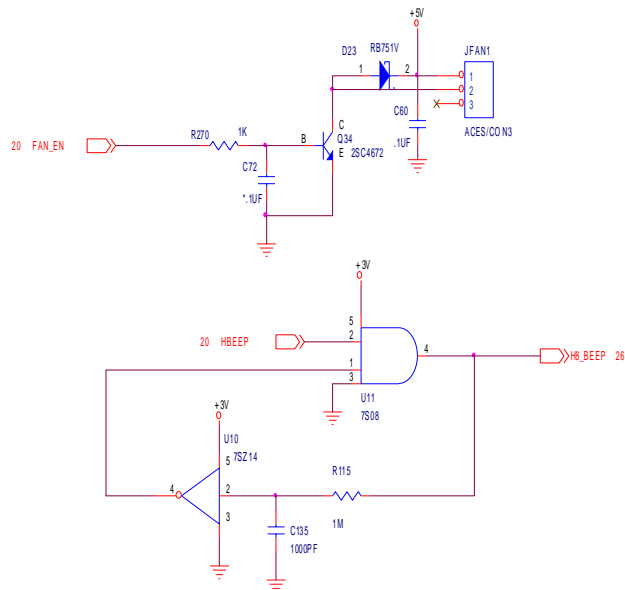


B



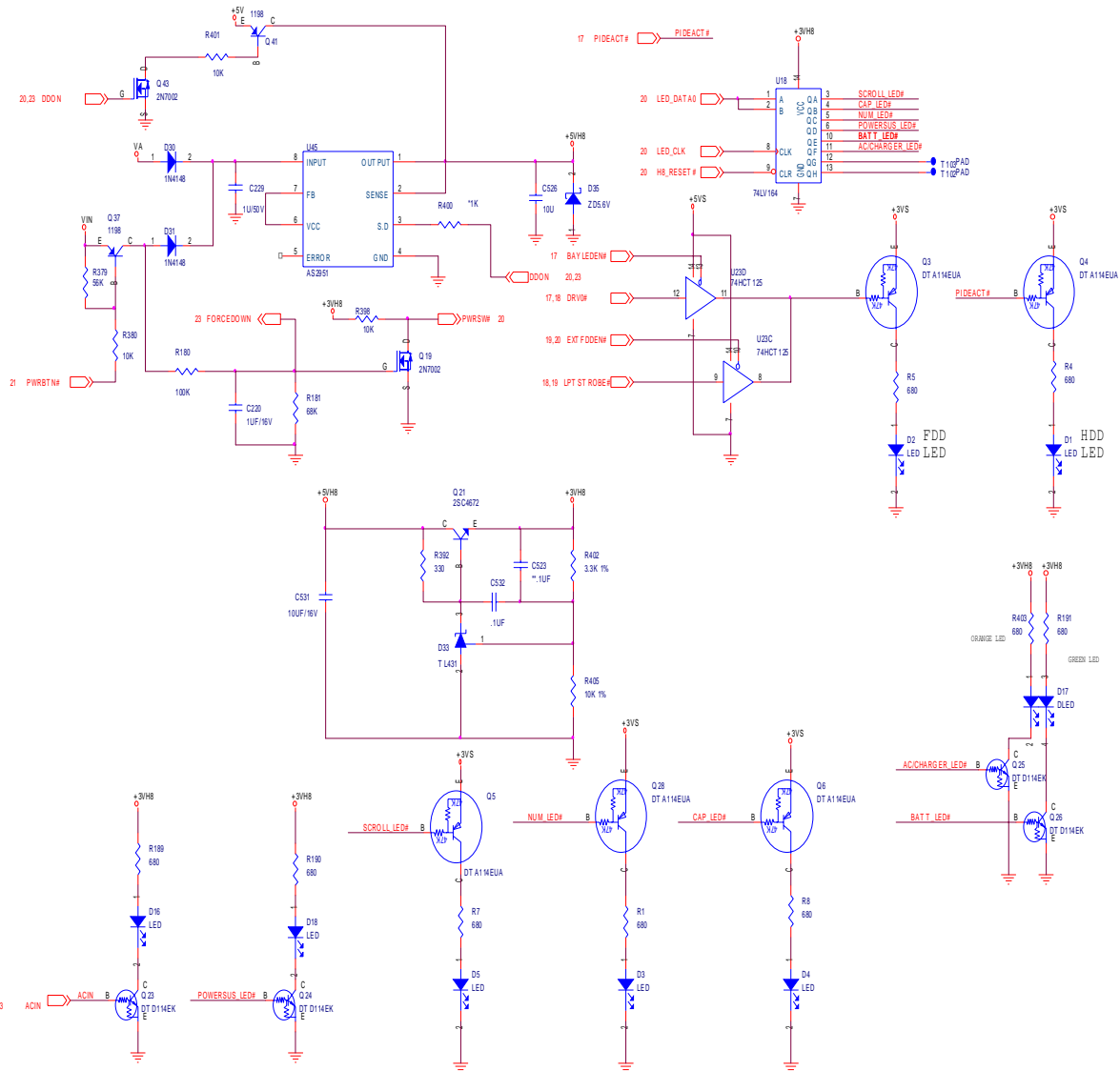
POWER BOTTOM /IR CONNECTOR

**KBC PS/2 & FAN**  
**Rev. 2**  
FIG. B – 20



**B**

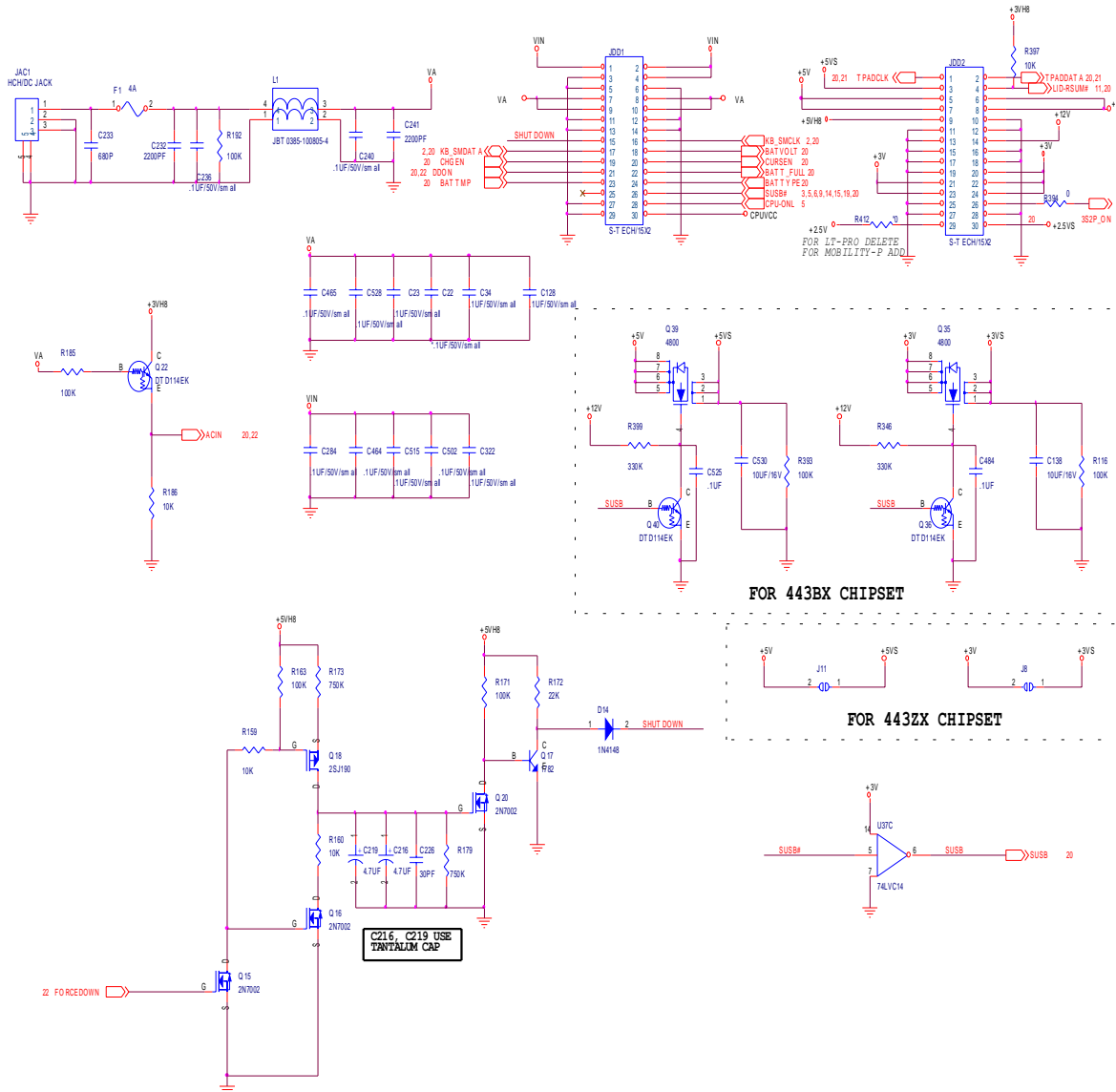
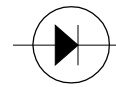
# Diagrams



**POWER BUTTON & LED**  
**3V H8 & LED**  
**REV. 2**  
**FIG. B - 21**

**B**



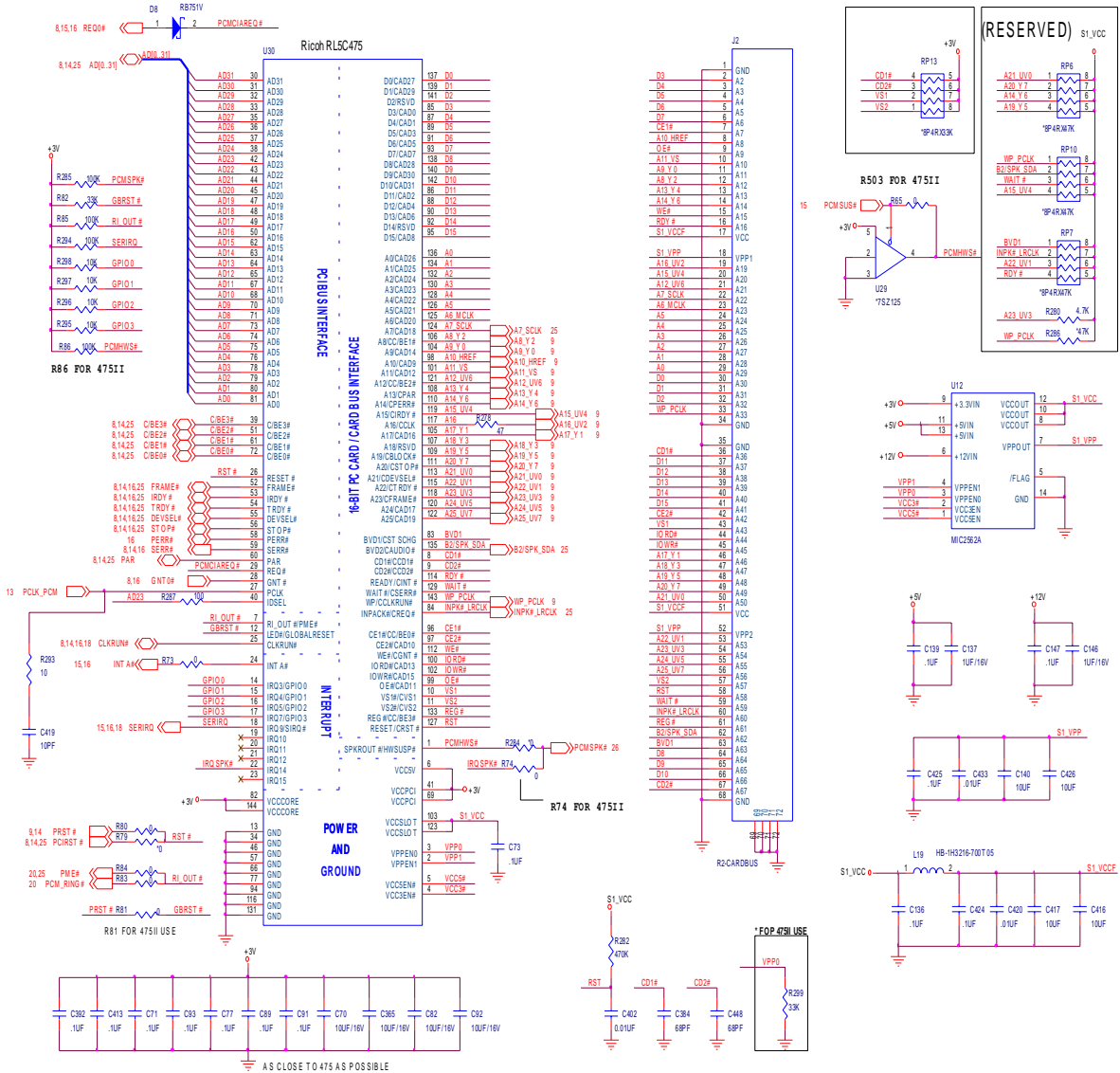


AC IN  
REV. 2  
FIG. B - 22

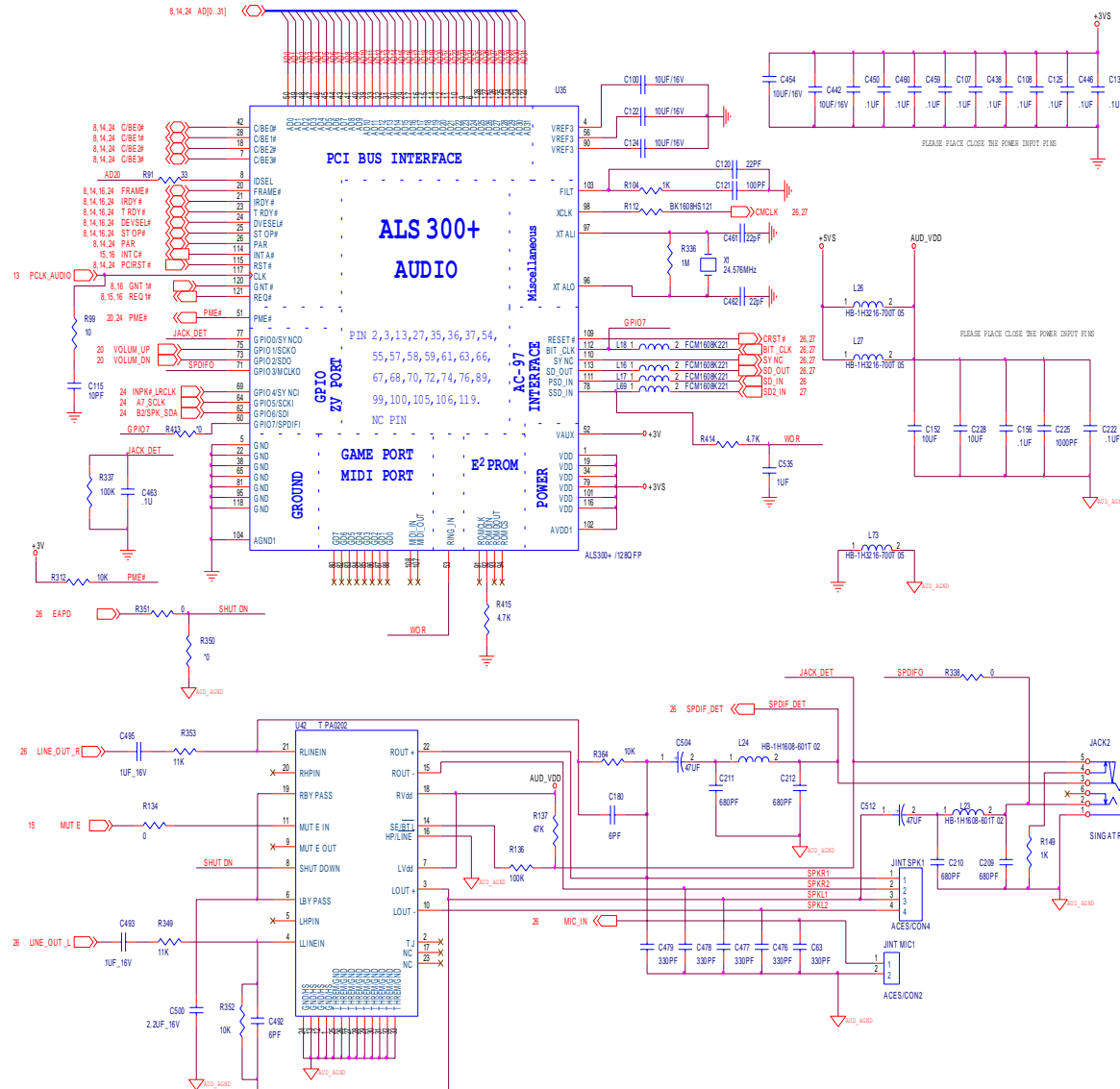
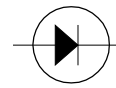
B

# Diagrams

PCMCIA RL5C475A  
Rev. 2  
FIG. B - 23



B

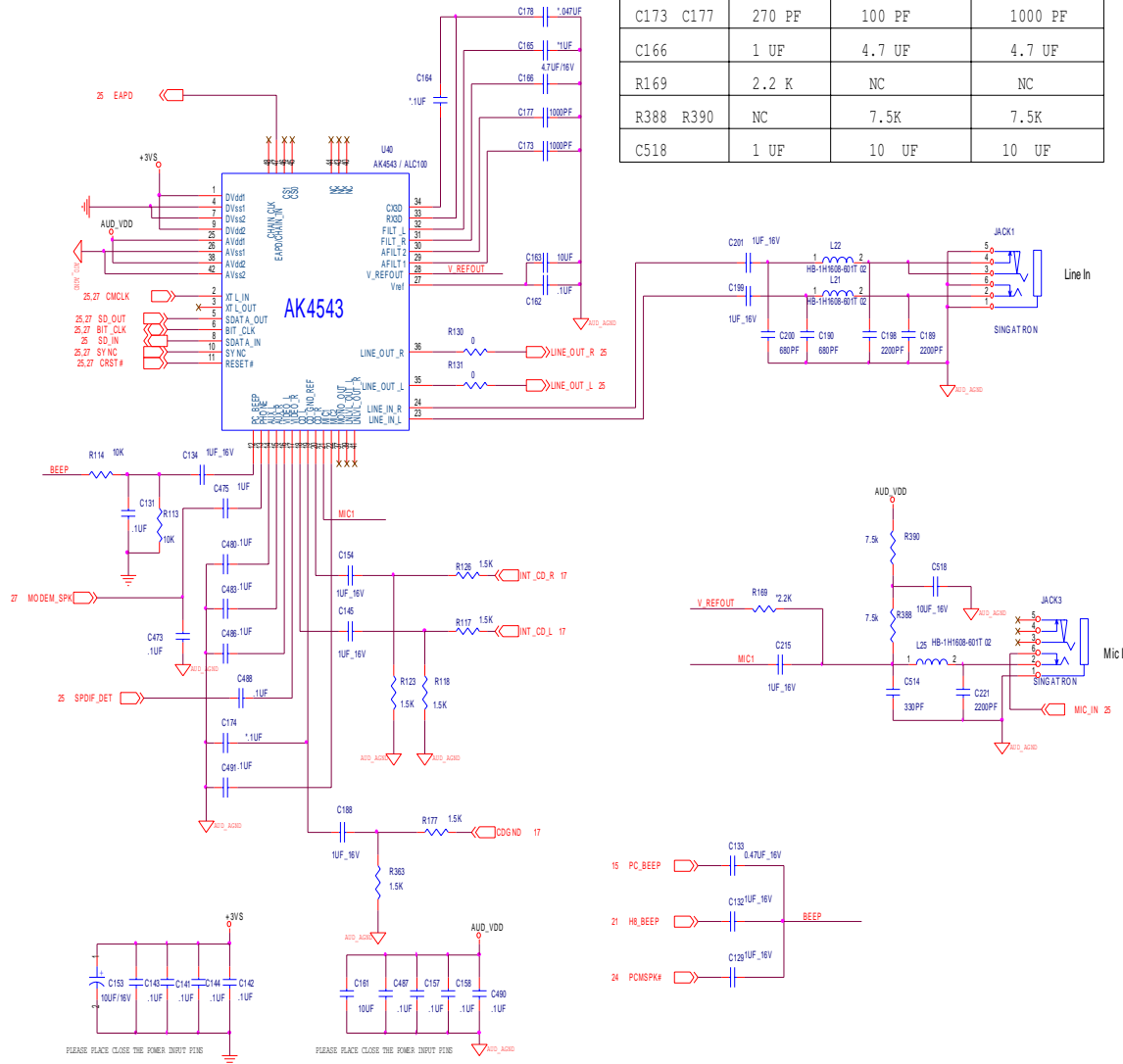


REALTEK AUDIO CONTROLLER  
ALS300+ & CONN.  
Rev. 2  
FIG. B - 24

B

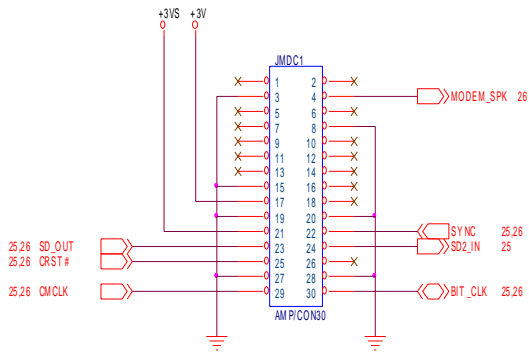
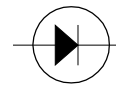
# Diagrams

AC 97  
REV. 2  
FIG. B - 125

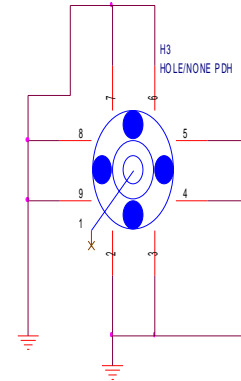
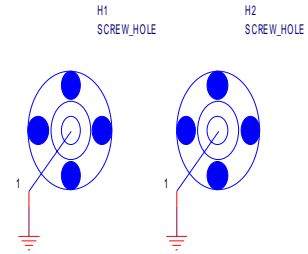


AD1881		AK4543	ALC100	
C173	C177	270 PF	100 PF	1000 PF
C166		1 UF	4.7 UF	4.7 UF
R169		2.2 K	NC	NC
R388	R390	NC	7.5K	7.5K
C518		1 UF	10 UF	10 UF

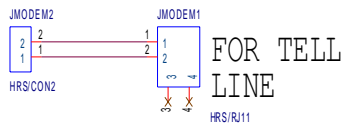
B



**MDC MODEM**

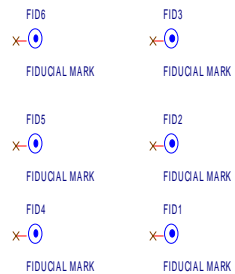


**MODEM CONNECTOR  
REV. 2  
FIG. B - 26**



FOR EMI REQUIRE

FOR TELL  
LINE



**B**

# Diagrams

*NOTES:*

**B**