2800/2820/2850

Notebook Computer

Service Manual

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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 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 core logic, memory and supporting chipset.

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, *Part Lists*

Appendix B, *2800 Circuit Diagrams*

Appendix C, *2820/2850 Circuit Diagrams*

Related Documents

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

User's Manual

The standard manufacturer's configuration includes a printed *Concise User's Manual* (usually in the language of the destination market) and a complete 'expanded' *User's Manual* on an accompanying CD-ROM.

Both the *Concise User's Manual* and the CD-ROM based 'expanded' *User's Manual* describe the notebook's basic features and the procedures for operating the computer. The 'expanded' manual also describes the installation & operation of the utility programs and how to upgrade the system's RAM and HDD.

Last Resort: The Manufacturer

If you can't find the information you need in these documents or your up-line source, contact the manufacturer at:

www.clevo.com.tw

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1 Introduction

This manual covers the information you need to service or upgrade the 2800/2820/2850 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, OS/2 Warp, 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. The 2800 supports Intel Pentium II & Celeron CPUs of different speeds and 12.1" & 14.1" TFT color LCD screens. The 2820 supports Intel Pentium III & Celeron CPUs of different speeds and 12.1" & 14.1" TFT color LCD screens while the 2850 supports Intel Pentium III & Celeron CPUs of different speeds and 15.1" TFT color LCD screens. In addition, system memory, hard disk, and BIOS are also upgradable. See *Chapter 3, "Disassembly*," for a detailed description of the upgrade procedures for each specific component.

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

	(2800)	(2820 & 2850)
Package	MicroPGA1	MicroPGA2
Type	Pentium II, 300MHz ~ 400MHz	Pentium III, 450MHz or faster
	Celeron, 300MHz ~ 400MHz	Celeron, 450MHz or faster

Memory

L1 cache (in CPU)	16KB code + 16KB data	16KB code + 16KB data
L2 cache (on die)	Pentium II: 256KB SRAM Celeron: 128KB SRAM	Pentium III: 256KB SRAM Celeron: 128KB SRAM
RAM base	0MB (onboard)	same
RAM expansion	2 S.O.DIMM sockets (144 pin)	same
	DIMM sizes: 32MB, 64MB, 128MB	same
	standards: 3.3-volt	same
	modes: SDRAM	same
	speed: 66MHz or faster	speed: 100MHz or faster
	use: singly, mixed* or identical pairs	same
	maximum expansion: 256MB	same

*Both must be the same speed

Core Logic

440BX AGPset, 66MHz	440BX AGPset, 100MHz

BIOS

512KB Flash ROM, Plug ‘n Play 1.0a, LBA, APM 1.2, ACPI

VIDEO

memory	4MB/8MB SGRAM
chipset	ATI 3D Rage LT Pro AGP (with 3D, AGP & ZV support/proprietary driver)
architecture	64-bit 2x AGP bus with Windows Acceleration
display	TFT (active matrix) 12.1” SVGA, (800 x 600) at 24-bit color (TrueColor) 14.1” XGA, (1024 x 768) at 32-bit color (TrueColor) 15.1” XGA, (1024 x 768) at 32-bit color (TrueColor)

DRIVES

	HDD module	semi-removable 2½” (9.5mm) , PCI local bus IDE interface
	FDD module	3.5”, 1.44MB (3-mode)
	Device Bay	
	CD-ROM module	24X, full size (5.25”) ATAPI interface tray-loading mechanism, access time below 100ms
or	**DVD module**	4X or faster, full size (5.25”) ATAPI interface tray-loading mechanism, access time below 100ms (with software MPEG support)

AUDIO

chipset	Yamaha YMF744B (DS-XG), proprietary driver
architecture	32-bit PCI bus
type	64-voice dual-audio engine, AC-3 speaker virtualization, PnP, up to 20-bit ADCDAC audio resolution, I^2S/zoomed video, high quality MIDI synthesis
sampling	max. record & playback up to 48 KHz stereo (WAVE audio)
3D	HRTF 3-D positional audio under DirectX™ 5.0
compatibility	Sound Blaster Pro™ legacy audio, MS Windows Sound System™
interface	speakers (phones), microphone, line-in
speakers	2 built-in: 0.5W stereo amp.

I/O

USB	2 ports, 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, output-only, bi-directional
CRT	15-pin VGA
PS/2	6-pin, mini-din, mouse or keyboard
PC Card	one Type I or Type II socket, PC Card 3.0, ZV port & 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: 60W, 20V, 3A
battery pack(s)	Li-Ion: smart battery with gauge circuit Ni-MH: dumb battery without gauge circuit
battery charge time	Fast (system off) approx. 2.5 hours per battery, 2000mA ±200mA Slow (system on) approx. 7 hours per battery, 700mA ± 50mA (based on a 3000mA smart battery)
life per charge	approx. 2.5hrs per battery (based on an Intel Pentium III 500 MHz CPU, running "*ZD BatteryMark 3.0*" software in the *Windows 98* operating system)
management	BIOS control, APM ver 1.2 levels: full-on, standby, suspend-to-RAM/suspend-to-disk (0 volt)

Advanced Users

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

OTHER FEATURES (OPTIONAL)

56K Fax/Data/Voice modem

10/100 Mbps PCI Ethernet Controller

ENVIRONMENT

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

PHYSICAL

2800 (12.1”/14.1” LCD capable):

dimensions	312mm(w) x 262mm(d) x 34.5mm(h)
weight	2.95Kg (with Li-Ion battery, FDD, HDD, CD-ROM & 14.1” LCD)

2820 (12.1”/14.1” LCD capable):

dimensions	312mm(w) x 262mm(d) x 36/37.5mm(h)
weight	2.95Kg (with Li-Ion battery, FDD, HDD, CD-ROM & 14.1” LCD)

2850 (15.1” LCD):

dimensions	326mm(w) x 267mm(d) x 37.5mm(h)
weight	3.22Kg (with Li-Ion battery, FDD, HDD, CD-ROM & 15.1” LCD)

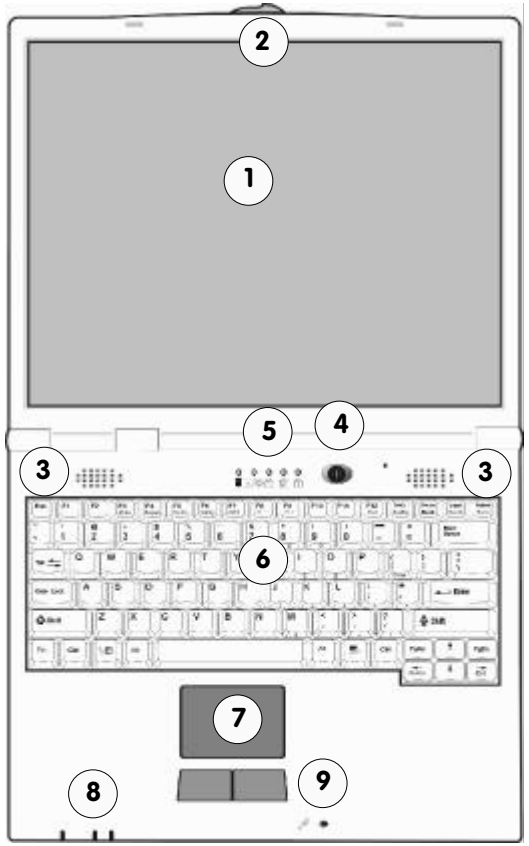
External Locator

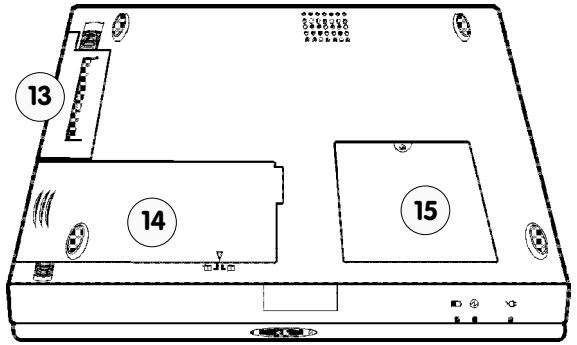
The following figures show the external locations of the computer's main subsystems.

Front View

Fig. 1 – 1

1. LCD
2. Cover latch
3. Speakers
4. On/Off switch
5. LED system status indicators
6. Keyboard
7. TouchPad & buttons
8. LED power status indicators
9. Microphone
10. Audio line-in jack
11. Mic jack
12. Phone jack

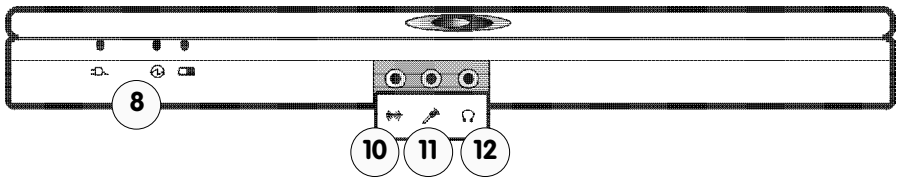


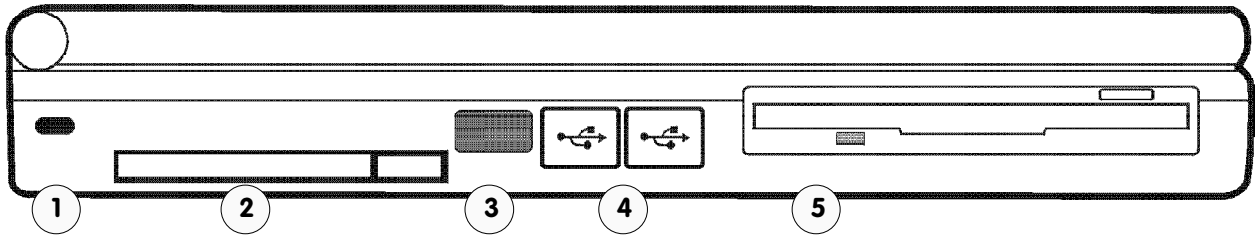


Bottom View

Fig. 1 - 2

13. Device bay
14. Battery bay
15. RAM bay

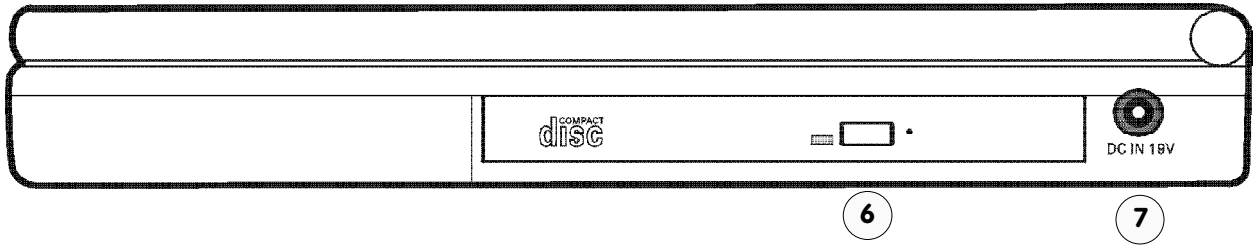




Left View

Fig. 1 – 3

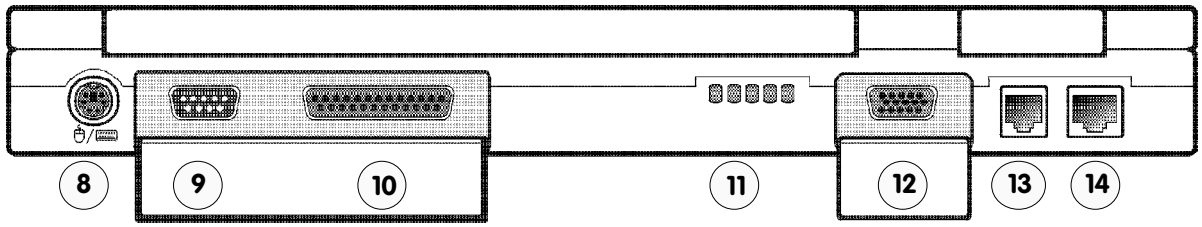
1. Kensington lock port
2. PC Card slot
3. IrDA (serial 2) port
4. USB ports
5. FDD



Right View

Fig. 1 – 4

6. CD-ROM module (option) or DVD ROM module (option)
7. Adapter port



Rear View

Fig. 1 – 5

8. PS/2 port
9. COM (serial 1) port
10. Parallel port
11. Fan
12. External monitor port
13. Fax/Modem (option)
14. LAN port (option)

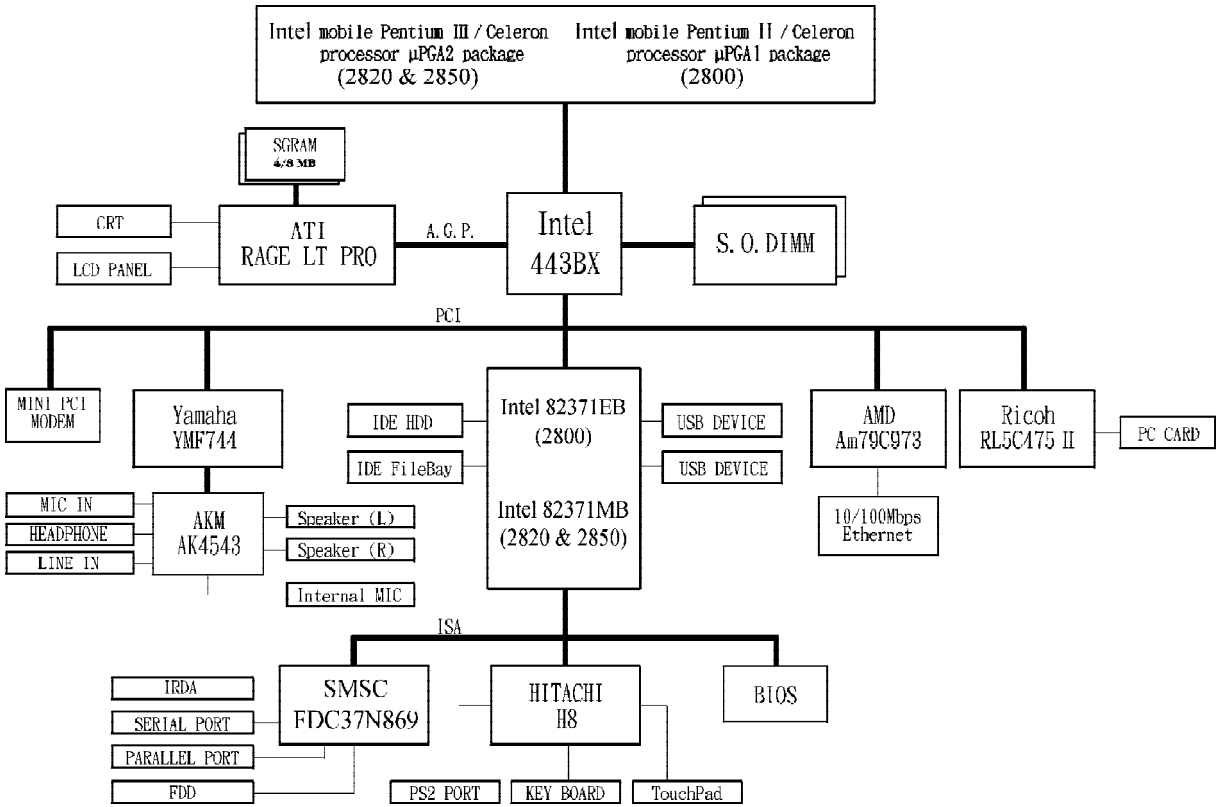
NOTES:

2 Chipset

The computer is completely AT-compatible. Its chipset supports a high-performance PCI 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

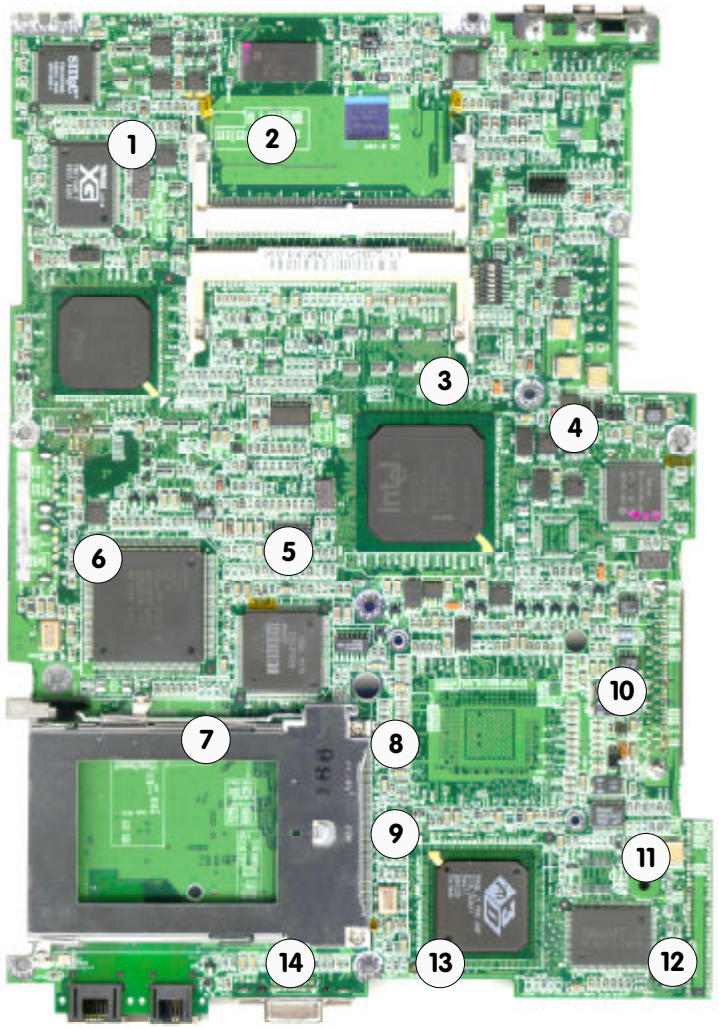
The following figures are the system block diagram and the chipset site diagram. These provide an overview of the computer's layout and a practical locator for chipset components.



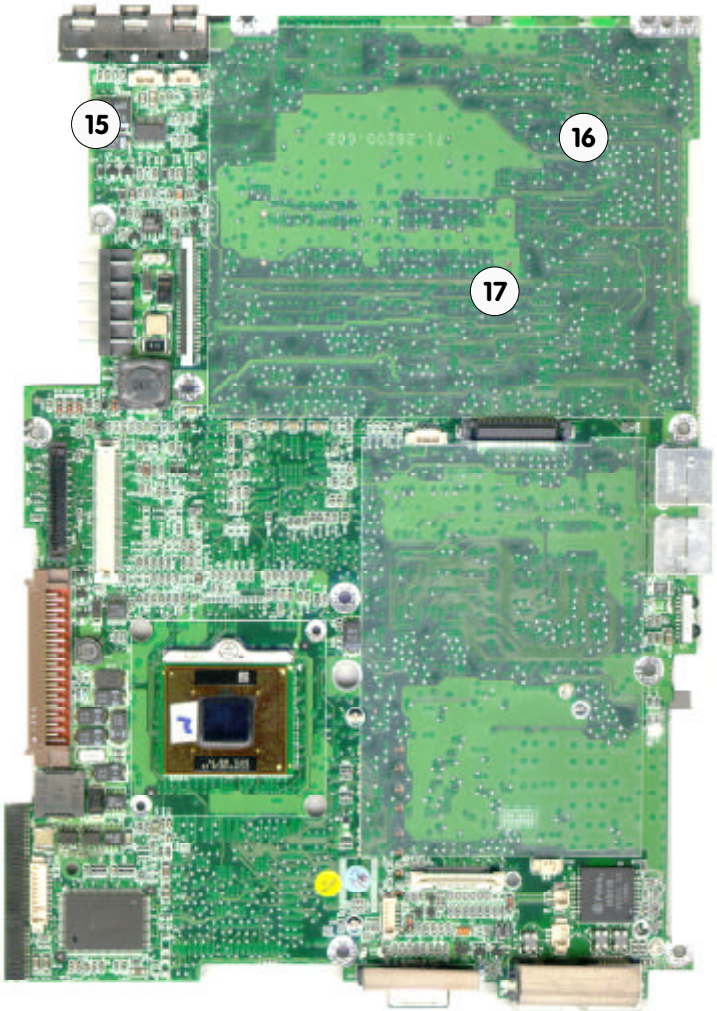
System Block Diagram
Fig. 2 – 1

Chipset

CHIPSET SITE DIAGRAM
FIG. 2 – 2



1. Video SGRAM
2. Video Controller
   ATI Rage LT Pro
3. PCI-CardBus Bridge
   Ricoh 5C475
4. LAN Controller
   AMD PCnet™ Fast III
   AM79C973
5. Core Logic chip
   82443BX
6. Keyboard Controller
   Hitachi HB/3434
7. SW1 & SW2
8. CN28 DIMM socket "0"
9. CN29 DIMM socket "1"
10. Core Logic chip
    82371EB (2800)
    82371MB (2820 & 2850)
11. Audio controller
    YAMAHA YMF744B
12. Super I/O controller
    SMSC FDC37N869
13. 4MB FLASH ROM BIOS
    AMD AM29LV004BT
14. Audio CODEC
    AKM AK4543 VQ



CHIPSET SITE DIAGRAM (CONT.)
FIG. 2 – 2

15. LAN Transformer LF-H71P
16. Video SGRAM
17. CPU

CPU - Intel Mobile Pentium III/Pentium II/Celeron

The 2800 uses the Intel Mobile Pentium II/Celeron processor in a microPGA1 package. The Intel Mobile Pentium II/Celeron processor features an integrated L2 cache (256KB for Pentium II and 128KB for Celeron) and a 64-bit high performance system bus.

The 2820 & 2850 use 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/Pentium II/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 PentiumIII/Pentium II/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
  - 128/256-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 III 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 440BX AGPset

The Intel 440BX AGPset consists of the BX System Controller (443BX) and the PCI ISA IDE Xcelerator (PIIX4E/PIIX4M). 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, 443BX

The BX System Controller (443BX) 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 host bus of the Pentium II & III processor families at 66MHz and 100MHz at 3.3V respectively
- 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/MB (PIIX4E/M)

The 2800 uses the 82371EB (PIIX4E) while the 2820 & 2850 use 82371MB (PIIX4M). The PCI ISA IDE Xcelerator (PIIX4E/PIIX4M) 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/PIIX4M 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/PIIX4M 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/PIIX4M 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/PIIX4M 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/PIIX4M contains support for “Ultra DMA” synchronous DMA compatible devices.

The PIIX4E/PIIX4M 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/PIIX4M 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/PIIX4M integrates both a System Management Bus (SMBus) Host and Slave interface for serial communication with other devices.

Features

- Supports Pentium, Pentium II & Pentium III 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 5C475II 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
- Yamaha744B DS-XG Audio Controller

RICOH 5C475 PCI-CARDBUS BRIDGE

The R5C475II is a PC card controller offering a single chip solution as a bridge between PCI bus andCardBus. The R5C475II includes a PC Card 95/97 compliant socket interface and a bridge function to the PCI bus of 33MHz. The R5C475II can support the 32-bit CardBus(Card-32) and the 16-bit PC card(Card-16) without external buffers.

Concerning the 16-bit card control interface, the R5C475II'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 R5C475II also allows direct connection to PCI bus.

The PCI and PC Card socket interfaces 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 or 2.5V.

The R5C475II allows the system to be equipped with the high performance multimedia PC cards like the Video capture card, and 100 BASE LAN card. It features:

- PC97/98/99 compliant
  - PC99 Design Guide compliant (Subsystem ID, Subsystem Vender ID)
  - ACPI 1.0 and PCI Bus Power Management 1.0 compliant
  - Global Reset support
- Low Power consumption
  - Hardware Suspend
  - CLKRUN#,CCLKRUN# support
  - VCC-COREC
- High-performance
- Single Chip PCI-CardBus Bridge
  - PCMCIA PC-Card 95/97 sockets support
  - CardBus(Card-32) Card and 16-bit(PCMCIA2.1/JEIDA4.2) Card work at the same time
  - Bridge function between PCI bus and CardBus
- PCI Bus Interface
  - Complian t with PCI Local Bus Specification2.2
  - The maximum frequency 33MHz
  - PCI Master/Target protocol support
  - Separated PCI configuration each socket
  - Direct connection to PCI bus
  - 3.3V interface (5V tolerant)

- CardBus PC card Bridge
  - – PC Card Standard 95/97 compliant
  - – 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 95/97 Standard Specification
  - – 5 programmable memory windows
  - – 2 programmable I/O windows
  - – Compliant with i82365SL compatible register set / ExCA
- 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
- Zoomed Video Port support
  - – Bypass type
- 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 perspectively 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 acccelerator with integrated LVDS transmitter.
- Innovative Dynamic Power Management with ACPI compliance.
- Superior 3D performance acheived 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.

YAMAHA YMF744B DS-XG

The YMF744B (DS-1S) is a high performance audio controller for the PCI Bus. DS-1S consists of two separated functional blocks. One is the PCI audio block and the other is the Legacy Audio block. PCI Audio block allows Software Driver to handle maximum of 73 concurrent audio streams with the Bus Master DMA engine. The PCI Audio Engine converts the sampling rate of each audio stream and the streams are mixed without utilizing the CPU or causing system latency. By using the Software Driver from YAMAHA, PCI Audio provides 64-voice XG wavetable synthesizer with Reverb and variation. It also supports DirectSound hardware accelerator, Downloadable Sound (DLS) and DirectMusic accelerator.

Legacy Audio block supports FM Synthesizer, Sound Blaster Pro, MPU401 UART mode and Joystick function in order to provide hardware compatibility for numerous PC games on real DOS without any software driver. To achieve legacy DMAC compatibility on the PCI, DS-1S supports both PC/PCI and Distributed DMA protocols. DS-1S also supports Serialized IRQ for legacy IRQ compatibility.

DS-1S supports the connection to AC'97s which provides high quality DAC, ADC and analog mixing, and it can connect two AC'97. In addition, it supports consumer IEC958, Audio Digital Interface (SPDIF), to connect external audio equipment by digital. It has the following features:

- PCI 2.2 compliant
- PC'98/PC'99 specification compliant
- PCI Bus Power Management rev. 1.0 compliant (support D0, D2 and D3 state)
- Supports clock run
- PCI Bus Master for PCI audio
  - True full duplex playback and capture with different sampling rate
  - Maximum 64-voice XG capital wavetable
  - Synthesizer including GM compatibility
  - DirectSound Hardware Acceleration
  - DirectMusic Hardware Acceleration
  - Downloadable Sound (DLS) level-1
- Legacy audio compatibility
  - FM synthesizer
  - Hardware Sound Blaster Pro compatibility
  - MPU401 UART mode MIDI interface
  - Joystick
- Supports PC/PCI and Distributed DMA for legacy DMAC (8237) emulation
- Supports serialized IRQ
- Supports I^2S serial input for Zoomed Video Port
- Supports Consumer IEC958 Output (SPDIF OUT)
- Supports Consumer IEC958 Input (SPDIF IN)
- Supports AC'97 Interface (AC-Link) Revision 2.1
- Multiple CODEC (Connectable two AC'97s)
- Hardware volume control
- EEPROM interface
- Single crystal operation (24.576Mhz)
- 3.3V power supply (5V tolerant)

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 two (2) models: 2800 and 2820/2850 and several “variations”:

The 280 is based on the Pentium II CPU. Different versions may have cosmetic and minor structural variations of the top and bottom covers (mostly concerning LCD panel sizes). As appropriate, these differences are noted in the sidebars. When servicing, be sure to note the mainboard version. This may affect CPU switch settings. Additional component information is available in *Appendix A: Part Lists* or *Appendix B: Circuit Diagrams*.

The 2820/2850 is based on the Pentium III. Like the earlier model, there may also be variations. However, unlike the 2800, there are no CPU switch adjustments.

CPU Upgrades: To upgrade, you only need to remove the keyboard, heat plate and heatsink. For the 280 model, the CPU switch settings can be accesed through the RAM bay opening.
Note: When re-assembling, make sure the heat plate is not “distorted” and is fastened securely.

LCD Upgrades (all versions): All switches are accessable throuth the RAM bay opening. Connections are under the status panel. The LCD/ top cover assembly is anchored with four (4) externally accessable screws.

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: Part Lists*.

The disassembly procedures appear in the following order:

- Keyboard – CPU upgrade/replacement
- LCD Module – LCD assembly, inverter
- Top Cover – TouchPad assembly
- Bottom Cover – HDD, FDD, mainboard, and DC/DC board
- Connector Locator

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/DVD-ROM module is removed. 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 module *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 support 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:

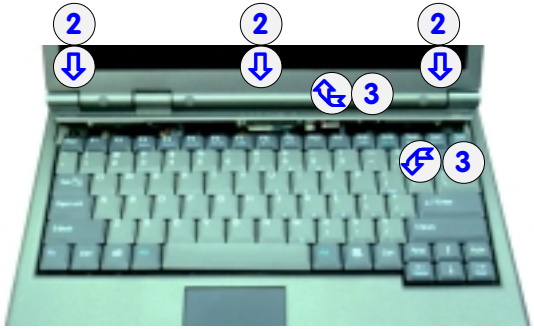
M3 Phillips-head screwdriver
M2.5 Phillips-head screwdriver (magnetized)*
M2 Phillips-head screwdriver
Small flat-head screwdriver
Pair of needle-nose pliers
anti-static wrist-strap
* note Maintenance Precaution #3.

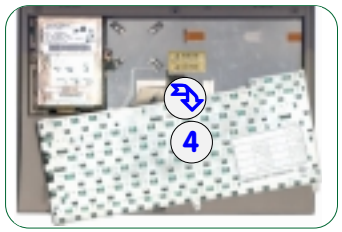
General Disassembly: Under the Keyboard

Removing the Keyboard & Heat Plate

1. Make sure the computer is turned off.
2. Remove the rubber caps and screws on the status panel.
3. Carefully angle the status panel up and then the keyboard.
4. Flip the keyboard face-down to expose the HDD and heatplate.
5. Use a flat-head screwdriver to pry up the collar of the keyboard's ribbon connector. Then set the keyboard aside.
6. Using the philips-head screwdriver again, remove the 5 screws anchoring the heat plate.

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	8
connectors:	1

CHANGING THE CPU

The CPU is further protected by cooling-fan/heatsink.

To remove it, again angle the status panel up. Lift the cooling-fan/heatsink up slightly and pull it forward. If you want to completely remove the cooling-fan/heatsink, disconnect it from its power supply at connection CN7.

Note: the cooling-fan/heatsink has a small “lip” overhanging the mainboard.

The removable CPU fits into a µPGA socket.

When changing it, use a small flat-head screwdriver to carefully turn the pin-lock to the release position. As you remove the old CPU, be sure to note the position of the CPU’s “Pin 1”. Make sure any replacement CPU is also properly locked into position.

CPU settings for the Intel Pentium II -based 2800 are controlled from SW1 which is accessible from the RAM bay on the notebook’s bottom.

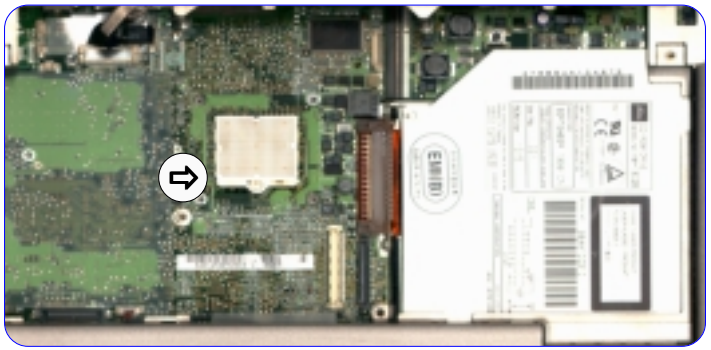
The Pentium III-based 2820/2850 models auto-detect the CPU, so there are no CPU- switches to adjust.

Before making any changes, note the mainboard version and use the appropriate switch settings shown in Table 3-1.

Mainboard **ver 3**					
CPU		**SW1 Switches**			
speed (MHz)	**Type**	**1**	**2**	**3**	**4**
233	Dixon/ Celeron	**on**	off	off	**on**
266		**on**	**on**	**on**	off
300		**on**	off	**on**	off
333		**on**	**on**	off	off
366		**on**	off	off	off

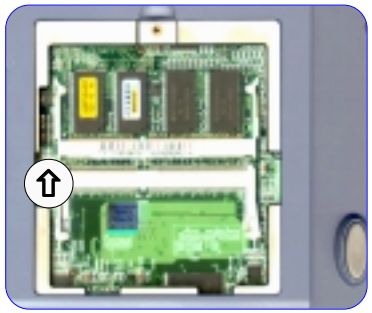
Mainboard **ver 4**											
CPU		**Switch Bank**									
		SW1									**SW2**
speed (MHz)	**Type**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**		**7**
233	Dixon & Celeron	**on**	off	off	**on**	**on**	off	**on**	off		**on**
266		**on**	**on**	**on**	off	**on**	off	**on**	off		**on**
300		**on**	off	**on**	off	**on**	off	**on**	off		**on**
333		**on**	**on**	off	off	**on**	off	**on**	off		**on**
366		**on**	off	off	off	**on**	off	**on**	off		**on**
400	Celeron	off	**on**	**on**	**on**	**on**	off	**on**	off		**on**
400	Dixon	off	**on**	**on**	**on**	off	off	off	**on**		off
433	Celeron	off	off	**on**	**on**	off	**on**	**on**	off		**on**
466	Celeron	off	**on**	off	**on**	off	**on**	**on**	off		**on**

TABLE 3 - 1
CPU SWITCH SETTINGS FOR 280



CPU
FIG. 3 – 2

Note the Pin1 location



SW1
FIG. 3 – 3

General Disassembly:
Removing & Replacing 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. Lift the status panel up, disconnect the status panel board at CN8 (A) and the left speaker at CN12(B). Set it aside.
2. Remove the hinge covers (C, D & E). Use the flat-head screwdriver to flex the cover up and back slightly.
4. Disconnect controller connector CN11(F to G) and inverter connector CN6 (H to I).
5. Remove the two (2) rear screws (J ~ K), set them aside.
   Note: On models 2800 & 2820 these are the *upper* rear screws.
6. Remove the four (4) hinge screws (L ~ O), set them aside and lift the LCD module away from the body.
   Note: On the 2850 model, screws M & O are on the bottom panel.

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 only *replacing* the LCD panel with one of the same size, continue to page 3-9.

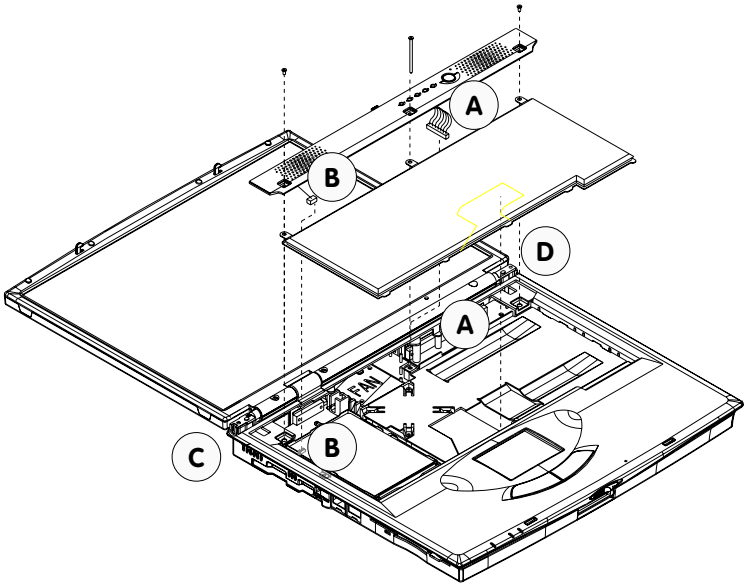
Depending on your replacement module, you may need to adjust SW2 settings in the RAM bay. Refer to Table 3-2:

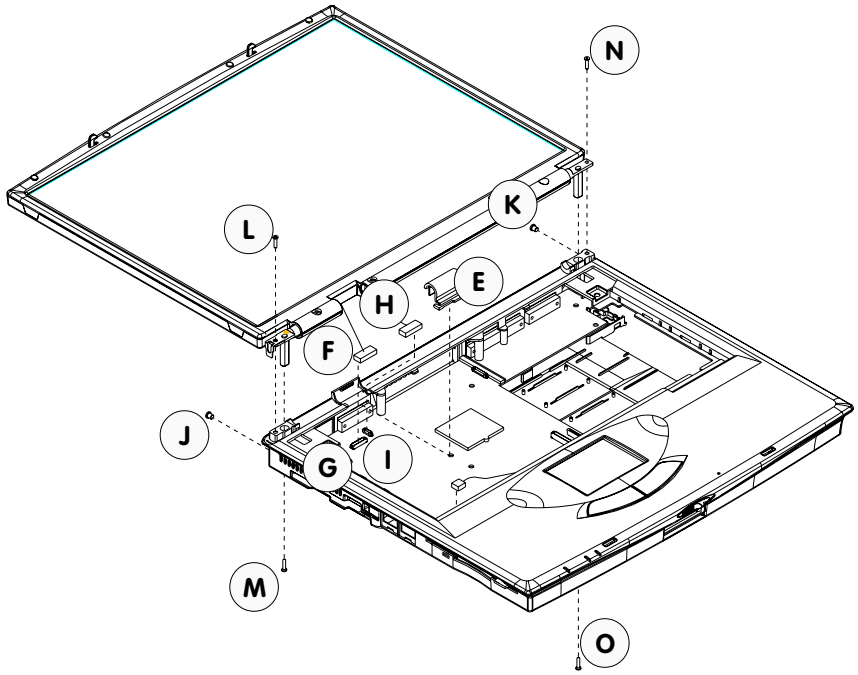
TABLE 3 - 2
LCD & MISCELLANEOUS SWITCH SETTINGS

280 Mainboard **Ver 3**		SW2 Switches							
		Panel Type			kbd		ID		
Feature		1	2	3	4	5	6	7	8
LCD Panel	12.1" S-TFT Fujitsu FLC31SVC6S-17	**on**	off	off					
	14.1" X-TFT LG LP141XA-A1NA	**on**	**on**	off					
Keyboard	US & other				off	off			
	Japanese				**on**	off			
Company ID	HTC						off	off	off
	Clevo						**on**	off	off

2800 Mainboard **Ver 4** 2820/2850 Mainboard ver 2			SW2 Switches								
			Panel Type			kbd	pwr	ID	CPU	ID	
Feature		**Model**	1	2	3	4	5	6	7*	8	
LCD Panel	12.1" S-TFT Sanyo TM1215V-02L04	all	**on**	off	off						
	12.1" S-TFT Fujitsu FLC31SVC6S-17	all	**on**	off	off						
	14.1" X-TFT Hitachi TX36D85VC	all	**on**	**on**	off						
	14.1" X-TFT LG LP141XA-A1NA	2800	**on**	**on**	off						
		2820	off	**on**	off						
	15.1" X-TFT LG LP150X1	2850	off	**on**	off						
Keyboard	US & other					[off]					
	Japanese					**on**					
Interlock AC Power	enabled						**on**				
	disabled						[off]				
Company ID	HTC							off		off	
	Sanyo							**on**		off	
	Clevo							**on**		**on**	

* Refer to CPU switch table for 2800 mainboards, not used for 2820/2850 models
[ ] Indicates default setting





REMOVING THE LCD MODULE
FIG. 3 – 4

Tip
This procedure involves:
screws 6
connectors: 2

Replacing the LCD

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

First separate the LCD module from the main body of the computer as described on pages 3-4 and 3-5.

If you are upgrading to a different LCD, this entire assembly, except for the side frame and hinge elements and possibly the inverter card, will be replaced.

12.1" Disassembly (not shown)

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

1. Remove the 6 rubber caps and frame screws under them.
2 Snap off the LCD frame. As you do this, make sure the cover latch doesn't spring out. There are snaps on all sides.
3. Disconnect the panel from the inverter board.
4. Remove the 4 LCD anchor screws, and lift the LCD away from the rear panel.

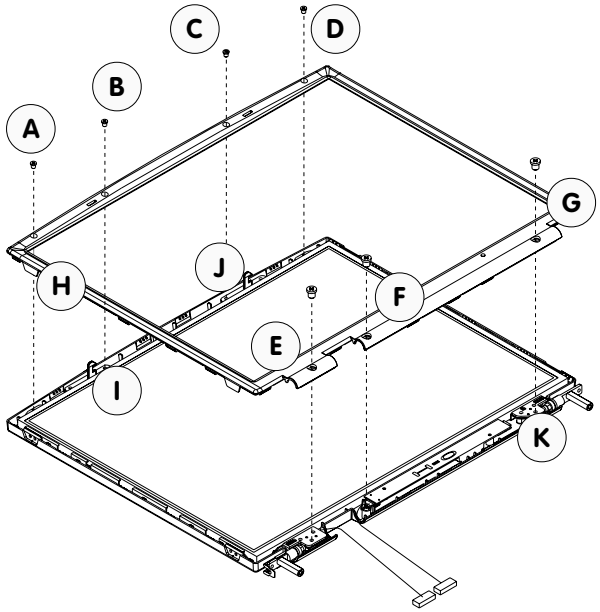
14.1 & 15.1" Disassembly (shown)

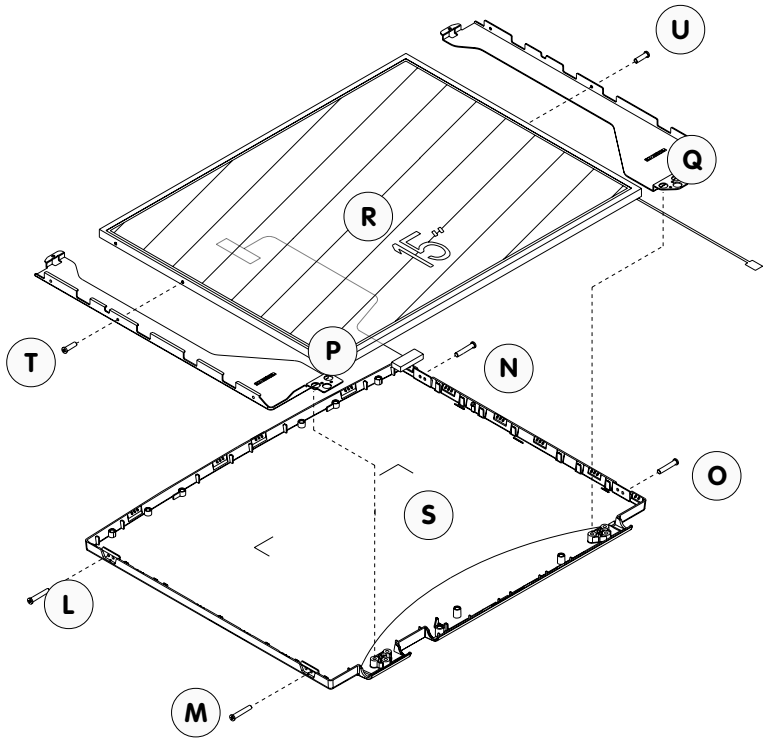
This LCD is mounted in a frame, which in turn attaches to the rear panel of the module.

1. Remove the 7 rubber caps (A ~ G) and frame screws under them.
2 Snap off the LCD frame (H). As you do this, make sure the cover latches (I & J) doesn't spring out. There are snaps on all sides.
3. Disconnect the panel from the inverter board (K).
4. Remove the frame and hinge anchor screws (L ~ Q) and lift the LCD panel (R) and frame away from the rear panel (S).
6. Remove the frame screws (T ~ U)

Removing the Inverter Board

The inverter board is anchored to the rear panel of the LCD module with two screws. 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.





Separating the LCD & Frame

Fig. 3 – 5

Tip

This procedure involves:

	15.1"
screws	17
connectors:	2

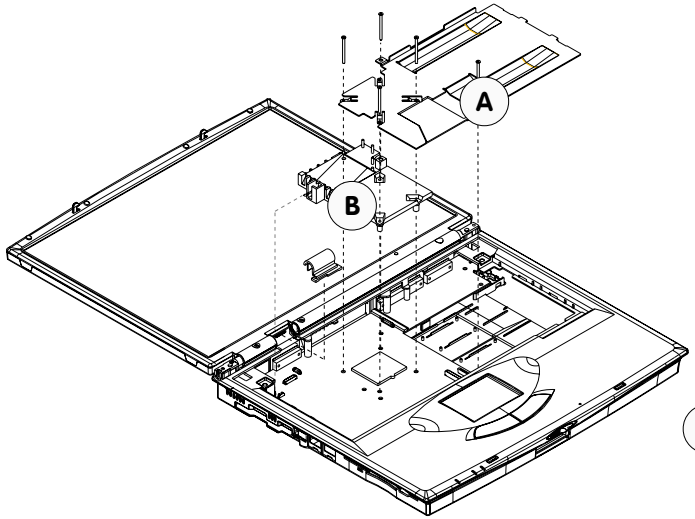
General Disassembly: Top Cover Assembly

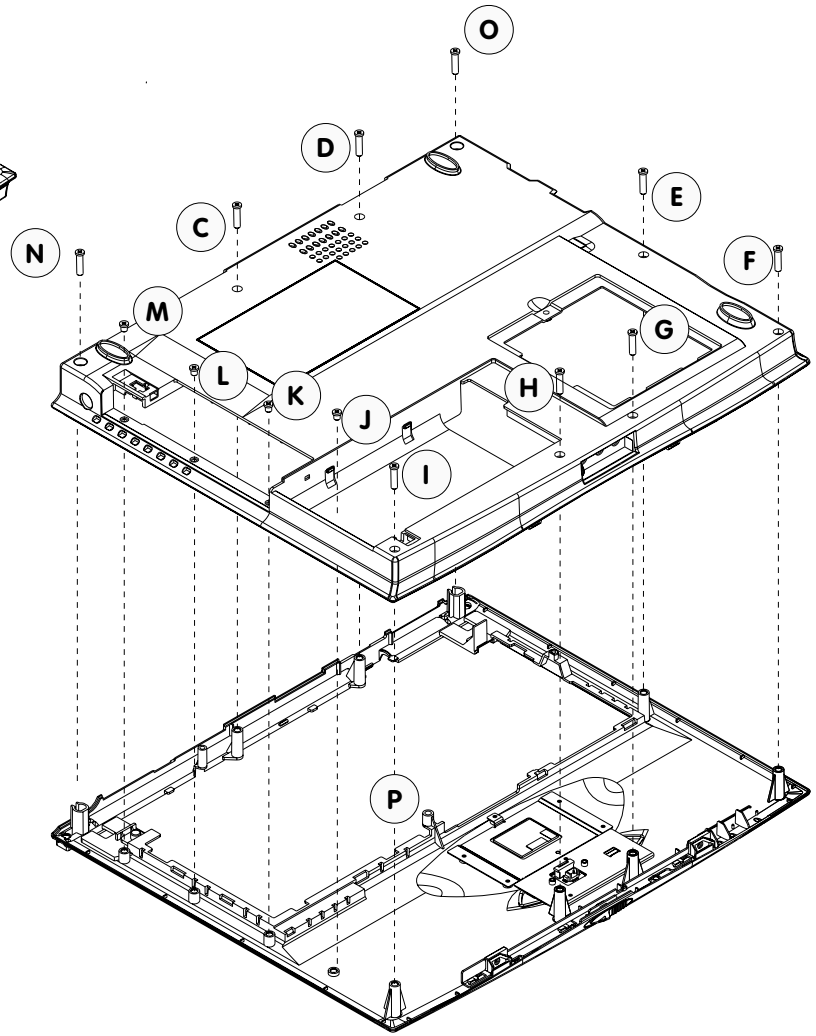
The Top Cover Assembly contains the TouchPad and daughterboards for the Status Panel LEDs and the Power Switch. However other components are only accessible after the Top Cover Assembly is removed.

Remove the **keyboard**, status panel, heat plate and LCD module as described on pages 3-5 and 3-9.

Separating the Top Cover Assembly

1. If you haven't already done so, remove the battery and DVD/CD-ROM, or spacer module.
2. Remove the heat plate (A) and CPU fan (B) assembly (disconnect the fan at CN6).
3. Remove the LCD module (refer to pages 3-8 and 3-9).
4. Turn the notebook body upside-down.
   For model 2850, remove 11 screws (C ~ M).
   For models 2800 & 2820, remove 13 screws (C ~ O).
5. Remove the 2 screws on the rear panel (the *lower* outer corner screws 2800 & 2820 versions only).
6. Return the notebook to its upright position and disconnect the TouchPad to mainboard connector at CN18 (P).





Top Cover Disassembly (Bottom Screws)

Fig. 3 – 6

Tip

This procedure involves:
screws 11 (2850)
or 13 (2800 & 2820)

Top Cover Disassembly (Top Screws)

Fig. 3 – 7

Tip

This procedure involves:
connector(s) 1

General Disassembly: Top Cover Components

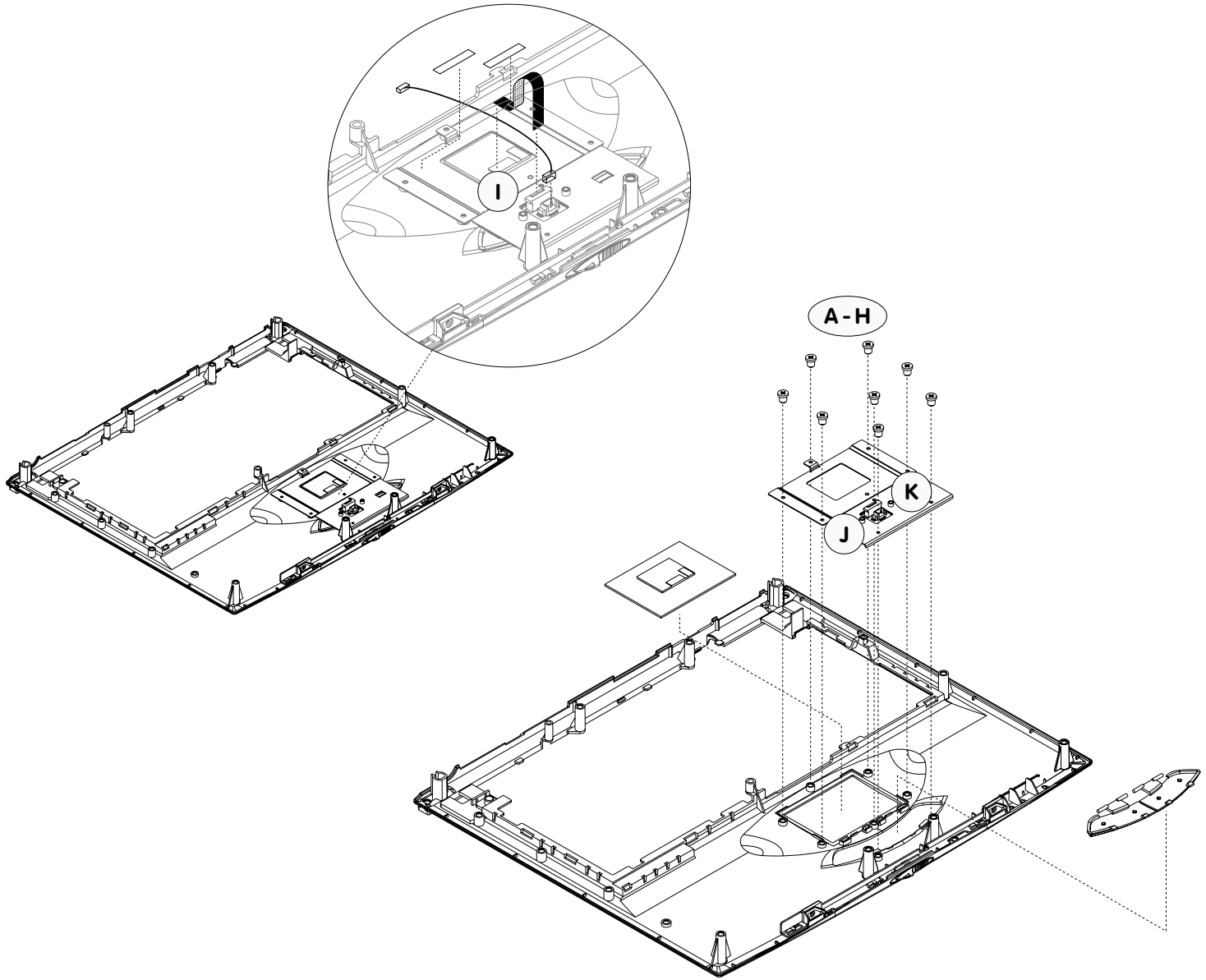
The 2 TouchPad daughterboards in this assembly are unlikely to require any service.

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. Remove the 8 screws anchoring the TouchPad assembly (A ~ H)
2. Lift the TouchPad assembly away from the top cover.
3. To remove the TouchPad itself, remove the tape anchoring the ribbon connector, then release the connector on the electronic component-side of the TouchPad (the connector’s collar flips up). (I)
4. The “mouse” button PC board is anchored to the assembly by two screws (J & K).



Tip

The TouchPad module has:

screws	10
connectors	1

General Disassembly: Bottom Cover Assembly

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

HDD Module

The HDD module (A) is held in place with two screws.

1. Remove the HDD module anchor screws (B & C).
2. Lift the HDD module away from the mainboard, disconnecting from pressure connector CN19 (D).
   Note: The mylar insulation between the bottom of the module and the mainboard should remain attached to the mainboard- there there are no serviceable components under it.

FDD Module

The FDD module (E) is held in place with two screws.

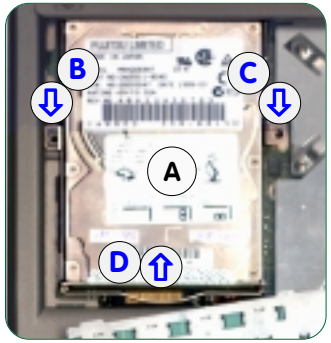
1. Remove the FDD module anchor screws (F & G). (front right & left rear)
2. Release the locking collar on the FDD's ribbon connector, CN21 (H).
3. Lift the FDD module away from the mainboard.
   Note: The mylar insulation between the bottom of the module and the mainboard should remain attached to the mainboard- there there are no serviceable components under it.
4. If you are replacing the FDD, you should also remove the module's side brackets (I & J), which are secured with 2 screws each.

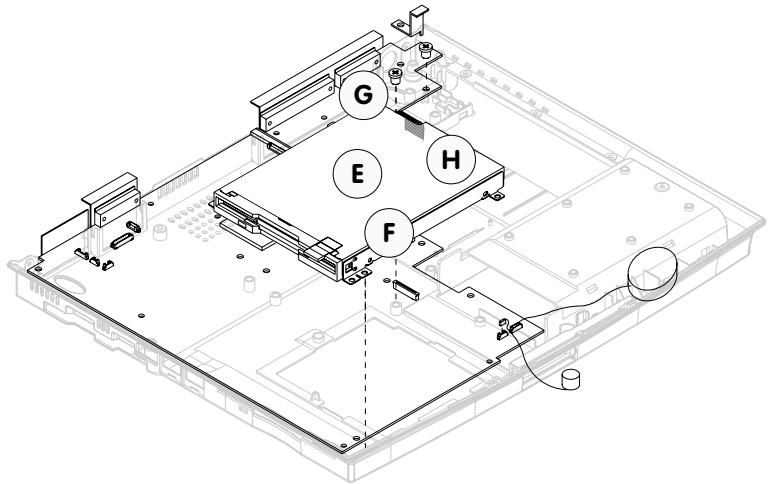
Mainboard & Frame (not shown)

The mainboard & frame assembly also includes the DC/DC board. To remove them from the bottom cover,

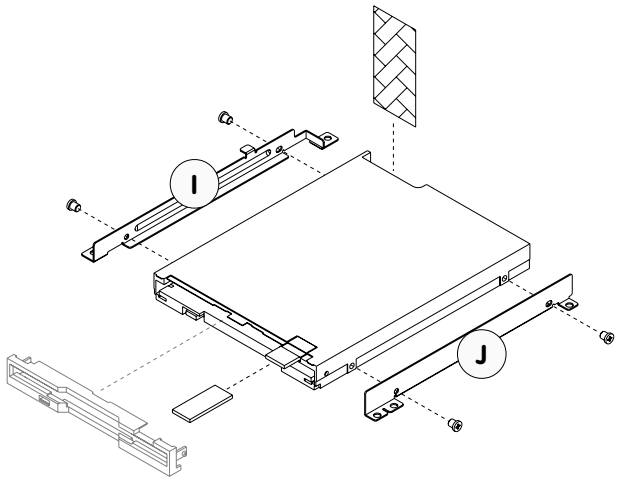
1. Disconnect the onboard microphone at CN22 and the backup battery at CN23.
2. Remove 4 screws (left-rear corner, near battery terminal, behind PS/2 connector, and near drive-bay latch) and the two stantion posts near the CPU.
3. Lift the mainboard & frame assembly up and away from the bottom cover.

To separate the mainboard, DC/DC board and frame, You only need to remove the hex nuts around the rear ports. Then separate the mainboard and DC/DC board.





BOTTOM COVER ASSEMBLY
FIG. 3 – 9



Tip

Separating the mainboard from the bottom cover includes:

screws	3
connectors	2

HDD Module Assembly

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

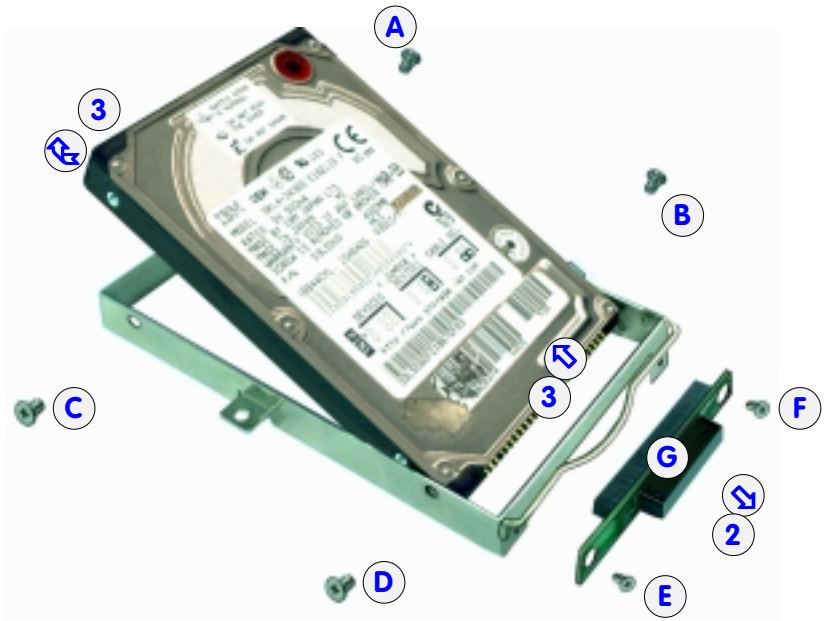
Taking it Apart

After you've removed the HDD module,

1. Remove the four (4) bracket screws (A~D), and set them aside.
2. Remove screws E &F and carefully pull off the HDD adapter board (G).
3. Gently tilt the HDD up and pull it out of the frame.

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 – 10

Note: *This operation is conducted with the electronics side face down.*

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 3: 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 3: 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 4: 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 3: Firmware and Chapter 4: Power.

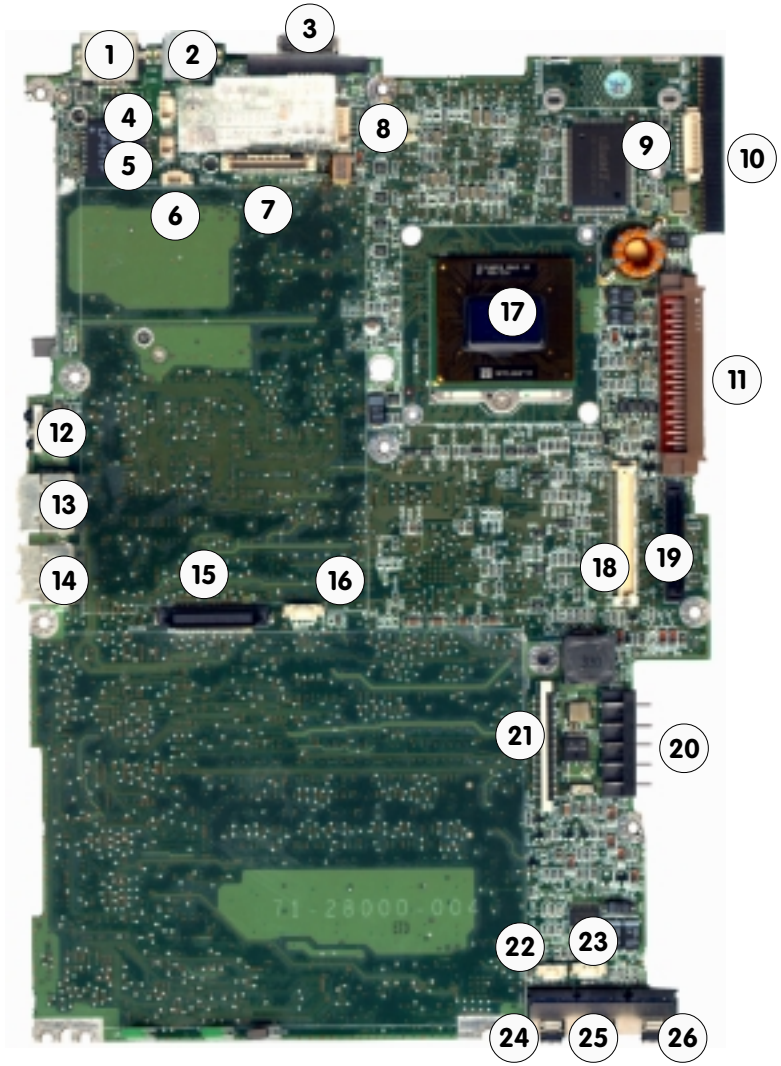
Switches & Connectors

These figures show the locations of the principal switches and connectors.

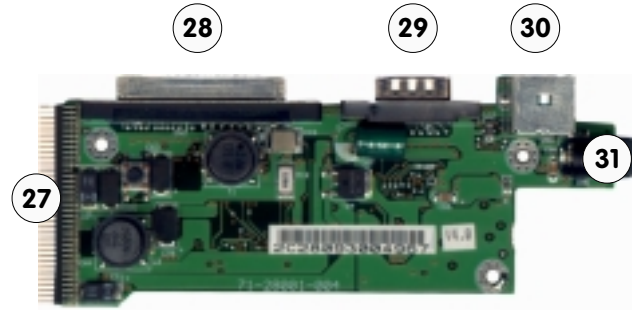
Switches & Connectors
Fig. 3 – 11

Mainboard (top view)

1. CN1 LAN port
2. CN2 Fax/Modem port
3. CN3 VGA port
4. CN5 to Fax/Modem card
5. CN7 to CPU fan
6. CN12 to #35 (Status Panel)
7. CN11 to LCD panel
8. CN6 to #38 (Inverter)
9. CN8 to #33 (Status)
10. CN9 to #27 (DC/DC)
11. CN13 to CD/DVD-ROM
12. IrDA port
13. CN14 USB port
14. CN17 USB port
15. CN19 to HDD
16. CN18 to TouchPad
17. CPU socket
18. CN15 to Fax/Modem card
19. CN16 to keyboard
20. CN20 to main battery
21. CN21 to FDD
22. CN 22 to on-board mic
23. CN 23 to CMOS battery
24. CN24 line-in
25. CN25 microphone
26. CN26 phones

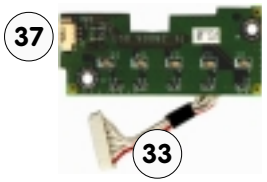


Mainboard (top)

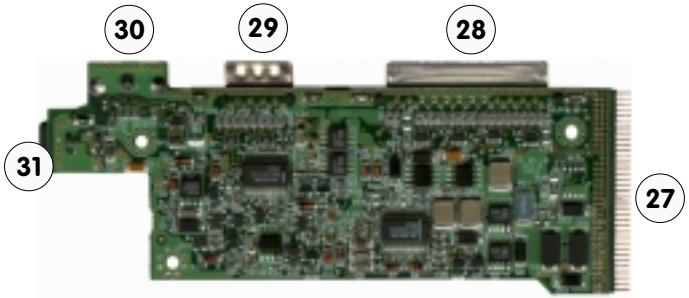


DC/DC Board (top)

Status Panel (Bottom)

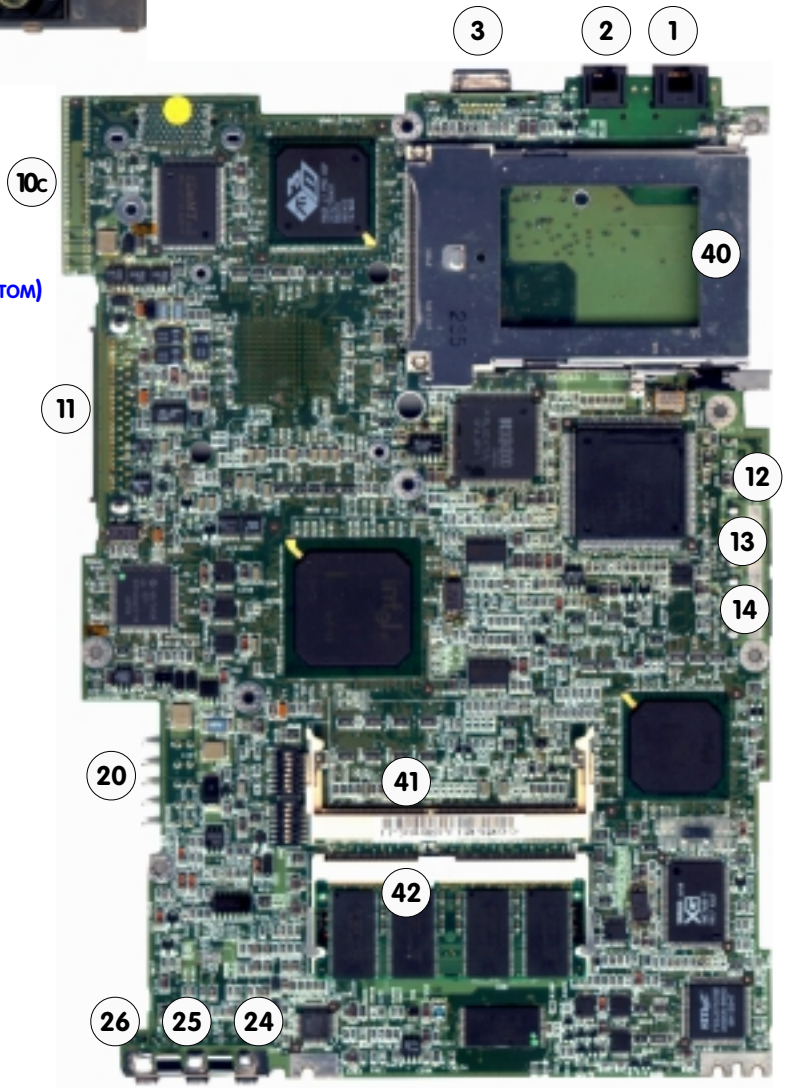


Status Board (Top)



DC/DC Board (bottom)

Inverter Board (bottom)



Switches & Connectors (Cont.)

Fig. 3 – 12

DC/DC Board

27. CN4 to #6 (Mainboard)
28. Parallel port
29. Serial 1 (COM1) port
30. PS/2 port
31. DC-in 19V
32. SW1 system power switch

Status Panel

33. CN2 to #9 (Mainboard)
34. Left speaker to #6 (Mainboard)
35. CN3 to Close-cover switch
36. Close-cover switch
37. CN1 to Right speaker

Inverter Board

38. CN2 to #8 (Mainboard)
39. CN1 to LCD power

Mainboard (bottom)

40. CN27 PC Card
41. CN28 RAM slot "0"
42. CN29 RAM slot "1"

NOTES:

4 Troubleshooting

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*.

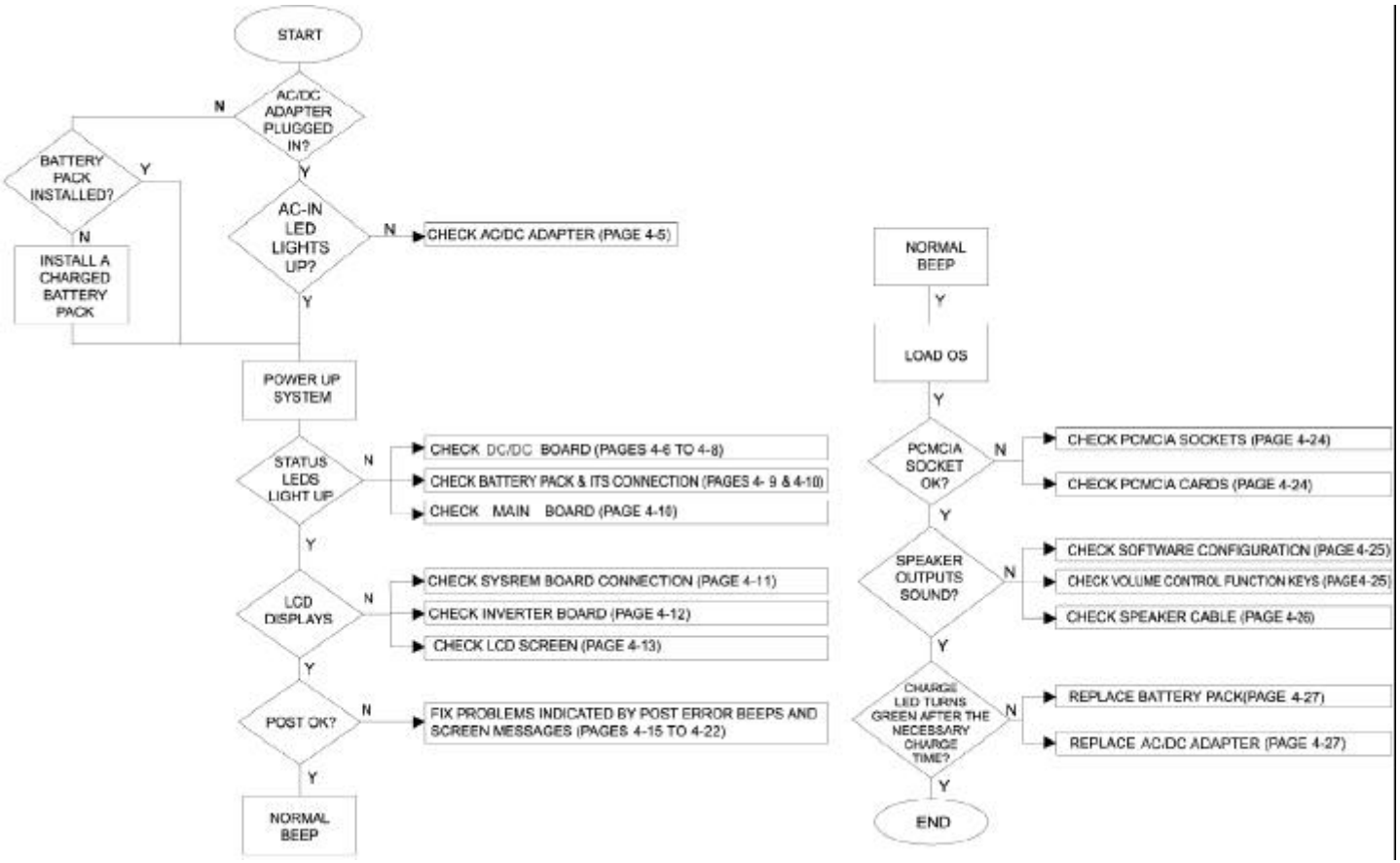
Tools

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	1. The DC/DC board has failed. 2. The battery pack has malfunctioned or its connection to the DC/DC board is bad. 3. There is a short circuit in the mainboard.
LCD screen fails to display	1. There is a bad connection between the LCD screen and the mainboard. 2. The inverter board has failed. 3. The LCD screen has malfunctioned.

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:

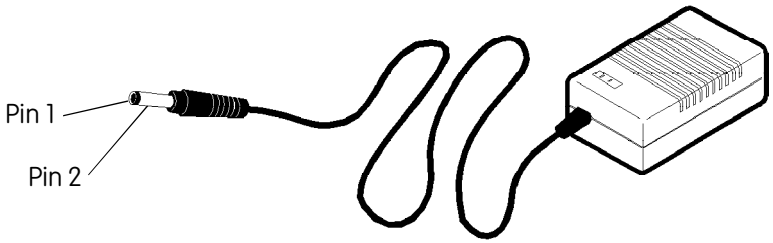
- Make sure the power cord to the adapter is securely plugged into a properly grounded socket.
- Make sure the adapter is completely connected to the adapter port on the computer.
- Check the adapter's contacts.

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)

Table 4 – 2
Adapter Contacts

Contact	Assignment	Description
inner ring (Pin 1)	20V	+20V/3A The adapter is in CV (constant voltage mode).
outer ring (Pin 2)	GND	



Adapter's Check Points
Fig. 4 – 2

AC Power & Charge LEDs Fail

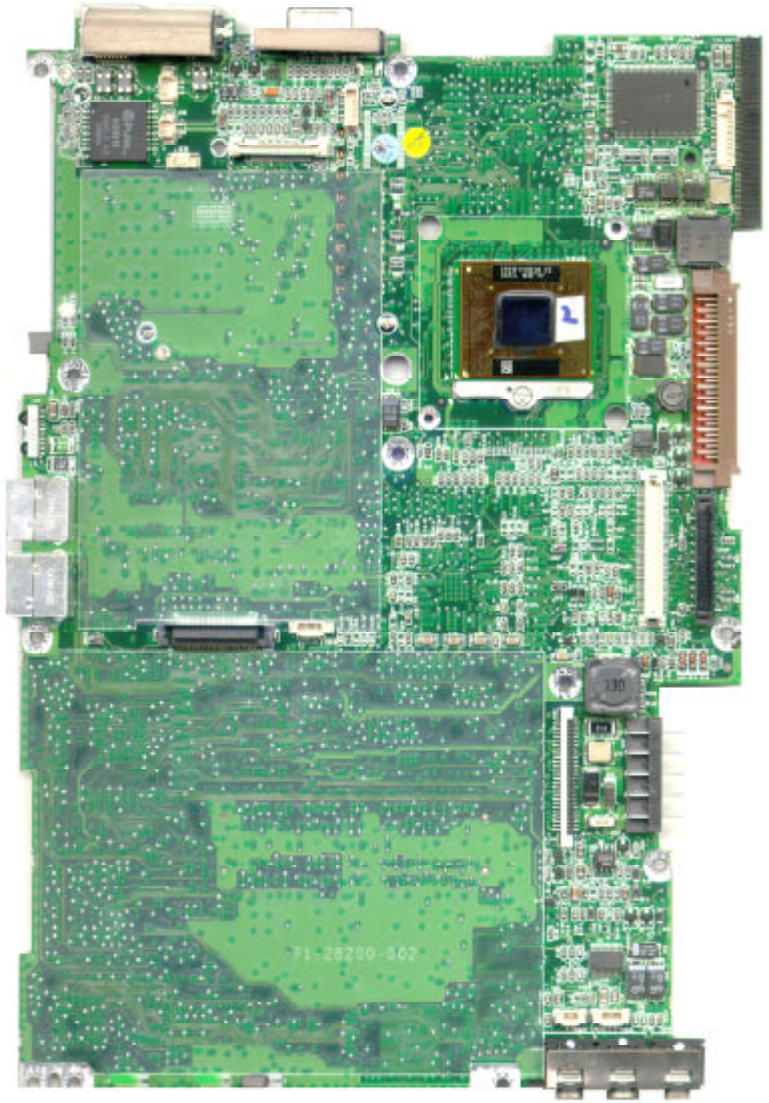
There may be other problems responsible for a system status LED's failure to appear:

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

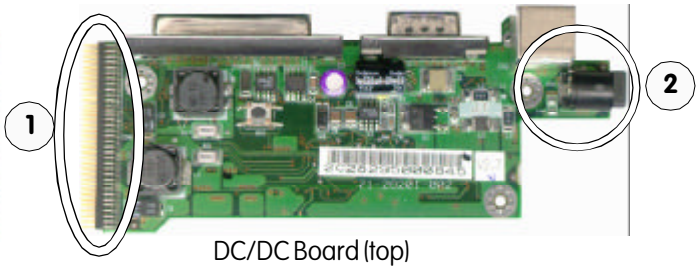
Try the following troubleshooting procedures.

Checking the DC/DC Board

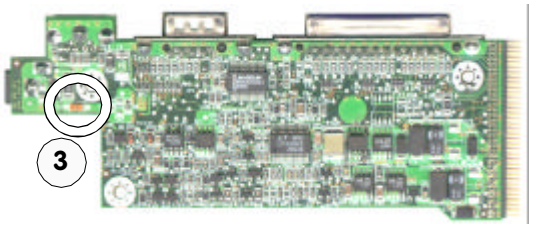
A blown fuse or an incorrect output voltage on the DC/DC board may cause the system status LEDs' malfunction. If either of the two situations occurs, replace the DC/DC board or send the board to the service center near you.



Mainboard (top)



DC/DC Board (top)



DC/DC Board (bottom)

POWER COMPONENTS

FIG. 4 – 3

1. CN5 DC/DC board to M/B
3. CN1 for DC IN Jack
3. F2 Fuse for AC-IN

CN5 DC/DC Board to M/B (on the DC/DC Board)

Pin	Signal	Pin	Signal
1	RIA	2	GND
3	LPSTROBE#	4	LPD0
5	LPACK#	6	LPD1
7	LPBUSY	8	LPD2
9	LPPE	10	LPD3
11	LPSLCT	12	LPD4
13	LPAFD#	14	LPD5
15	LPERROR#	16	LPD6
17	LPINIT#	18	LPD7
19	LPSLCTIN#	20	GND
21	SUSB#	22	V_CORE
23	DCD1#	24	NC
25	DSR1#	26	DTR1#
27	RXD1	28	RTS1#
29	CTS1#	30	TXD1
31	RING1#	32	PS2_DATA
33	KBDATA	34	PS2_CLK
35	KBCLK	36	EXTFDDPWR#
37	H8SHDN	38	LPTDRV2
39	GND	40	PWRSW#
41	V_H8	42	+5V
43	+12V	44	+5V
45	GND	46	GND
47	VA	48	VA
49	GND	50	VA
51	GND	52	GND
53	+3V	54	+3V
55	GND	56	+3V
57	GND	58	GND
59	+5VS	60	+5VS
61	+5VS	62	+5VS
63	+3VS	64	+3VS
65	GND	66	+3VS
67	VIN	68	VIN
69	VIN	70	VIN

CN1 DC IN JACK

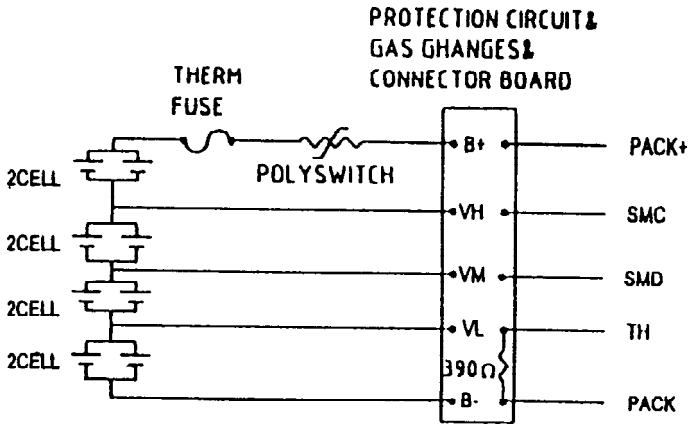
Pin	Signal
1	+20V
2	GND
3	GND

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 14.4V for 4S2P.) If the supply voltage is still not in the correct range, replace the faulty battery pack.



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 CN20 on the mainboard (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 Mainboard

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 mainboard, fix the problem accordingly.

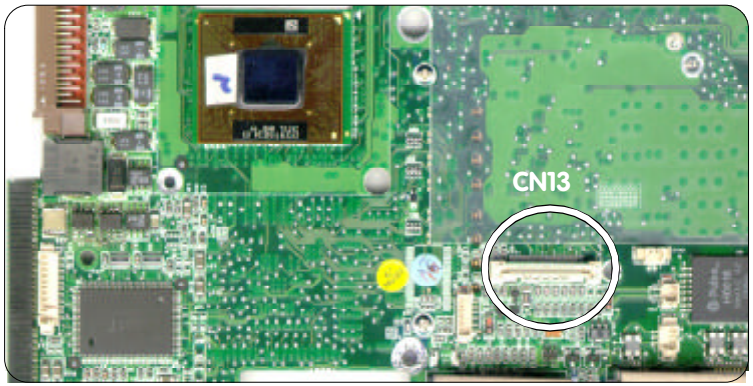
LCD Screen Failure to Display

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 mainboard
- The inverter board has malfunctioned
- The LCD screen has malfunctioned

Checking the LCD to Mainboard Connection

A bad connection between the LCD screen and the mainboard 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 CN13 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 Mainoard Connection
Fig. 4 – 5

Warning

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

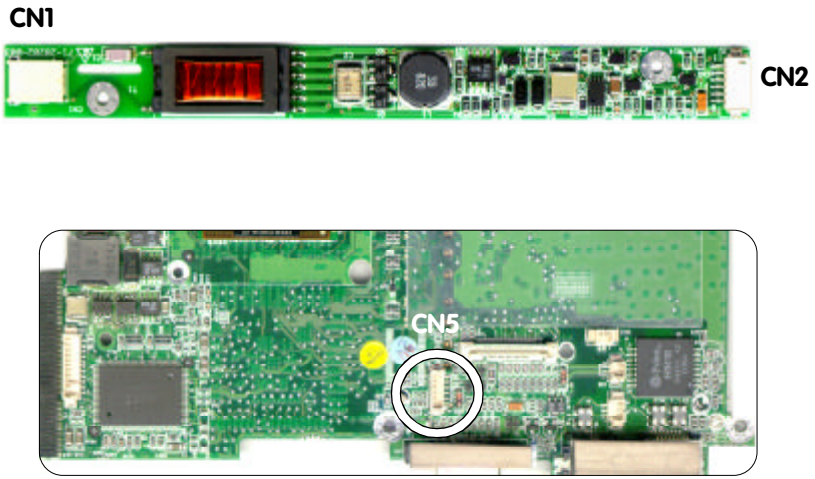
Checking the Inverter Board

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.

Table 4 – 3
Inverter Board
Check Areas

Area to Check	Action
Fuse 1.0A (F1)	Check the fuse and replace it if necessary.
Connector CN2	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 CN1	Check if the cable connecting the LCD lamp to the inverter board is well plugged into connector CN1. If there is no connection problem, replace the inverter board.

Inverter Board Component Sites
Fig. 4 – 6



CN2 Inverter to CN5 on M/B

Pin	Signal
1	VIN
2	VIN
3	GND
4	INT_VCC
5	PANEL_ON
6	BRIGHT

Checking the LCD Screen

If you found no problems with the inverter board and its connection to the mainboard 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

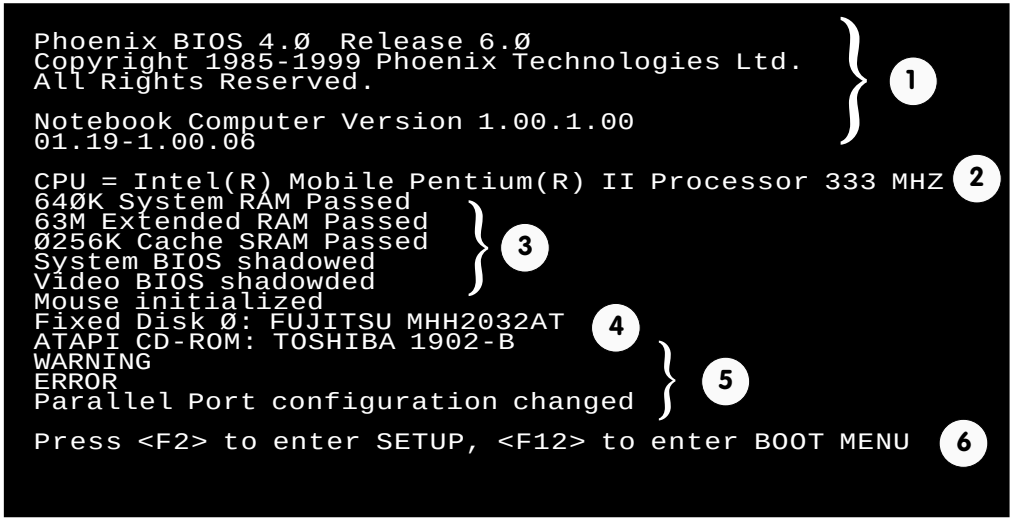
The BIOS will initialize the video, sound a single short beep, and show a message if the system passes the *POST*. The system then will attempt to boot. If there is a problem which prevents the system from booting, it will tell you to run *Setup*. A sample screen message is shown below.

Startup Screen: The POST (sample screen)
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.



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

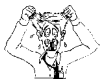
each beep group is separated by a pause

Most displayed errors as listed in Table 4-5 (pages 4-16 to 4-18) and Table 4-6 (pages 4-19 to 4-22), 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*.

TABLE 4 – 5
NON-FATAL ERROR MESSAGES

Meassage	Description & Suggested Solution	
nnnn Cache SRAM Passed	description:	Where nnnn is the amount of system cache in kilobytes successfully tested.
Diskette drive A error or Diskette drive B error	description: solution:	Drive A: or B: is present but fails the BIOS POST diskette tests. Check to see that the drive is defined with the proper diskette type in Setup and that the diskette drive is attached correctly.
Entering SETUP...	description:	Starting Setup Program.
Extended RAM failed at offset: nnnn	description: solution:	The extended memory is either not working, or is imporperly configured. Enter the Setup 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.
nnnn Extended RAM Passed	description:	Where nnnn is the amount of RAM in kilobytes successfully tested.
Failing Bits: nnnn	description: solution:	Where hex number nnnn 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. 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 Ø Failure or Fixed Disk 1 Failure or Fixed Disk Controller Failure	description: solution:	The hard disk is not working, or is not properly configured. Check that the HDD is properly attached. Run Setup to make sure the HDD is correctly configured.
Incorrect Dirve A type - run SETUP	description:	Type of floppy drive A: not correctly identified in Setup.
Invalid NVRAM media type	description:	Problem with NVRAM (CMOS) access.
Keyboard Controller Error	description: solution:	The keyboard controller failed test. You may have to replace keyboard or controller.



Meassage	Description & Suggested Solution	
Keyboard Error	description: solution:	The keyboard is not working. Reboot the computer. If the problem persists, replace the computer.
Keyboard Error nn	description: solution:	The BIOS discovered a stuck key and displays the scan code nn for the stuck key. 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 SETUP	description:	The monitor type is not correctly identified in Setup.
Operating system not found	description: solution:	The operating system cannot be found on either drive A: or drive C:. Enter Setup 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 Setup	description:	Displayed after any recoverable error message. Press <F1> to start the boot process or <F2> to enter Setup and change any settings.
Press <F2> to enter SETUP, <F12> to enter Boot Menu	description:	Optional message displayed during POST. Can be turned off in Setup.
Previous boot incomplete-Default configuration used	description: solution:	The previous POST did not complete successfully. The POST loads defult values and offers to run Setup. 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 Setup can also terminate POST and cause this error on the next boot. Run Setup and verify the wait-state configuration is correct. This error is cleared the next time the system is booted.

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

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

Meassage	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: nnnn	description: The shadow RAM failed at the offset nnnn of the 64K block at which the error was detected. solution: Try to restart the system. Check that the DIMMs are properly seated.
nnnn Shadow RAM Passed	description: Where nnnn is the amount of shadow RAM in kilobytes successfully tested.
System battery is dead - Replace and run SETUP	description: The CMOS clock battery indicator shows the battery is dead. solution: Replace the battery and run Setup 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 SETUP	description: The CMOS has been corrupted or incorrectly modified, perhaps by an application program that changes data stored in the CMOS. solution: Run Setup to reconfigure the system either by getting the Default Values and/or making your own selections.
System RAM failed at offset: nnnn	description: The system RAM failed at the offset nnnn of the 64K block at which the error was detected.
nnnn System RAM passed	description: Where nnnn is the amount of system RAM in kilobytes successfully tested.
System timer error	description: The timer test failed. solution: Go to Setup and reset the Date and Time fields.
UMB upper limit segment address: nnnn	description: Displays the address nnnn 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.

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 interrup controller

Error Code	Definition
20	Test DRAM refresh code 3-1-1
22	Test 8247 keyboardcontroller (beep code 3-1-3)
24	Set ES segment gegister 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

TABLE 4 – 6
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
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

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 user patch2
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 & 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

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

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

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

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

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	1. Something wrong with the socket. 2. Something wrong with the card in use.
Speakers fail to output sound	1. The audio driver is not properly installed. 2. The volume control key combinations are not properly adjusted. 3. The speaker cables are loose or frayed.
Charge LED fails to display	1. The battery pack has malfunctioned. 2. The AC/DC adapter has malfunctioned.

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	1. Check if the card is properly inserted. 2. Check if the card is configured with appropriate drivers. (For software installation, see the User's Manual.) 3. Check with the card vendor to see if the card is damaged. 4. If the card is still not readable, send the notebook to the nearest service center for repair.
Data reading error (SRAM card)	1. Replace the SRAM card's battery if necessary. 2. Check with the card vendor to see if the card is damaged. 3. If the problem persists, send the notebook to the nearest service center for repair.

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 Cables

If the speaker cables are not properly plugged into their connectors, or they are frayed, the speakers may not work. First locate the speaker connectors, 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.

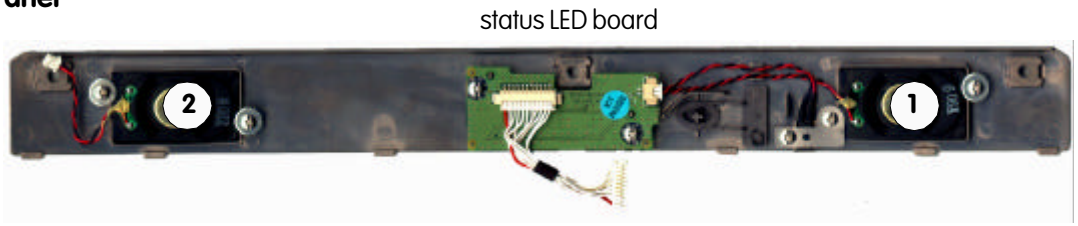
Locating the Speakers and Their Cable Connectors

To locate the speakers and their connectors, you need to remove the status panel and the keyboard. Refer to *Chapter 3, Disassembly* for information on the removal procedures.The speakers are on the status panel. The right speaker connects to the status LED board (on the status panel) at connector CN1 and then to the mainboard at connector CN8 on its upper middle area while the left speaker connects to the mainboard at connector CN12 on its upper left area.

Speakers
Fig. 4 – 8

1. right speaker (connects to CN1 on the LED status board and then to CN8 on the mainboard)
2. left speaker (connects to CN12 on the mainboard)

2800 Status Panel



2820/2850 Status Panel

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.

NOTES:

Appendix A 2800/2820 Part Lists

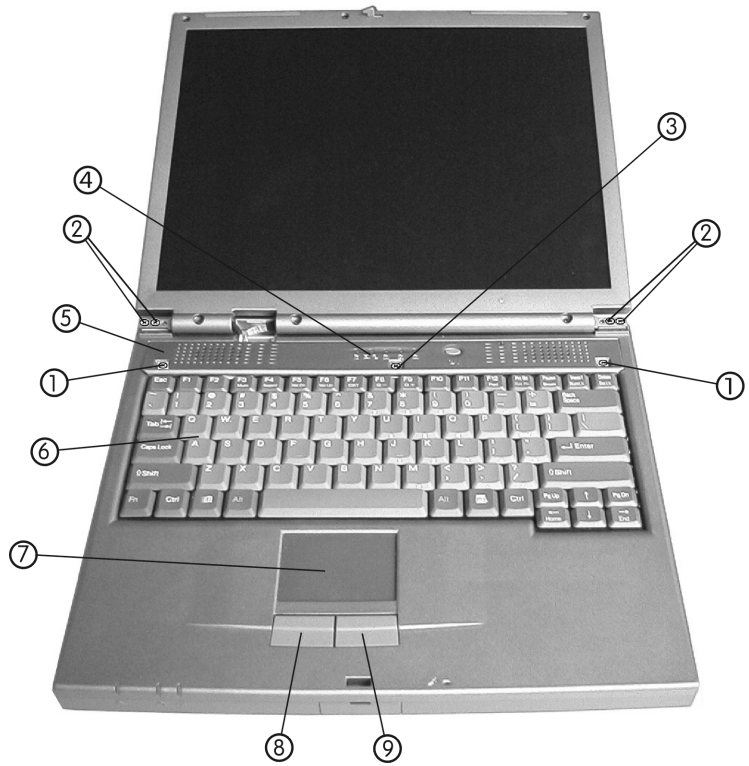
This appendix breaks down the notebook's construction into a series of illustrations. The component part numbers are indicated in the tables opposite the drawings.

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

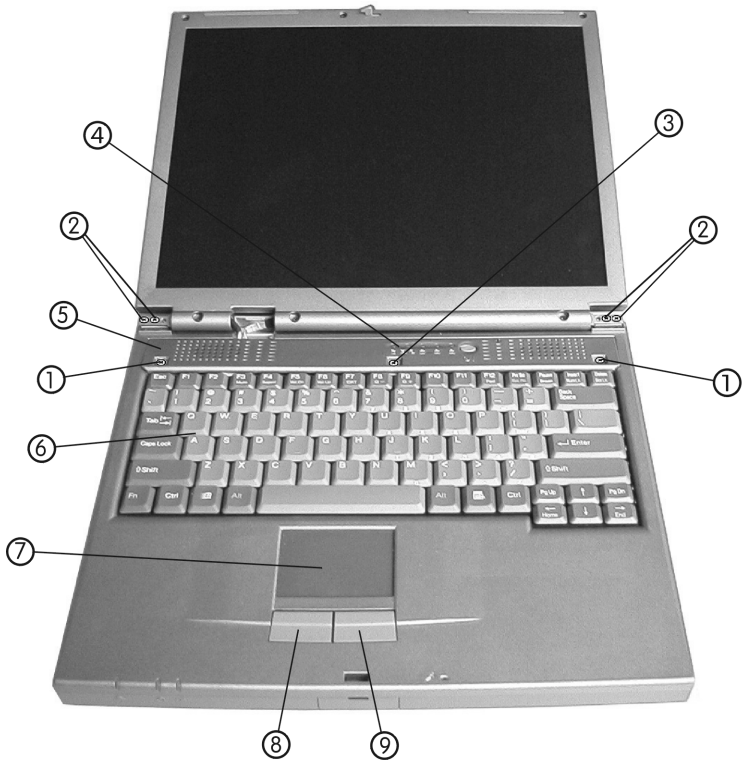
Note: Some assemblies may have parts in common (especially screws). However, the part lists *do not* indicate the total number of duplicated parts used.

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.

2800 FRONT
FIG. A – 1



ITEM	PART NAME	PART NO.	Q'TY	REMARK
09	TRACKET PAD BUTTON (R)	39-28H14-000	1	
08	TRACKET PAD BUTTON (L)	39-28H15-000	1	
07	TRACK PAD	49-28000-010	1	
06	KEYBOARD		1	
05	CENTER COVER	39-28H17-002	1	
04	INDICATOR LENS	39-28H29-000	1	
03	SCREW M2.5*20L KI BNI ICT NY	35-B9125-200	1	
02	SCREW M2.5*8L B BN ICT NY	35-49125-8R0	4	
01	SCREW M2.5*4L KI BNI ICT	35-B9125-4R0	2	



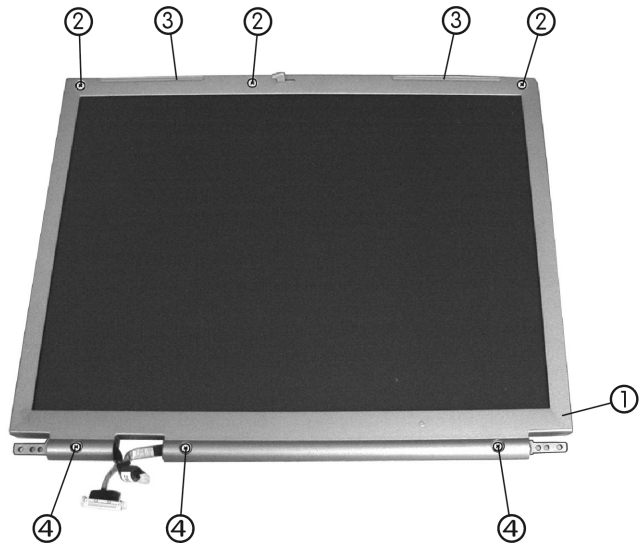
ITEM	PART NAME	PART NO.	Q'TY	REMARK
09	TRACKET PAD BUTTON (R)	39-28H14-000	1	
08	TRACKET PAD BUTTON (L)	39-28H15-000	1	
07	TRACK PAD	49-28000-010	1	
06	KEYBOARD		1	
05	CENTER COVER	39-28204-001	1	
04	INDICATOR LENS	39-28205-000	1	
03	SCREW M2.5*22L KI NI ICT NY	35-B1125-22A	1	
02	SCREW M2.5*8L B BN ICT NY	35-49125-8R0	4	
01	SCREW M2.5*4L KI BNI ICT	35-B9125-4R0	2	

2820 FRONT
FIG. A – 2

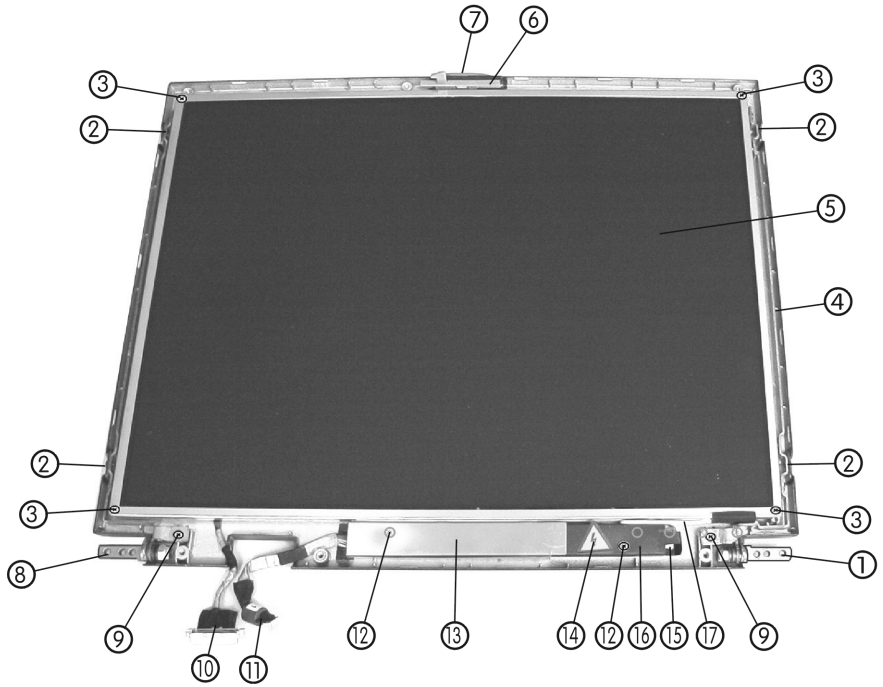
A

2800 LCD Assembly

Fig. A – 3



ITEM	PART NAME	PART NO.	Q'TY	REMARK
04	LCD HINGR SIDE RUBBER	47-28H01-050	3	
	SCREW M2.5*5L KI BNI ICT NY	35-B9125-5R0	3	
03	DISPLAY RUBBER PAD (FRONT)	47-99H01-092	2	
02	LCD TOP SIDE RUBBER	47-28H01-060	3	
	SCREW M2*3L KI BZ ICT NY	35-B6120-3RC	3	
01	LCD F-CVR	39-28003-000	1	FOR 14.1" LCD
		39-28004-000	1	FOR 12.1" LCD



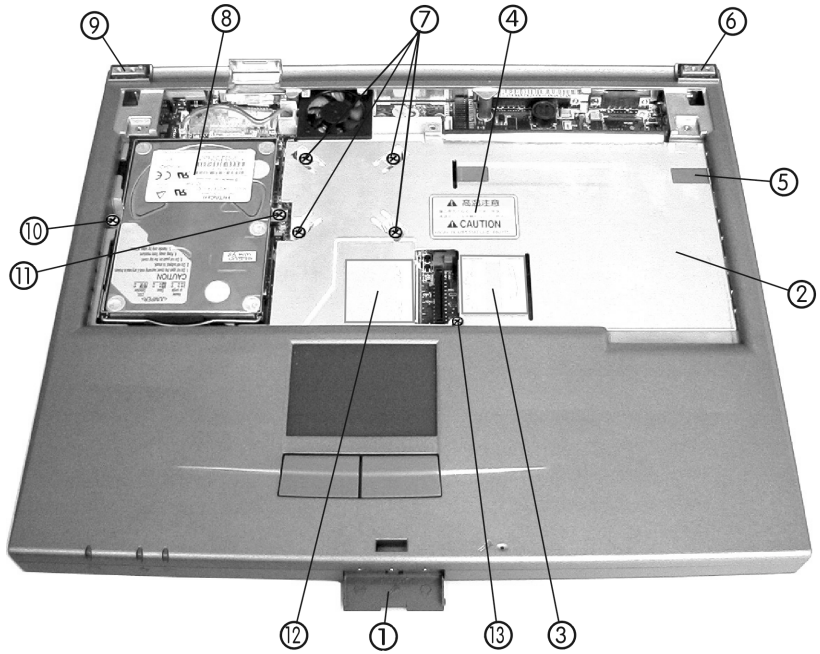
ITEM	PART NAME	PART NO.	Q'TY	REMARK
17	CABLE ASS'Y	43-2800M-002C	2	
16	INVERTER MYLAR	40-28H06-001	1	
15	INVERTER BOARD	77-28002-002H	1	
14	ELECTRIC SHOOK CAUTION LABEL	45-82004-000	1	
13	INVERTER THERMAL (A)	33-28H25-000	1	
	INVERTER THERMAL (B)	39-28H26-000	1	
12	SCREW M2*3L KI NI ICT NY	35-B1120-3RB	2	
11	WIRE CABLE	43-2800Q-001	1	
10	COAXIAL CABLE	43-2800S-001	1	FOR LG 14.1" LCD
		43-28001-003	1	FOR FUJ. 12.1" LCD
		43-2800P-001	1	FOR SANYO 12.1" LCD
09	SCREW M2.5*5L KI BNI ICT NY	35-B9125-5R0	2	
08	LCD HINGE (L)	79-2800Y-020	1	FOR LG 14.1" LCD
		79-28H0Y-040	1	FOR (FUJ & SANYO)12.1" LCD
07	LCD HOOK KNOB	39-28H33-000	1	
06	LCD HOOK	39-28H32-001	1	
	HOOK SPRING	38-00R35-060	1	
05	LCD	50-J6787-65L	1	FOR LG 14.1" LCD
		50-42215-150	1	FOR FUJ. 12.1" LCD
		50-F1257-S00	1	FOR SANYO 12.1" LCD
04	LCD B-CVR	39-28001-000	1	FOR LG 14.1" LCD
		39-28H08-003	1	FOR (FUJ & SANYO)12.1" LCD
03	SCREW M2.5*4L KI BNI ICT NY	35-B9125-4RA	4	FOR 12.1" LCD
02	SCREW M2*3L KI BZ ICT NY	35-B6120-3RC	4	FOR 14.1" LCD
01	LCD HINGE (R)	79-2800Y-010	1	FOR LG 14.1" LCD
		79-28H0Y-033	1	FOR (FUJ & SANYO)12.1" LCD

2820 LCD ASSEMBLY
FIG. A – 4

A

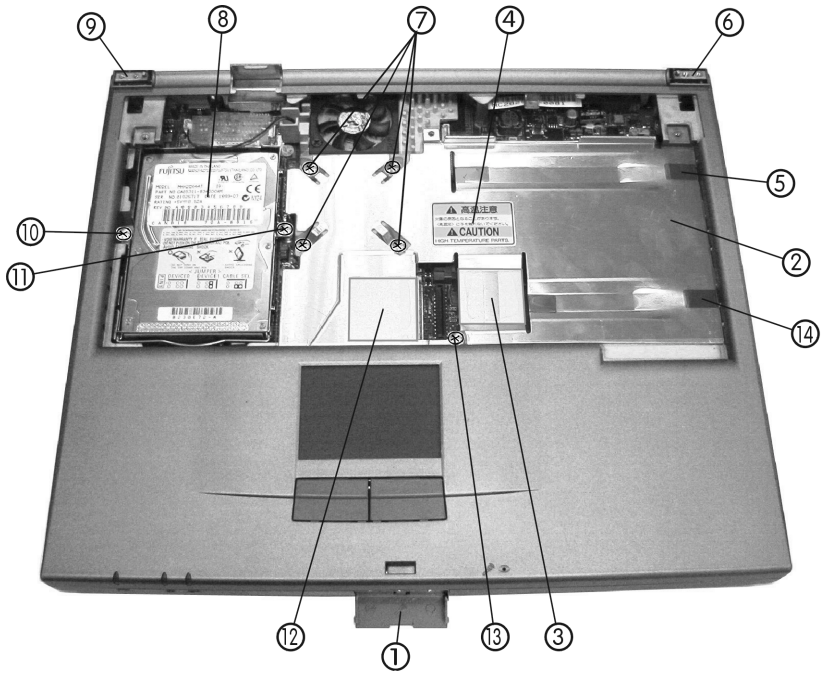
2800 WORK ASSEMBLY

FIG. A – 5



ITEM	PART NAME	PART NO.	Q'TY	REMARK
13	SCREW M2.5*14L KI NI ICT NY	35-B1125-140	1	
12	HEAT PLATE LOWER MYLAR	40-28H10-000	1	
11	SCREW M2.5*3L B NI ICT	35-41125-3R0	2	
10	SCREW M2*10L B NI ICT NY	35-49120-100	1	
09	HINGE SUPPORT (L)	33-28H17-000	1	
08	HDD ASS'Y		1	
07	SCREW M2*13L B NI ICT NY	35-41120-130	4	
06	HINGE SUPPORT (R)	33-28H16-000	1	
05	HEAT PLATE KAPTON	47-28H03-020	1	
04	HIGH TEMPERATURE CAUTION LABEL	45-82009-000	1	
03	HEAT PLATE MYLAR (A)	40-28H11-000	1	
02	TOP HEAT PLATE	33-28H02-001	1	
01	AUDIO DOOR	39-28H24-001	1	

A



ITEM	PART NAME	PART NO.	Q'TY	REMARK
14	HEAT PLATE KAPTON (A)	47-28203-020	1	
13	SCREW M2.5*17L KI BNI ICT NY	35-B9125-17A	1	
12	HEAT PLATE LOWER MYLAR	40-28H10-000	1	
11	SCREW M2.5*3L B NI ICT	35-41125-3R0	2	
10	SCREW M2*10L B NI ICT NY	35-49120-100	1	
09	HINGE SUPPORT (L)	33-28H17-000	1	
08	HDD ASS'Y		1	
07	SCREW M2*13L B NI ICT NY	35-41120-130	4	
06	HINGE SUPPORT (R)	33-28H16-000	1	
05	HEAT PLATE KAPTON	47-28H03-020	1	
04	HIGH TEMPERATURE CAUTION LABEL	45-82009-000	1	
03	HEAT PLATE MYLAR (A)	40-28H11-000	1	
02	TOP HEAT PLATE	33-28201-002	1	
01	AUDIO DOOR	39-28H24-001	1	

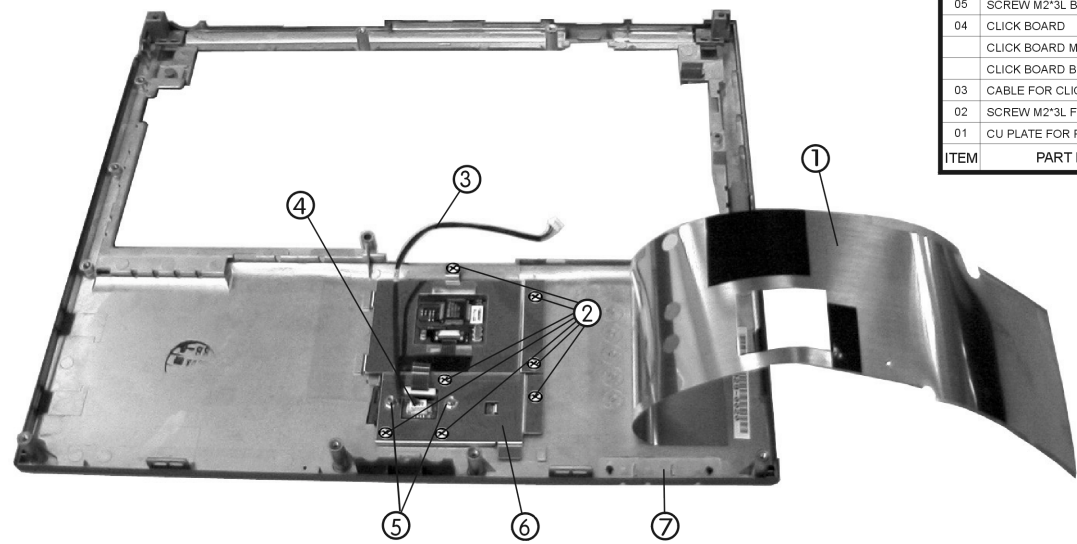
2820 WORK ASSEMBLY

FIG. A – 6

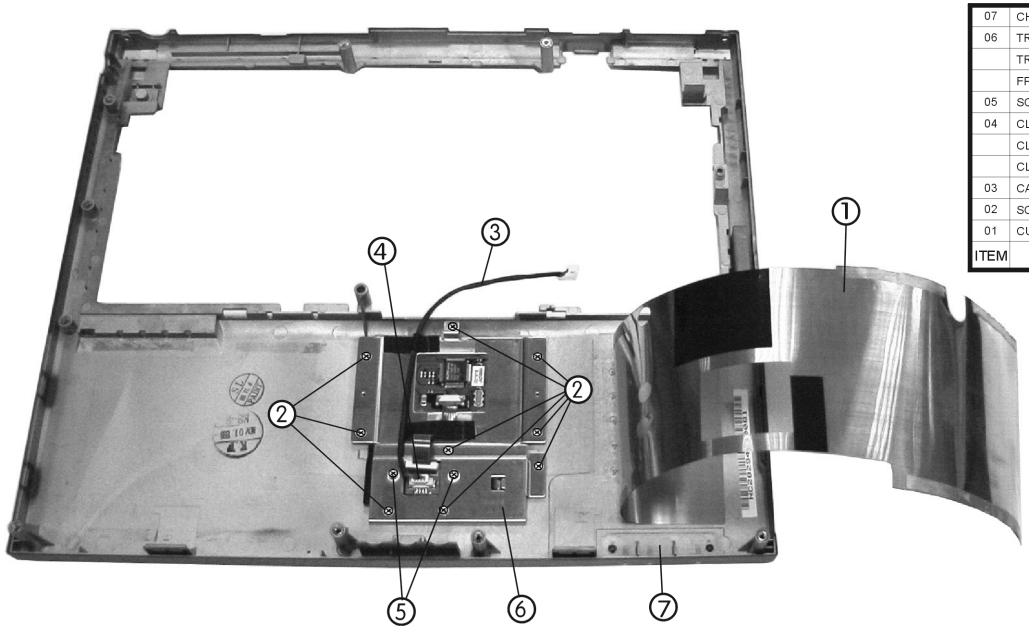
A

2800 Top Cover Assembly

Fig. A – 7



ITEM	PART NAME	PART NO.	Q'TY	REMARK
07	CHARGER LENS	39-28H30-001	1	
06	TRACK PAD BRACKET	33-28H05-000	1	
	TRACK PAD MYLAR	40-28H07-000	1	
	FPC CABLE FOR T/P	43-2800B-001	1	
05	SCREW M2*3L B NI ICT NY	35-41120-3RA	2	
04	CLICK BOARD	77-28004-002H	1	
	CLICK BOARD MYLAR	40-28H09-000	1	
	CLICK BOARD BLACK MYLAR	40-28H15-000	1	
03	CABLE FOR CLICK BOARD	43-2800E-002	1	
02	SCREW M2*3L F NI ICT NY	35-21120-3RA	7	
01	CU PLATE FOR PALM	33-28H21-002	7	



ITEM	PART NAME	PART NO.	Q'TY	REMARK
07	CHARGER LENS	39-28H30-001	1	
06	TRACK PAD BRACKET	33-28209-000	1	
	TRACK PAD MYLAR	40-28201-000	1	
	FPC CABLE FOR T/P	43-2800B-001	1	
05	SCREW M2*3L B NI ICT NY	35-41120-3RA	2	
04	CLICK BOARD	77-28204-002H	1	
	CLICK BOARD MYLAR	40-28202-000	1	
	CLICK BOARD BLACK MYLAR	40-28H15-000	1	
03	CABLE FOR CLICK BOARD	43-2800E-002	1	
02	SCREW M2*3L F NI ICT NY	35-21120-3RA	9	
01	CU PLATE FOR PALM	33-28H21-002	7	

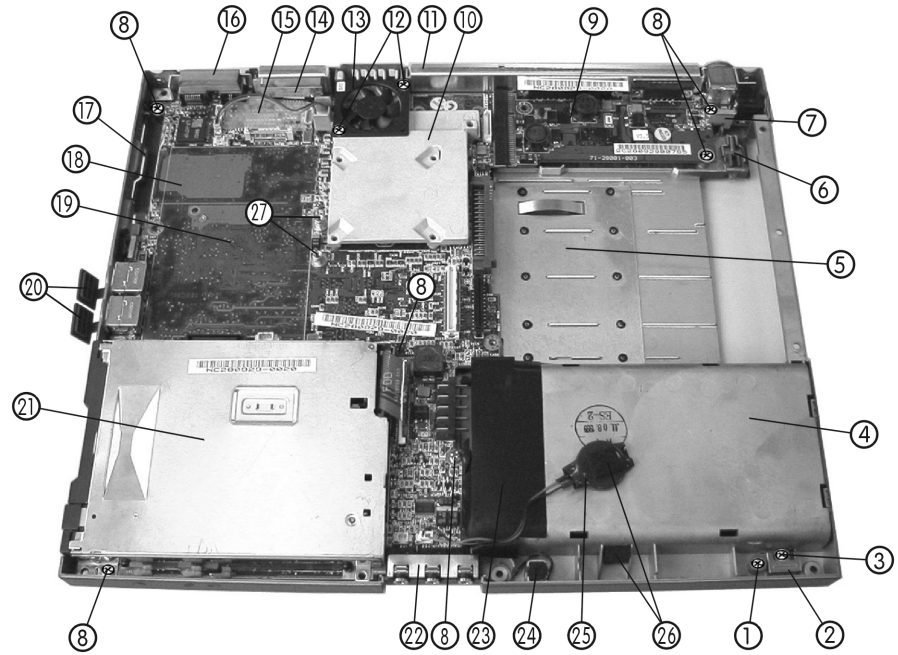
2820 Top Cover Assembly

Fig. A – 8

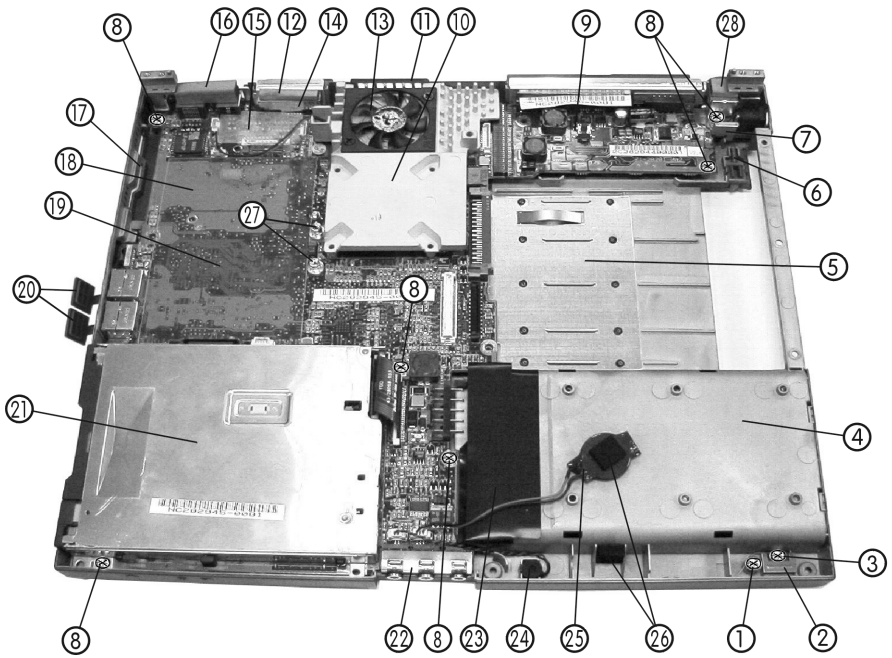
A

2800 Bottom Cover Assembly

Fig. A – 9



ITEM	PART NAME	PART NO.	Q'TY	REMARK
27	HEX STUD	34-28H04-000	2	
26	RTC BATTERY SPONGE	47-28H01-080	1	
25	RTC BATTERY		1	
24	MIC RUBBER	47-86001-010	1	
	MIC+CABLE ASS'Y		1	
23	BATTERY MYLAR	40-28H04-002	1	
22	AUDIO SHIELDING PLATE	33-28H15-000	1	
21	FDD ASS'Y		1	
20	USB RUBBER	47-28H01-031	2	
19	M/B	77-28000-004	1	
18	HDD MYLAR FOR M/B	40-28H01-001	1	
17	PCMCIA (B) SPRING	38-99H03-000	1	
	PCMCIA DOOR	39-28H28-000	2	
16	GASKET (L30*W8*H8)	47-28H02-050	1	
15	MB MYLAR	40-28H20-000	1	
14	VGA GROUDDING PLATE	33-99H14-000	1	
13	FAN		1	
12	SCREW M2*5.5L KI NI ICT	35-B1120-550	2	
11	REAR BRACKET	33-28H03-005	1	
10	TOP HEAT SINK (FOR uPGA)	33-28H19-005	1	
	TOP THERMAL PAD	47-28H01-010	1	
09	DC/DC BOARD V3.0	77-28001-003	1	
08	SCREW M2.5*5L B NI ICT NY	35-41125-5RA	6	
07	K/B SUPPORT BRACKET	33-28H20-000	1	
06	BAY LOCK SPRING	38-99H01-001	1	
	BAY LOCK HOOK	39-28H36-001	1	
05	FILE BAY SHELDING PLATE	33-28H14-000	1	
04	BOTTOM CASE	39-28H02-002	1	
03	SCREW 1.7*3L KI NI TAP	35-B1717-3RB	1	
02	BATTERY KNOB BRACKET	33-28H24-001	1	
	BATTERY LOCK SPRING	38-28H01-001	1	
01	SCREW M2*2.5L P NI ICT NY	35-01020-250	1	



ITEM	PART NAME	PART NO.	Q'TY	REMARK
28	GASKET (L13*W10*H4)	47-28202-050	1	
27	HEX STUD	34-28H04-000	2	
26	RTC BATTERY SPONGE	47-28H01-080	1	
25	RTC BATTERY		1	
24	MIC RUBBER	47-86001-010	1	
	MIC+CABLE ASS'Y		1	
23	BATTERY MYLAR	40-28H04-002	1	
22	AUDIO SHIELDING PLATE	33-28H15-000	1	
21	FDD ASS'Y		1	
20	USB RUBBER	47-28H01-031	2	
19	M/B	77-28200-002H	1	
18	HDD MYLAR FOR M/B	40-28H01-001	1	
17	PCMCIA (B) SPRING	38-99H03-000	1	
	PCMCIA DOOR	39-28H28-000	2	
16	GASKET (L30*W8*H11)	47-28202-030	1	
15	MB MYLAR	40-28H20-000	1	
14	VGA GROUDDING PLATE	33-99H14-000	1	
13	FAN		1	
12	GASKET (L29*W5*H3.5)	47-28202-060	2	
11	REAR BRACKET	33-28202-001	1	
10	TOP HEAT SINK (FOR uPGA2)	33-28207-003	1	
	TOP THERMAL PAD	47-28201-021	1	
09	DC/DC BOARD V2.0	77-28201-002H	1	
08	SCREW M2.5*5L B NI ICT NY	35-41125-5RA	6	
07	K/B SUPPORT BRACKET	33-28H20-000	1	
06	BAY LOCK SPRING	38-99H01-001	1	
	BAY LOCK HOOK	39-28H36-001	1	
05	FILE BAY SHELDING PLATE	33-28H14-000	1	
04	BOTTOM CASE	39-28202-004	1	
03	SCREW 1.7*3L KI NI TAP	35-B1717-3RB	1	
02	BATTERY KNOB BRACKET	33-28H24-001	1	
	BATTERY LOCK SPRING	38-28H01-001	1	
01	SCREW M2*2.5L P NI ICT NY	35-01020-250	1	

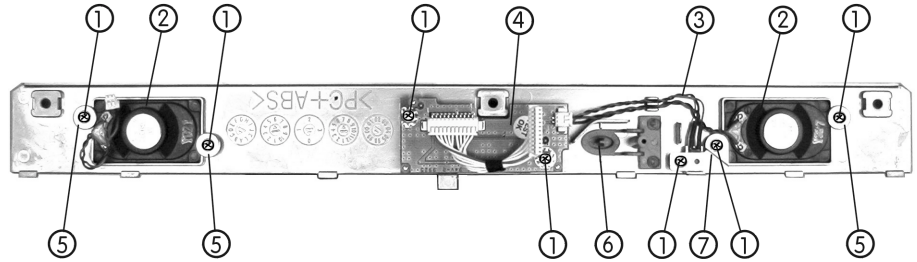
2820 Bottom Cover Assembly

Fig. A – 10

A

2800 Status Panel Assembly

Fig. A – 11

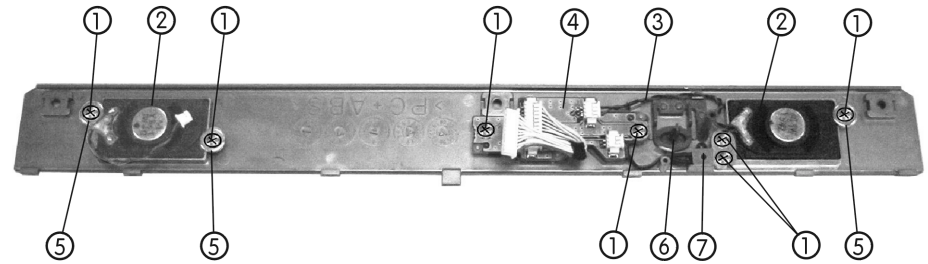


ITEM	PART NAME	PART NO.	Q'TY	REMARK
07	COVER S/W BRACKET	33-28H13-001	1	
06	POWER BUTTON	39-28H16-002	1	
05	WASHER M2*0.8t	37-02211-200	3	
04	LED BOARD	77-28005-004H	1	
	CABLE FOR LED BOARD	43-2800D-001	1	
03	COVER S/W + CABLE ASS'Y	79-280HD-0B0	1	
02	SPEAKER + CABLE (R)	23-5A110-450	1	
	SPEAKER + CABLE (L)	23-5A110-590	1	
	SPEAKER RUBBER	47-28H01-041	2	
	SPEAKER HIMILON	47-28H01-070	2	
01	SCREW M2*3L B NI ICT NY	35-41120-3RA	7	

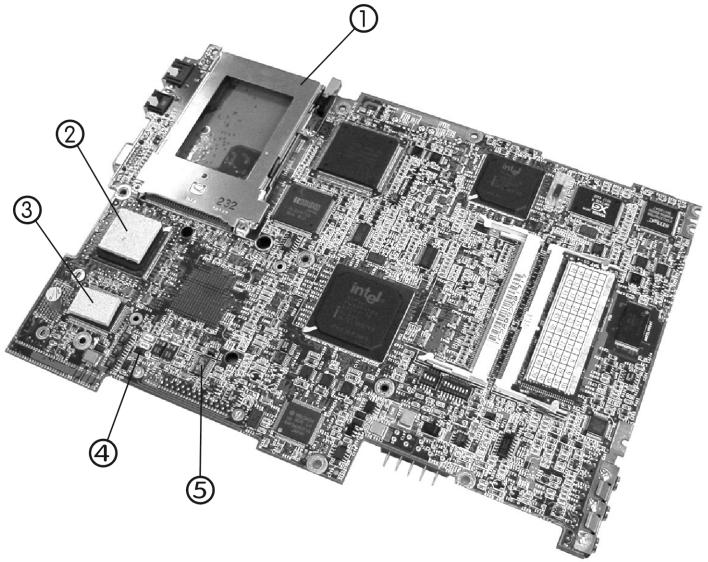
A

2820 Status Panel Assembly

Fig. A – 12

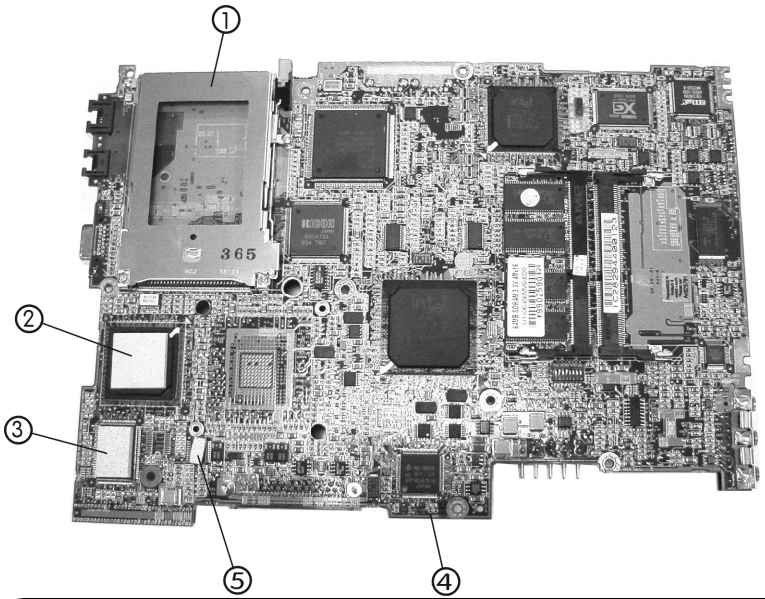


ITEM	PART NAME	PART NO.	Q'TY	REMARK
07	COVER S/W BRACKET	33-28206-000	1	
06	POWER BUTTON	39-28203-002	1	
05	WASHER M2*0.8t	37-02211-200	3	
04	LED BOARD	77-28005-004H	1	
	CABLE FOR LED BOARD	43-2800D-001	1	
03	COVER S/W + CABLE ASS'Y	79-280HD-0B0	1	
02	SPEAKER + CABLE (R)	23-5A110-450	1	
	SPEAKER + CABLE (L)	23-5A110-590	1	
	SPEAKER RUBBER	47-28H01-041	2	
	SPEAKER HIMILON	47-28H01-070	2	
01	SCREW M2*3L B NI ICT NY	35-41120-3RA	7	



ITEM	PART NAME	PART NO.	Q'TY	REMARK
05	VRM U8 THERMAL PAD	47-28H01-110	1	
04	M/B V3.0	77-28003-003	1	
03	SGRAM U7 THERMAL PAD	47-28H01-100	1	
02	VGA THERMAL PAD	47-28H01-160	1	
01	PCMCIA ASS'Y		1	

2800 MAINBOARD ASSEMBLY
FIG. A – 13



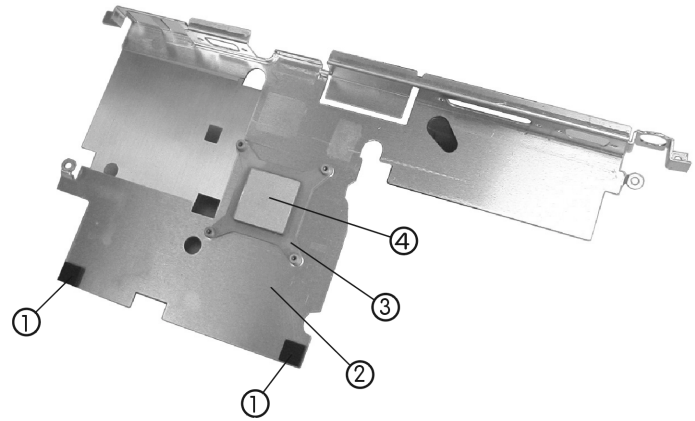
ITEM	PART NAME	PART NO.	Q'TY	REMARK
05	VRM (U8) THERMAL PAD	47-28201-030	1	
04	M/B V2.0	77-28200-002H	1	
03	SGRAM U7 THERMAL PAD	47-28H01-100	1	
02	VGA THERMAL PAD	47-28H01-160	1	
01	PCMCIA ASS'Y		1	

2820 MAINBOARD ASSEMBLY
FIG. A – 14

A

2800 Bracket Assembly

Fig. A – 15

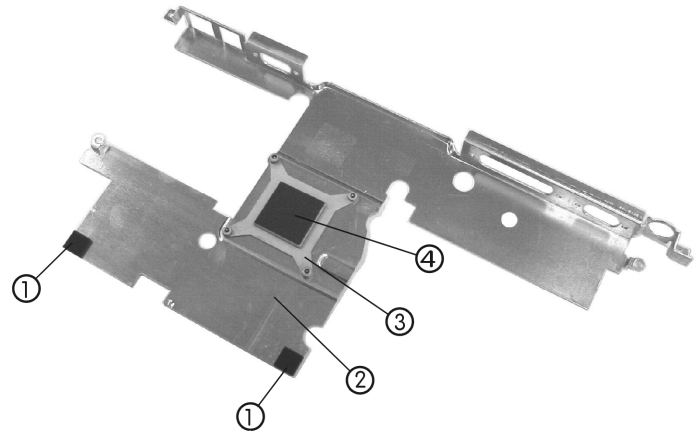


ITEM	PART NAME	PART NO.	Q'TY	REMARK
05	PCMCIA LU PLATE	33-28H23-000	1	
04	BOTTOM THERMAL PAD	47-28H01-020	1	
03	BOTTOM HEAT SINK	33-28208-000	1	
02	REAR BRACKET	33-28H03-005	1	
01	REAR BRACKET RUBBER	47-28H01-140	2	

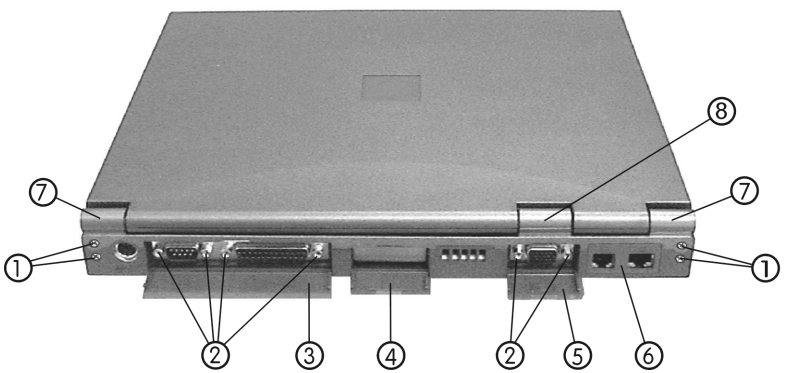
A

2820 Bracket Assembly

Fig. A – 16



ITEM	PART NAME	PART NO.	Q'TY	REMARK
04	BOTTOM HEAT SINK RUBBER	47-28201-040	1	
03	BOTTOM HEAT SINK	33-28208-000	1	
02	REAR BRACKET	33-28202-001	1	
01	REAR BRACKET RUBBER	47-28H01-140	2	



ITEM	PART NAME	PART NO.	Q'TY	REMARK
08	CABLE COVER	39-28H18-000	1	
	GASKET (L18*W4*H3)mm	47-28H02-030	1	
07	HINGE COVER	39-99H13-001	2	
06	MODEM &LAN COVER	39-28H19-000	1	
	MODEM COVER	39-28H20-000	1	
	LAN COVER	39-28H21-000	1	
	DUMMY COVER	39-28H22-000	1	
05	VGA DOOR	39-28H25-002	1	
04	DOCKING DOOR	39-28H26-000	1	(2800 only)
	REAR DOOR MYLAR	40-96021-001	1	
03	I/O DOOR	39-28H27-001	1	
02	HEX STUD	34-96002-000	6	
01	SCREW M2.5*4L KI BNI ICT	35-B9125-4R0	4	

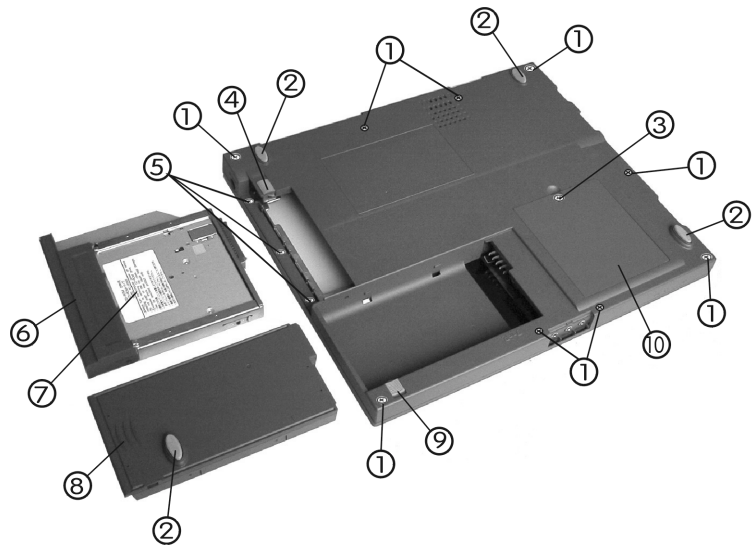
2800/2820 REAR ASSEMBLY

FIG. A – 17

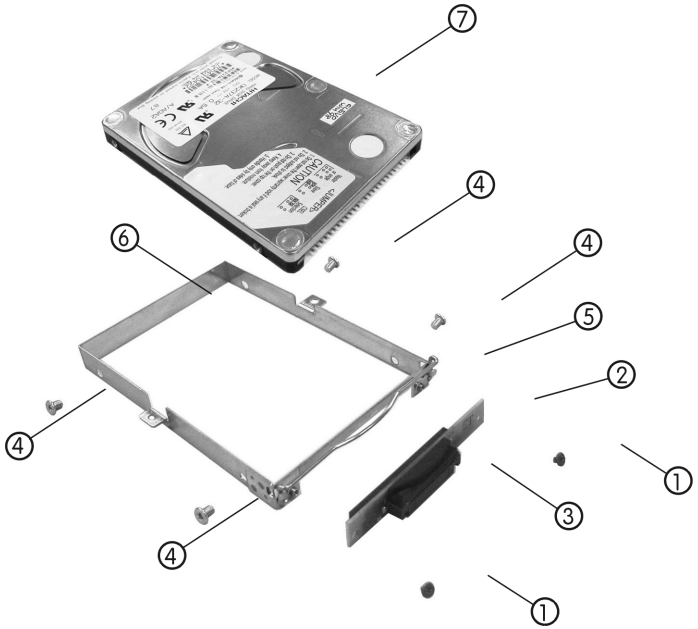
A

2800/2820 Bottom Assembly

Fig. A – 18



ITEM	PART NAME	PART NO.	Q'TY	REMARK
10	RAM COVER MYLAR	40-28H05-000	1	
	RAM COVER	39-28H23-001	1	
09	BATTERY LOCK KNOB	39-28H34-001	1	
08	BATTERY LI-ION ASS'Y	87-2808S-45B	1	
	BATTERY NI-MH ASS'Y	87-28080-355	1	
07	CD-ROM CAUTION LABEL	45-28001-000	1	
06	CD-ROM ASS'Y		1	
05	SCREW M2.5*5L KI BNI ICT NY	35-B9125-5R0	3	
04	BAY LOCK KNOB	39-28H35-000	1	
03	SCREW M2*4L B BNI ICT NY	35-49120-4R0	1	
02	RUBBER FOOT	47-99H01-022	4	
01	SCREW M2.5*8L B BN ICT NY	35-49125-8R0	9	



2820

ITEM	PART NAME	PART NO.	Q'TY	REMARK
07	HDD		1	
06	HDD BRACKET	33-28211-000	1	
05	HDD HDNDLE	33-28H11-000	1	
04	SCREW M3*4L KI NI ICT	35-B1130-4RB	4	
03	HDD RUBBER	47-28201-010	1	
02	HDD COVERTER BOARD	71-28206-001	1	
01	SCREW M2*2L KI BZ ICT NY	35-B6120-2R0	2	

2820 HDD ASSEMBLY
FIG. A – 19

2800

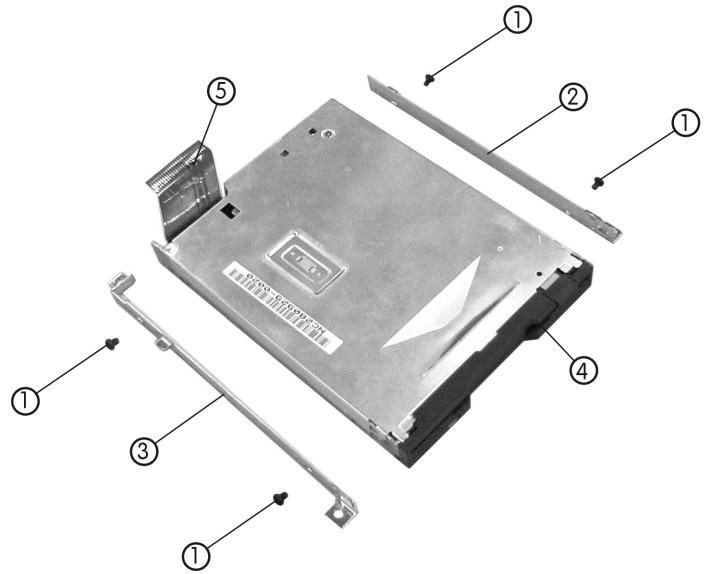
ITEM	PART NAME	PART NO.	Q'TY	REMARK
07	HDD		1	
06	HDD BRACKET	33-28210-001	1	
05	HDD HDNDLE	33-28H11-000	1	
04	SCREW M3*4L KI NI ICT	35-B1130-4RB	4	
03	HDD RUBBER	47-28201-010	1	
02	HDD COVERTER BOARD	71-28206-001	1	
01	SCREW M2*2L KI BZ ICT NY	35-B6120-2R0	2	

2800 HDD ASSEMBLY
FIG. A –20

A

2820/2800 FDD ASSEMBLY

FIG. A – 21



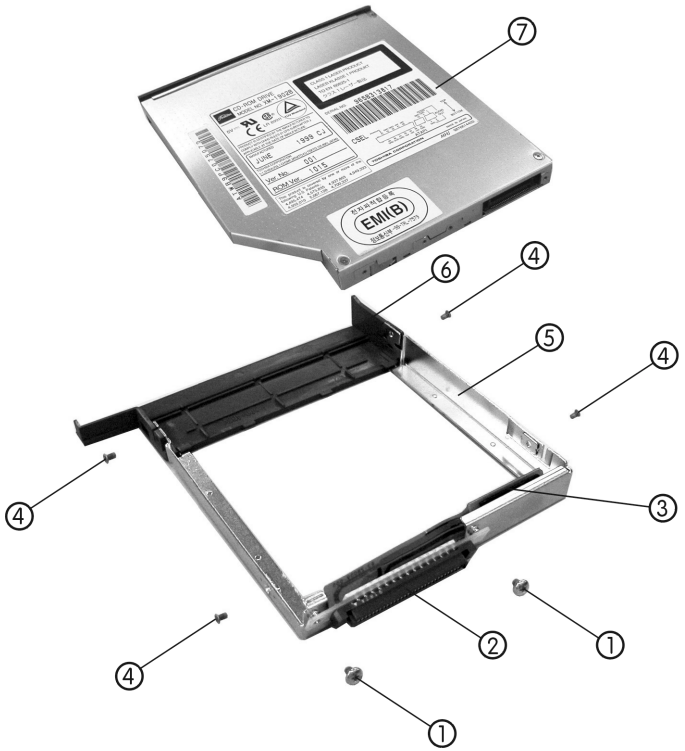
2820

ITEM	PART NAME	PART NO.	Q'TY	REMARK
05	FDD FPC CABLE	43-2800A-003	1	
04	FDD		1	
03	FDD BRACKET (L)	33-28H09-001	1	
02	FDD BRACKET (R)	33-28H08-001	1	
01	SCREW M2.5*3L P BZ ICT NY	35-06125-3R0	4	

2800

ITEM	PART NAME	PART NO.	Q'TY	REMARK
05	FDD FPC CABLE	43-2800A-003	1	
04	FDD		1	
03	FDD BRACKET (L)	33-28204-001	1	
02	FDD BRACKET (R)	33-28203-001	1	
01	SCREW M2.5*3L P BZ ICT NY	35-06125-3R0	4	

A



ITEM	PART NAME	PART NO.	Q'TY	REMARK
07	CD-ROM		1	
06	CD-ROM TRAY	39-28H13-001	1	
05	CD-ROM BRACKET	33-28H12-002	1	
04	SCREW M2*3.5L F NI ICT NY	35-21120-35B	4	
03	CD-ROM RUBBER	47-28H01-090	1	
02	CD-ROM FPC CABLE ASS'Y	43-28009-004C	1	
01	SCREW M2.5*3L B NI ICT NY	35-41125-3RA	2	

2820/2800 CD-ROM ASSEMBLY

FIG. A – 22

A

NOTES:

Appendix B 2850 Part Lists

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

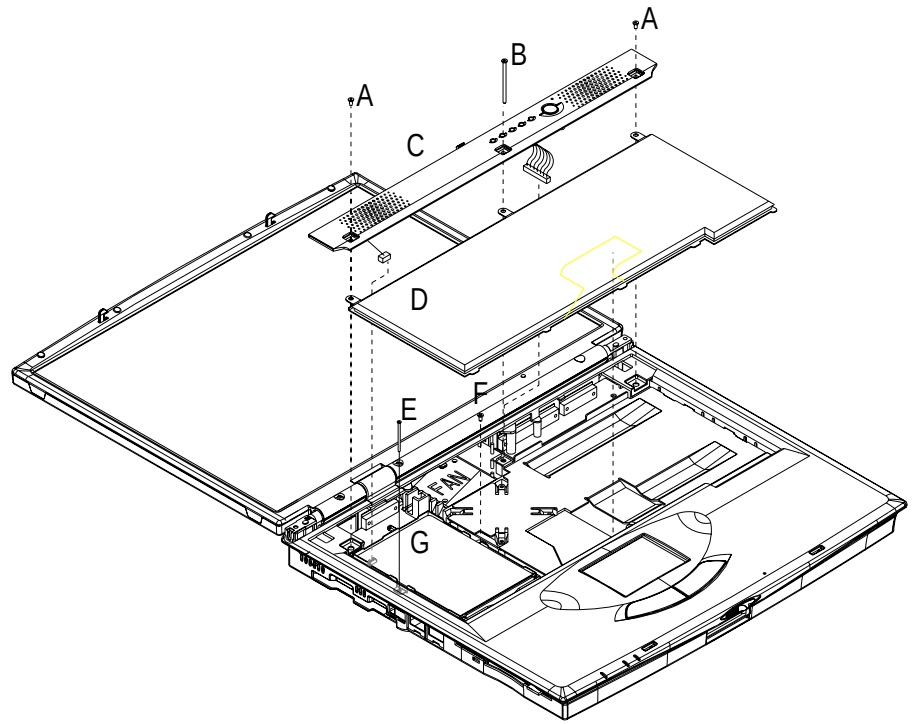
Note: This section indicates the *manufacturer's* part numbers. Your organization may use a different system, so be sure to cross-check any relevant documentation.

Note: Some assemblies may have parts in common (especially screws). However, the part lists *do not* indicate the total number of duplicated parts used.

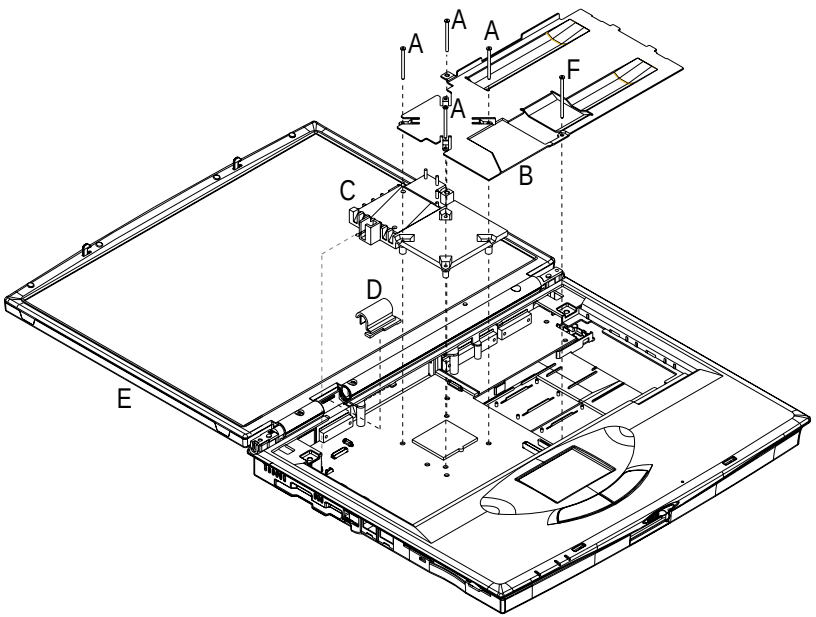
Note: Be sure to check any update notices. The parts shown in these illustrations are appropriate for the system at the time of publication. Over the product life, some parts may be improved or reconfigured, resulting in *new* part numbers.

2850 KEYBOARD

FIG. B – 1



PARTS	NAME	Q'TY
PARTS NUMBER	DESCRIPTION	
A.35-B9125-4R0	SCREW M2.5*4.0L K1 BNI	2
B.35-B1125-22A	SCREW M2.5*22L KI NI NY	1
C.	CENTER COVER ASS'Y	1
D.	K/B	1
E.35-49120-100	SCREW M2*10L B BN NY	1
F.35-41125-3R0	M2.5*3L*0.45P BIND HEAD	1
G.	HDD MODULE	1



PARTS	NAME	Q'TY
PARTS NUMBER	DESCRIPTION	
A.35-41120-130	SCREW M2*13L B NI NY	4
B.33-28201-002	TOP HEAT PLATE	1
C.79-282HE-0A2	TOP HEAT SINK & FAN	1
D.	CABLE COVER ASS'Y	1
E.	\M+2A544\M+2C5E9\M+2A562\M+2A6A8\M+2AB7E	1
F.35-B9125-17A	SCREW M2.5*17L KI NY	1

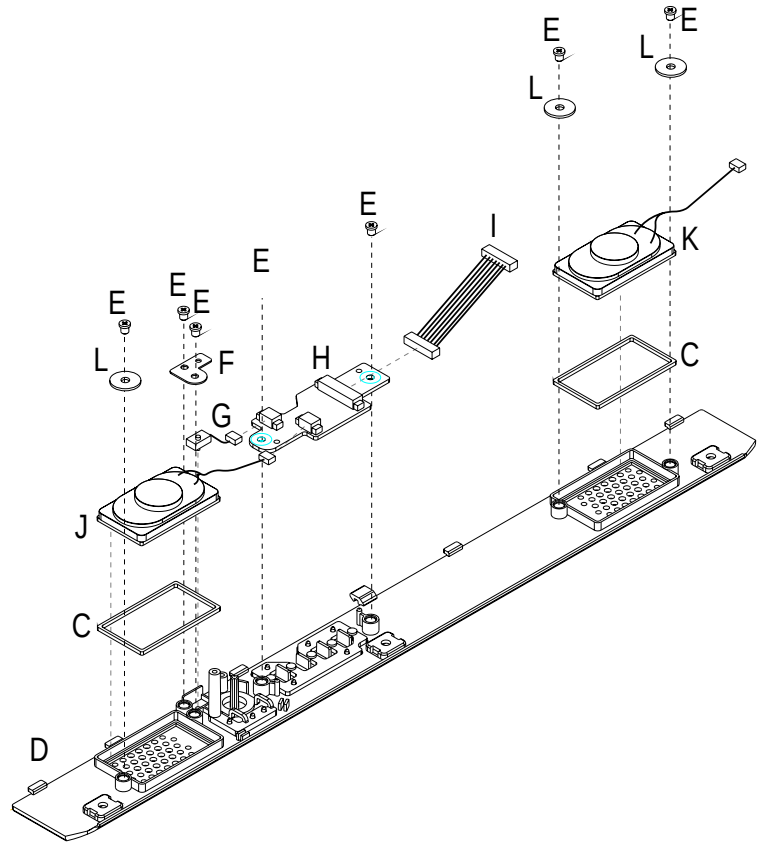
2850 HEAT SINK

FIG. B – 2

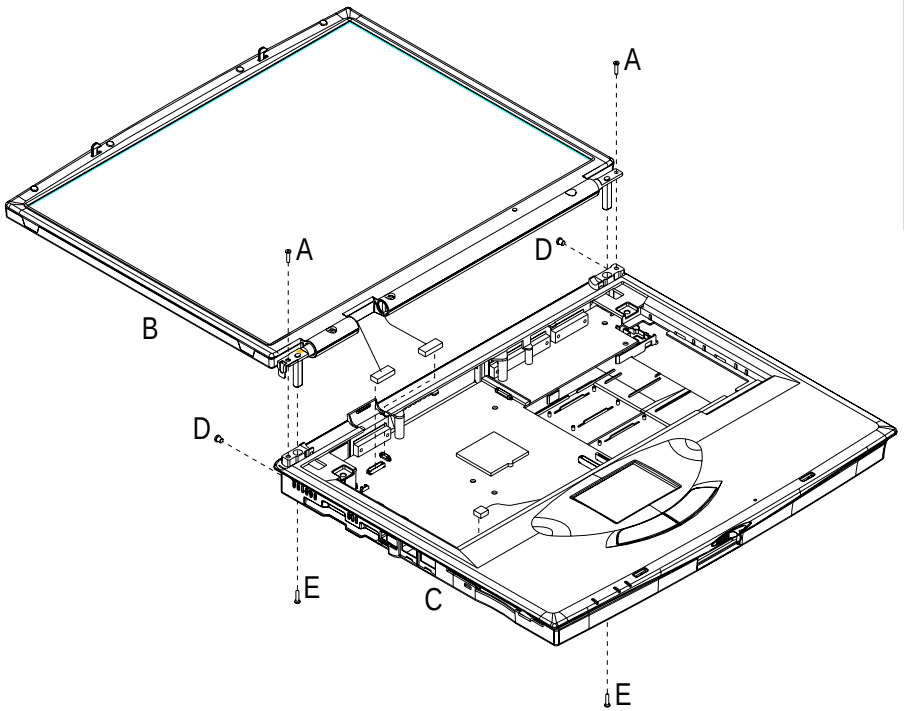
B

2850 Status Panel

Fig. B – 3



PARTS	NAME	Q'TY
PARTS NUMBER	DESCRIPTION	
C.47-28H01-041	SPEAKER RUBER	2
D.39-28505-000	LED COVER,PC+ABS 285	1
E.35-41120-3RA	SCREW M2*3L B NI ICT NY	7
F.33-28206-000	COVER S/W BRACKET	1
G.79-282HD-0B0	COVER SWITCH & CABLE	1
H.77-28205-001H	LED BOARD V1.0 282H	1
I.43-2800D-001	CABLE FOR LED BOARD	1
J.23-5A110-650	SPK. WITH CABLE(R)	1
K.23-5A110-450	SPK. WITH CABLE(L)	1
L.37-02211-200	WASHER M2*0.8t*\M+2A1ED8 NI	3



PARTS	NAME	Q'TY
PARTS NUMBER	DESCRIPTION	
A.35-49125-8R0	SCREW M2.5*8L B BN NY	2
B.	LCD\M+2A562\M+2A6A8\M+2AB7E	1
C.	\M+2A544\M+2C5E9\M+2A562\M+2A6A8\M+2AB7E	1
D.35-B9125-5R0	SCREW M2.5*5L K1 BNI NY	2
E.35-49125-120	SCREW M2.5*12L B BN NY	2

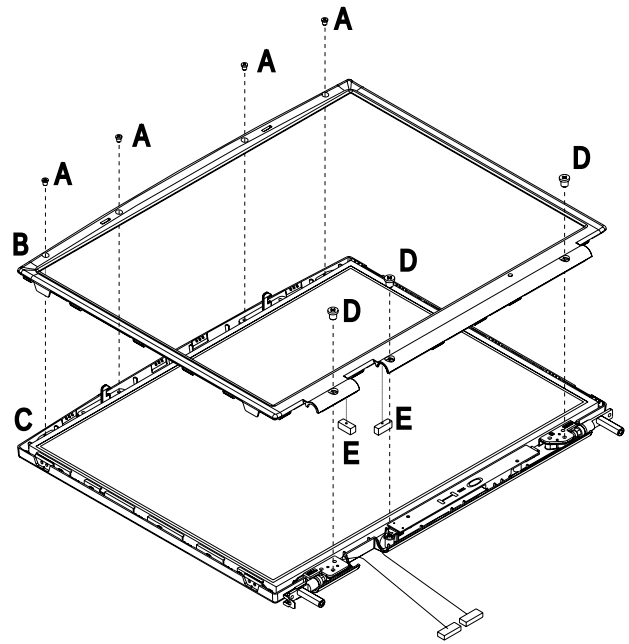
2850 LCD Assembly

Fig. B – 4

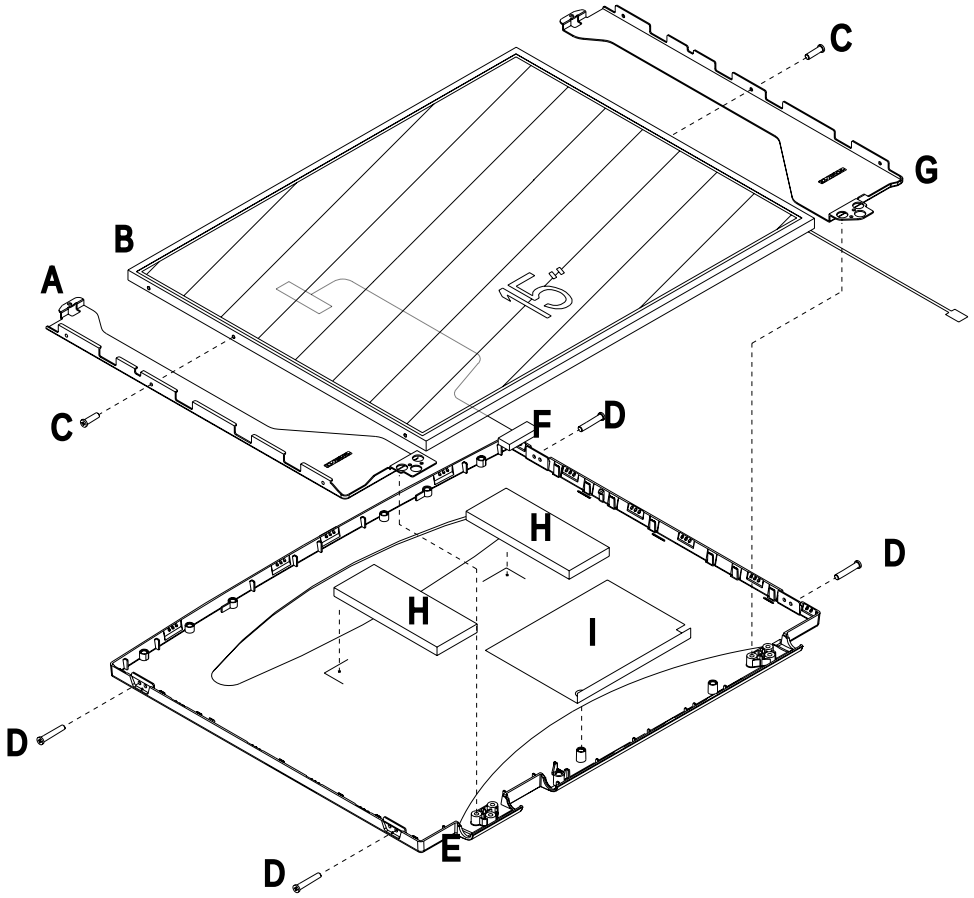
B

2850 LCD Frame

Fig. B – 5



PARTS	NAME	Q'TY
PARTS NUMBER	DESCRIPTION	
A.35-B1120-4RB	SCREW M2*4L KI NI ICT	4
B.39-28503-001	LCD F-CVR 15.1" X-TFT	1
C.	\M+2ABE1\M+2BB5C\M+2A94DLCD,\M+2C54B\M+2AC5B\M+2B5A5	1
D.35-B9125-5R0	SCREW M2.5*5L K1 BNI NY	3
E.47-28502-010	CONDUCTIVE GASKET	2



PARTS	NAME	Q'TY
PARTS NUMBER	DESCRIPTION	
A.33-28505-000	LCD BRACKET (L) FOR LG	1
B.50-L6707-63L	LG 15" LCD	1
C.35-B1120-4RB	SCREW M2*4L KI NI ICT	2
D.35-B1120-5R0	SCREW M2*5L K1 NI NY	4
E.39-28504-001	\M+2ABE1\M+2BB5C	1
F.43-28501-001	COAXIAL CABLE FOR LG	1
G.33-28504-000	LCD BRACKET (R) FOR LG	1
H.47-28501-040	BACK RUBBER L120*W20*H1	2
I.33-28H25-000	INVERTER THERMAL CU	1

2850 LCD ASSEMBLY

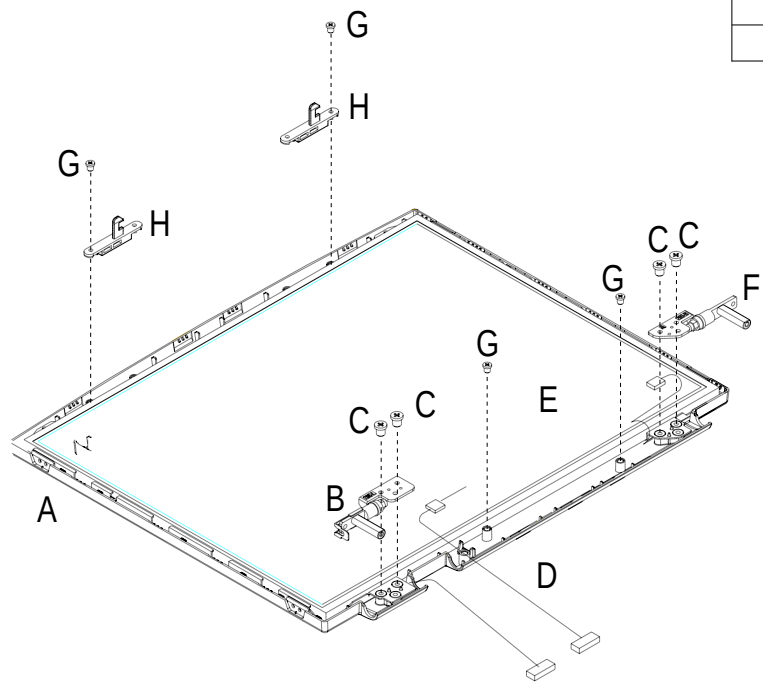
FIG. B – 6

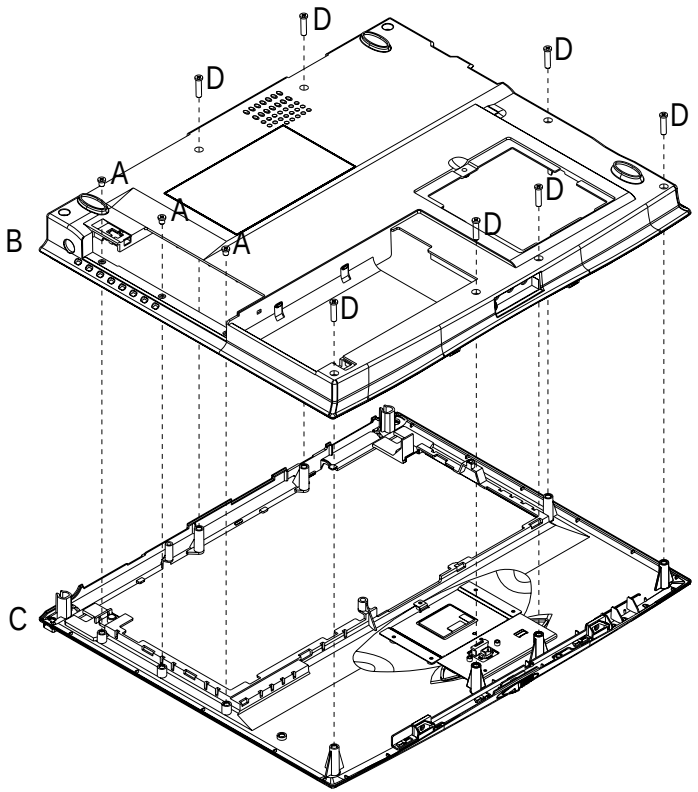
B

PARTS	NAME	Q'TY
PARTS NUMBER	DESCRIPTION	
A.	\M+2ABE1\M+2BB5C\M+2A94DLCD,\M+2C54B\M+2AC5B	1
B.79-2850Y-020	HINGE (L) ASS'Y 285	1
C.35-B9125-5R0	SCREW M2.5*5L K1 BNI NY	6
D.43-2800Q-001	WIRE CABLE FOR INVERTER	1
E.	INVERTER	1
F.79-2850Y-010	HINGE (R) ASS'Y 285	1
G.35-B1120-4RB	SCREW M2*4L KI NI ICT	2
H.39-28511-001	LCD HOOK,POM 285	1

2850 LCD Cover Assembly

Fig. B – 7





PARTS	NAME	Q'TY
PARTS NUMBER	DESCRIPTION	
A.35-B9125-5R0	SCREW M2.5*5L K1 BNI NY	3
B.	\M+2A455\M+2BB5C\M+2A94DM/B..\M+2A562\M+2A6A8\M+2AB7E	1
C.	\M+2A457\M+2BB5C\M+2A562\M+2A6A8\M+2AB7E	1
D.35-41125-8R0	SCREW M2.5*8L B NI NY	7

2850 Bottom Cover Assembly

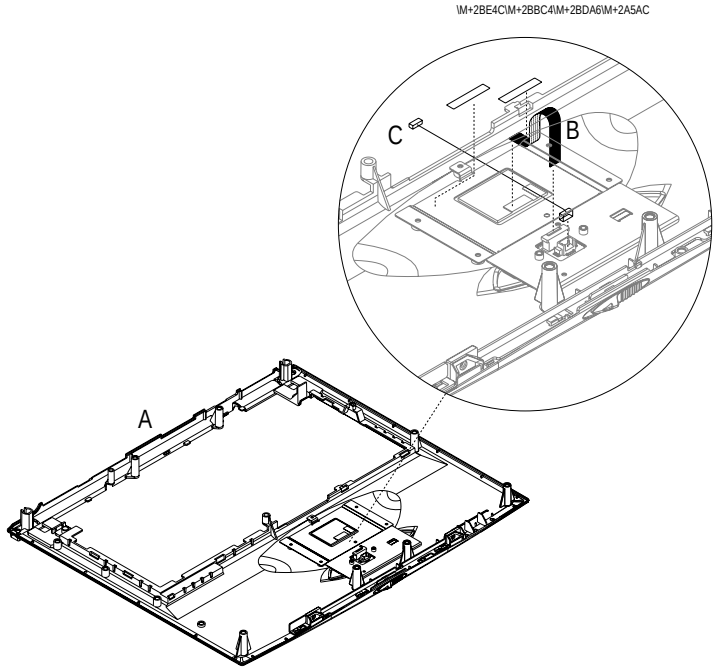
Fig. B – 8

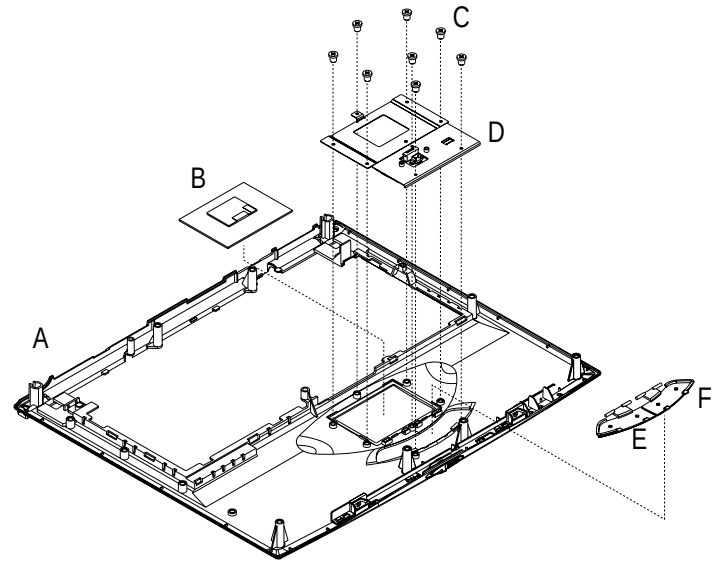
PARTS	NAME	Q'TY
PARTS NUMBER	DESCRIPTION	
A.	\M+2A457\M+2BB5C\M+2A94D\M+2A8E4\M+2A5A6\M+2B2D5\M+2A5F3	1
B.43-2800B-001	FPC CABLE FOR T/P	1
C.43-2800E-00	CABEL FOR CLICK BOARD	1

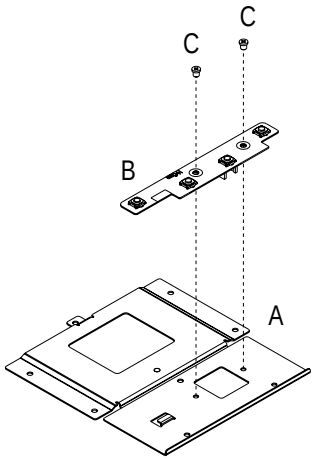
PARTS	NAME	Q'TY
PARTS NUMBER	DESCRIPTION	
A.	\M+2A457\M+2BB5C\M+2A94D\M+2C54B\M+2A5F3	1
B.	T/P \M+2AA4F	1
C.35-21120-3RA	SCREW M2.0*3L F NI NY	8
D.	T/P \M+2C54B\M+2A5F3	1
E.39-28507-001	TOUCH PAD BUTTON (R)	1
F.39-28508-001	TOUCH PAD BUTTON (L)	1

2850 Top Cover Assembly

Fig. B – 9



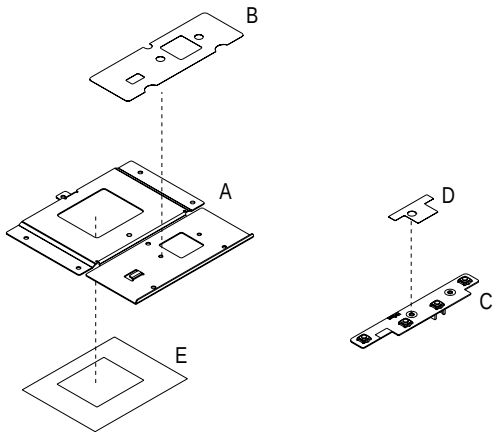




PARTS	NAME	Q'TY
PARTS NUMBER	DESCRIPTION	
A.79-2850C-0B0	T/P BRACKET ASS'Y 285	1
B.	285 CLICK BOARD	1
C.35-41120-3RA	SCREW M2*3L B NI ICT NY	1

2850 TouchPad Assembly

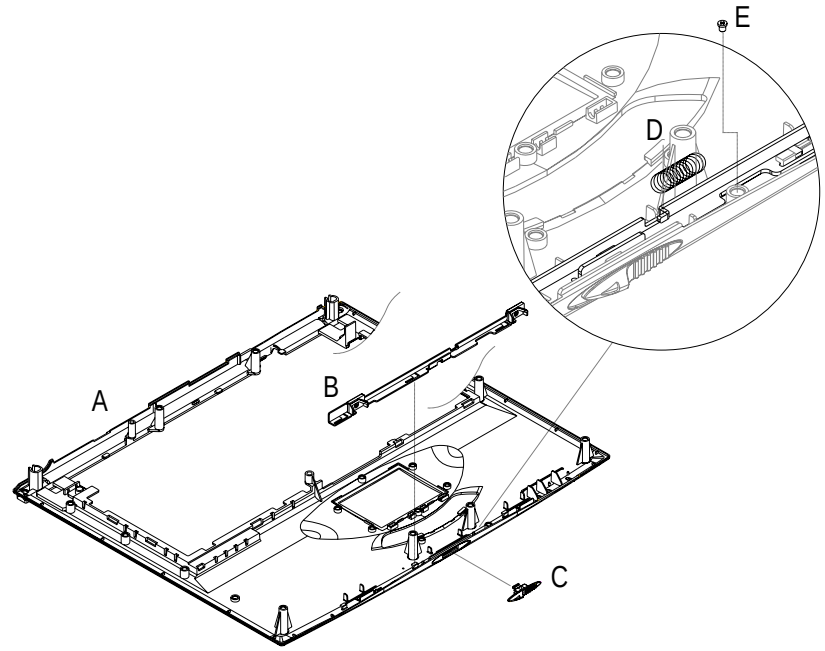
Fig. B – 10



PARTS	NAME	Q'TY
PARTS NUMBER	DESCRIPTION	
A.33-28503-000	TOUCH PAD BRACKET	1
B.40-28501-000	TOUCH-PAD MYLAR	1
C.	285 CLICK BOARD	1
D.40-28502-000	CLICK BOARD (TOP) MYLAR	1
E.40-28201-000	TRACK PAD MYLAR	1

2850 Latch Assembly

Fig. B – 11

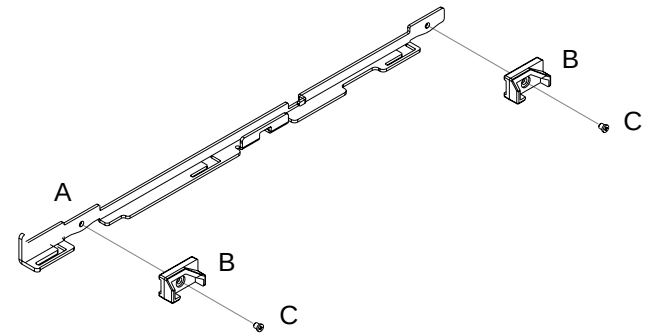


PARTS	NAME	Q'TY
PARTS NUMBER	DESCRIPTION	
A.79-2850C-0A0	TOP CASE ASS'Y 285	1
B.	LCD\M+2A564\M+2B95F\M+2C54B\M+2AC5B	1
C.39-28513-001	LCD HOOK KNOB	1
D.38-28501-000	LCD HOOK SPRING \M+2A3723.4mm	1
E.35-41120-3RA	SCREW M2*3L B NI ICT NY	1

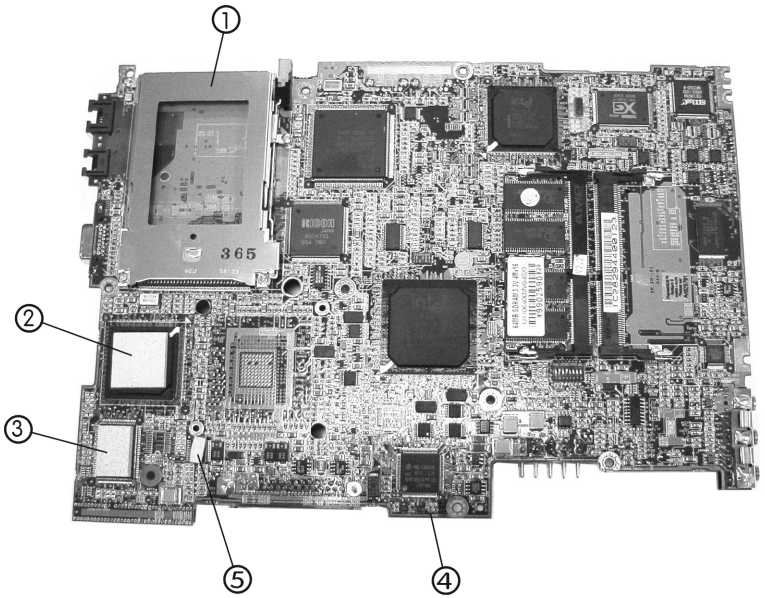
B

2850 LCD Latch Assembly

Fig. B – 12



PARTS	NAME	Q'TY
PARTS NUMBER	DESCRIPTION	
A.33-28506-001	LCD LATCH BRACKET	1
B.39-28512-000	LCD HOOK LATCH,POM 285	2
C.35-B1120-3R0	SCREW M2*3L K1 NI ICT	2



ITEM	PART NAME	PART NO.	Q'TY	REMARK
05	VRM (U8) THERMAL PAD	47-28201-030	1	
04	M/B V2.0	77-28200-002H	1	
03	SGRAM U7 THERMAL PAD	47-28H01-100	1	
02	VGA THERMAL PAD	47-28H01-160	1	
01	PCMCIA ASS'Y		1	

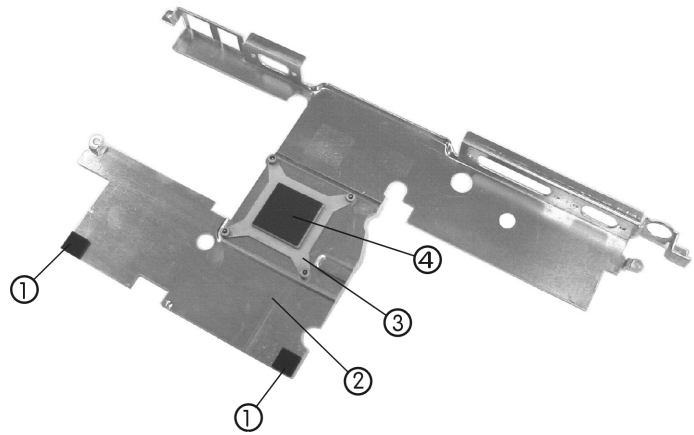
2820/2850 Mainboard Assembly

Fig. B – 13

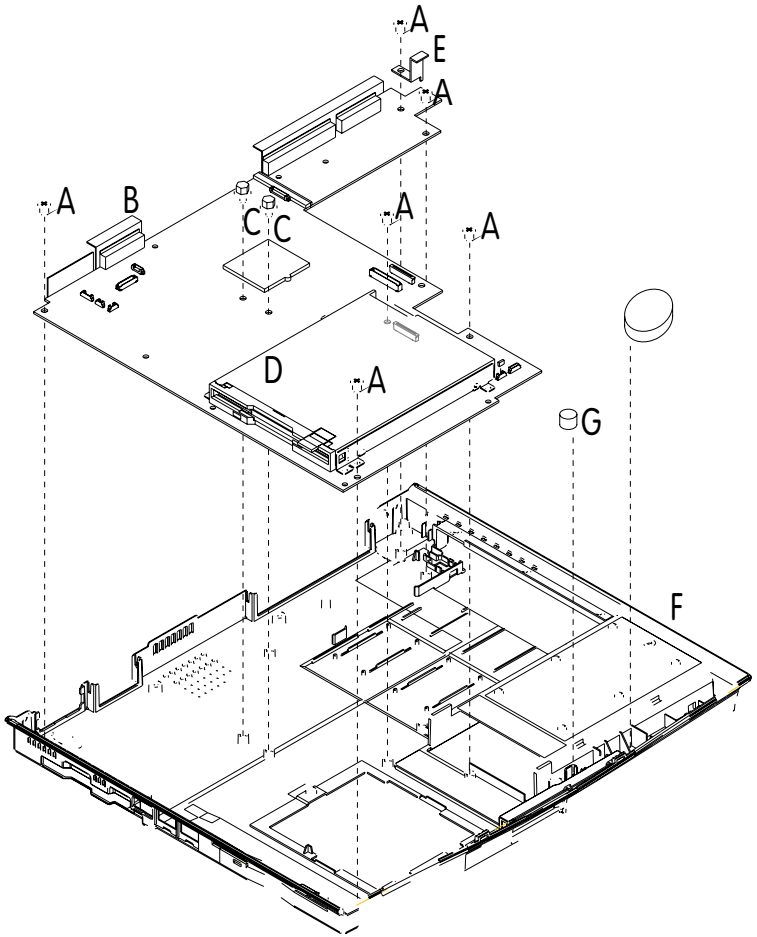
B

2820/2850 Bracket Assembly

Fig. B – 14



ITEM	PART NAME	PART NO.	Q'TY	REMARK
04	BOTTOM HEAT SINK RUBBER	47-28201-040	1	
03	BOTTOM HEAT SINK	33-28208-000	1	
02	REAR BRACKET	33-28202-001	1	
01	REAR BRACKET RUBBER	47-28H01-140	2	

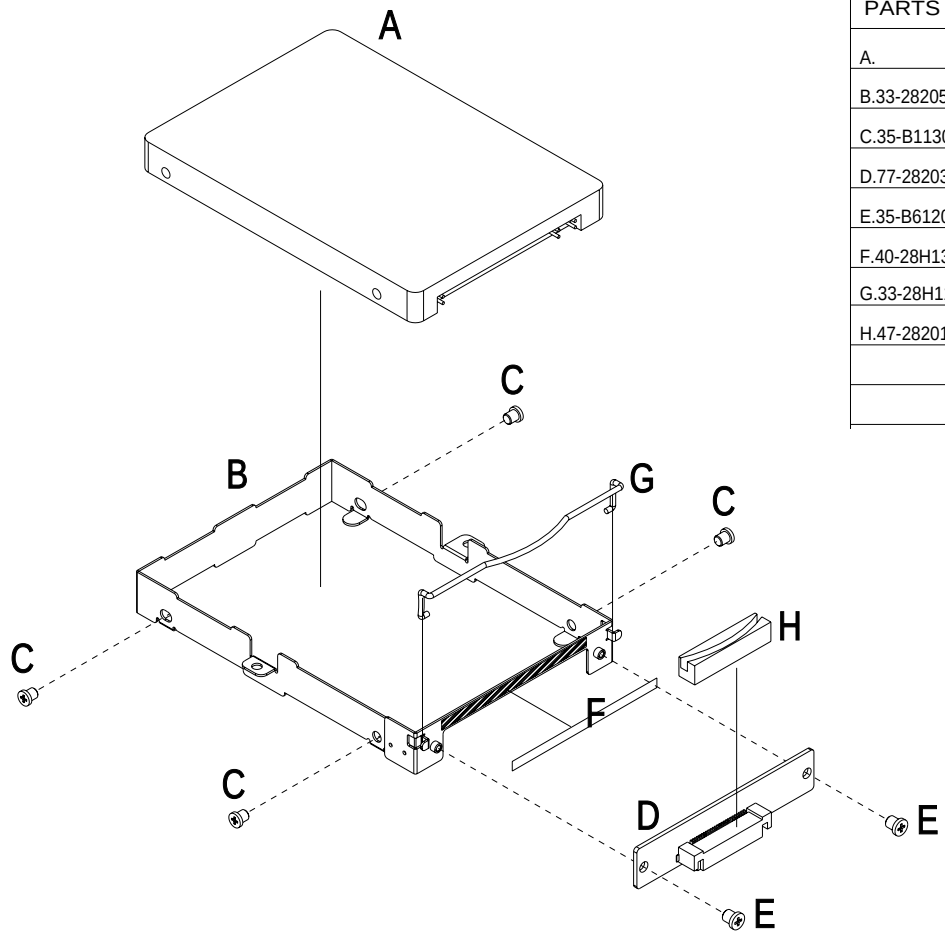


PARTS	NAME	Q'TY
PARTS NUMBER	DESCRIPTION	
A.35-41125-5RA	SCREW M2.5*5L B NI NY	6
B.	M/B ASS'Y	1
C.34-28H04-000	HEX STUD,\M+2BBC9 NI-PL	2
D.	FDD MODULE	1
E.33-28H20-000	K/B SUPPORT BRACKET	1
F.	\M+2A455\M+2BB5C	1
G.79-280HF-00A	MICRO PHONE & CABLE	1

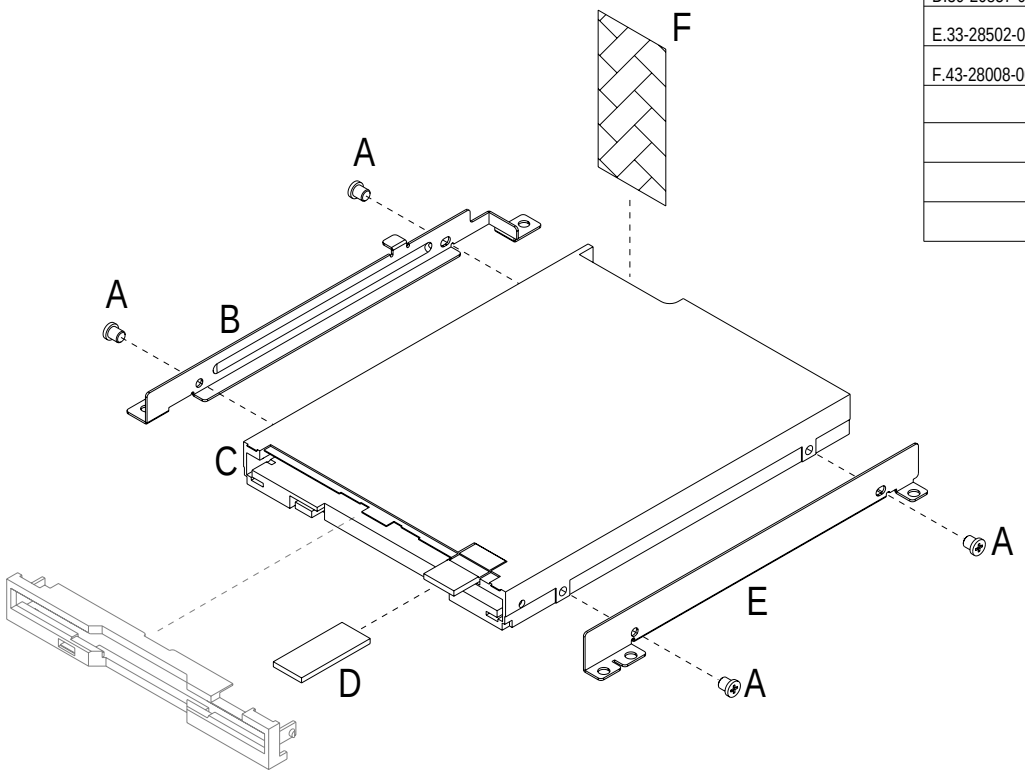
2850 Bottom Assembly
Fig. B – 15

B

2820/2850 HDD Assembly
Fig. B – 16



PARTS	NAME	Q'TY
PARTS NUMBER	DESCRIPTION	
A.	HDD	1
B.33-28205-002	HDD BRACKET,SUS	1
C.35-B1130-4RB	SCREW M3*4L KI NI ICT	4
D.77-28203-003	HDD CONVERTER BOARD V3	1
E.35-B6120-2R0	SCREW M2*2L KI BZ NY	2
F.40-28H13-001	HDD BRACKET MYLAR	1
G.33-28H11-000	HDD HANDLE,SUS	1
H.47-28201-010	HDD RUBBER,SILICONE	1



PARTS	NAME	Q'TY
PARTS NUMBER	DESCRIPTION	
A.35-06125-3R0	SCREW M2.5*3L P BZ NY	4
B.33-28501-000	FDD BRACKET (L)	1
C.	FDD	1
D.39-26857-000	BUTTON OF FDD MODULE	1
E.33-28502-000	FDD BRACKET (R)	1
F.43-28008-003	FPC CABLE FOR FDD V3.0	1

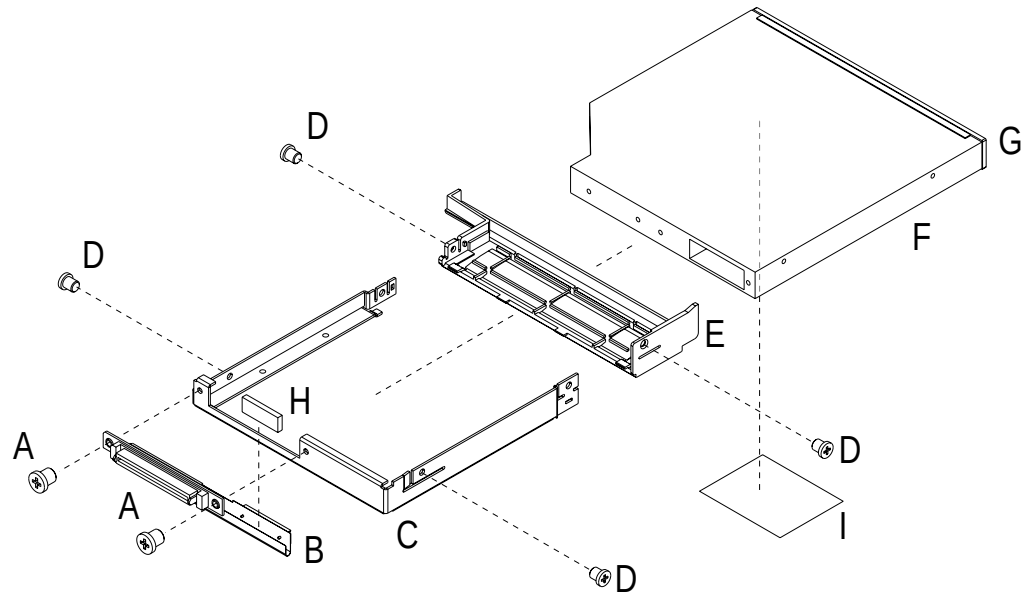
2850 FDD ASSEMBLY
FIG. B – 17

B

PARTS	NAME	Q'TY
PARTS NUMBER	DESCRIPTION	
A.35-41125-3RA	SCREW M2.5*3L B NI NY	2
B.43-28009-004C	M/B ASS'Y	1
C.33-28H12-002	CD BRACKET,SPCC 280H	1
D.35-21120-35B	M2*3.5L F BNI ICT NY	4
E.39-28H13-001	FPC CABLE (W/CU TAPE)	1
F.85-605OX-T01	CD-ROM TOSHIBA XM-7002B	1
G.39-28H39-000	CD-ROM BEZEL(TOS1902B)	1
H.47-28H01-090	CD-ROM RUBBER	1
I.45-28001-000	CD CAUTION LABEL 2800	1

2850 CD-ROM ASSEMBLY

FIG. B – 18



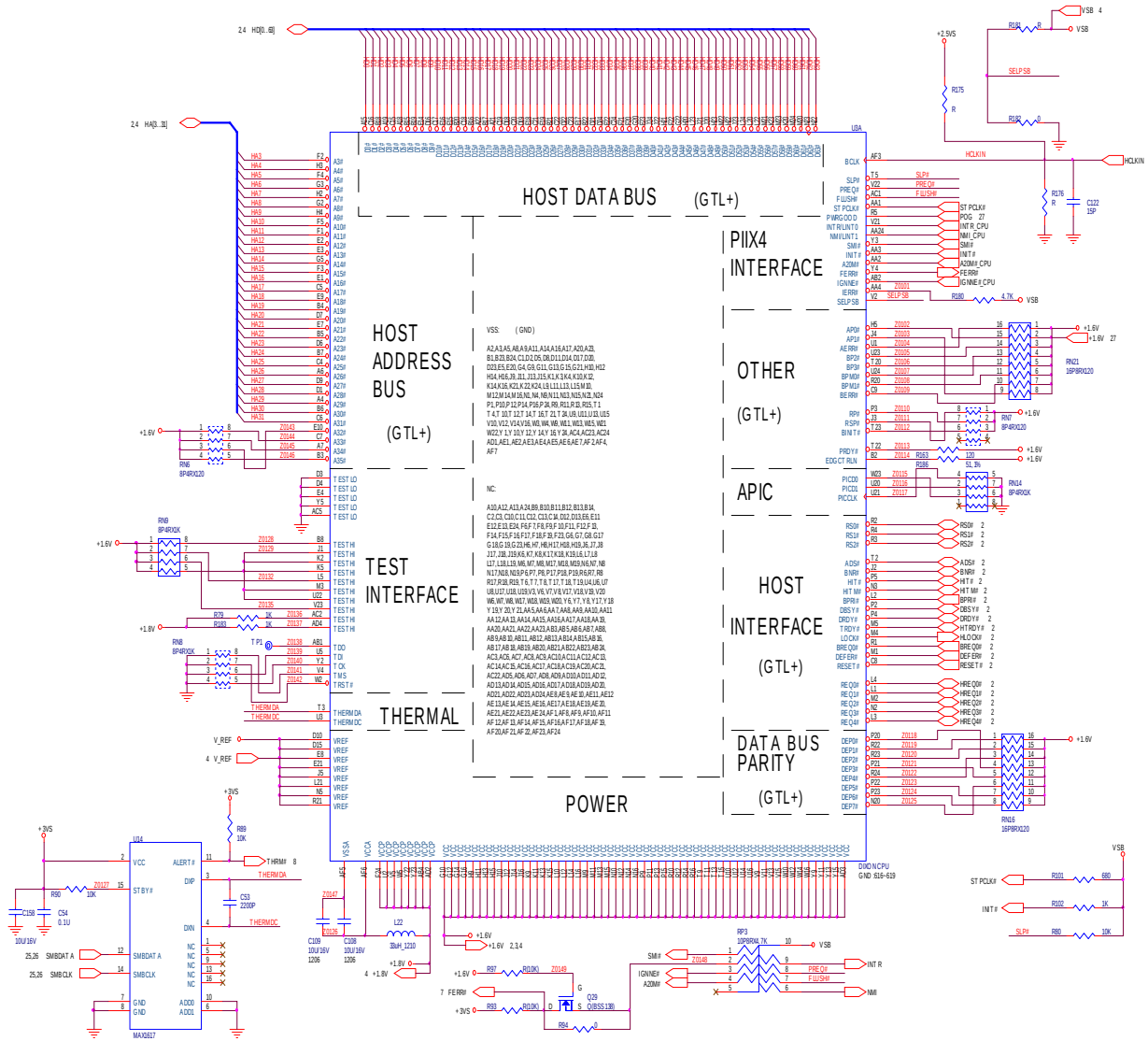
Appendix C 2800 Circuit Diagrams

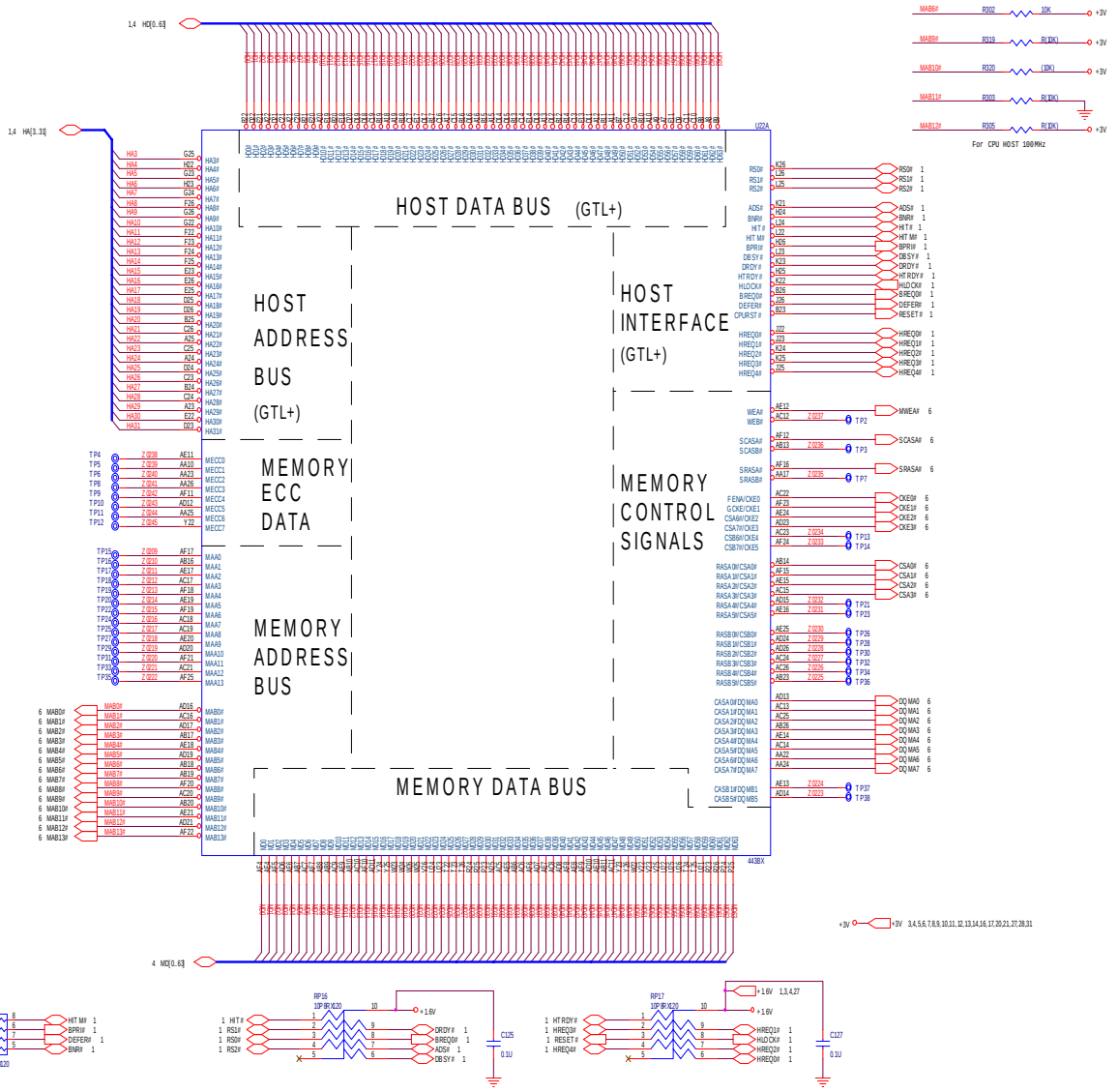
This appendix has circuit diagrams of the major parts of the 2800 notebook's mainboard.
We've included all available diagrams for version 3 and revised diagrams for version 4. So, if you are examining a version 4 mainboard and the diagram you want is not available, refer to one provided for version 3.
If the mainboard you are repairing is a different version, consult the manufacturer for the appropriate diagrams.

2800 VER 3 MAINBOARD

DIXON CPU
REV. 3
FIG. C – 1

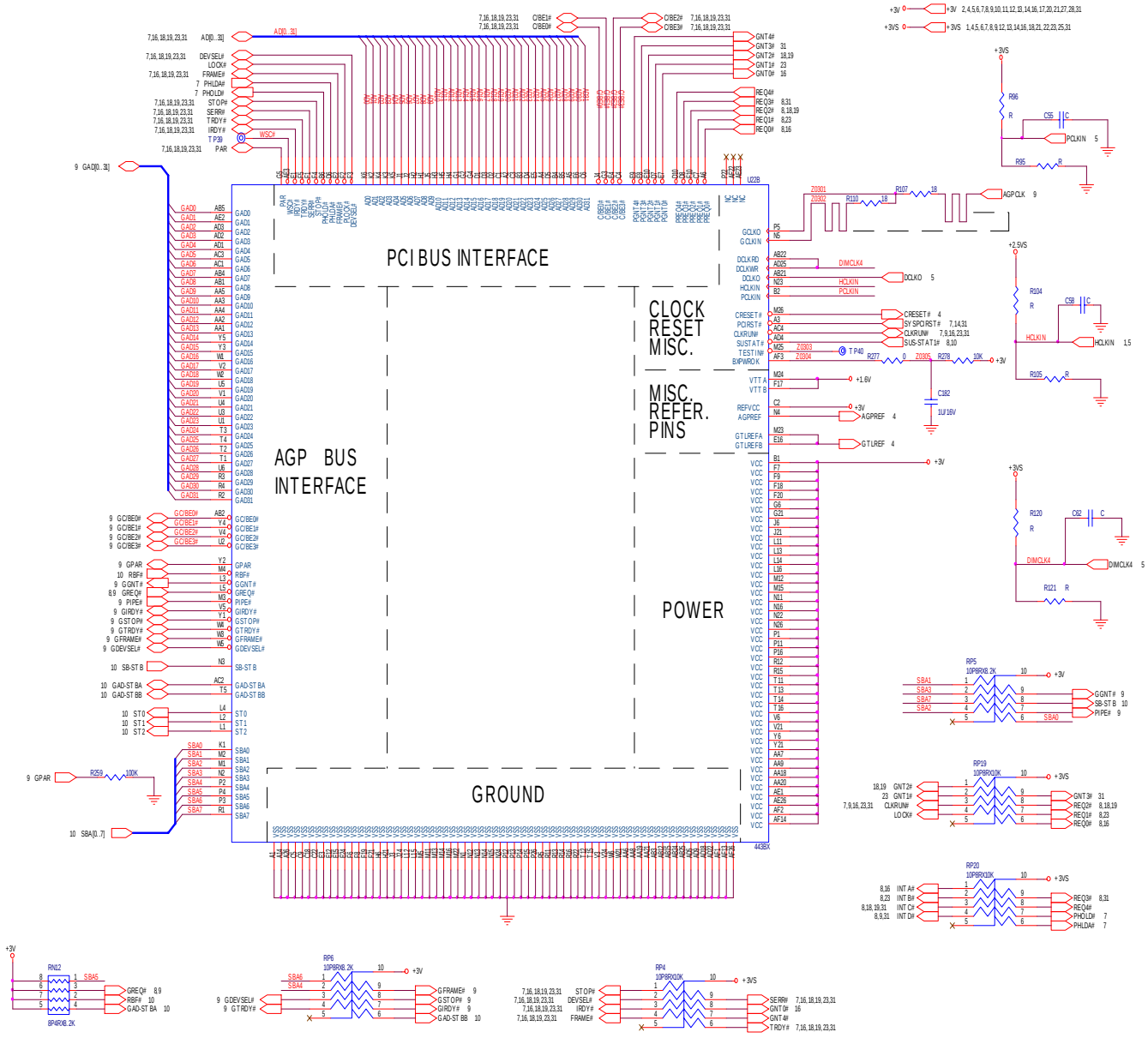
see Fig. C-32 for rev. 4

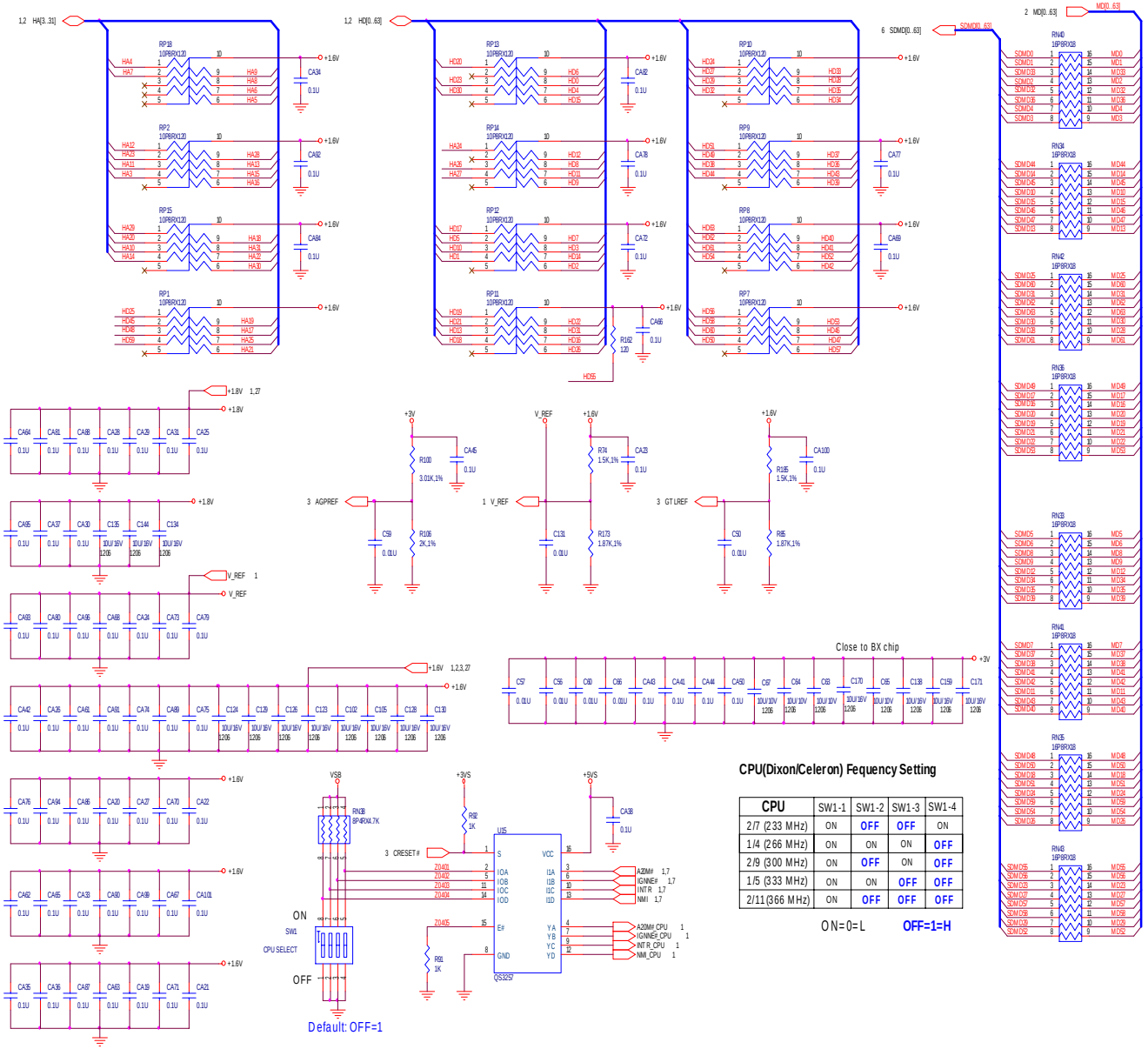



HOST DATA BUS (GTL+)
HOST ADDRESS BUS (GTL+)
HOST INTERFACE (GTL+)
MEMORY ECC DATA
MEMORY CONTROL SIGNALS
MEMORY ADDRESS BUS
MEMORY DATA BUS
443BX
For CPU HOST 100Mhz

443BX-2
REV. 3
FIG. C – 3

see Fig. C-33 for rev. 4





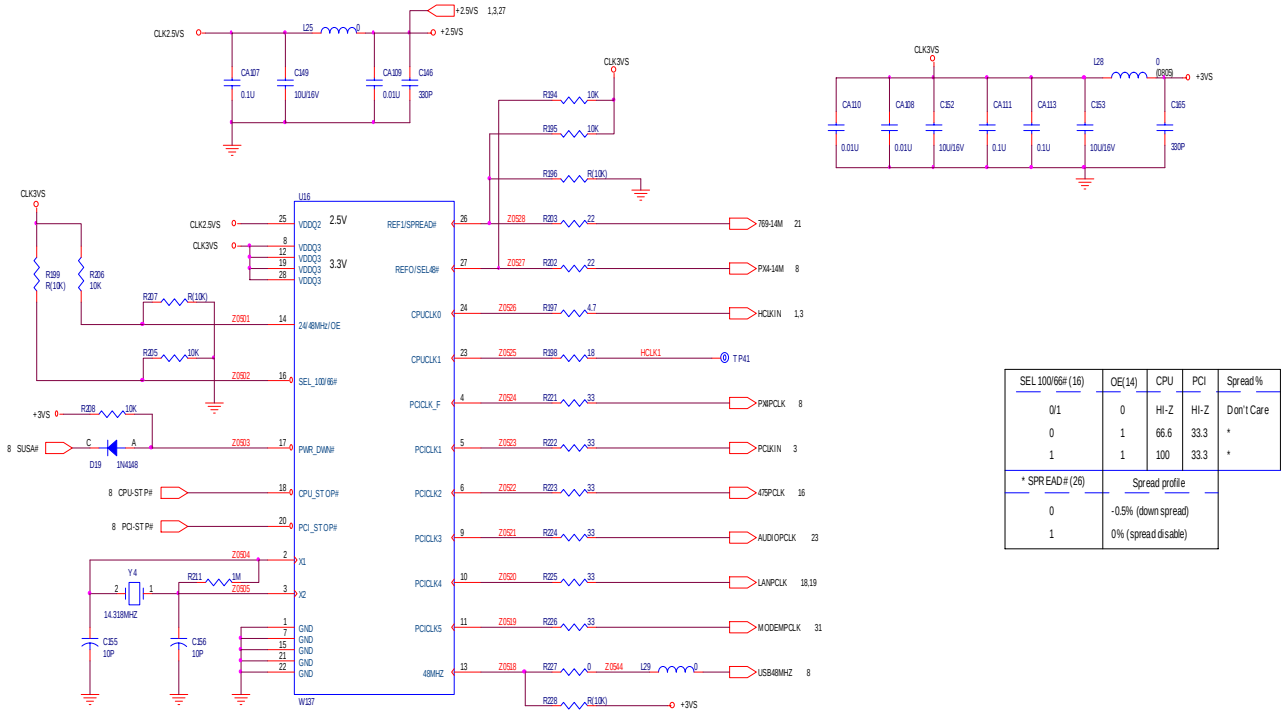
CPU	SW1-1	SW1-2	SW1-3	SW1-4
2/7 (233 MHz)	ON	OFF	OFF	ON
1/4 (266 MHz)	ON	ON	ON	OFF
2/9 (300 MHz)	ON	OFF	ON	OFF
1/5 (333 MHz)	ON	ON	OFF	OFF
2/11(366 MHz)	ON	OFF	OFF	OFF

ON=0=L OFF=1=H

DAMPING & DECOUPLING
REV. 3
FIG. C – 4

see Fig. C-34 for rev. 4

C

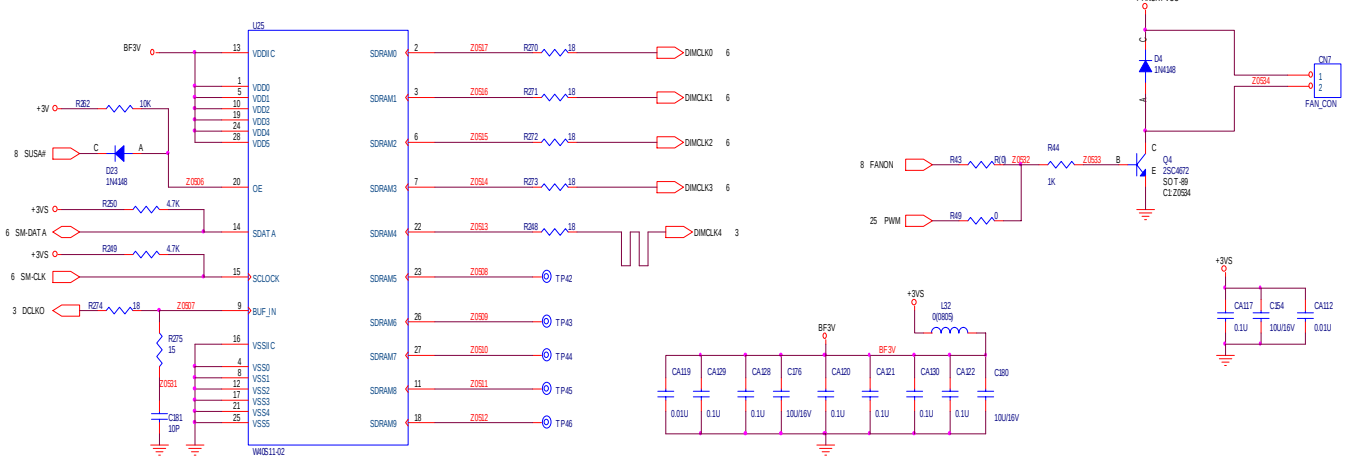


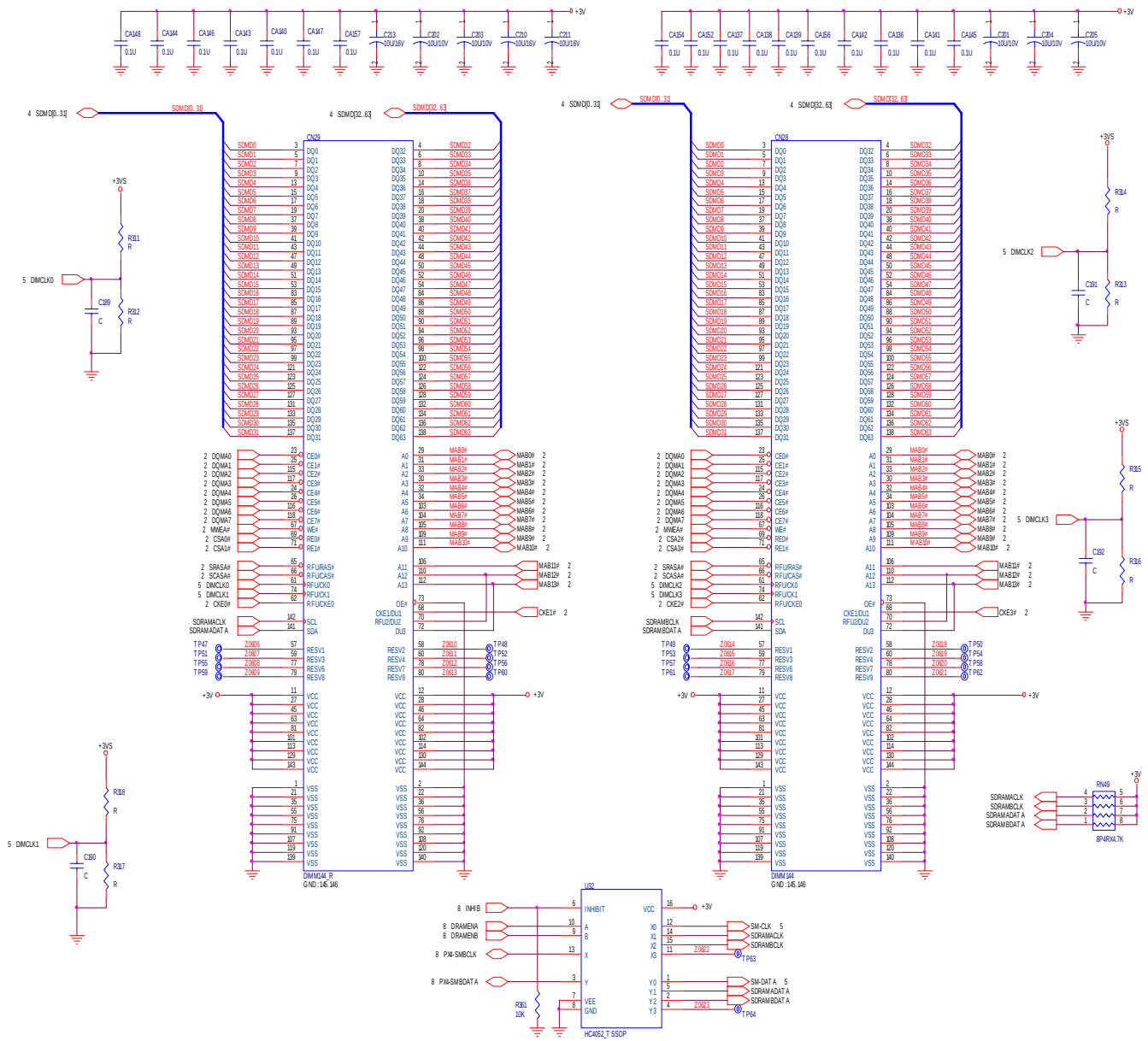
SEL 100/66# (16)	OE(14)	CPU	PCI	Spread %
0/1	0	HI-Z	HI-Z	Don't Care
0	1	66.6	33.3	*
1	1	100	33.3	*

* SPREAD# (26)	Spread profile
0	-0.5% (down spread)
1	0% (spread disable)

CLOCK GENERATOR
REV. 3
FIG. C – 5

see Fig. C-35 for rev. 4





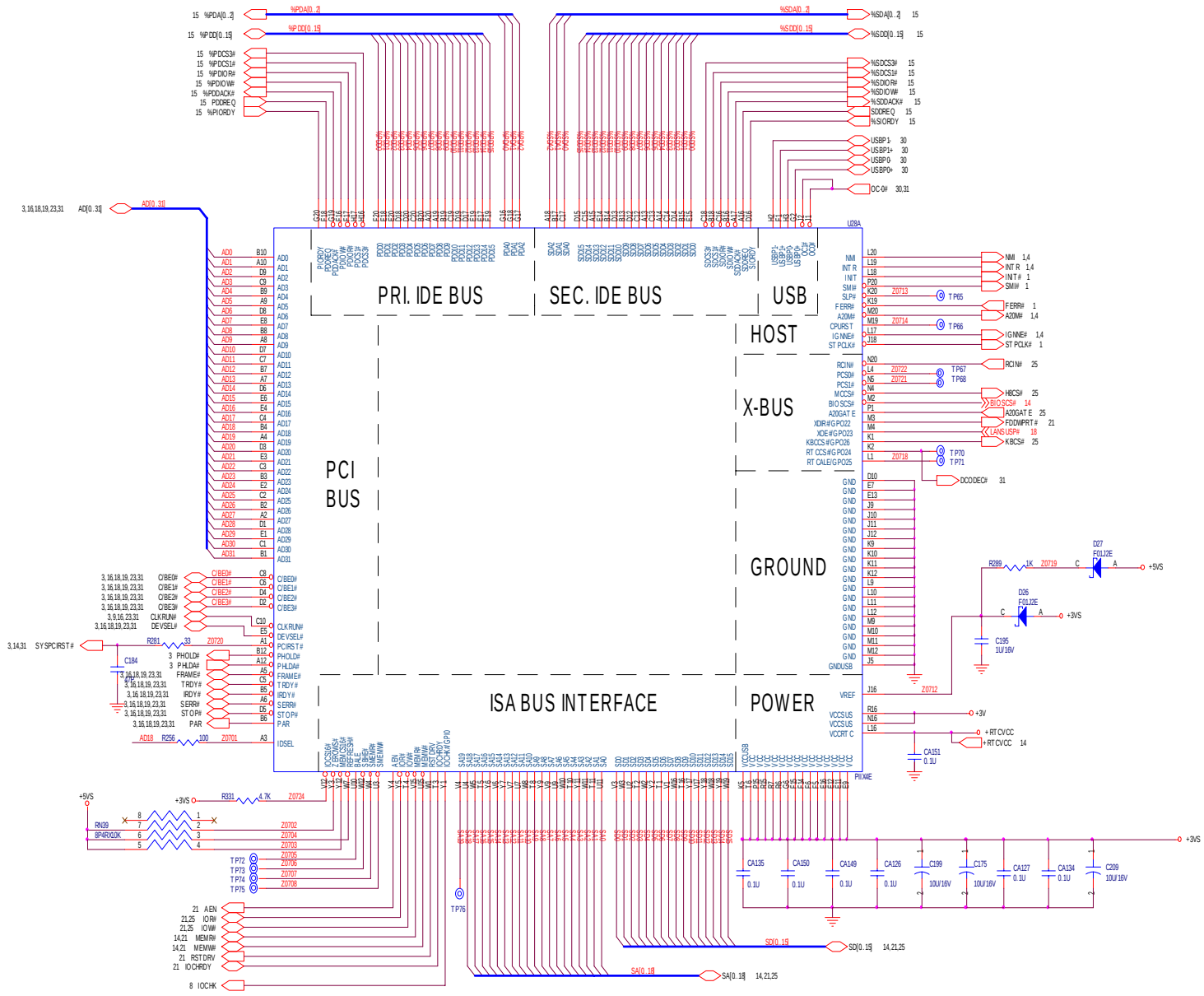
SODIMM SDRAM

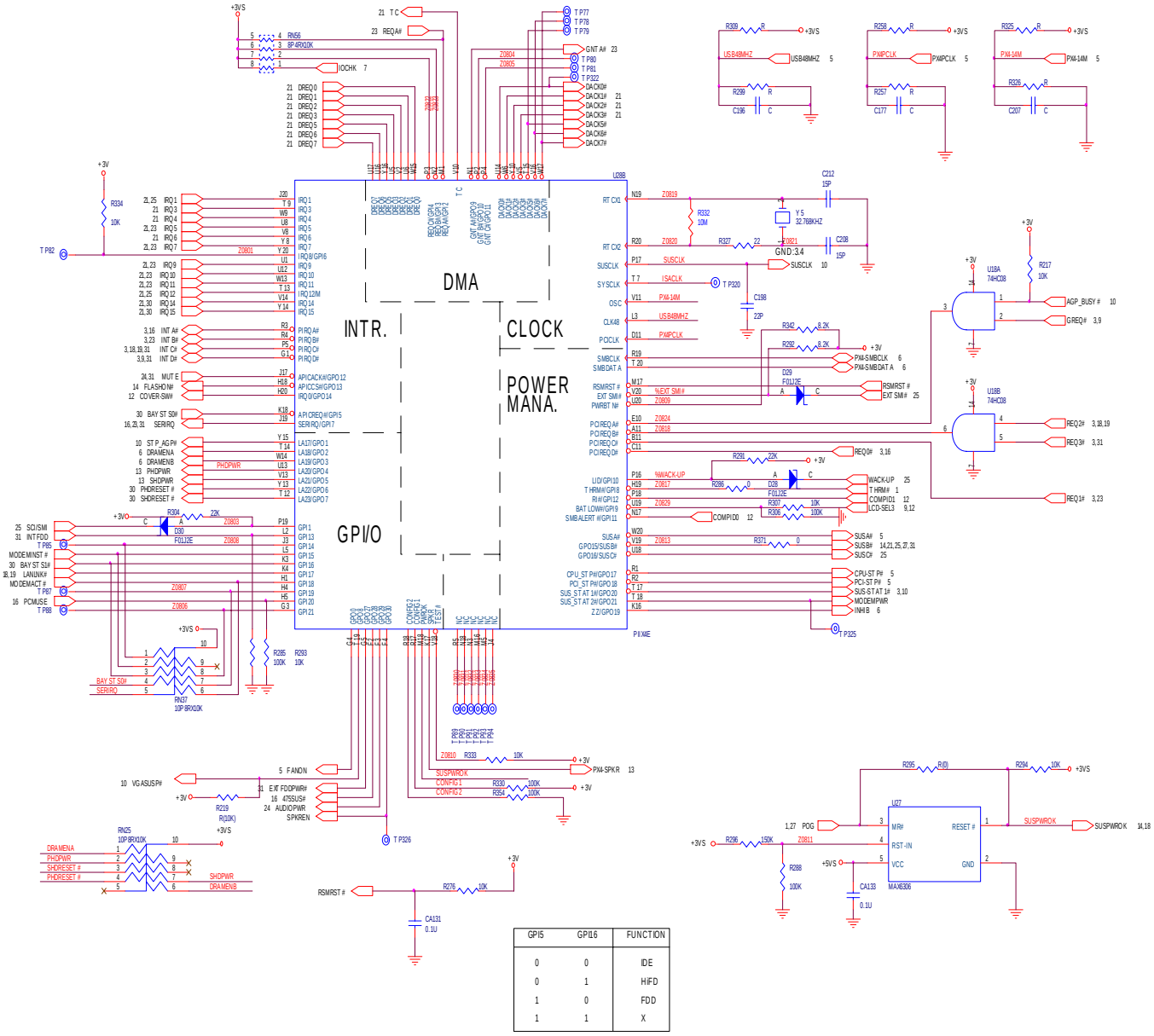
REV. 3

FIG. C – 6

C

INTEL 82371EB PIIX4E-1
REV. 3
FIG. C – 7





GPI5	GPI16	FUNCTION
0	0	IDE
0	1	HIFD
1	0	FDD
1	1	X

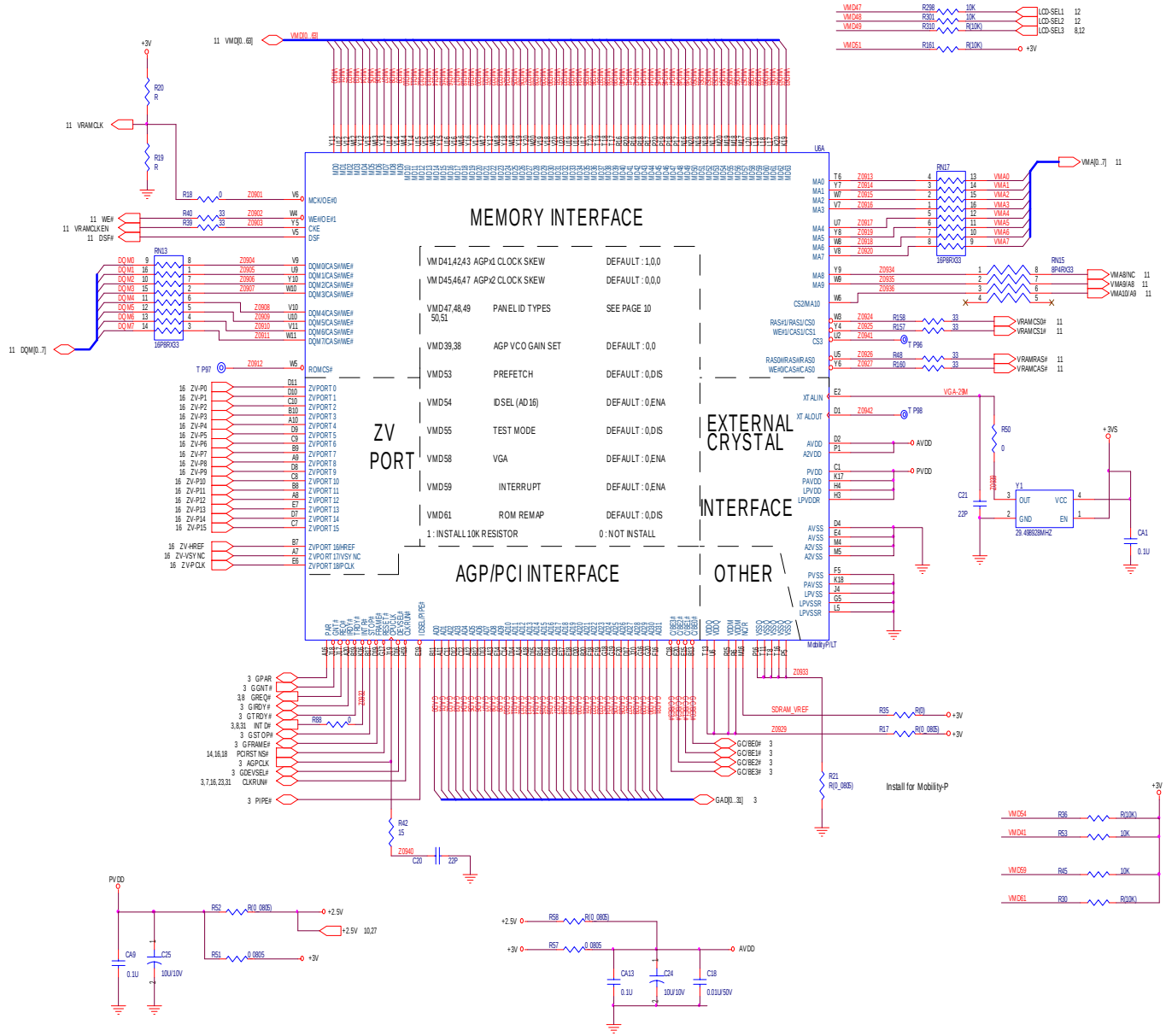
INTEL 82371EB PIIX4E-2
REV. 3
FIG. C – 8

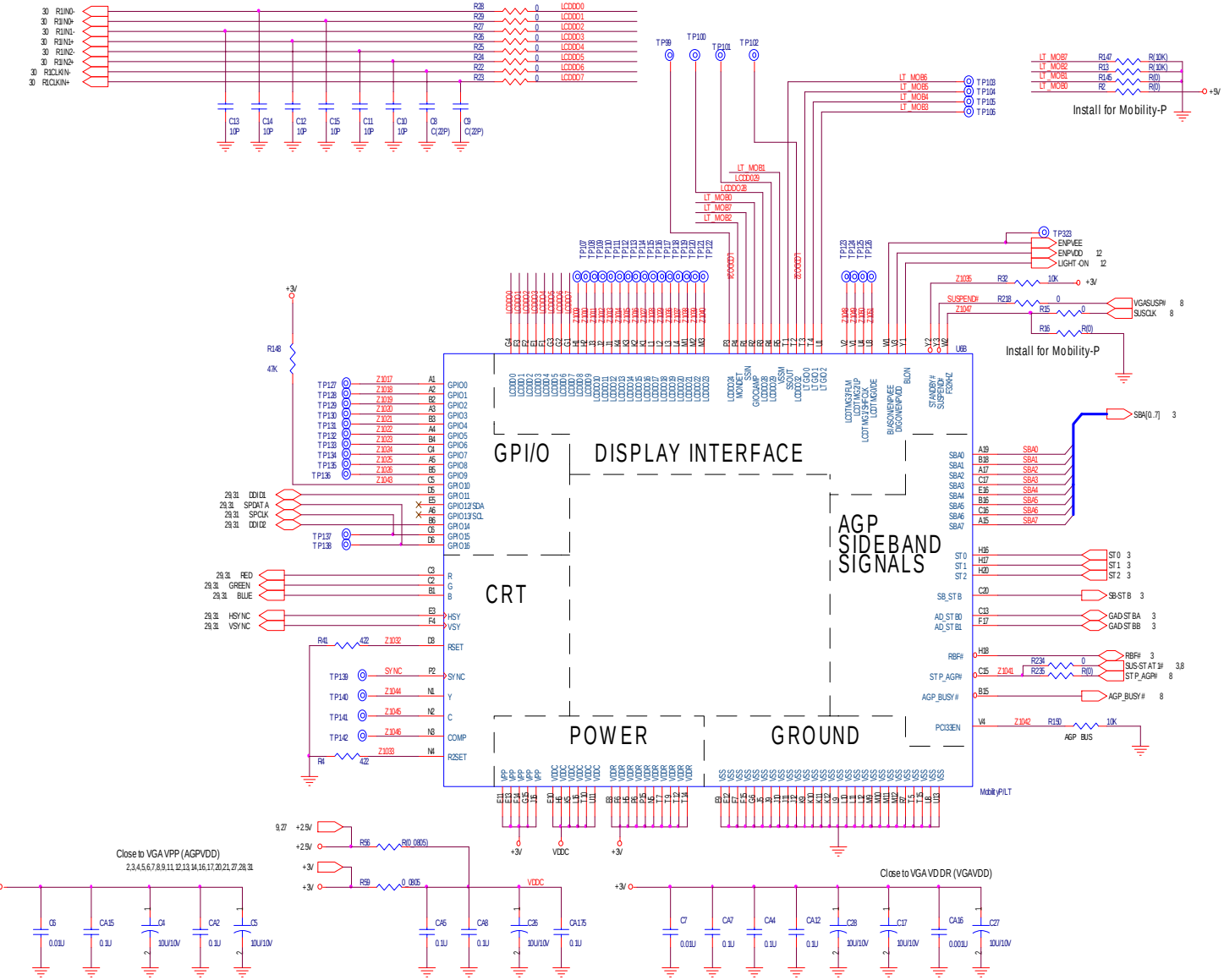
see Fig. C-36 for rev. 4

C

VGA CONTROLLER
REV. 3
FIG. C – 9

see Fig. C-37 for rev. 4

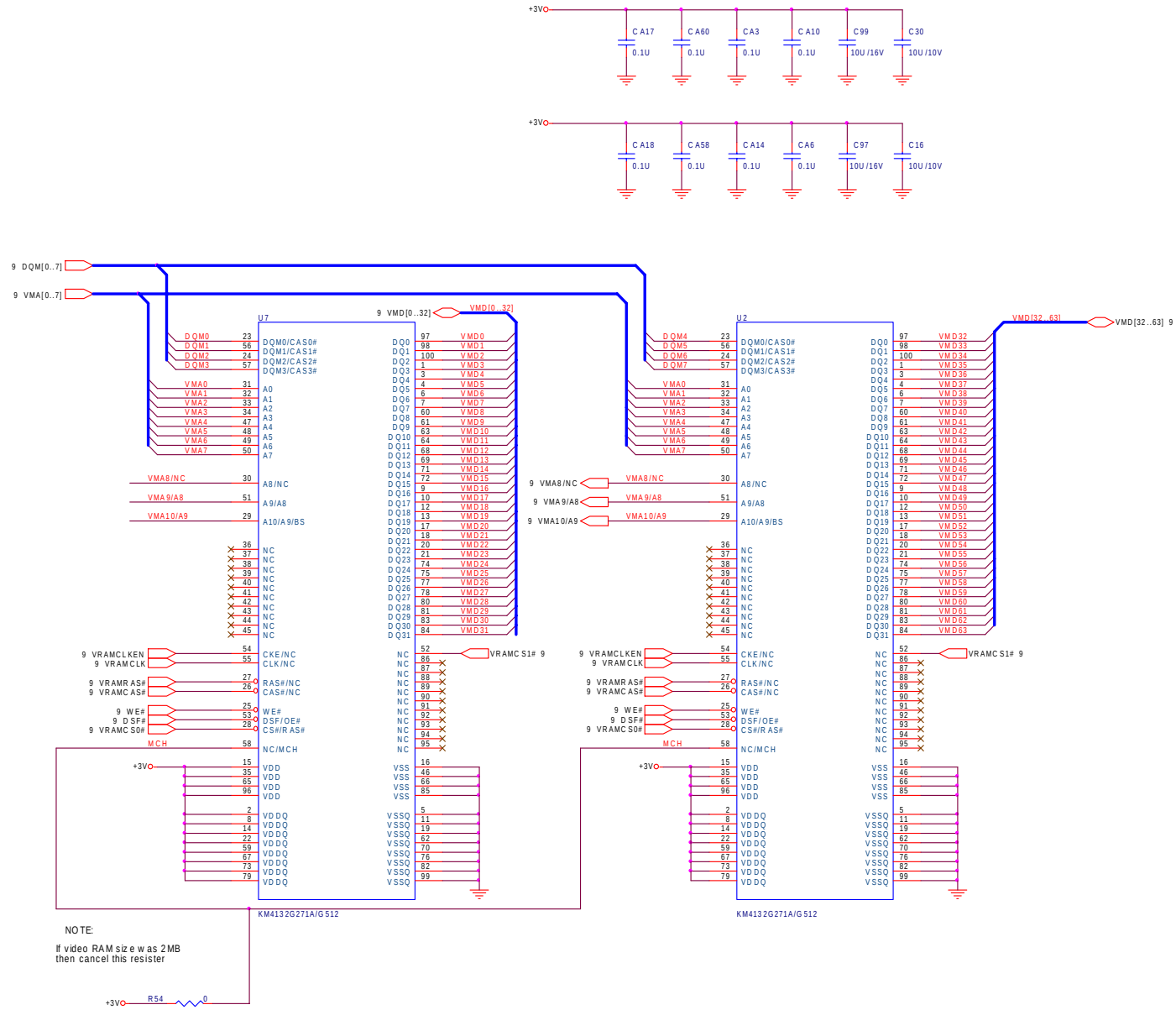




VGA CONTROLLER-2
REV. 3
FIG. C – 10

C

SGRAM 4MB
REV. 3
FIG. C – 11

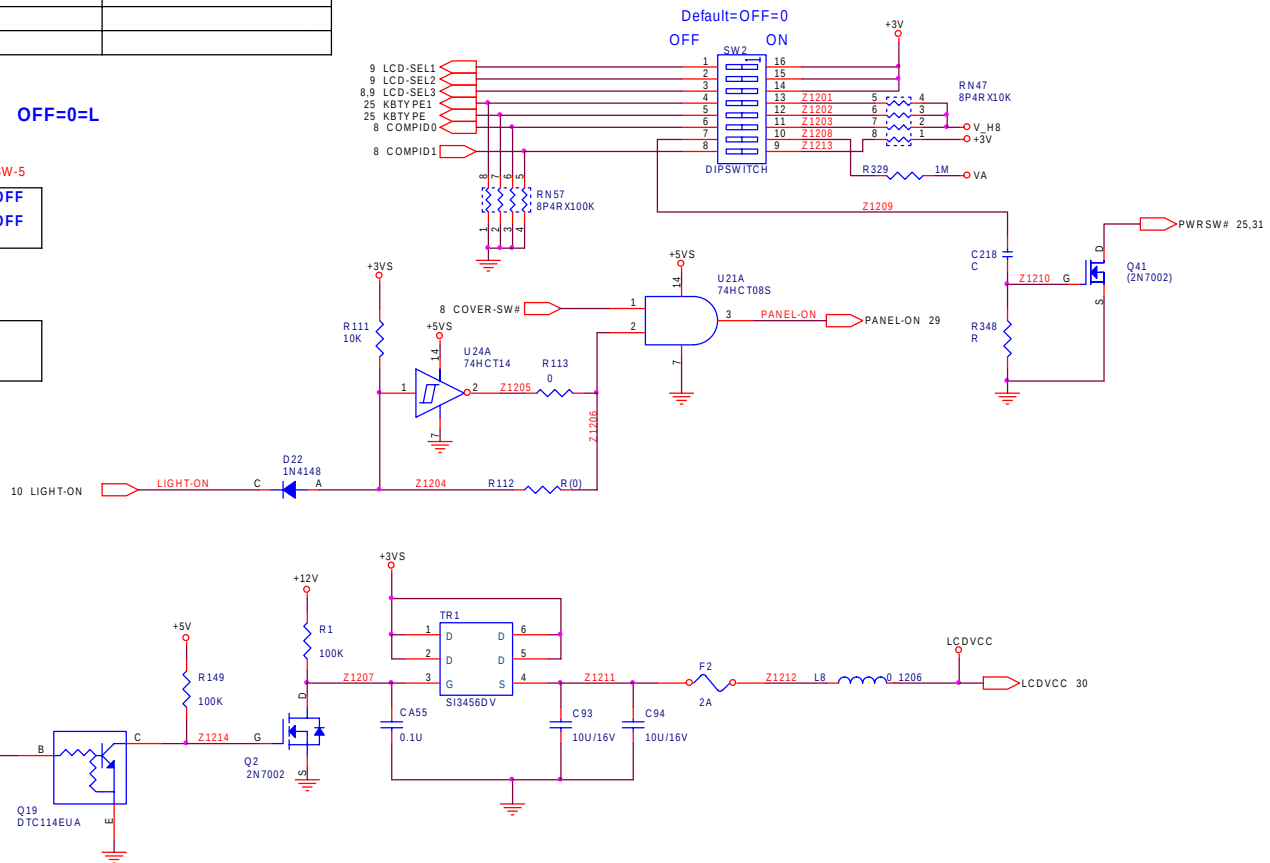


PANEL TYPE		SW-1	SW-2	SW-3
ID1	12.1" S-TFT FUJITSU-FLC31SVC6S-17	ON	**OFF**	**OFF**
ID2	13.3" X-TFT Hitachi-TX34D74VC1CAA	**OFF**	ON	**OFF**
ID3	14.1" X-TFT Hitachi-TX36D75VC1CAA	ON	ON	**OFF**
ID4				
ID5				

ON=1=H **OFF=0=L**

K/B TYPE	SW-4	SW-5
US	**OFF**	**OFF**
JP	ON	**OFF**

COMPANY ID	SW-6
HTC	**OFF**
CLEVO	ON



LCD INTERFACE
REV. 3
FIG. C – 12

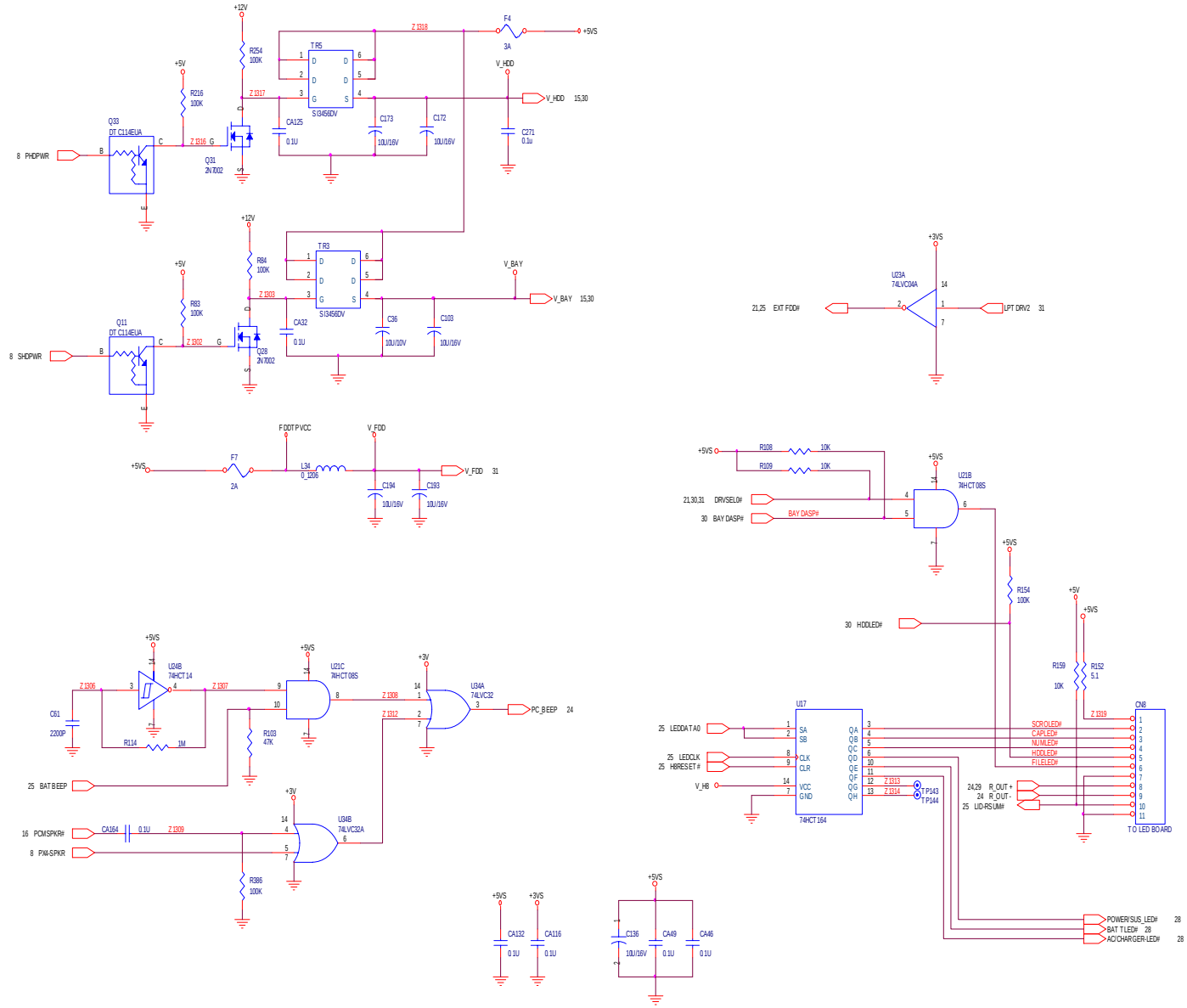
see Fig. C-38 for rev. 4

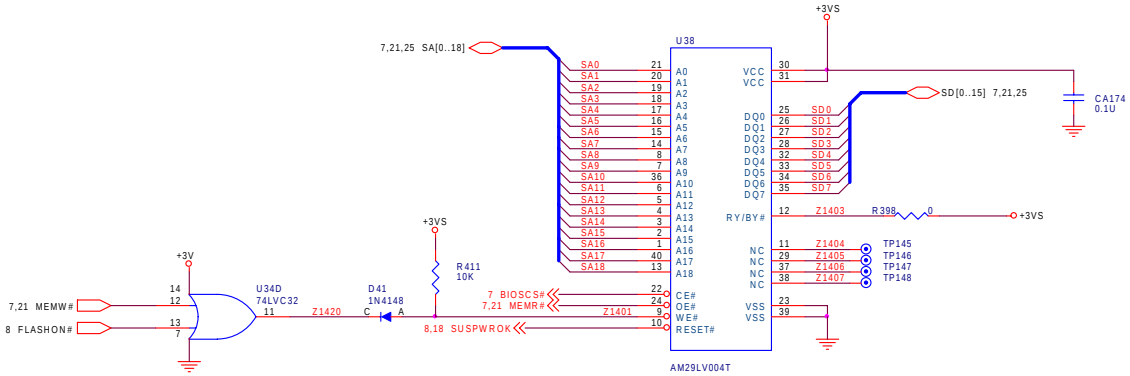
C

IO INDICATOR & MODEM CONNECTOR REV. 3

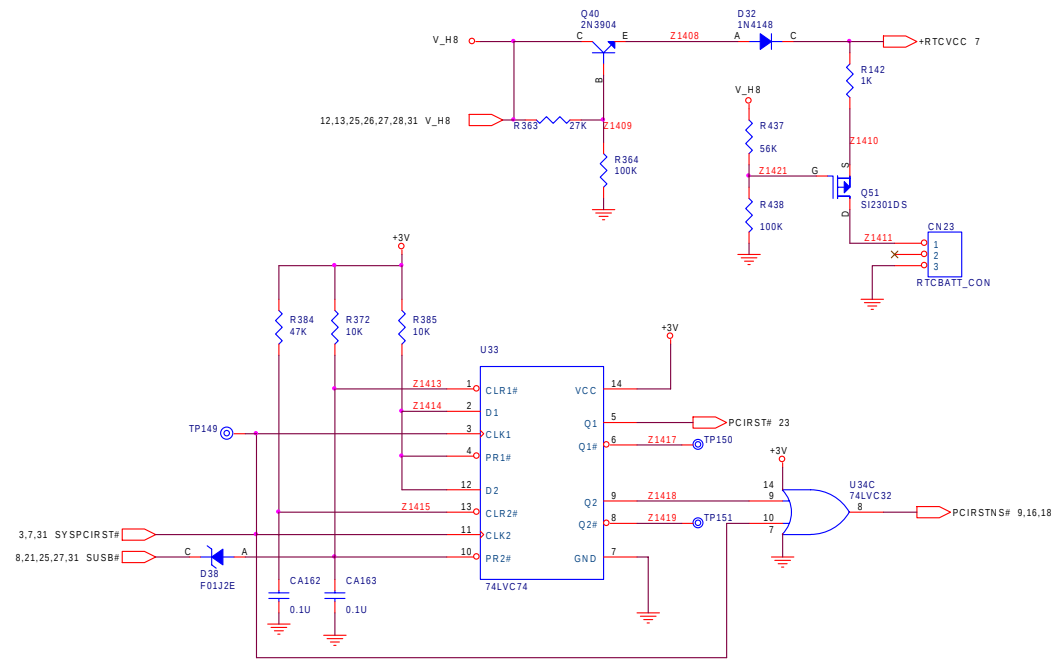
FIG. C – 13

see Fig. C-39 for rev. 4



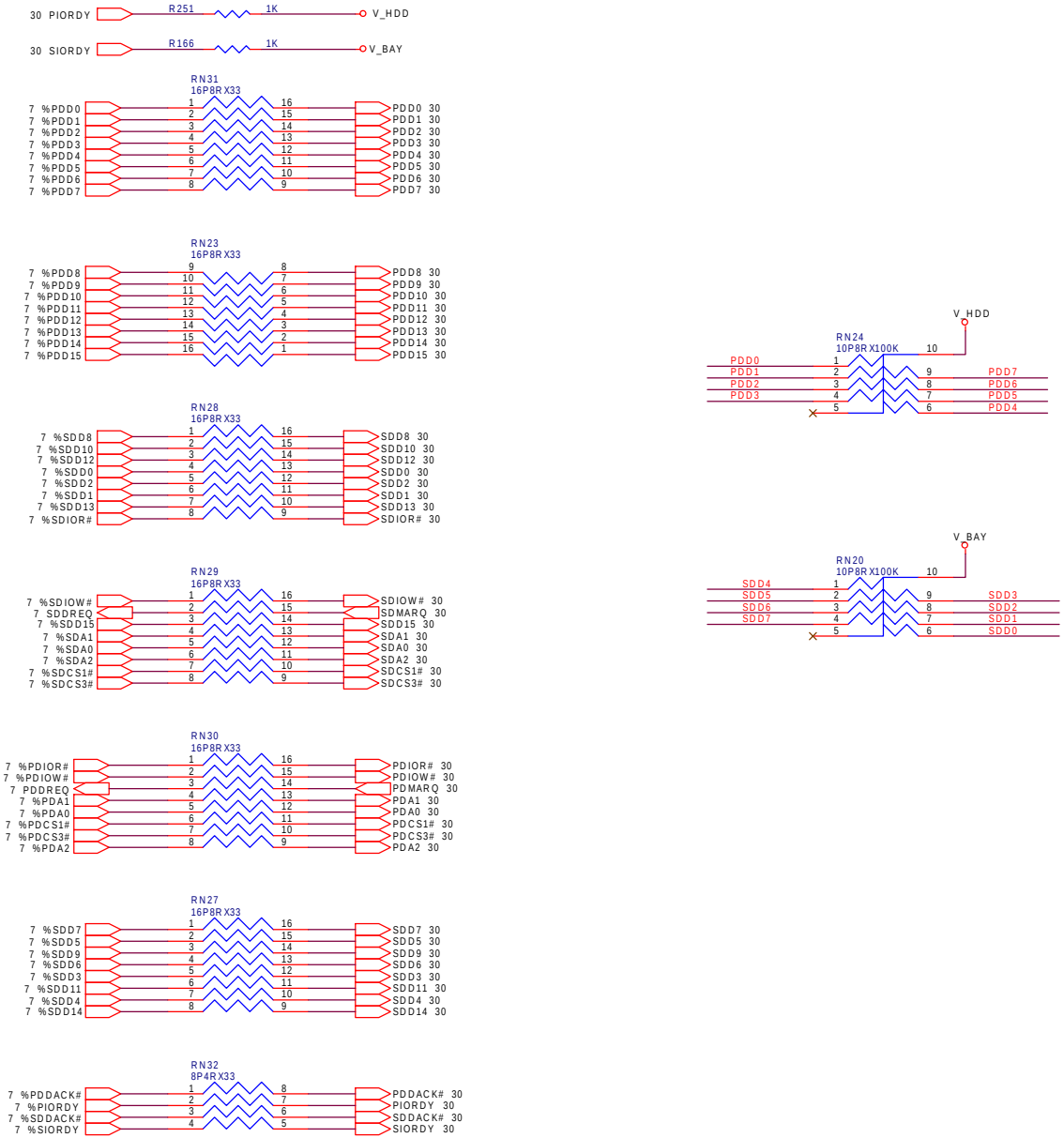


FOR CMOS RESET

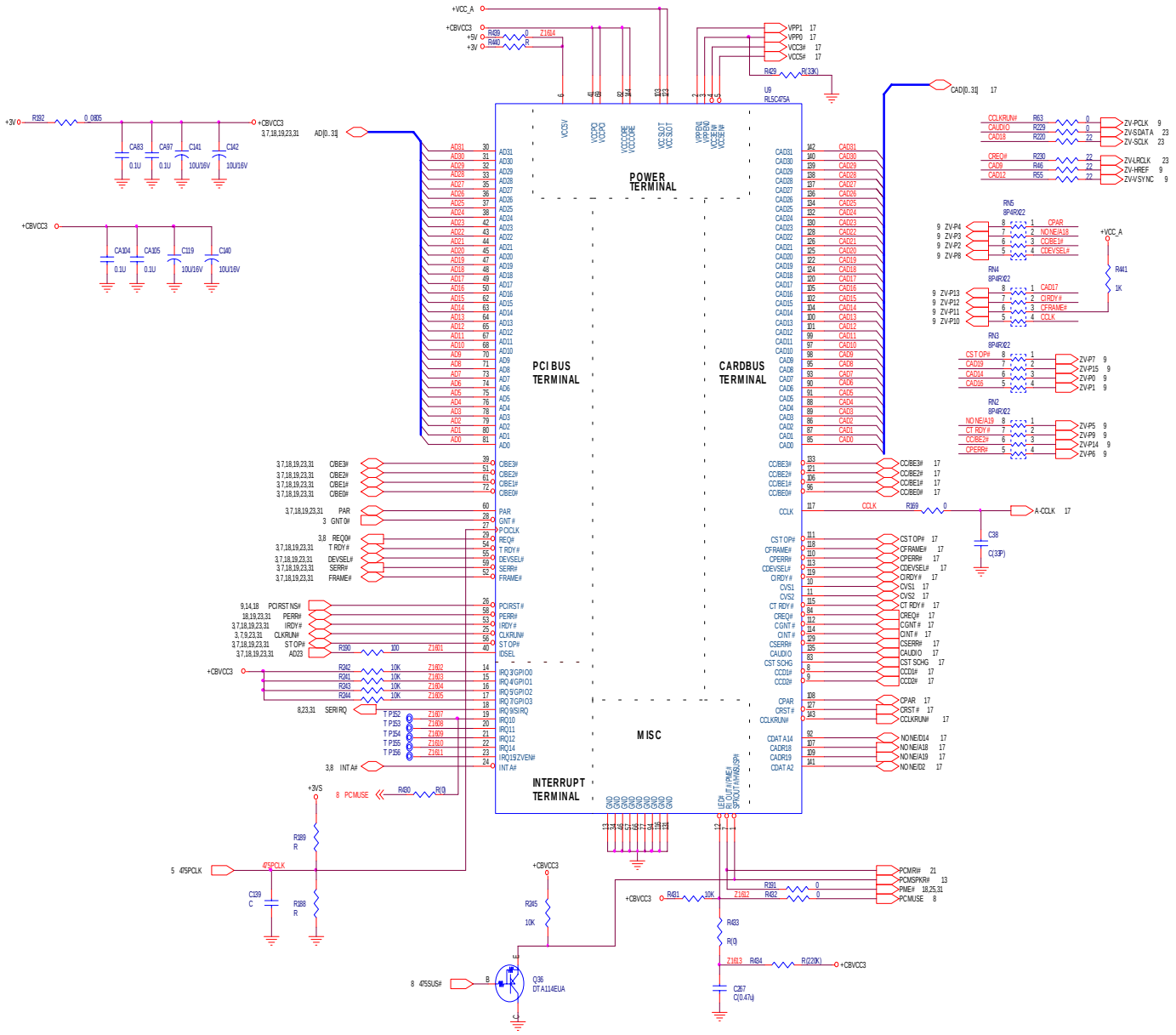


BIOS & RTC
REV. 3
FIG. C – 14

C



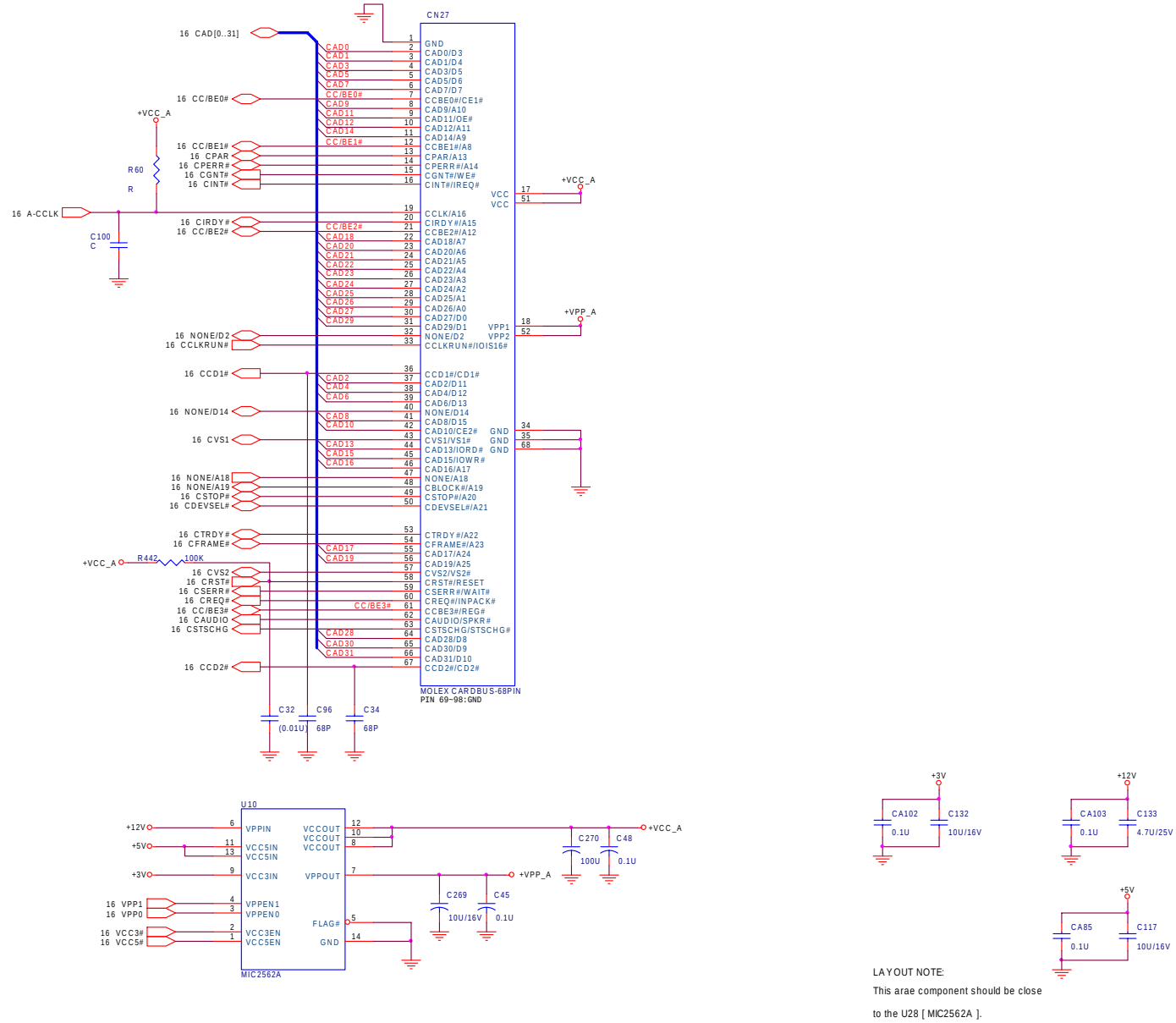
IDE INTERFACE
REV. 3
FIG. C – 15

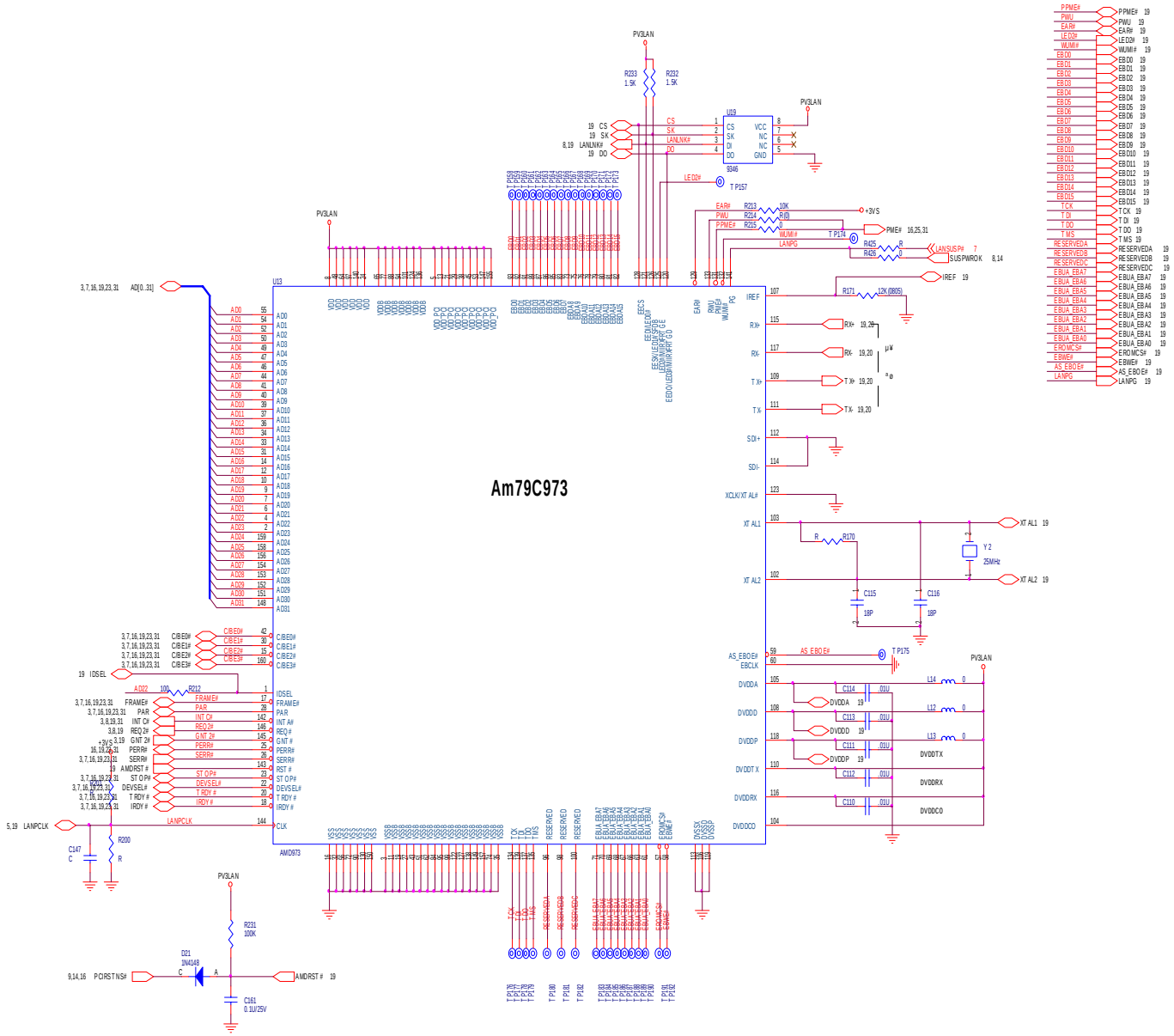


CARDBUS CONTROLLER
REV. 3
FIG. C – 16

C

CARDBUS SLOT
REV. 3
FIG. C – 17





LAN CONTROLLER 973
REV. 3
FIG. C – 18

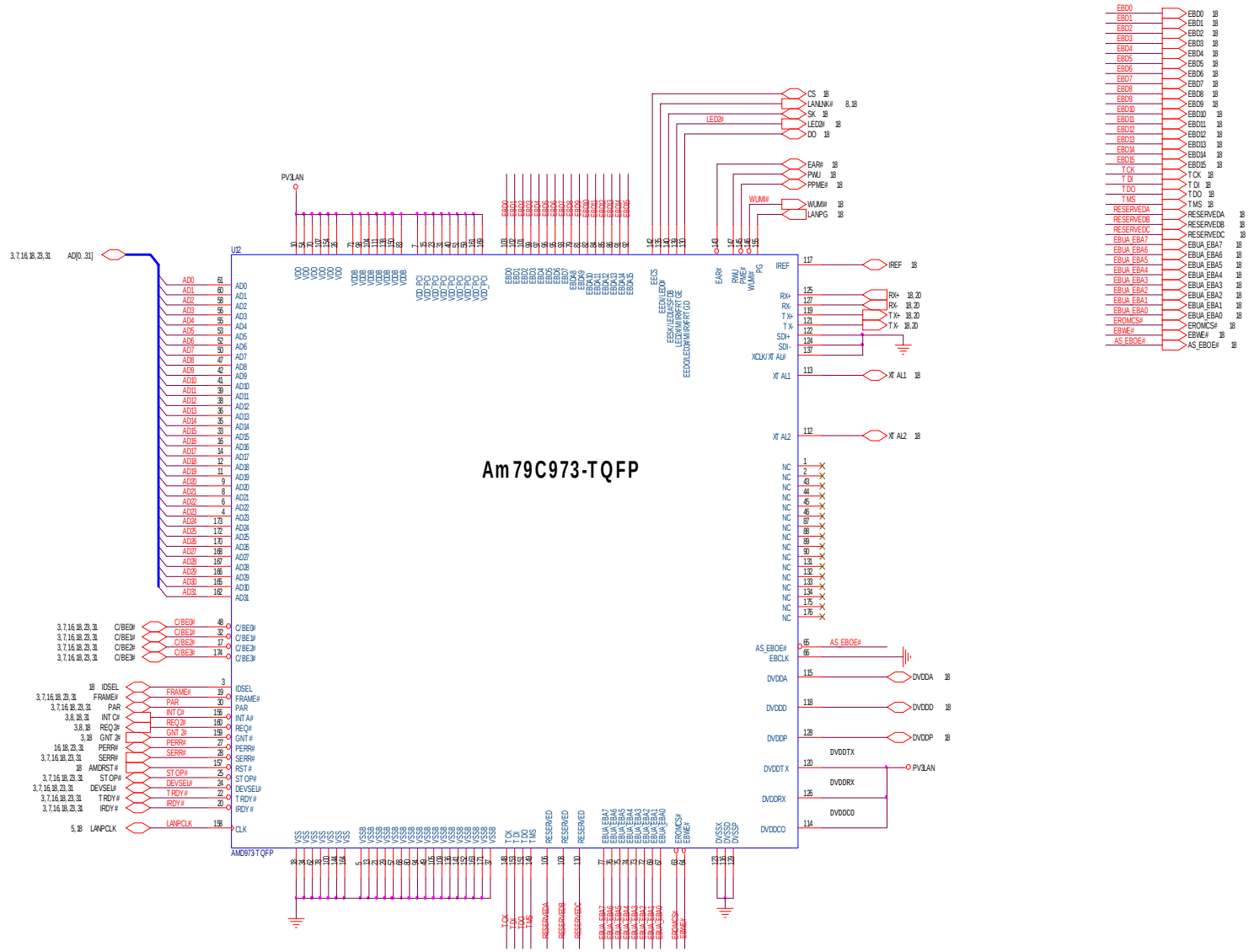
see Fig. C-40 for rev. 4

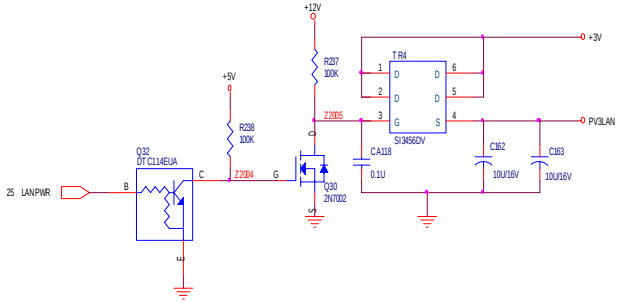
C

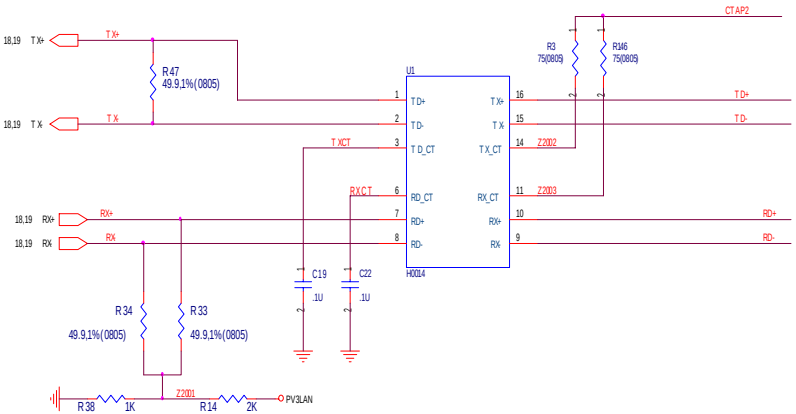
LAN CONTROLLER 973

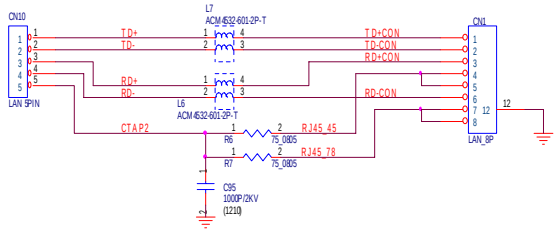
REV. 3

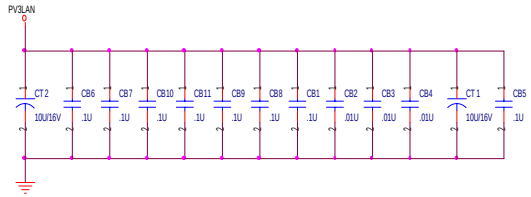
FIG. C – 19









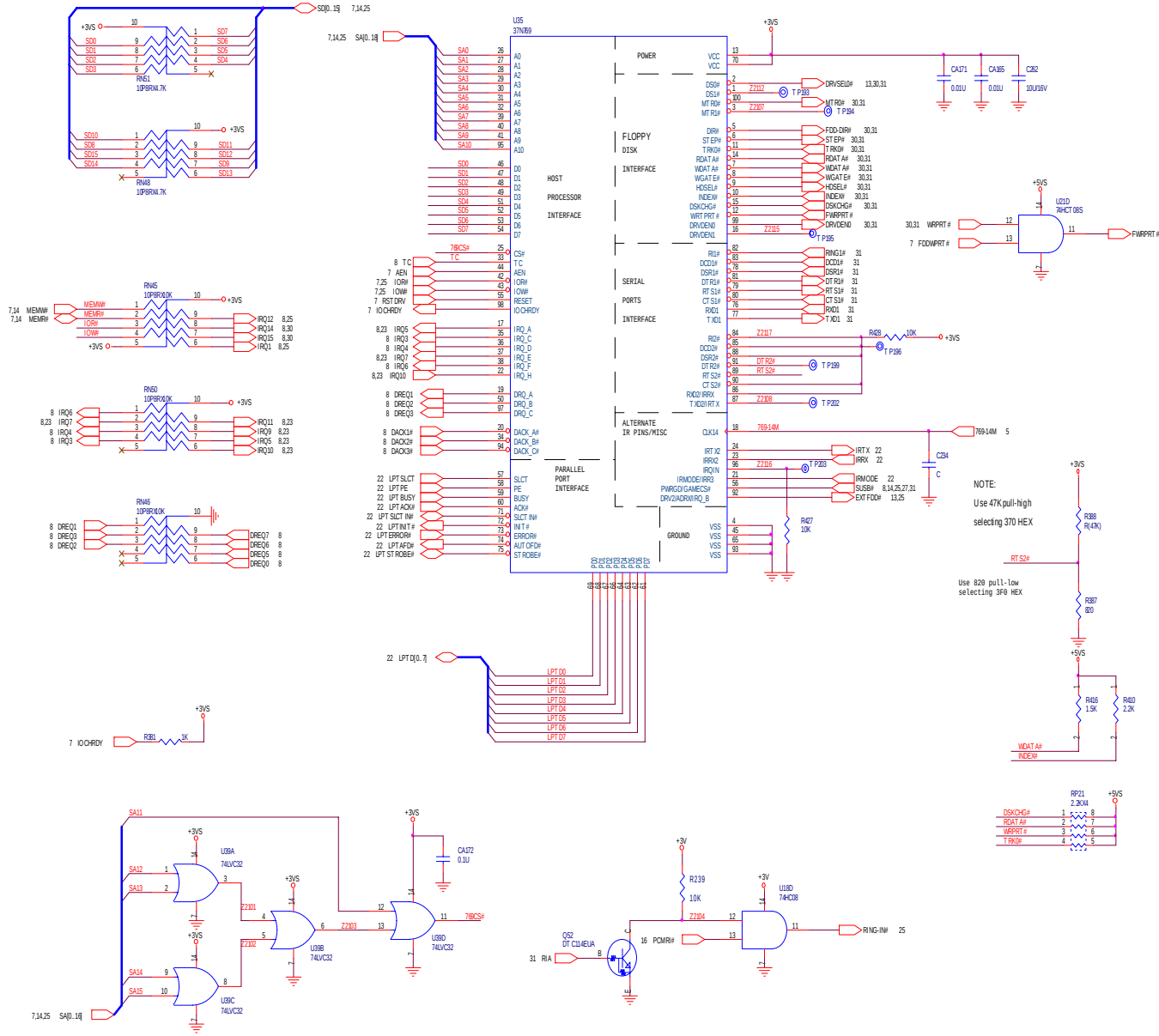


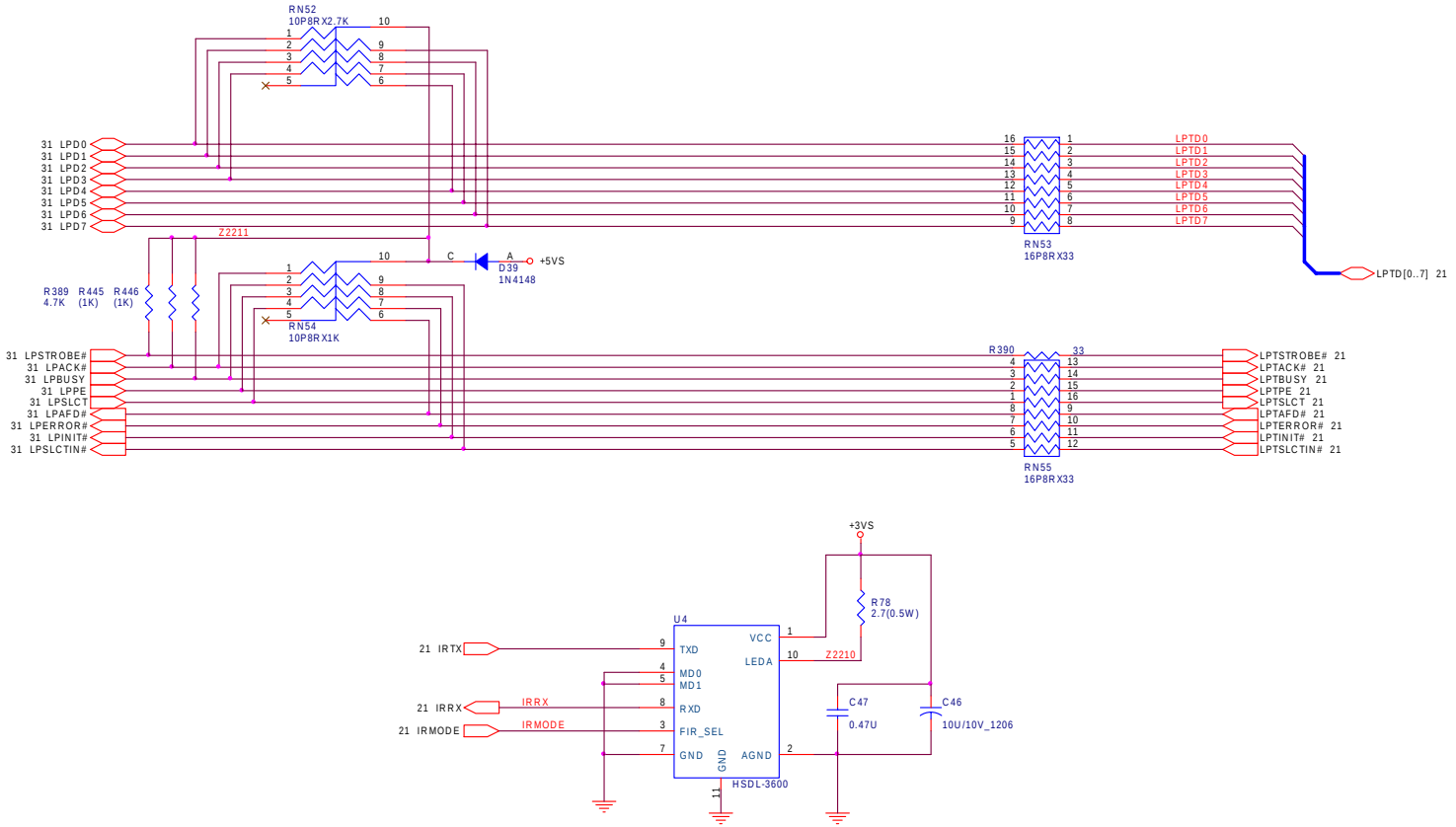
LAN PHYSICAL
REV. 3
FIG. C – 20

C

I/O CONTROLLER
REV. 3
FIG. C – 21

see Fig. C-41 for rev. 4

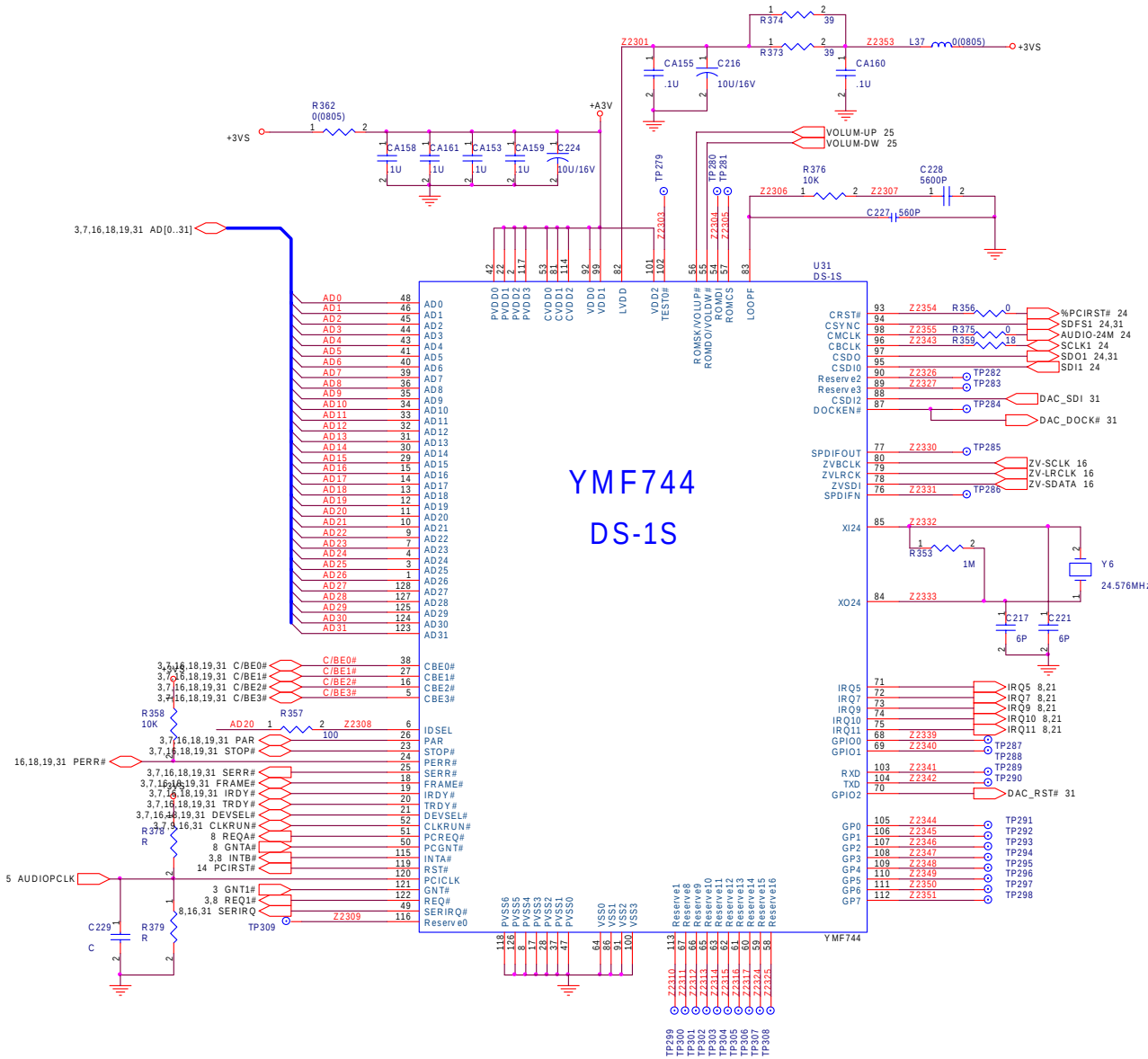


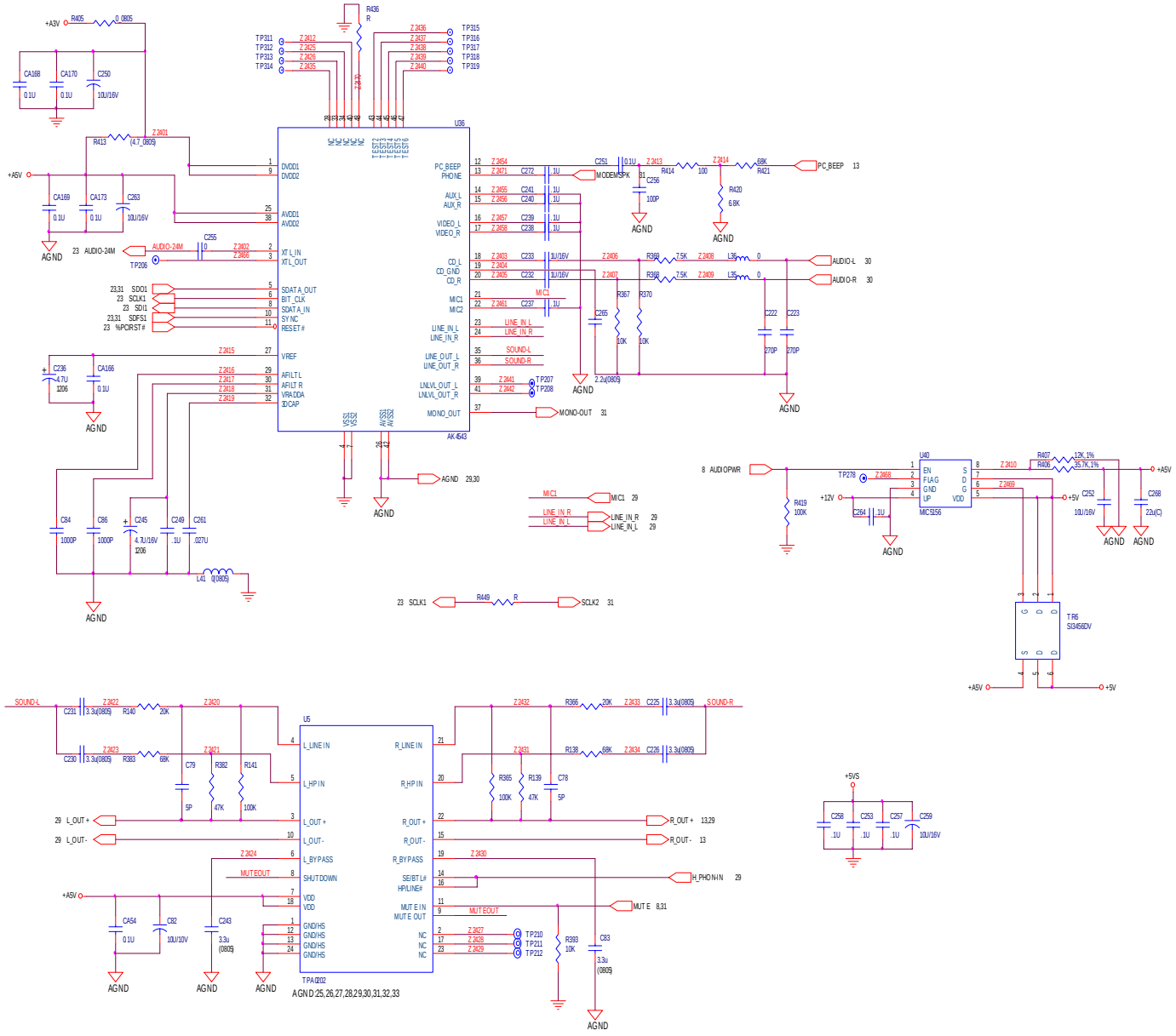


FIR & I/O INTERFACE
REV. 3
FIG. C – 22

C

YAMAHA AUDIO CHIP
REV. 3
FIG. C – 23





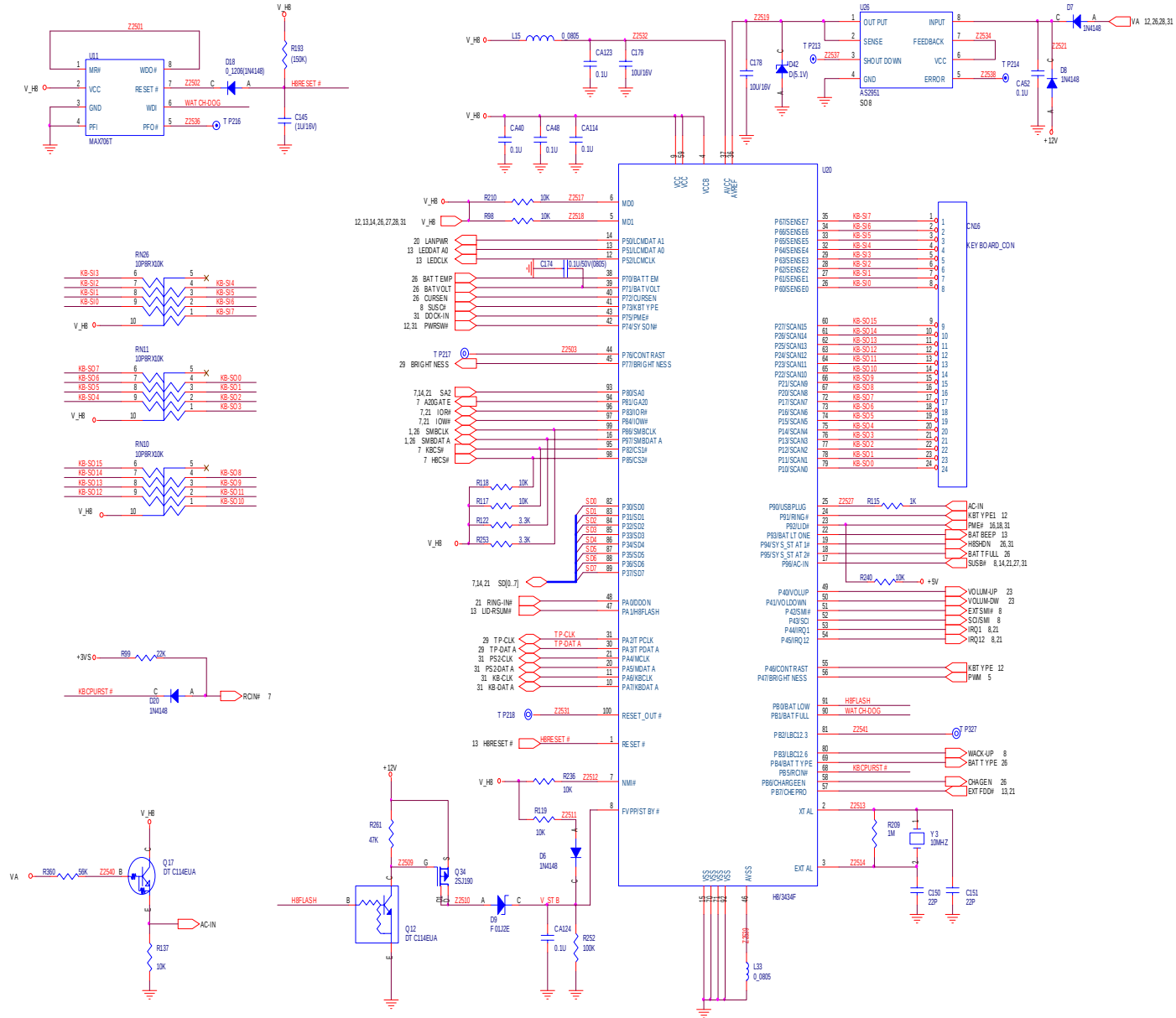
AUDIO CODEC & AMP
REV. 3
FIG. C – 24

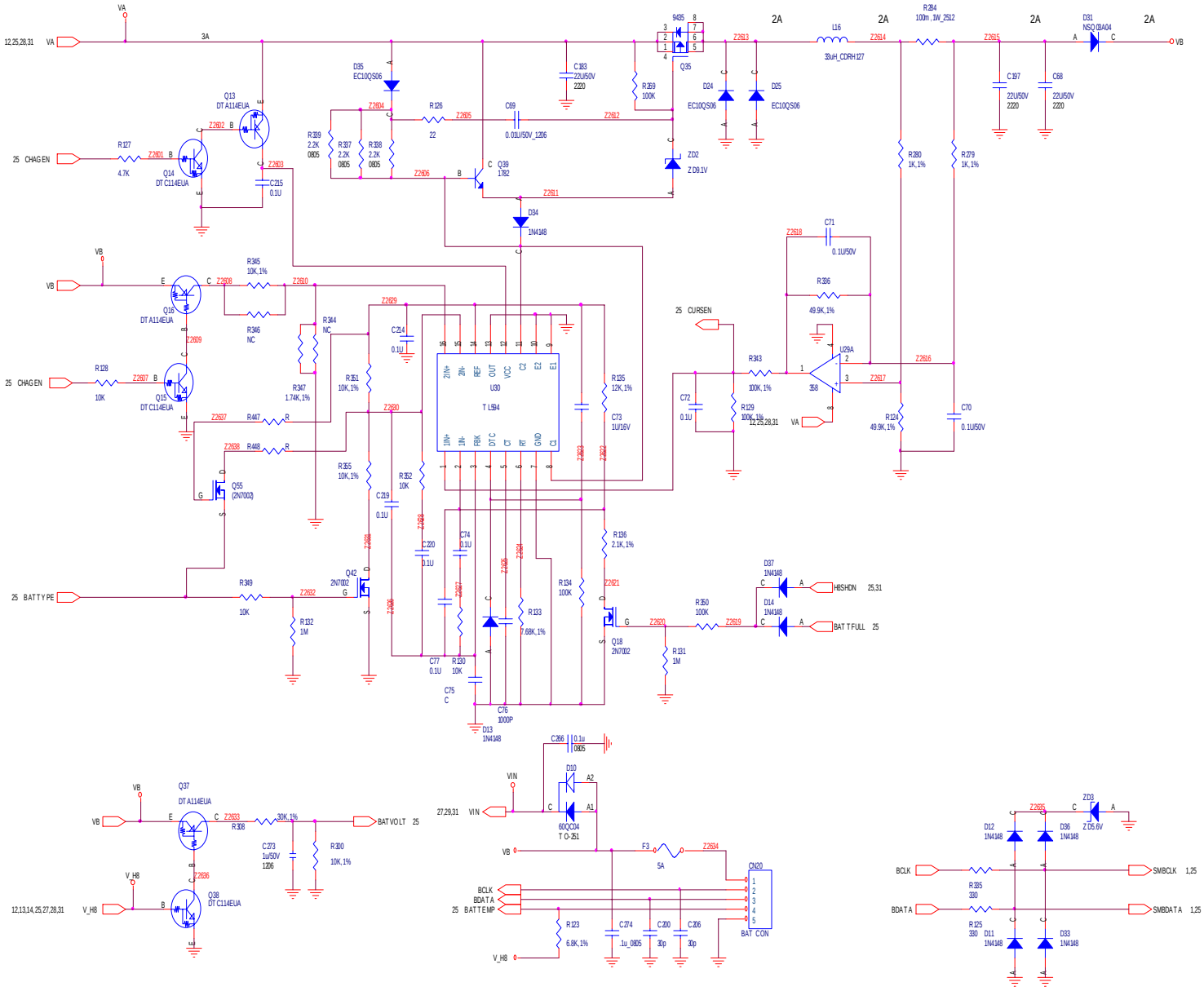
see Fig. C-42 for rev. 4

C

H8
REV. 3
FIG. C – 25

see Fig. C-43 for rev. 4





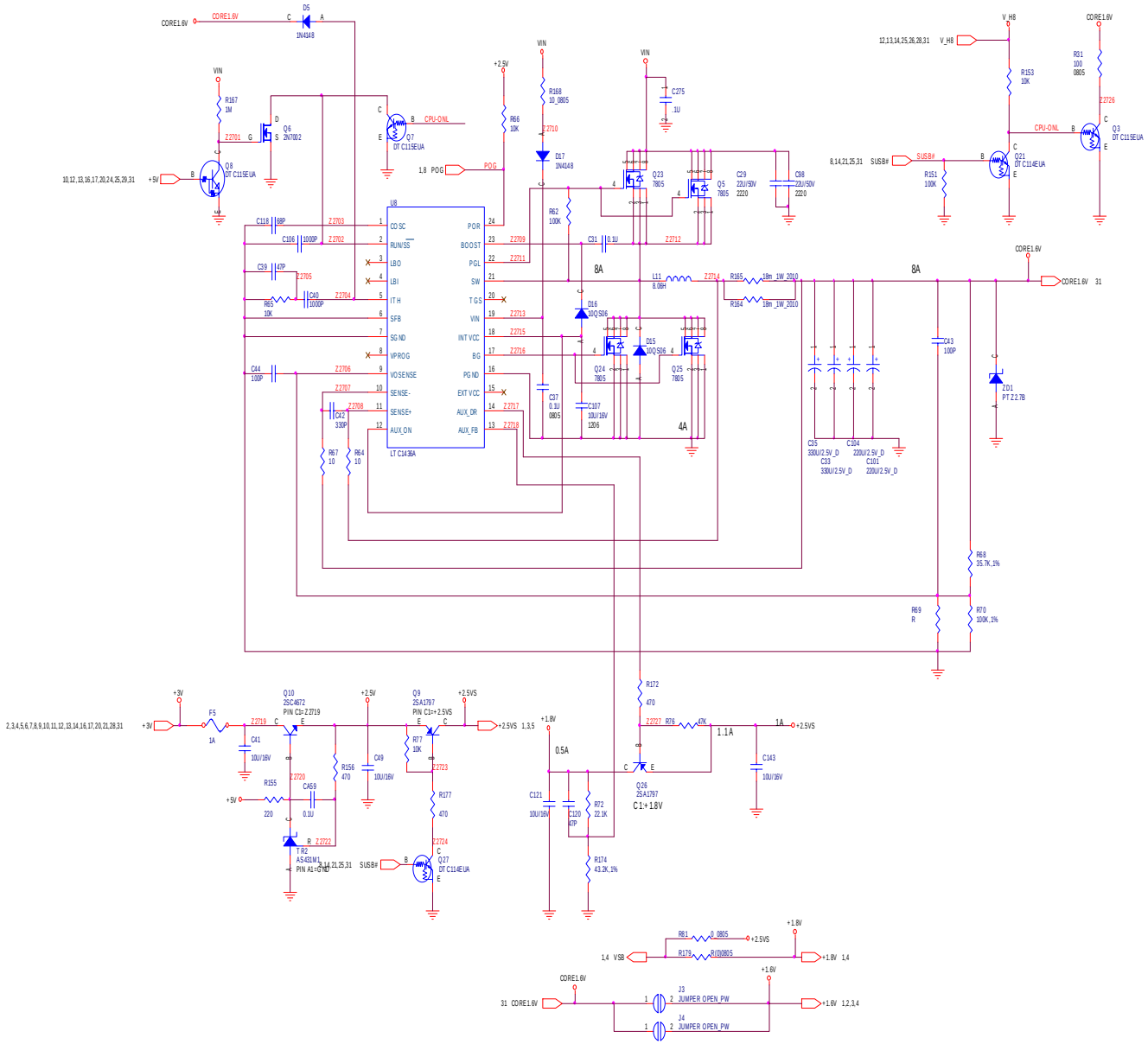
CHARGER
REV. 3
FIG. C – 26

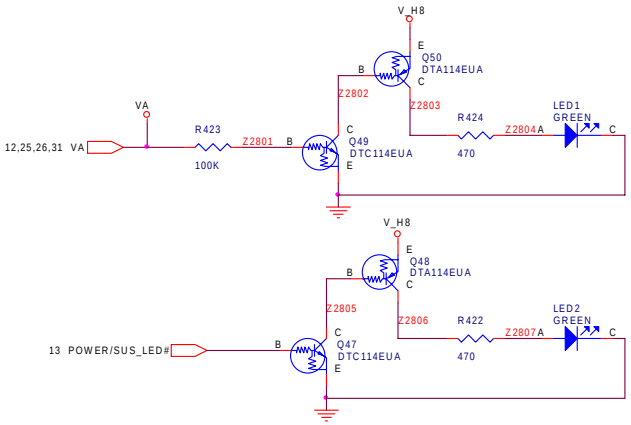
see Fig. C-44 for rev. 4

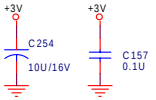
C

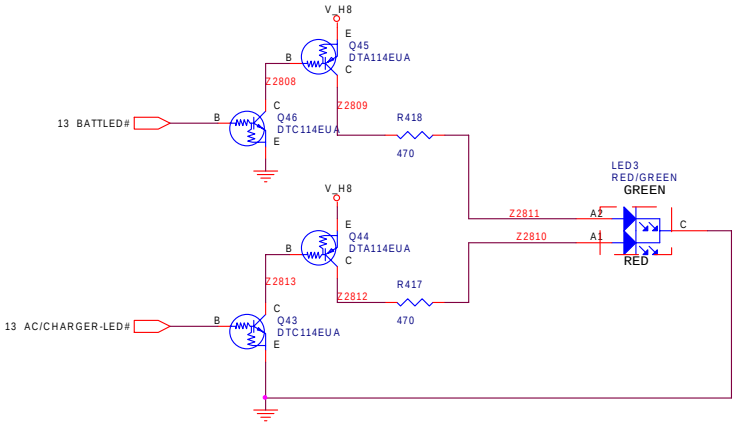
VRM
REV. 3
FIG. C – 27

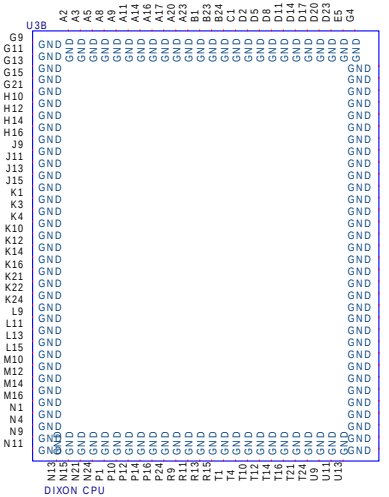
see Fig. C-45 for rev. 4







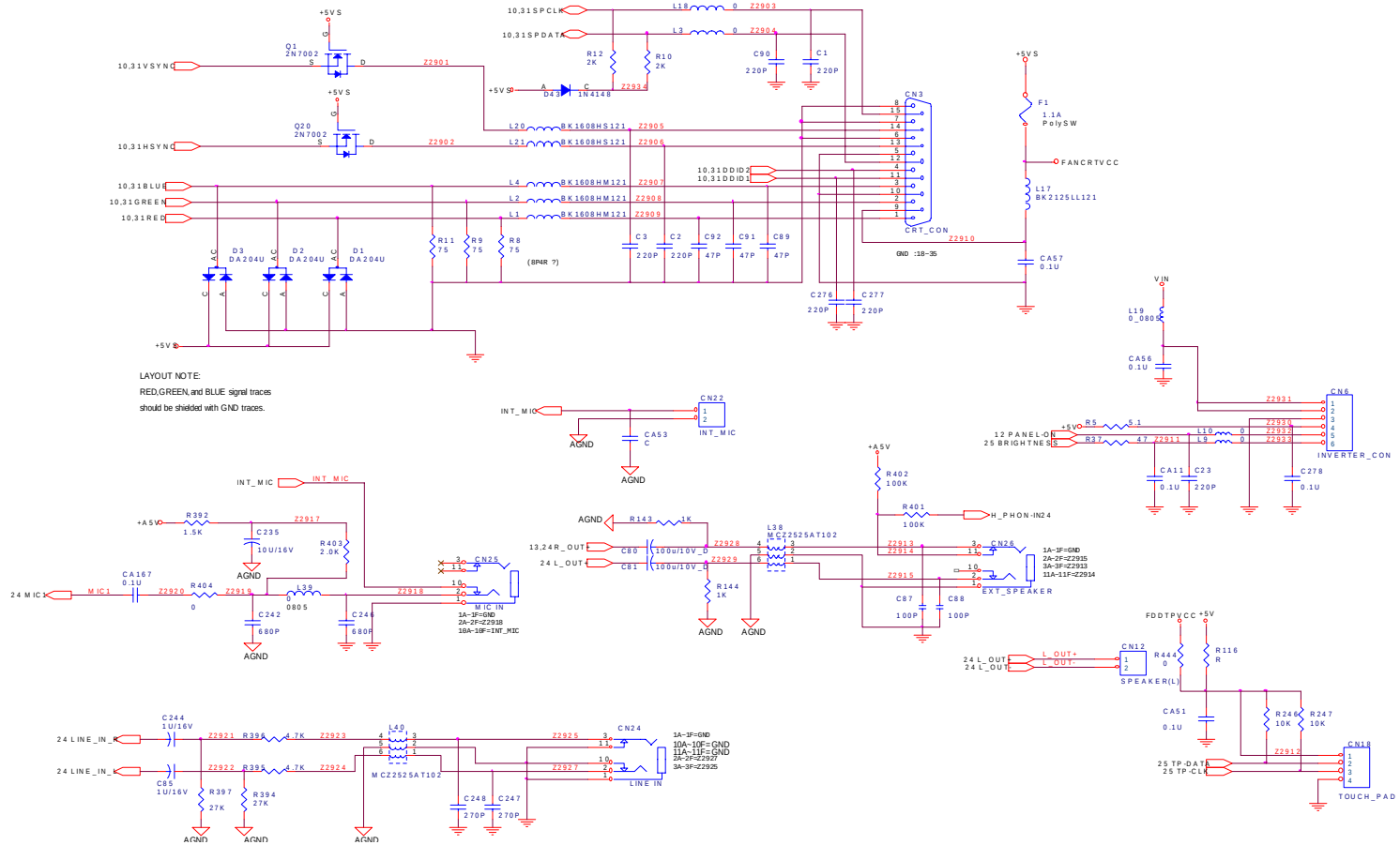


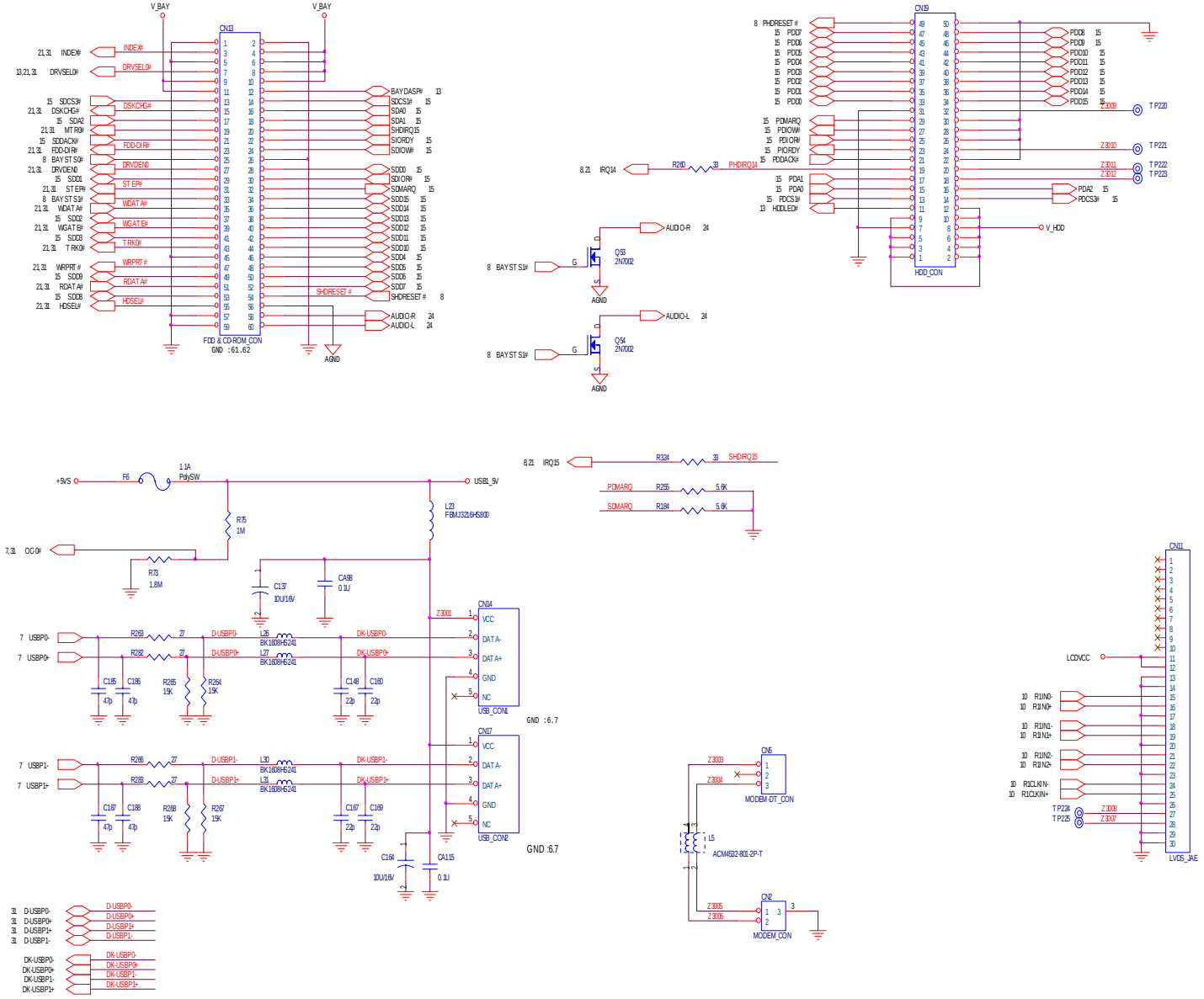


LED
REV. 3
FIG. C – 28

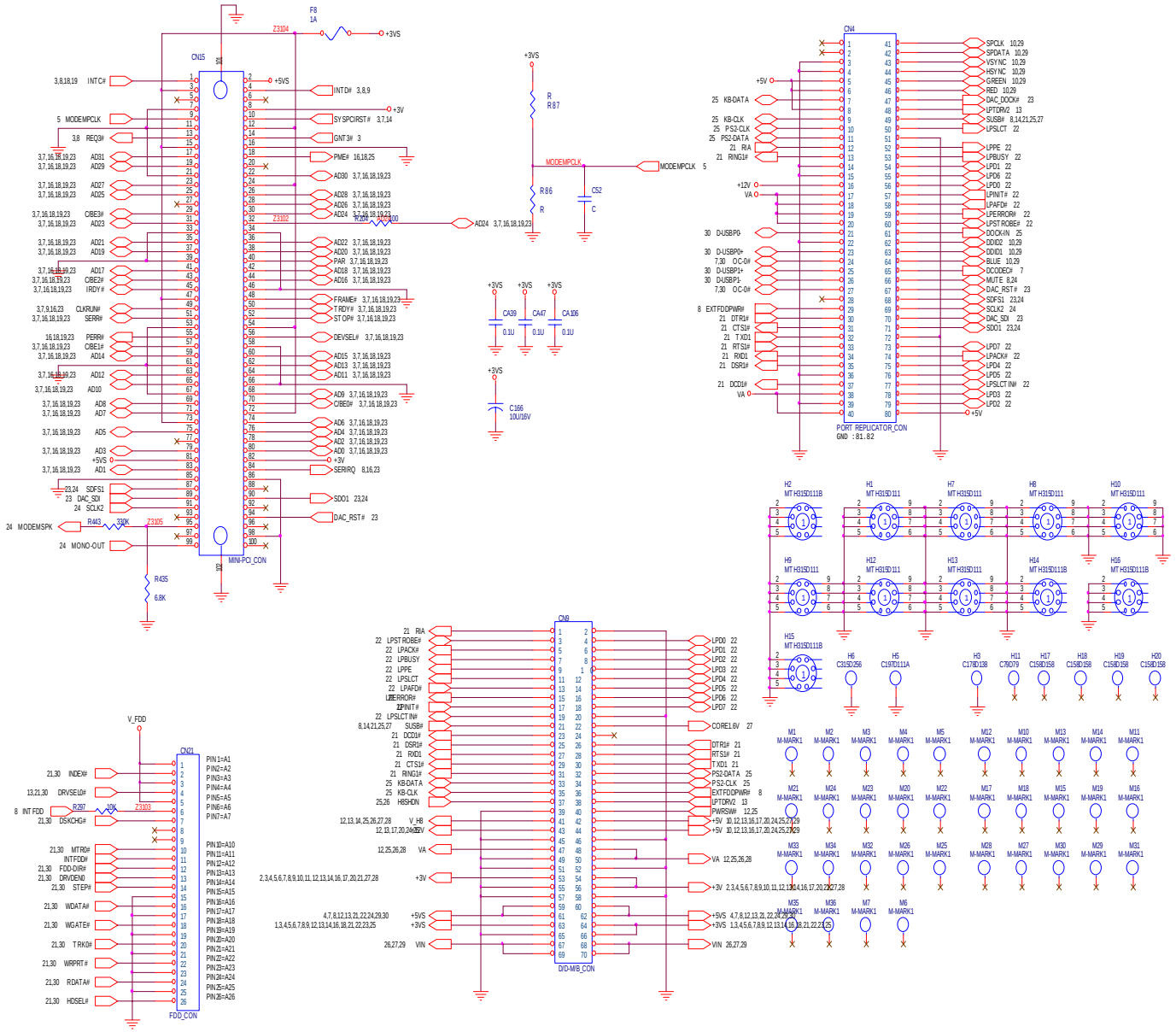
C

CRT & TV-OUT INTERFACE
REV. 3
FIG. C – 29

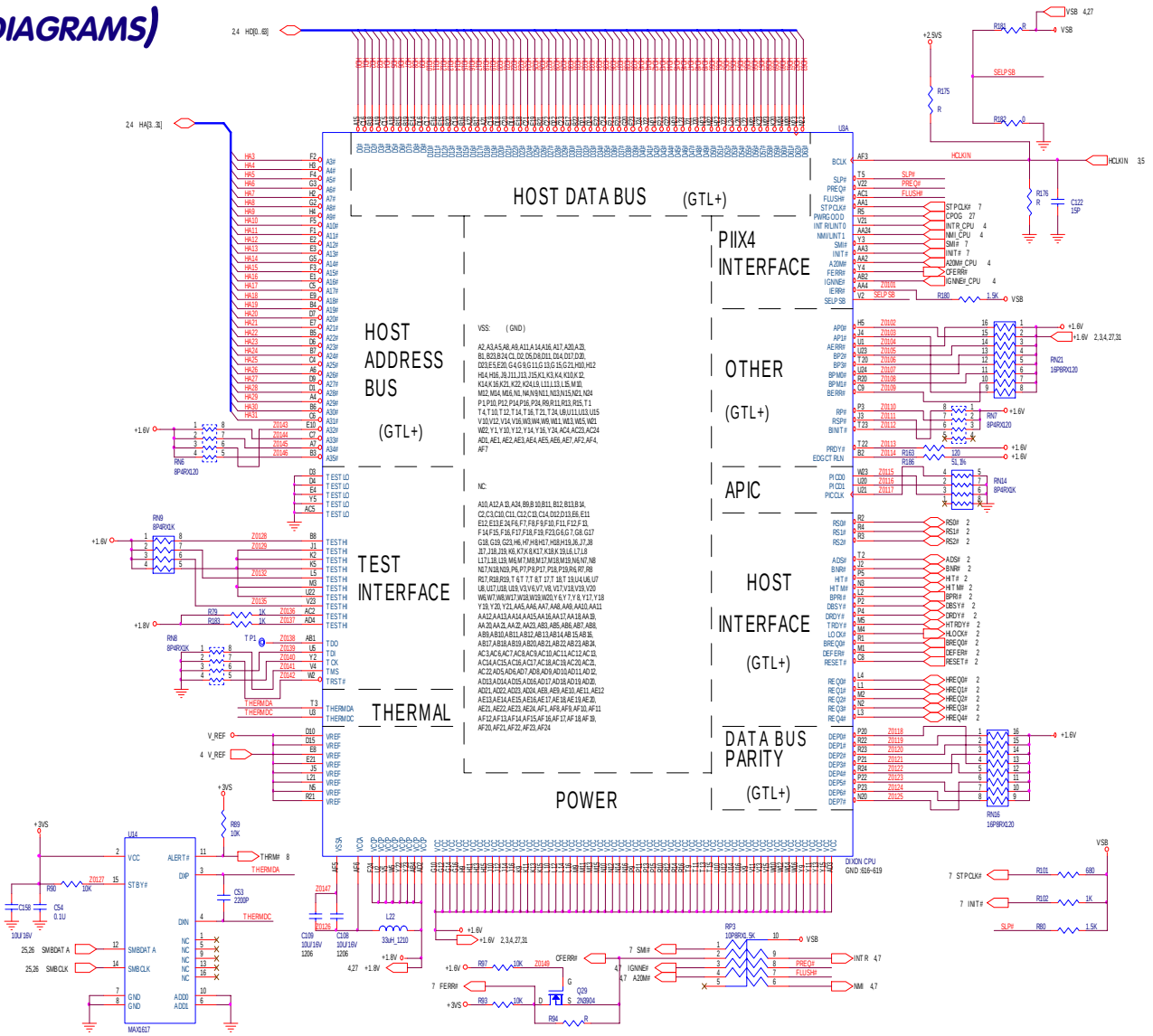



V_BAY
V_BAY
CN13
INDEX#
DRVSEL0#
DSKCHG#
SDA2
FDD-DIR#
DRVDEN0
ST EP#
WDAT A#
WGAT E#
T RK0#
WRPRT #
RDAT A#
HDSEL#
BAY DASP#
SDCS3#
SDA0
SDA1
SHDIRQ15
SIORDY
SDIOW#
SDD0
SDIOR#
SDMARQ
SDD15
SDD14
SDD13
SDD12
SDD11
SDD10
SDD4
SDD5
SDD6
SDD7
SHDRESET #
AUDIO-R
AUDIO-L
FDD & CD-ROM_CON
GND :61.62
AGND
CN19
PHDRESET #
PDD7
PDD6
PDD5
PDD4
PDD3
PDD2
PDD1
PDD0
PDMARQ
PDIOW#
PDIOR#
PIORDY
PDDACK#
PDA1
PDA0
PDCS3#
HDDLED#
PDD8
PDD9
PDD10
PDD11
PDD12
PDD13
PDD14
PDD15
T P220
T P221
T P222
T P223
PDA2
V_HDD
HDD_CON
IRQ14
R260
PHDIRQ14
AUDIO-R
AUDIO-L
BAY ST S1#
Q53
2N7002
Q54
2N7002
AGND
IRQ15
R324
SHDIRQ15
PDMARQ
R225
5.6K
SDMARQ
R184
5.6K
+5VS
F6
1.1A
PolySW
USB1_5V
L23
FBMJ3216HS800
R75
1M
R73
1.8M
OC0#
C137
10U/16V
CA98
0.1U
USB_CON1
USB_CON2
CN14
CN17
VCC
DAT A-
DAT A+
GND
NC
USBP0-
USBP0+
USBP1-
USBP1+
R283
R282
R286
R288
27
D-USBP0-
D-USBP0+
D-USBP1-
D-USBP1+
L26
L27
L30
L31
BK1608HS241
DK-USBP0-
DK-USBP0+
DK-USBP1-
DK-USBP1+
C165
C166
C187
C188
47p
R265
R264
R286
R287
15K
C148
C160
C167
C169
22p
C164
C1115
10U/16V
0.1U
GND :6.7
CN6
MODEM-DT_CON
L5
ACM4532-801-2P-T
CN2
MODEM_CON
CN11
LCDVCC
R1IN0-
R1IN0+
R1IN1-
R1IN1+
R1IN2-
R1IN2+
R1CLKIN-
R1CLKIN+
TP224
TP225
LVDS_JAE

PORTS
REV. 3
FIG. C – 31



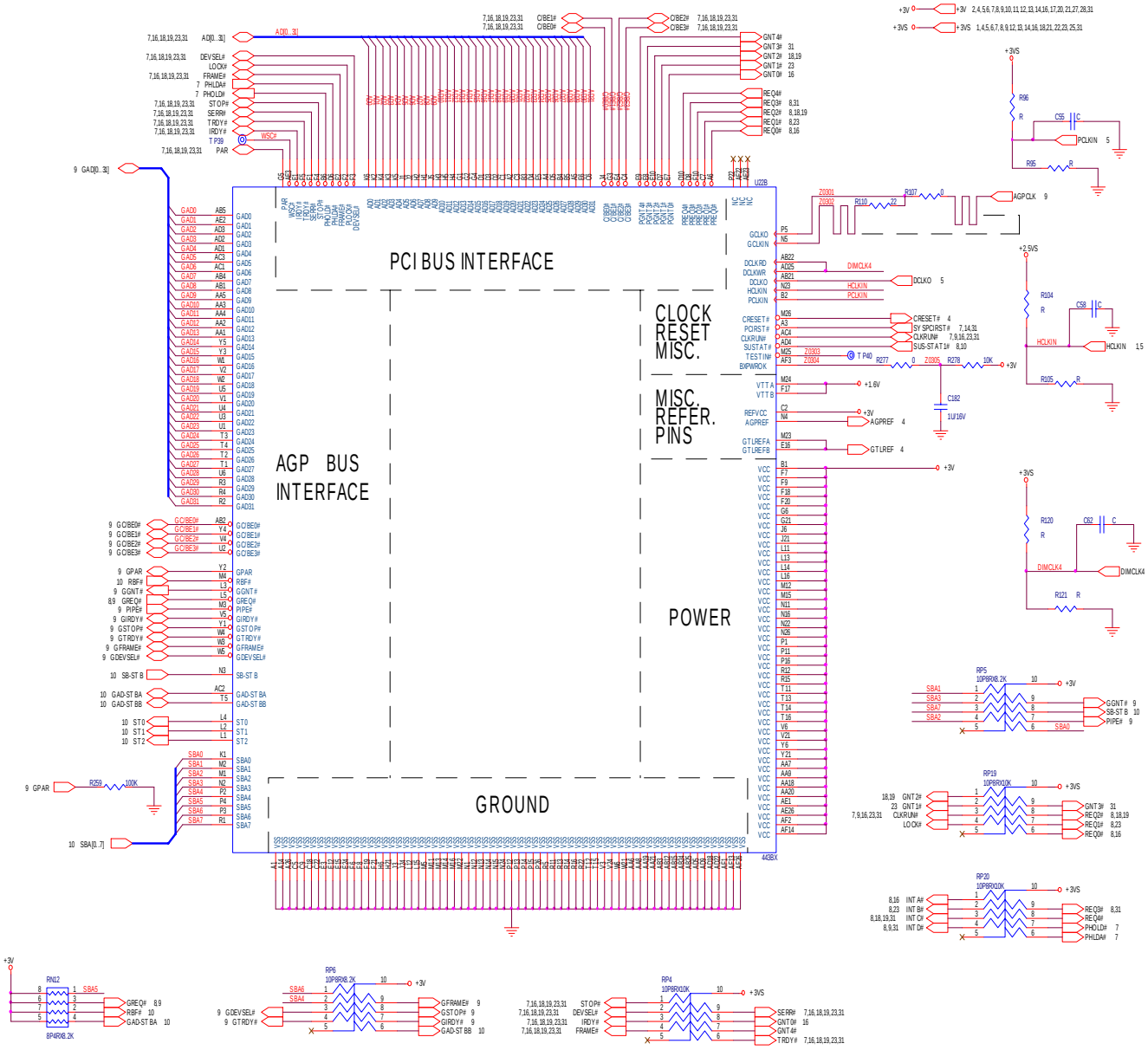
2800 VER 4 MAINBOARD
(SELECTED DIAGRAMS)

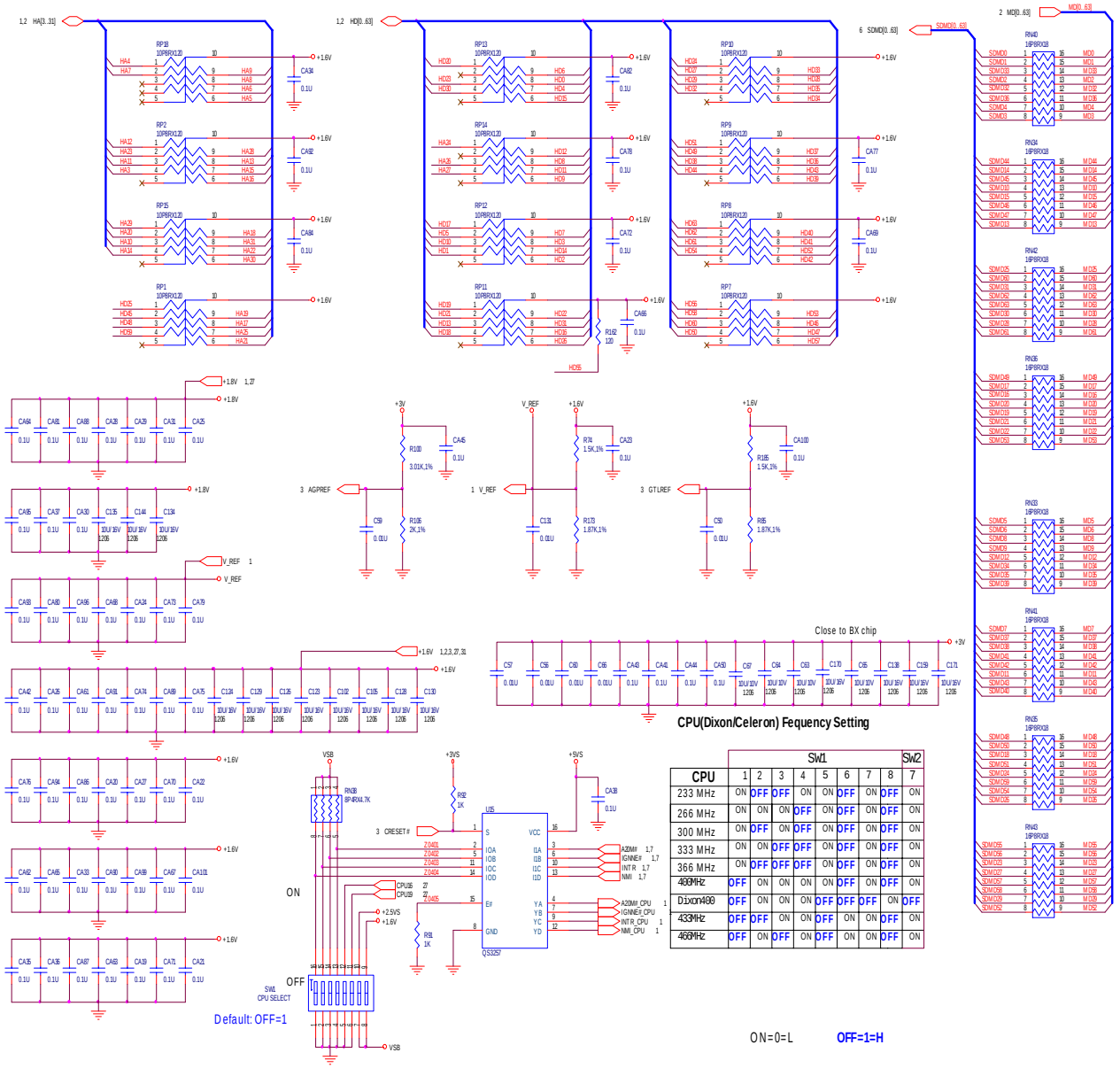


DIXON CPU REV. 4
FIG. C – 32

C

443BX-2
REV. 4
FIG. C – 33

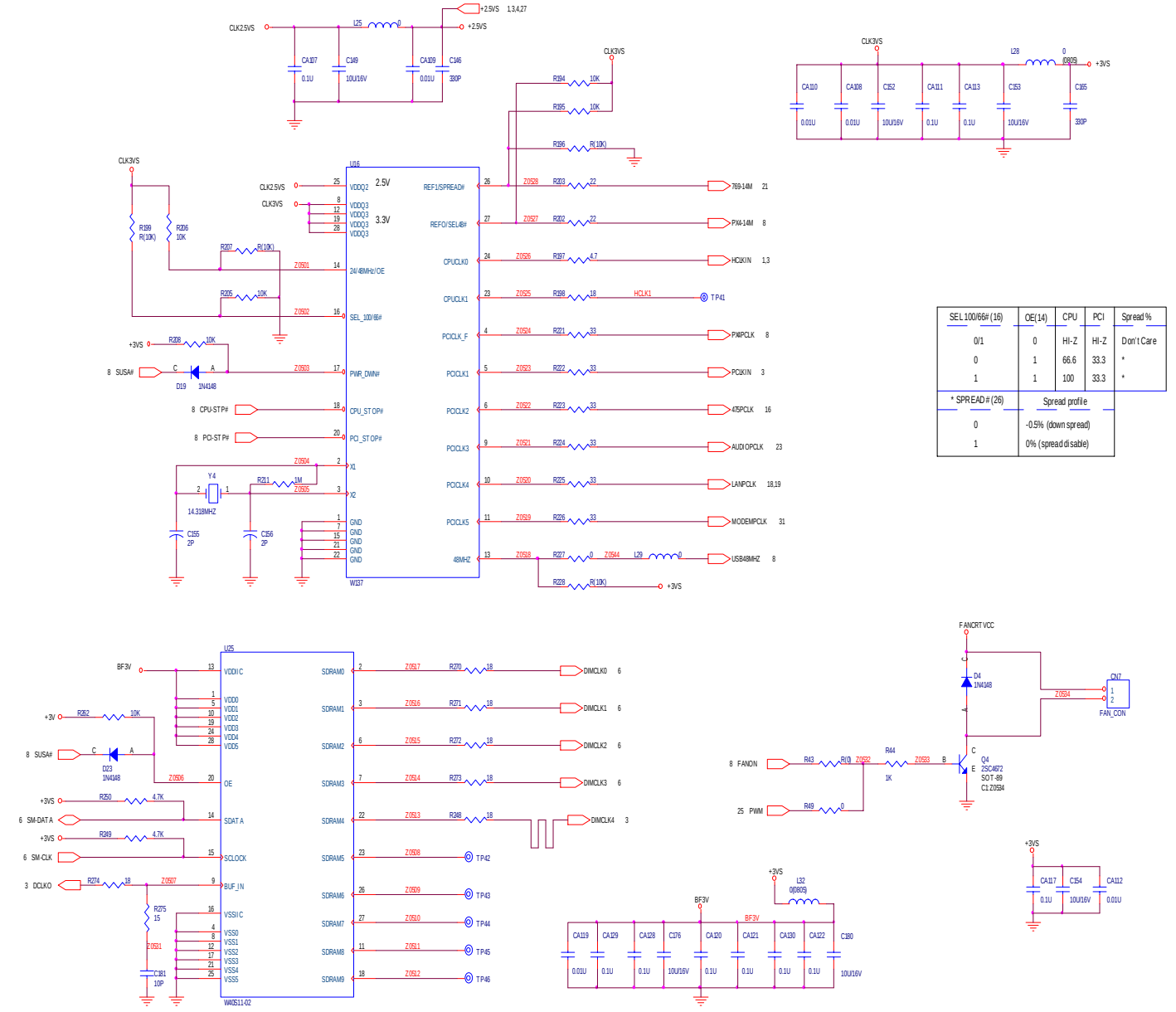




CPU	Sw1 1	2	3	4	5	6	7	8	Sw2 7
233 MHz	ON	OFF	OFF	ON	ON	OFF	ON	OFF	ON
266 MHz	ON	ON	ON	OFF	ON	OFF	ON	OFF	ON
300 MHz	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
333 MHz	ON	ON	OFF	OFF	ON	OFF	ON	OFF	ON
366 MHz	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	ON
400MHz	OFF	ON	ON	ON	ON	OFF	ON	OFF	ON
Dixon400	OFF	ON	ON	ON	OFF	OFF	OFF	ON	OFF
433MHz	OFF	OFF	ON	ON	OFF	ON	ON	OFF	ON
466MHz	OFF	ON	OFF	ON	OFF	ON	ON	OFF	ON

DAMPING & DECOUPLING
REV. 4
FIG. C – 34

C

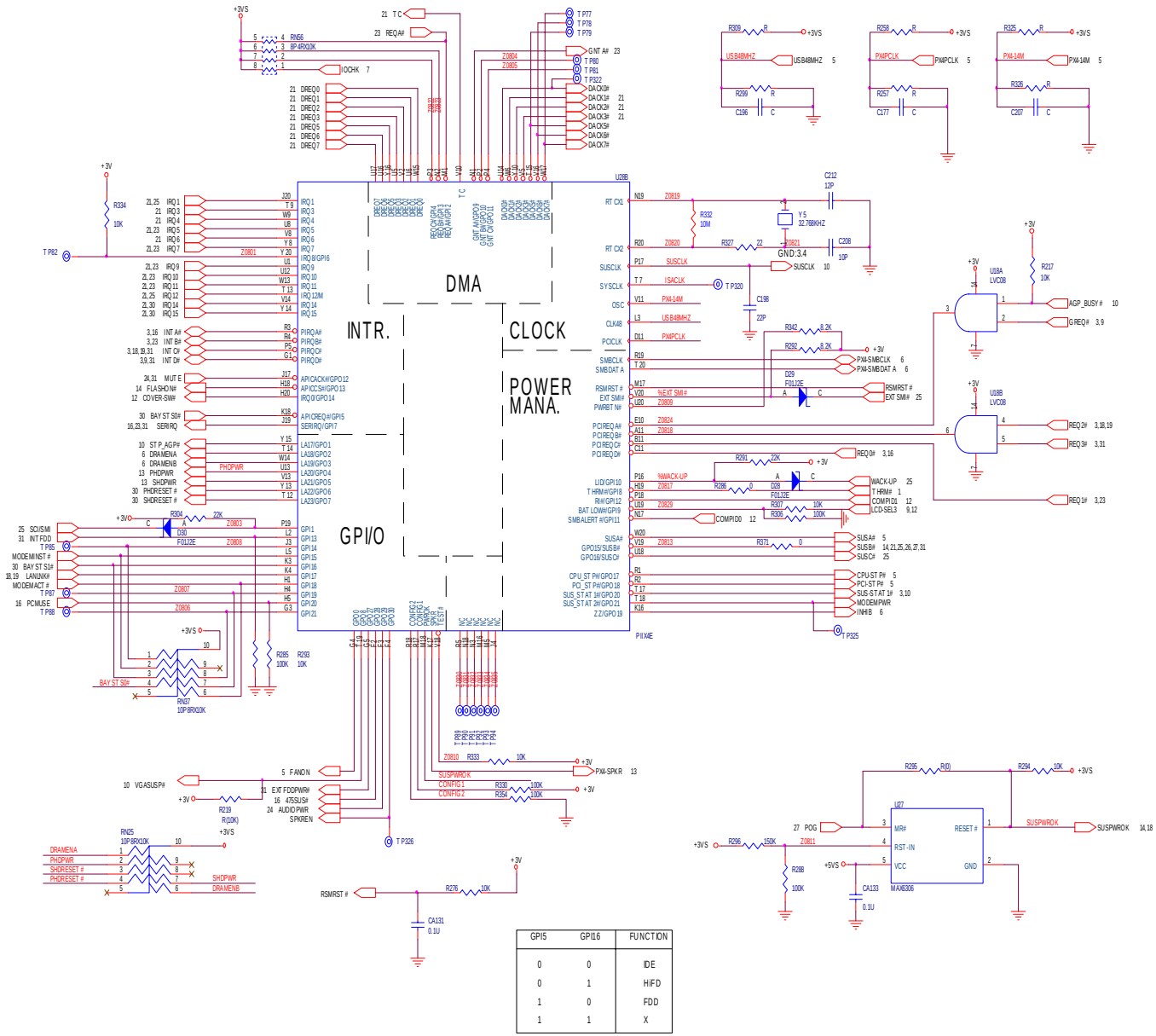


SEL 100/66# (16)	OE(14)	CPU	PCI	Spread %
0/1	0	HI-Z	HI-Z	Don't Care
0	1	66.6	33.3	*
1	1	100	33.3	*

* SPREAD# (26)	Spread profile
0	-0.5% (down spread)
1	0% (spread disable)

CLOCK GENERATOR
REV. 4
FIG. C – 35

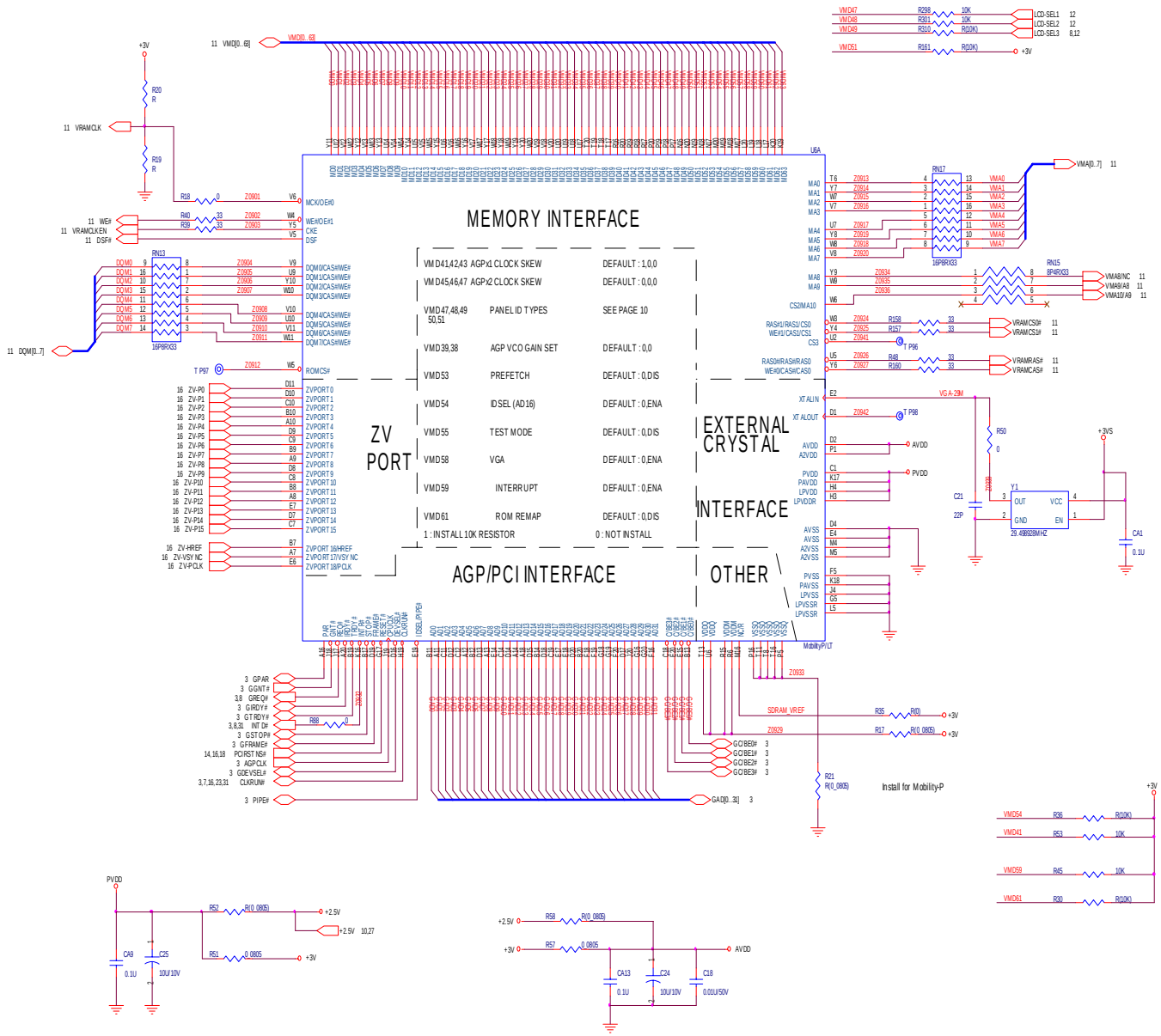
C



INTEL 8237EB PIIX4E-2
REV. 4
FIG. C – 36

C

VGA CONTROLLER -1
REV. 4
FIG. C – 37



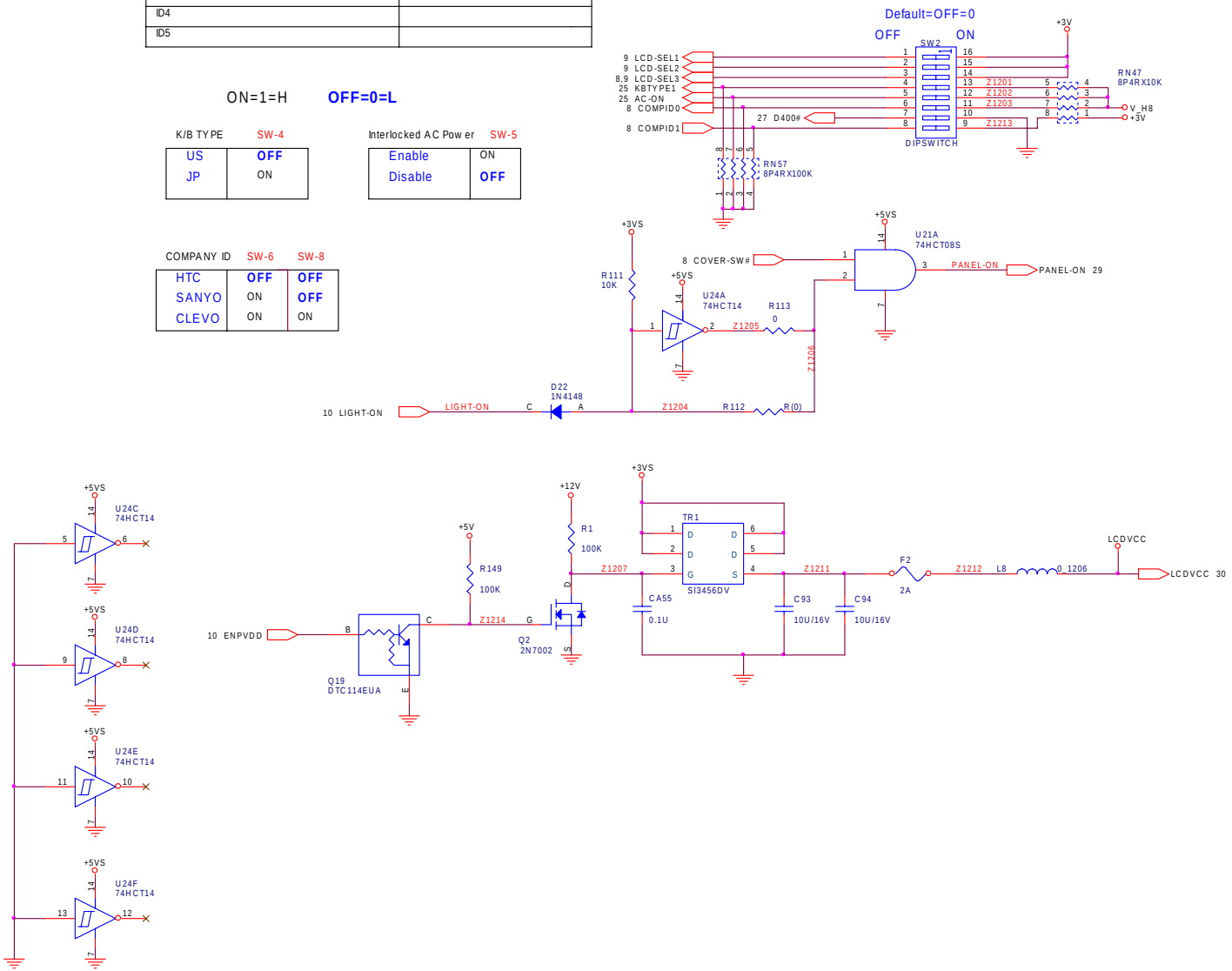
	PANEL TYPE	SW-1	SW-2	SW-3
ID1	12.1" S-TFT FUJITSU-FLC31SVC6S-17	ON	**OFF**	**OFF**
ID2	13.3" X-TFT Hitachi-TX34D74VC1CAA	**OFF**	ON	**OFF**
ID3	14.1" X-TFT Hitachi-TX36D75VC1CAA	ON	ON	**OFF**
ID4				
ID5				

ON=1=H **OFF=0=L**

K/B TYPE	SW-4
US	**OFF**
JP	ON

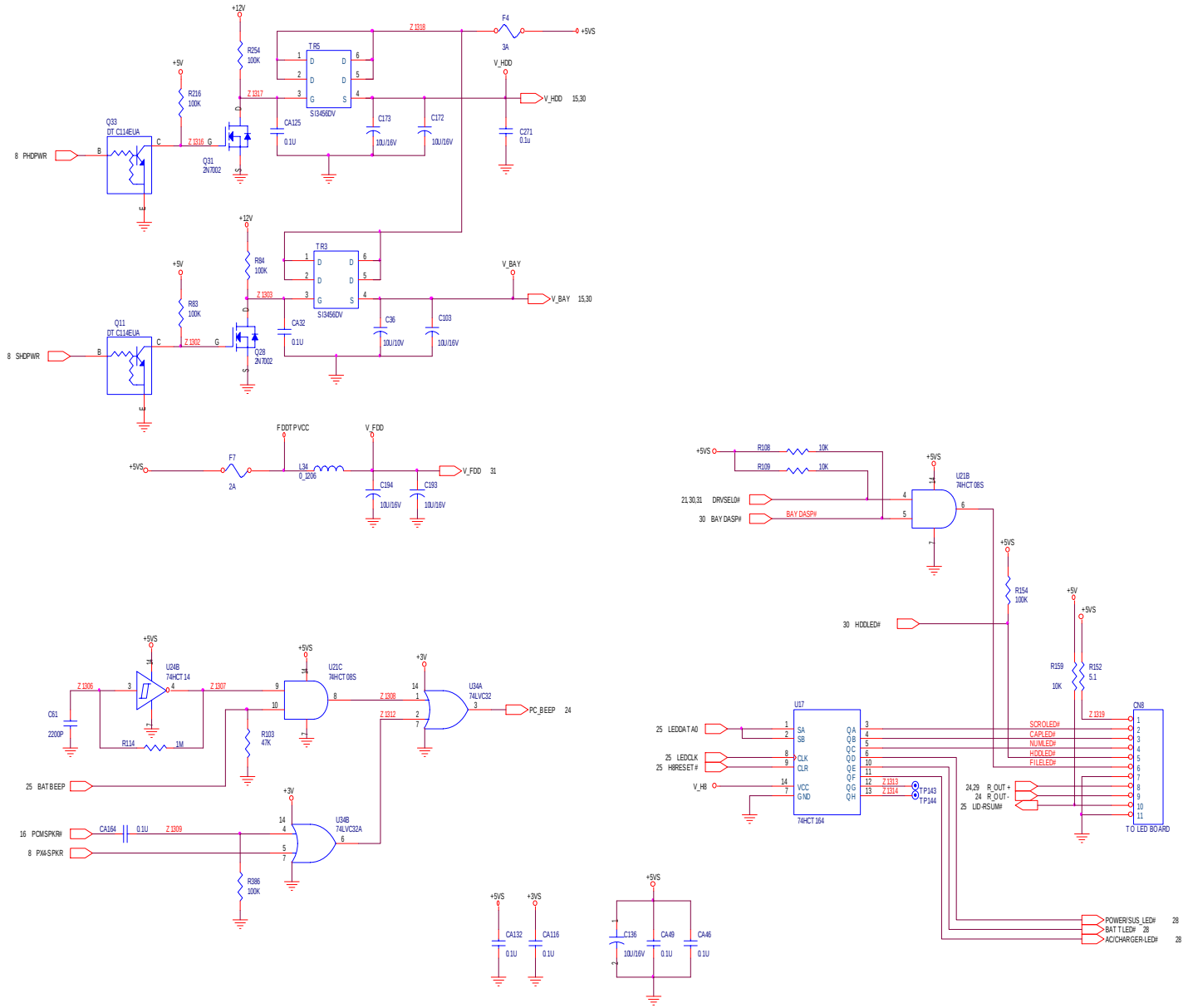
Interlocked AC Power	SW-5
Enable	ON
Disable	**OFF**

COMPANY ID	SW-6	SW-8
HTC	**OFF**	**OFF**
SANYO	ON	**OFF**
CLEVO	ON	ON

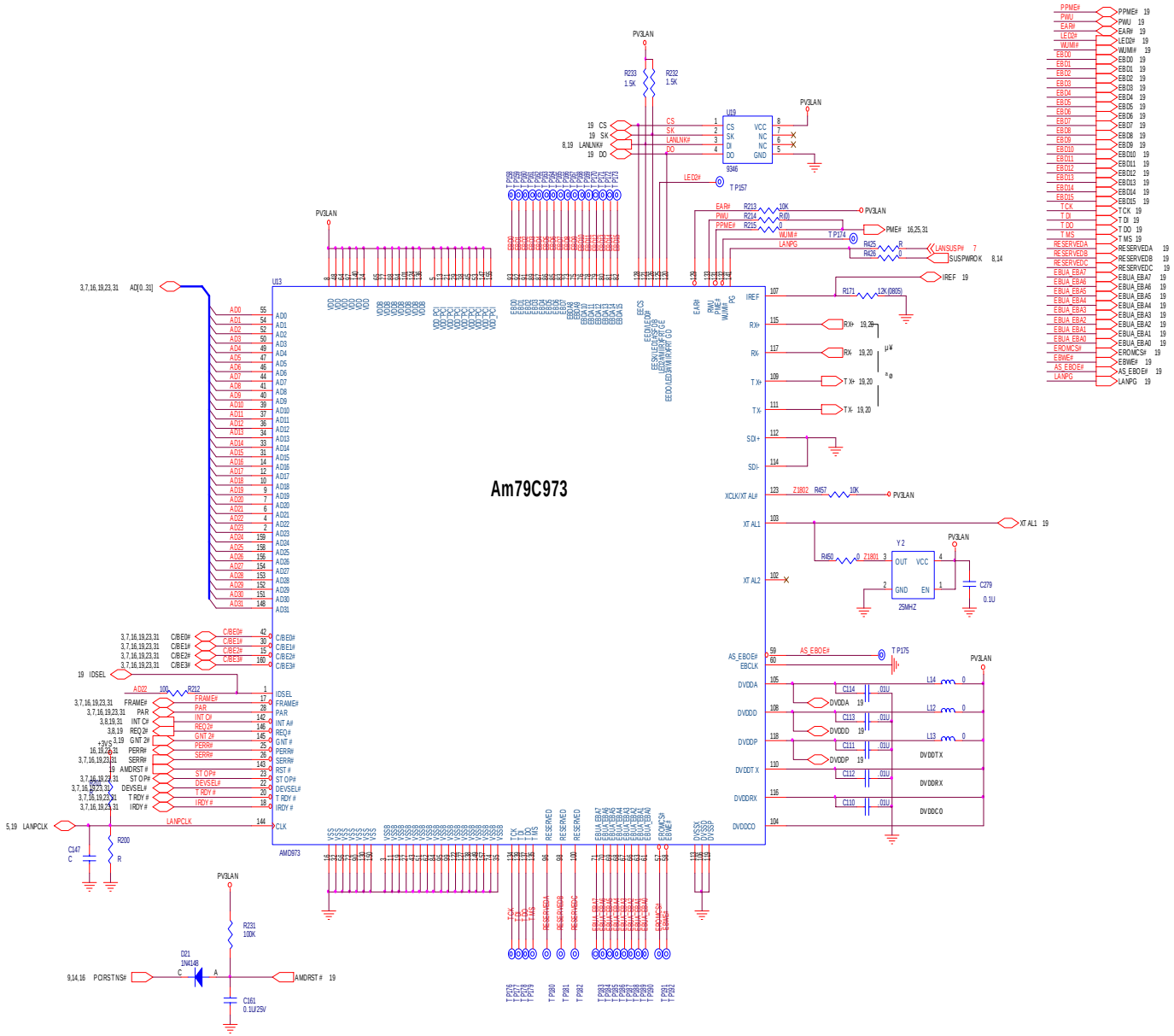


LCD INTERFACE
REV. 4
FIG. C – 38

C



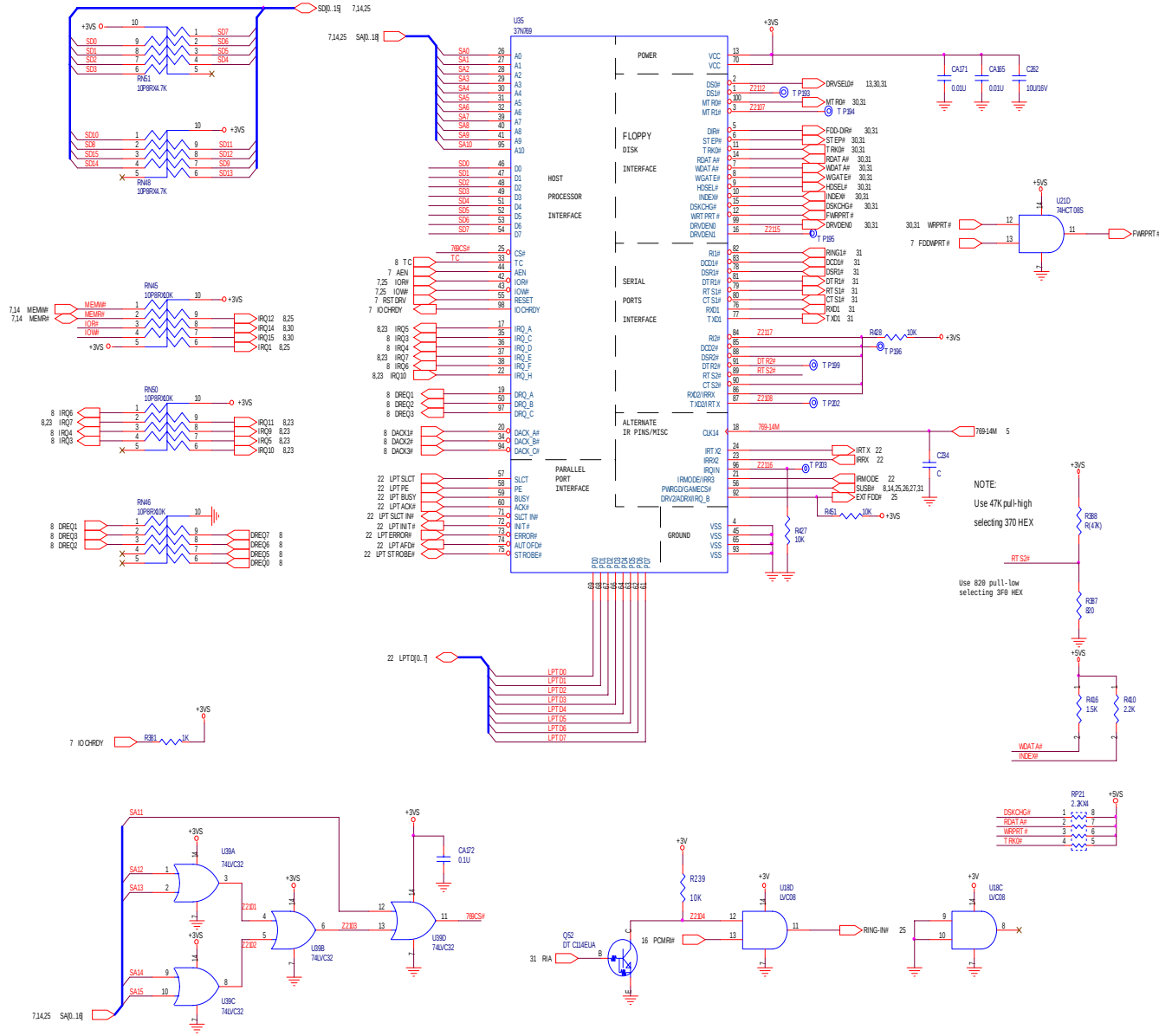
INDICATOR & MODEM CONNECTOR
REV. 4
FIG. C – 39

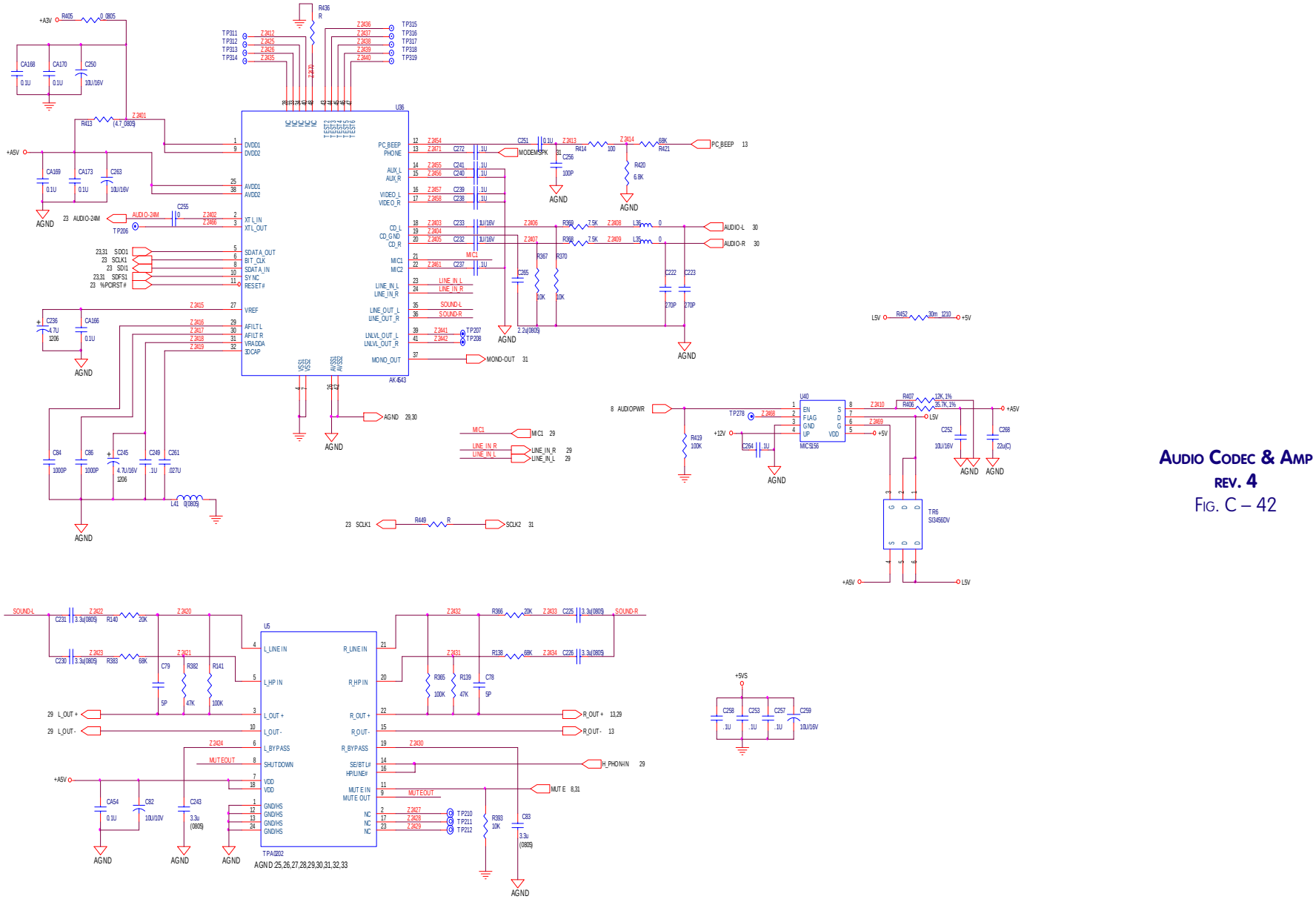


LAN CONTROLLER 973
REV. 4
FIG. C – 40

C

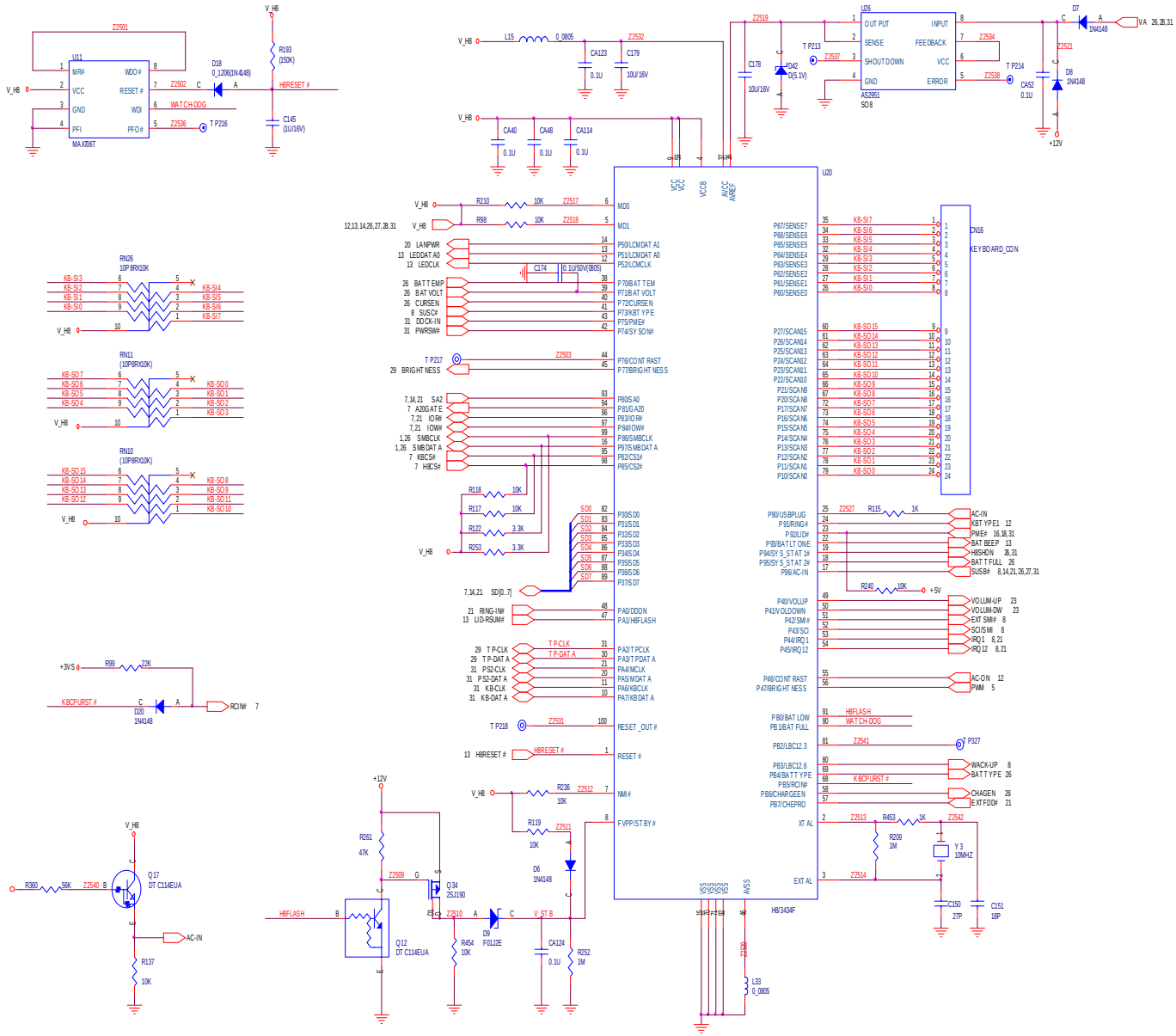
I/O CONTROLLER
REV. 4
FIG. C – 41





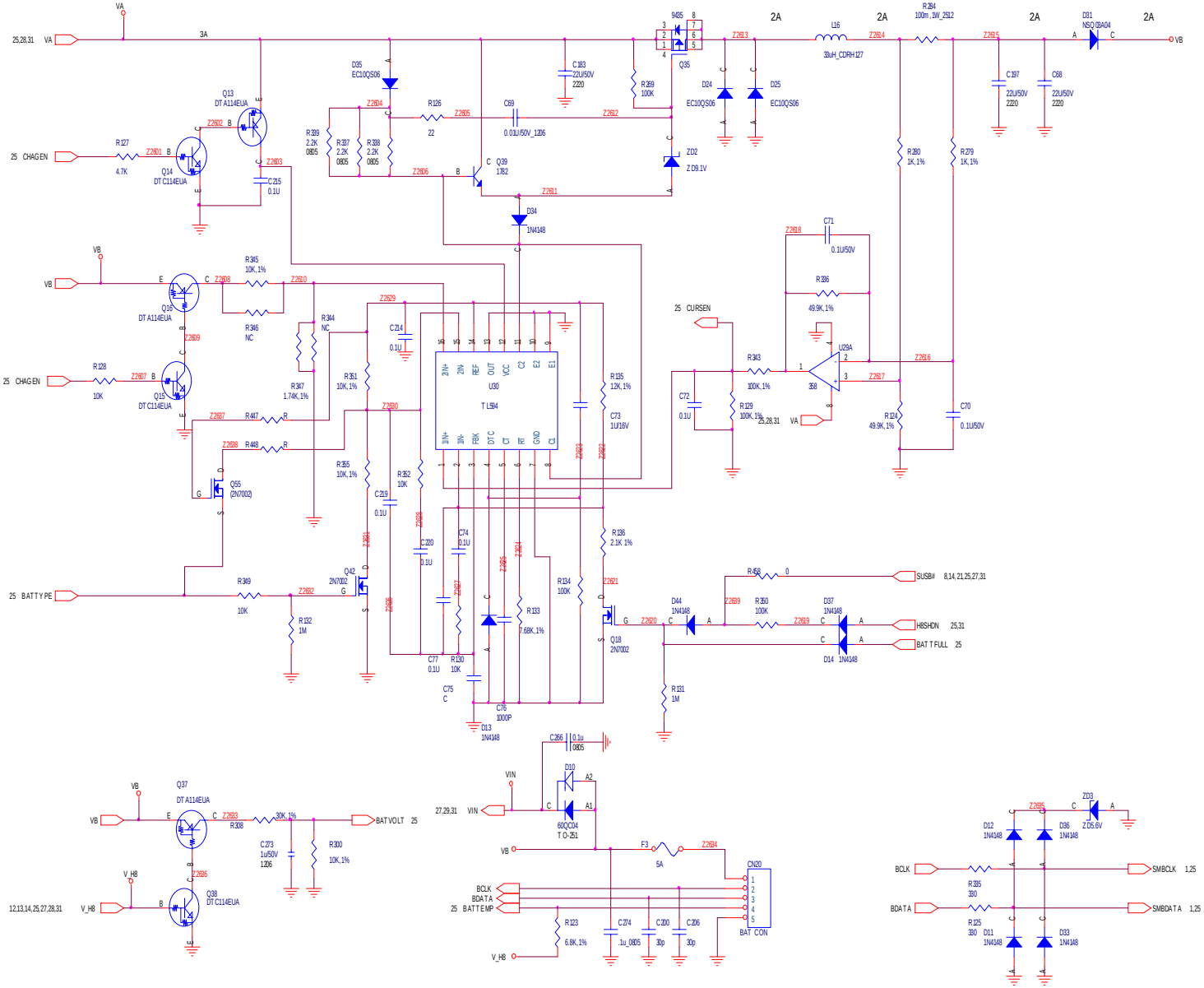
AUDIO CODEC & AMP
REV. 4
FIG. C – 42

C



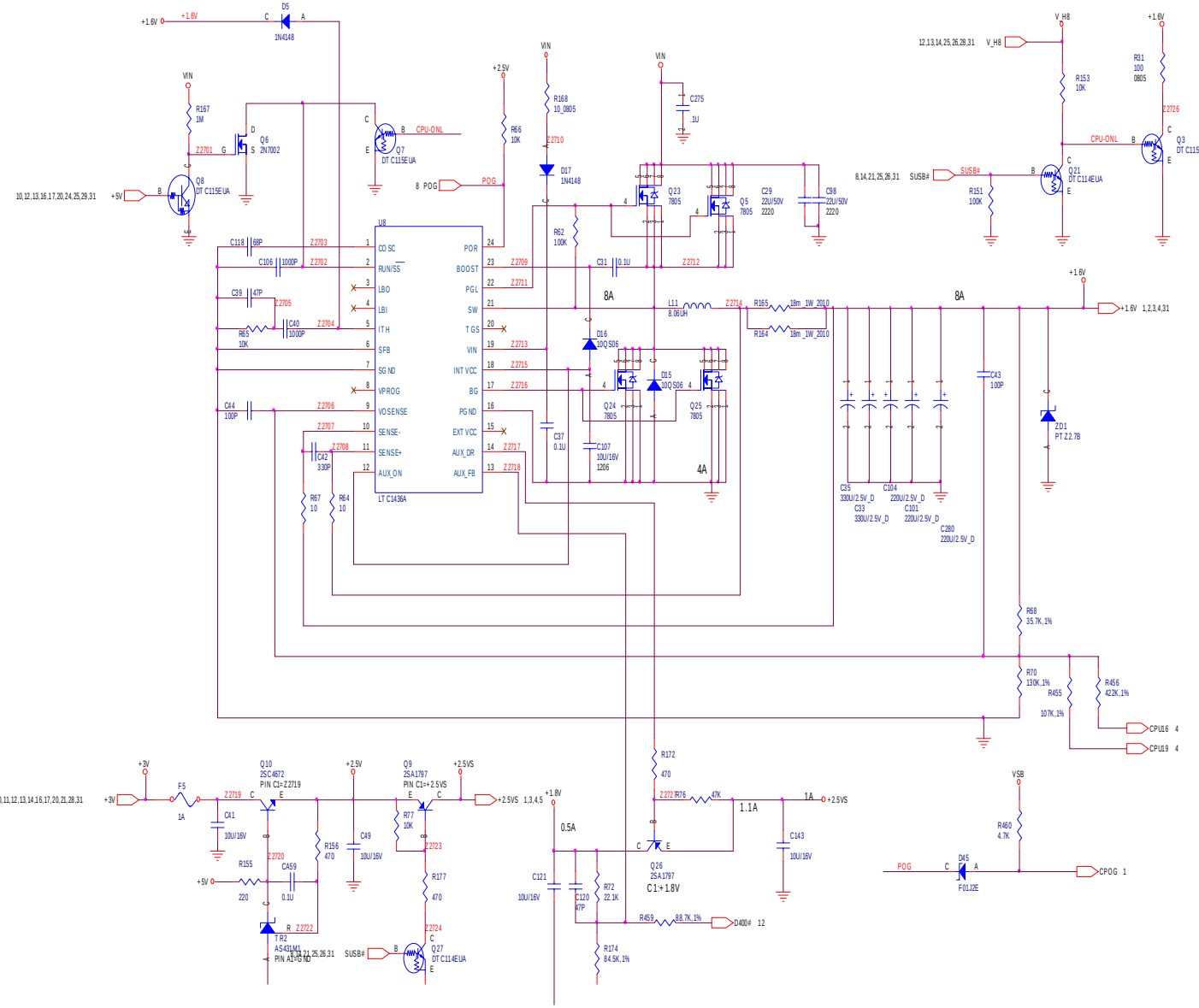
H8
REV. 4
FIG. C – 43

C



CHARGER
REV. 4
FIG. C – 44

C



VRM
REV. 4
FIG. C – 45

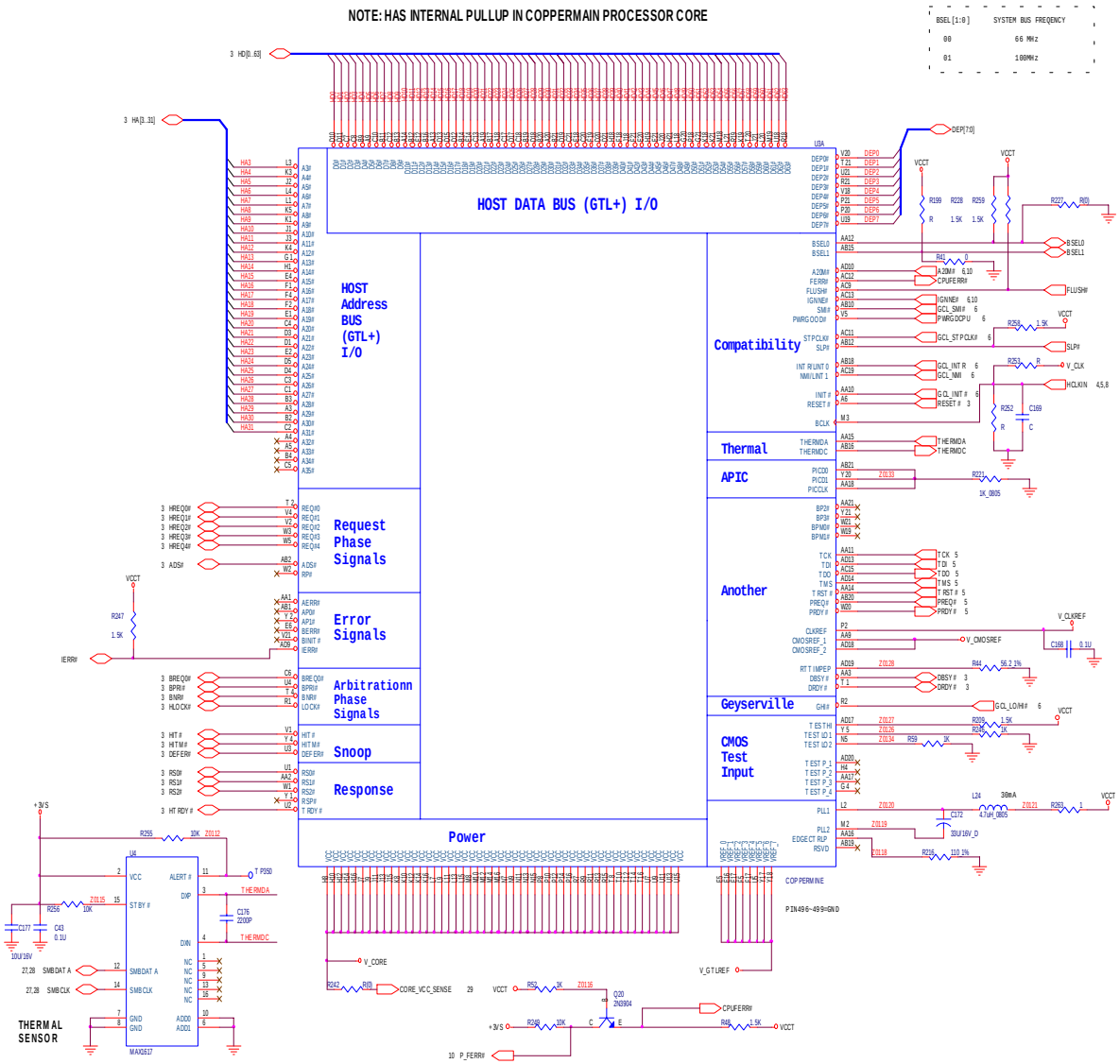
C

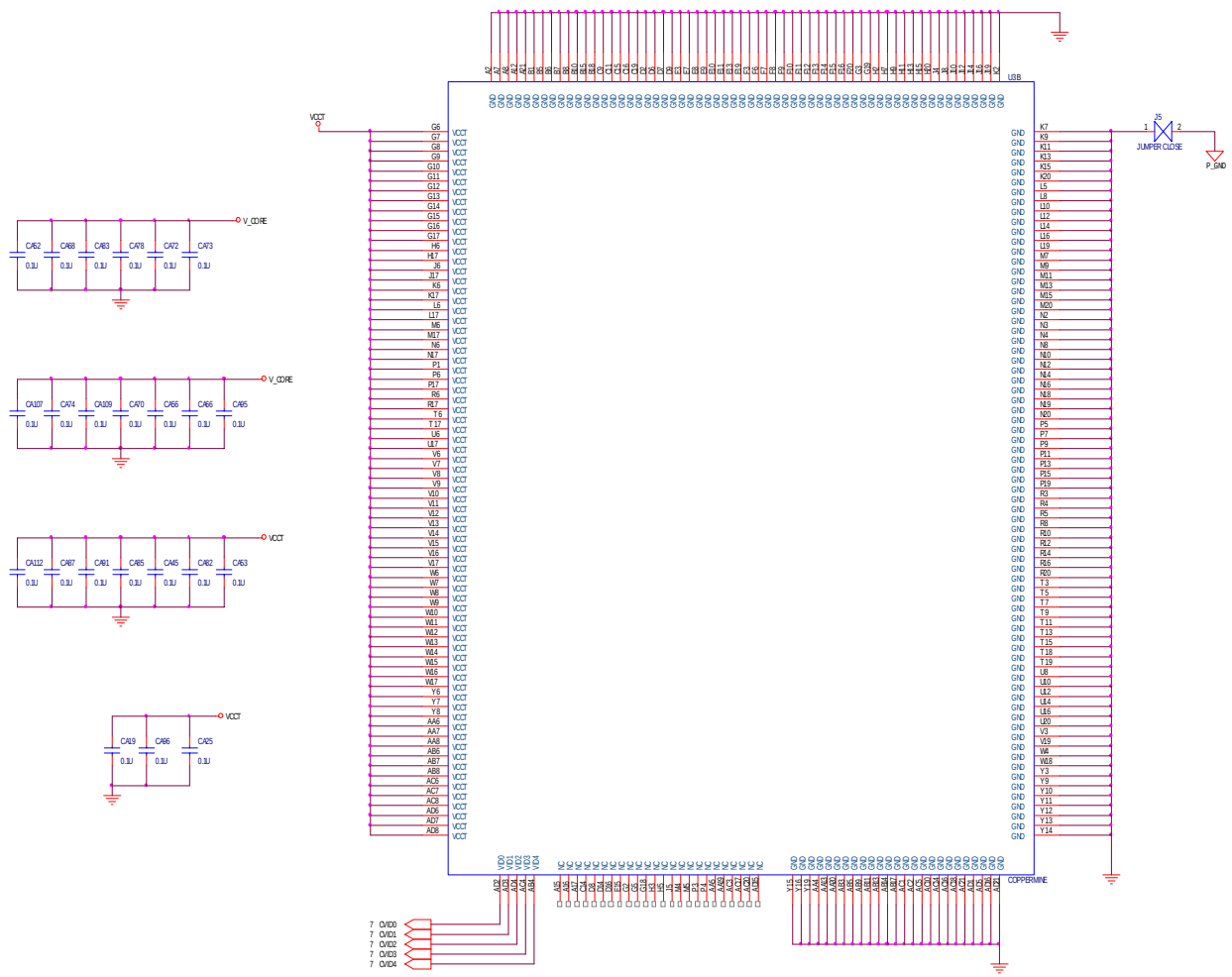
Appendix D 2820/2850 Circuit Diagrams

This appendix has circuit diagrams of the major parts of the 2820/2850 notebook's mainboard.
We've included all available diagrams for version 2 of this board.
If the mainboard you are repairing is a different version, consult the manufacturer for the appropriate diagrams.

2820/2850 VER 2 MAINBOARD

COPPERMINE CPU
REV. 2
FIG. D – 1

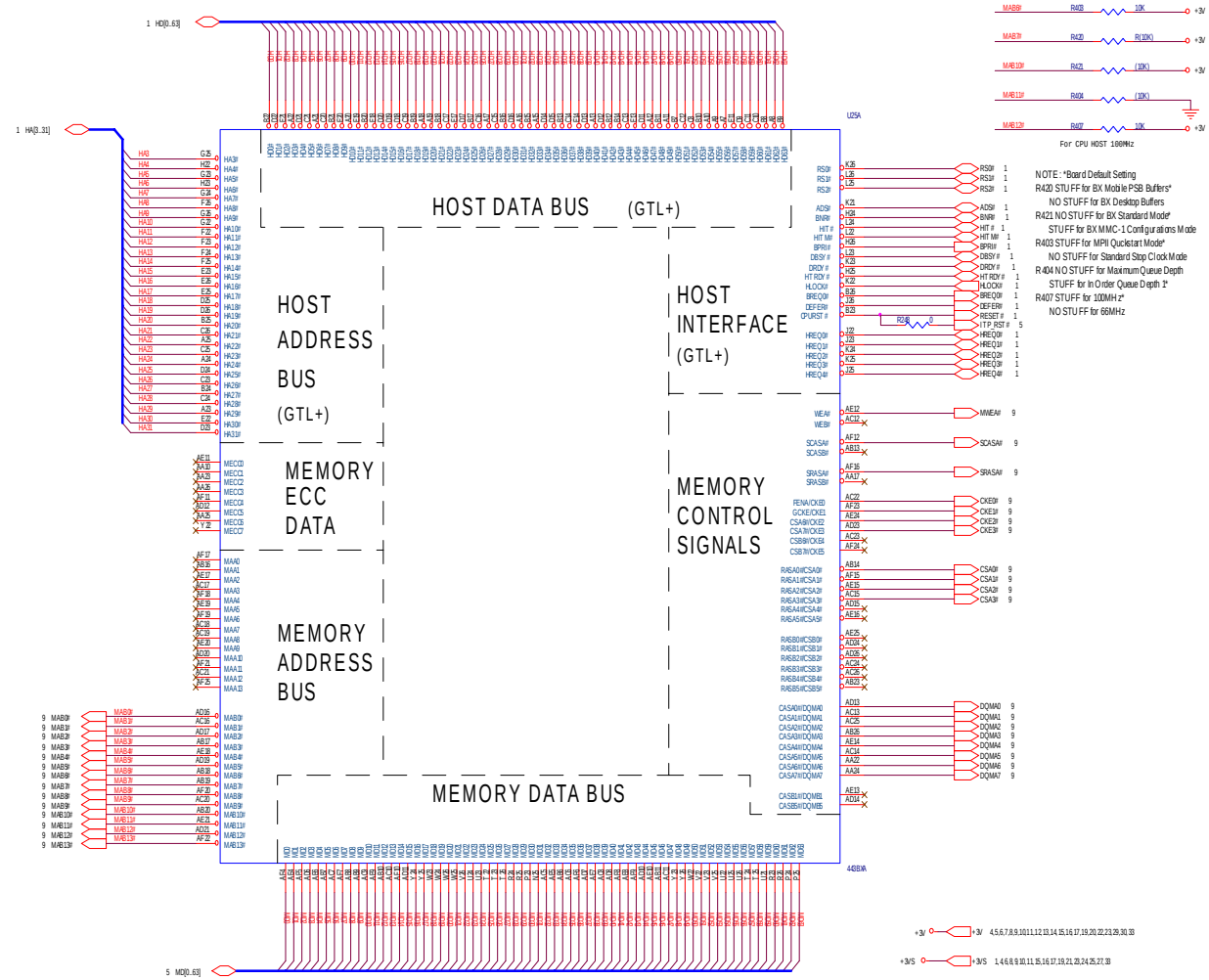


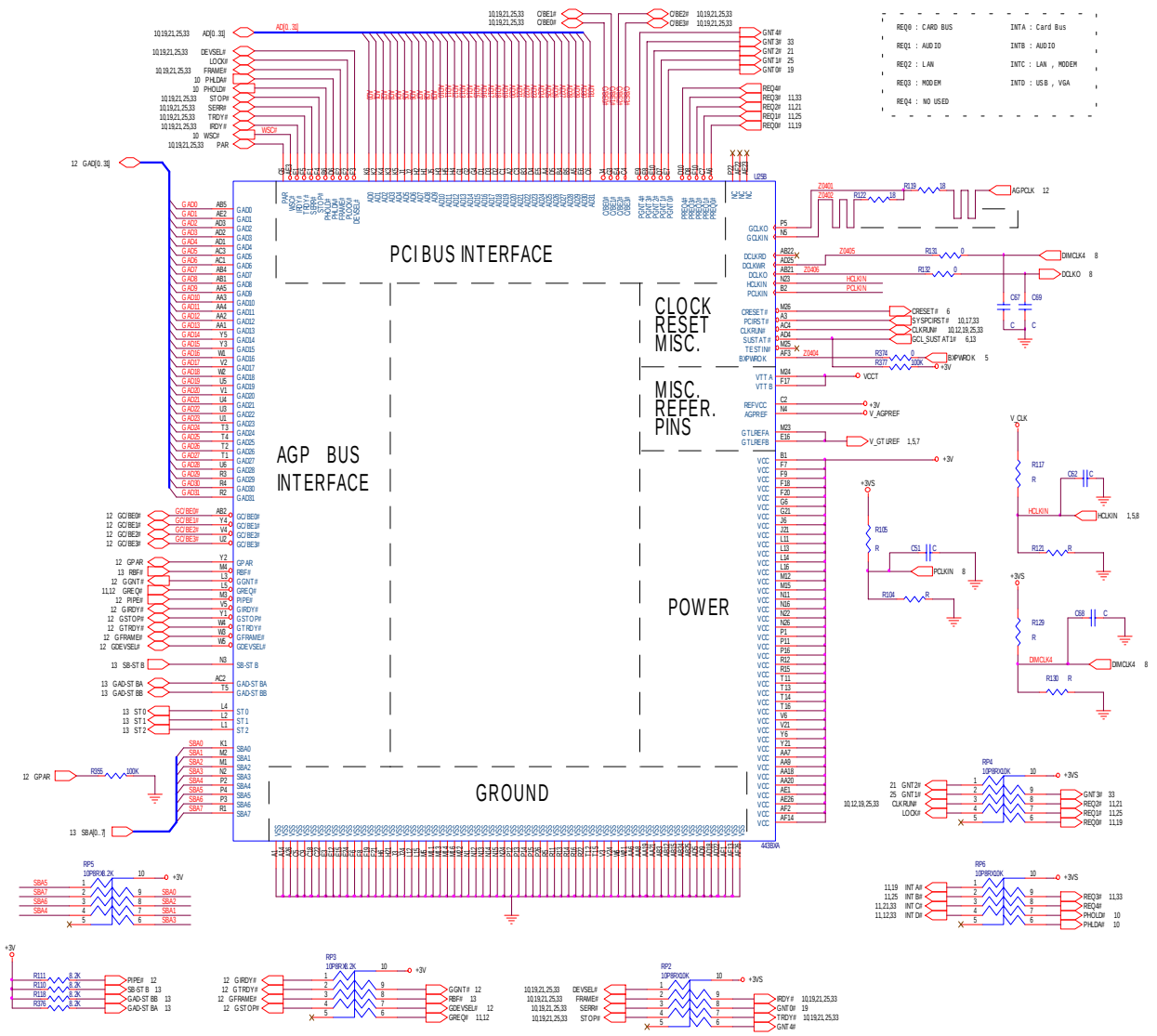


COPPERMINE
REV. 2
FIG. D – 2

D

443BX-1
REV. 2
FIG. D – 3

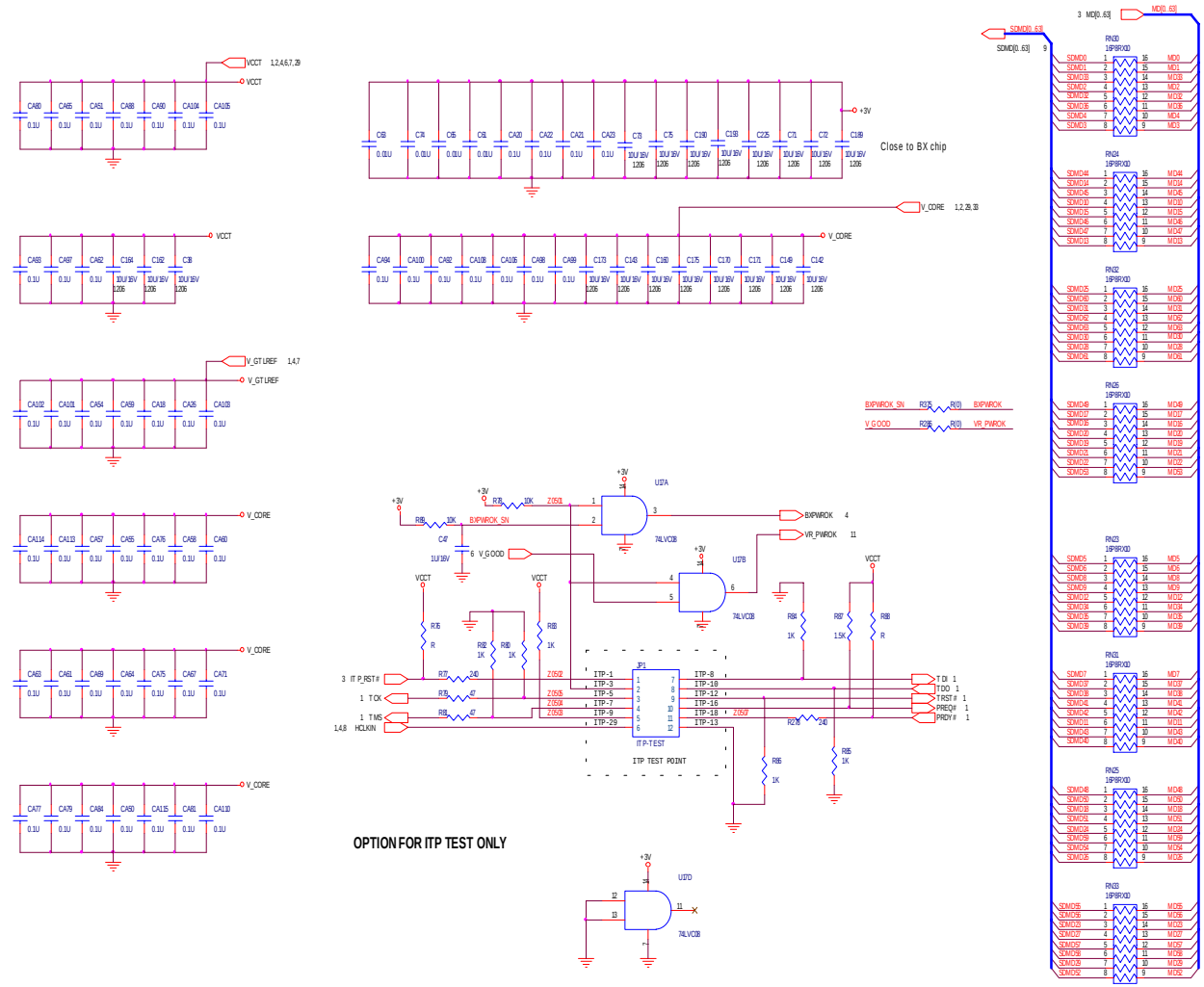


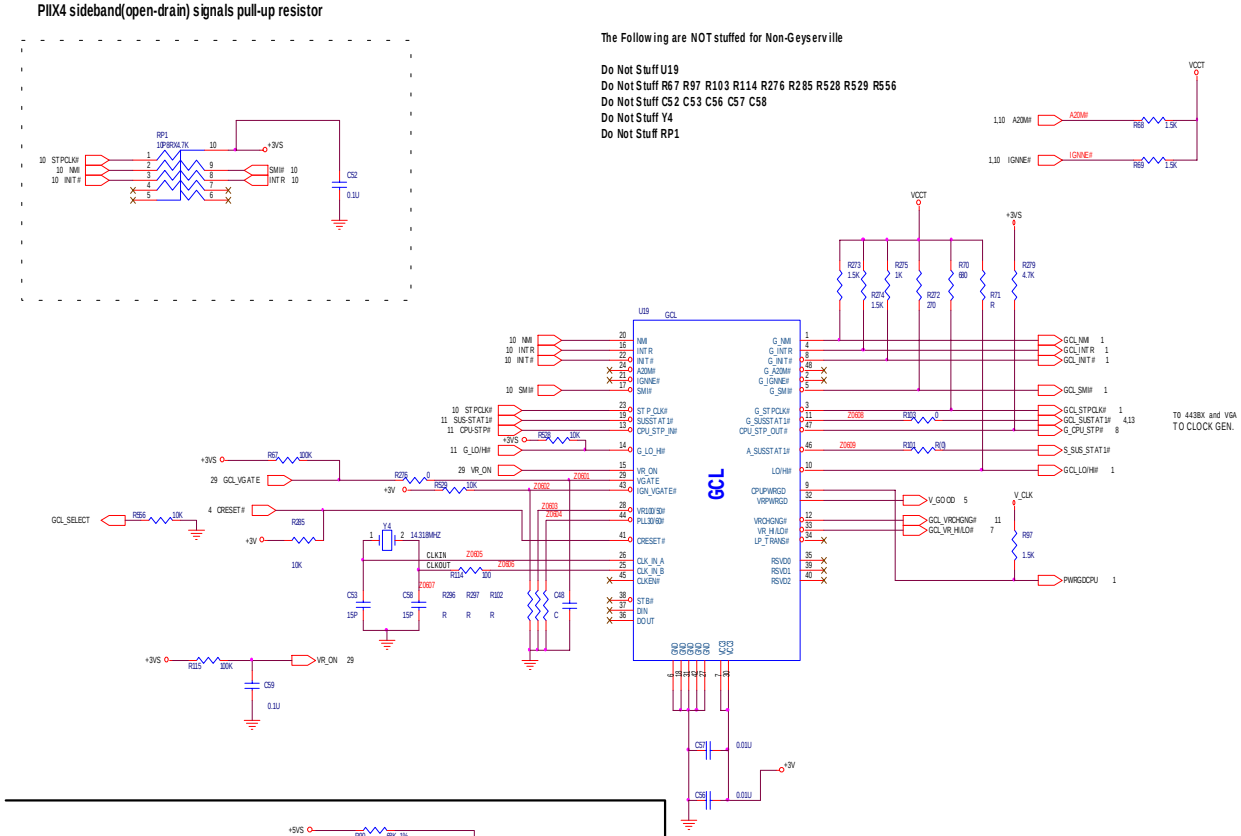


443BX-2
REV. 2
FIG. D – 4

D

DAMPING & ITP TEST POINTS
REV. 2
FIG. D – 5



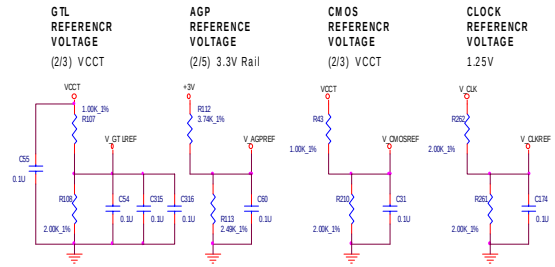


GYSERVILLE CONTROL LOGIC
REV. 2

FIG. D – 6

D

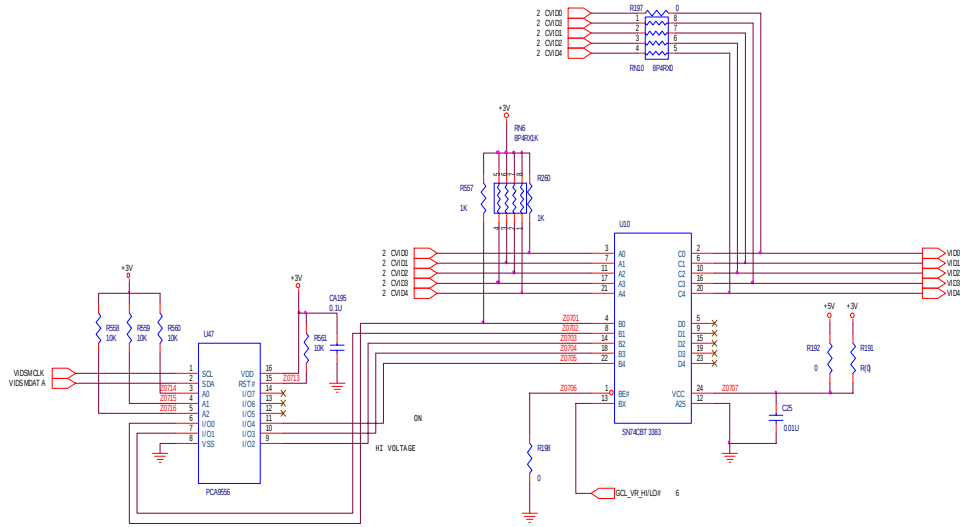
VRM SELECT
REV. 2
FIG. D – 7



V_CORE : 0.925V~2.0V
VCCT : 1.5V
V_CLK : 2.5V
V_GTLREF : 2/3 VCCT
V_CMOSFEF : 2/3 VCCT
V_AGPREF : 2/5 +3V(1.32V)
V_CLKREF : 1/2 V_CLK

CPU VRM SELECT TABLE

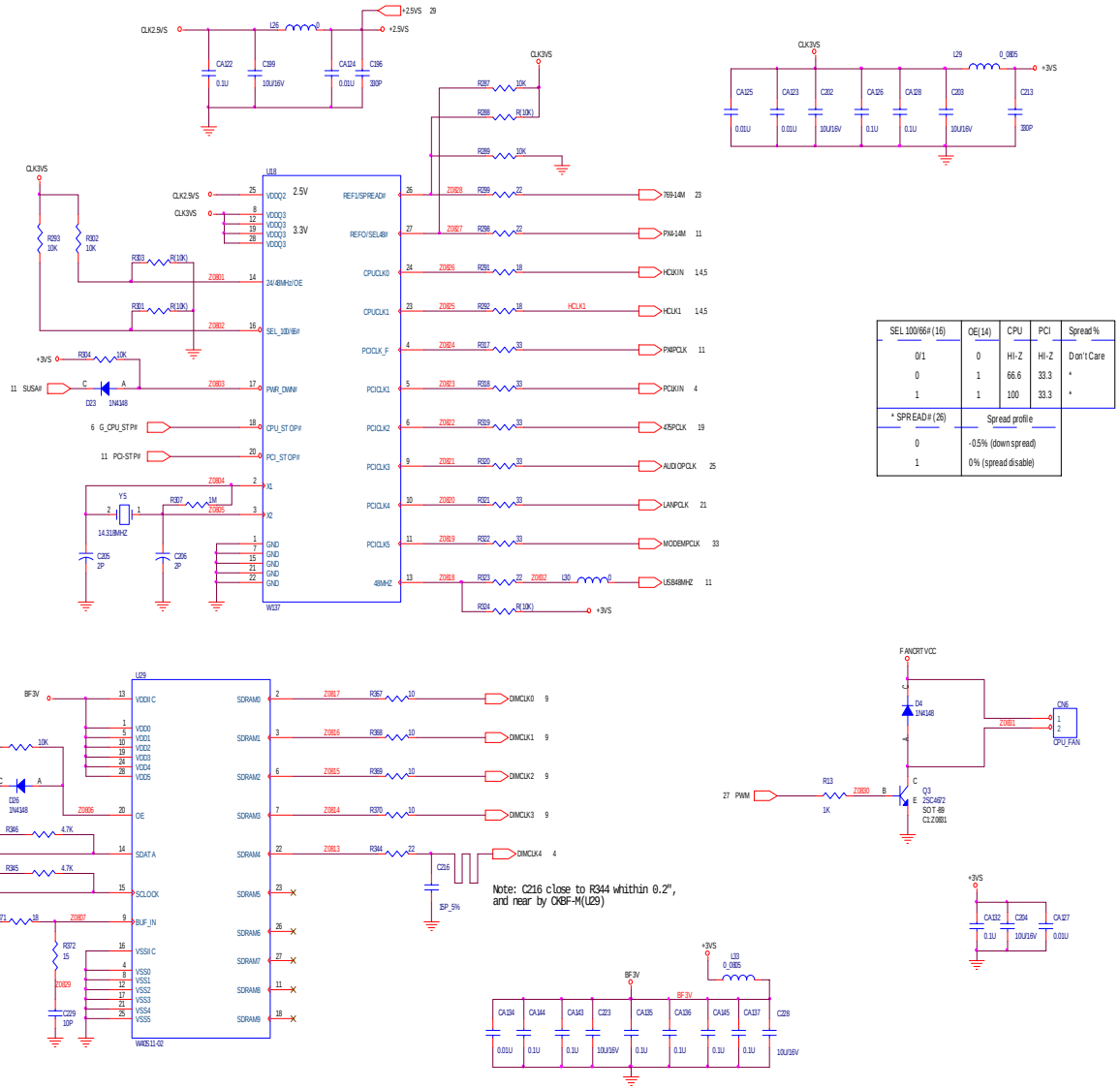
VID4	VID3	VID2	VID1	VID0	V_CORE
OFF	OFF	OFF	OFF	OFF	NO CPU
OFF	OFF	OFF	OFF	ON	0.925V
OFF	OFF	OFF	ON	OFF	0.950V
OFF	OFF	OFF	ON	ON	0.975V
OFF	OFF	ON	OFF	OFF	1.000V
OFF	OFF	ON	OFF	ON	1.025V
OFF	OFF	ON	ON	OFF	1.050V
OFF	OFF	ON	ON	ON	1.075V
OFF	ON	OFF	OFF	OFF	1.100V
OFF	ON	OFF	OFF	ON	1.125V
OFF	ON	OFF	ON	OFF	1.150V
OFF	ON	OFF	ON	ON	1.175V
OFF	ON	ON	OFF	OFF	1.200V
OFF	ON	ON	OFF	ON	1.225V
OFF	ON	ON	ON	OFF	1.250V
OFF	ON	ON	ON	ON	1.275V
ON	OFF	OFF	OFF	OFF	NO CPU
ON	OFF	OFF	OFF	ON	1.30V
ON	OFF	OFF	ON	OFF	1.35V
ON	OFF	OFF	ON	ON	1.40V
ON	OFF	ON	OFF	OFF	1.45V
ON	OFF	ON	OFF	ON	1.50V
ON	OFF	ON	ON	OFF	1.55V
ON	OFF	ON	ON	ON	1.60V
ON	ON	OFF	OFF	OFF	1.65V
ON	ON	OFF	OFF	ON	1.70V
ON	ON	OFF	ON	OFF	1.75V
ON	ON	OFF	ON	ON	1.80V
ON	ON	ON	OFF	OFF	1.85V
ON	ON	ON	OFF	ON	1.90V
ON	ON	ON	ON	OFF	1.95V
ON	ON	ON	ON	ON	2.00V



NOTE: This Circuit for Geyserville CPU V_CORE Select

GCL_VR_HI/LO# VID0..4 SELECT :
AC MODE : B0 ... B4
BATTERY MODE : A0 ... A4

D



SEL 100/66# (16)	OE(14)	CPU	PCI	Spread %
0/1	0	HI-Z	HI-Z	Don't Care
0	1	66.6	33.3	*
1	1	100	33.3	*

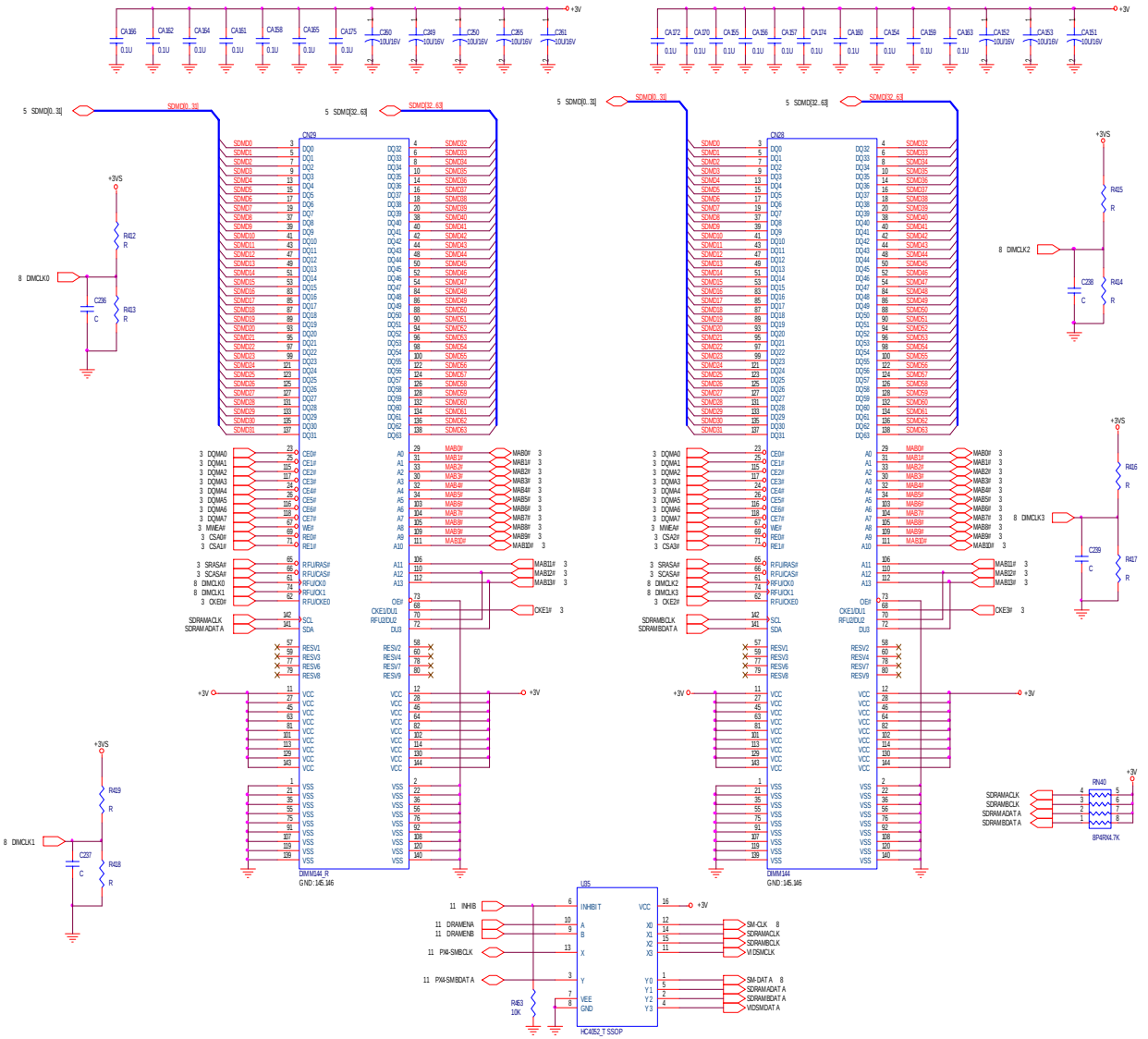
* SPREAD# (26)	Spread profile
0	-0.5% (down spread)
1	0% (spread disable)

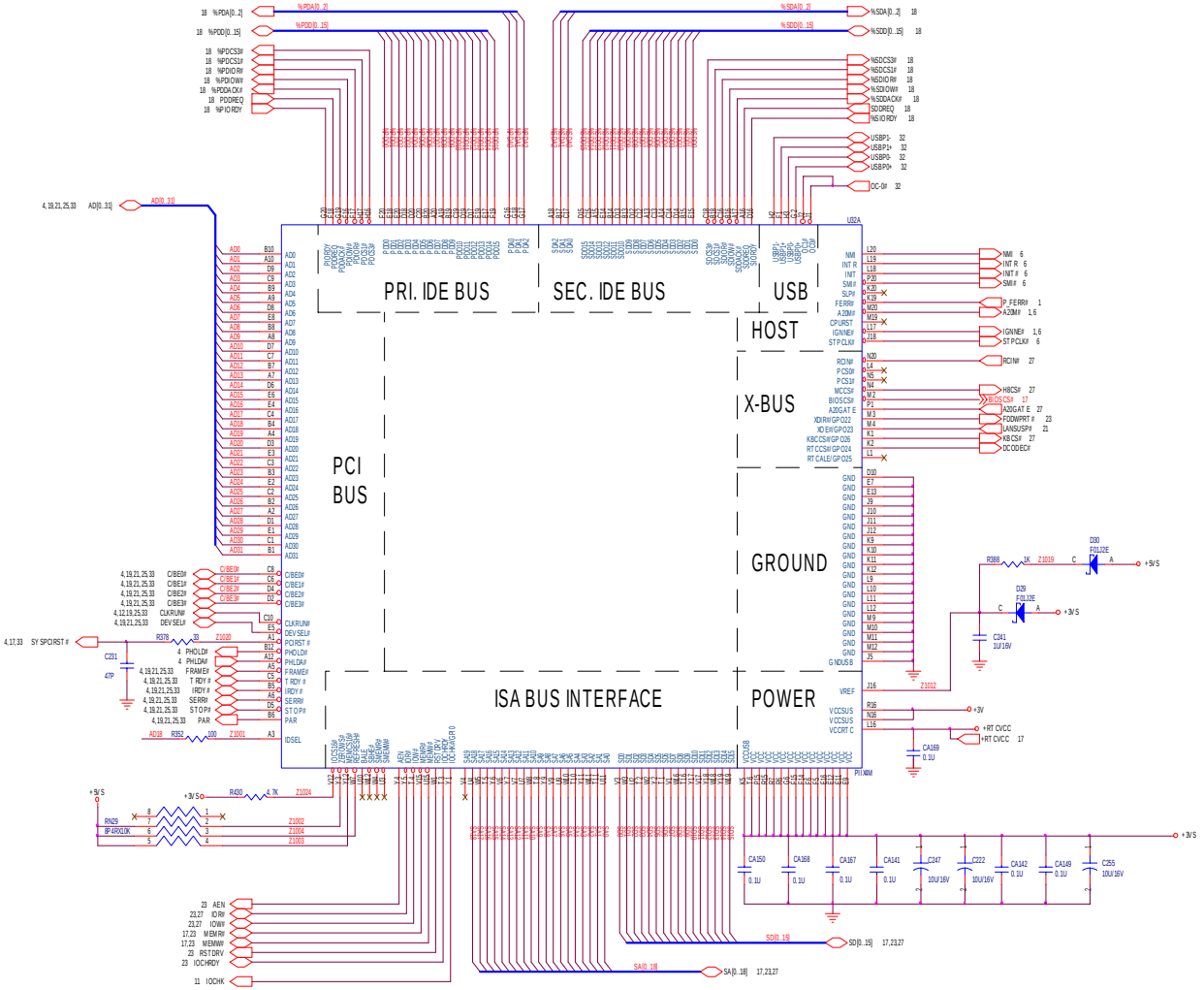
CLOCK GENERATOR
REV. 2
FIG. D – 8

SO DIMM SDRAM

REV. 2

FIG. D – 9

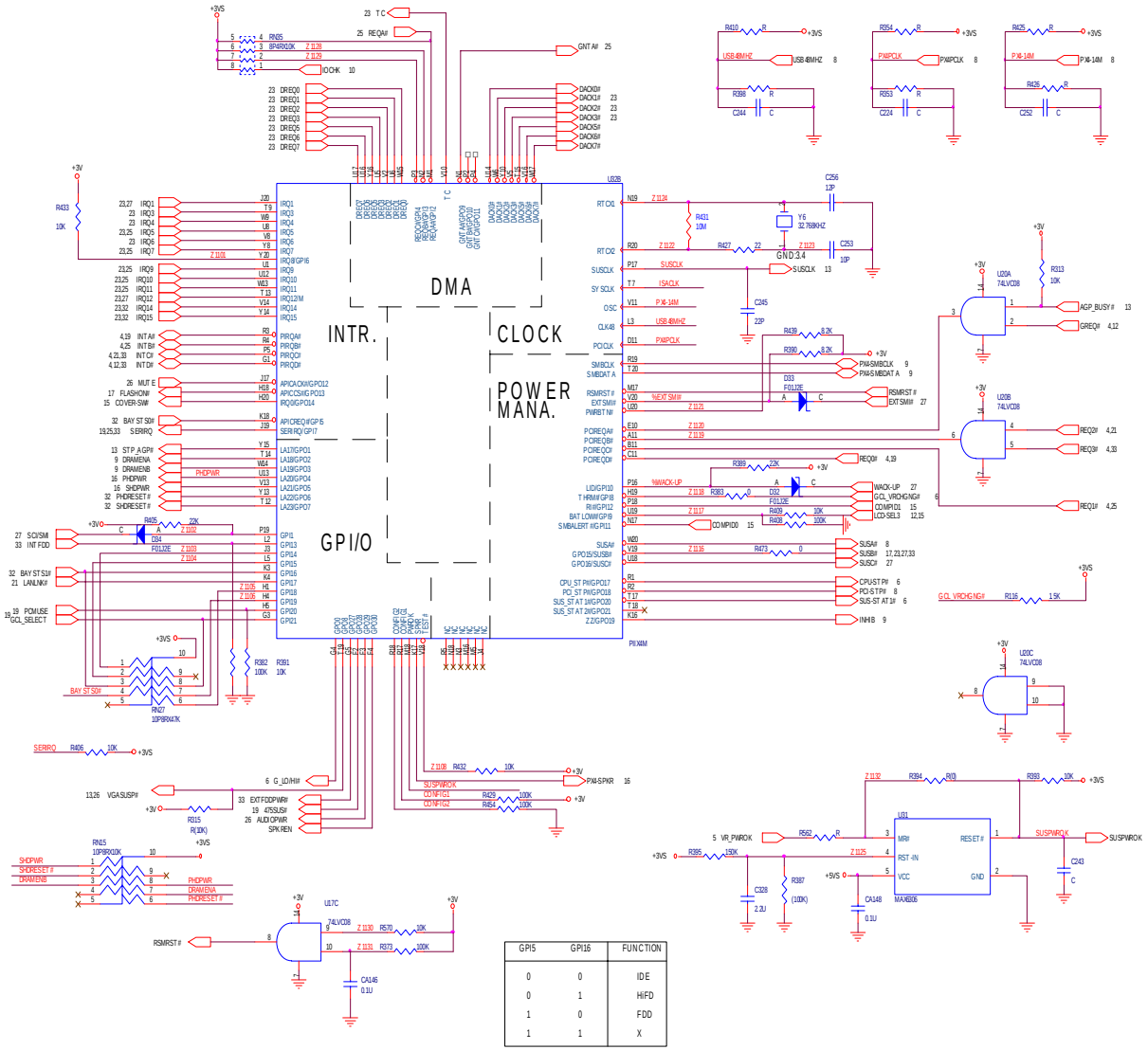




INTEL 82371MB PIIX4M-1
REV. 2
FIG. D – 10

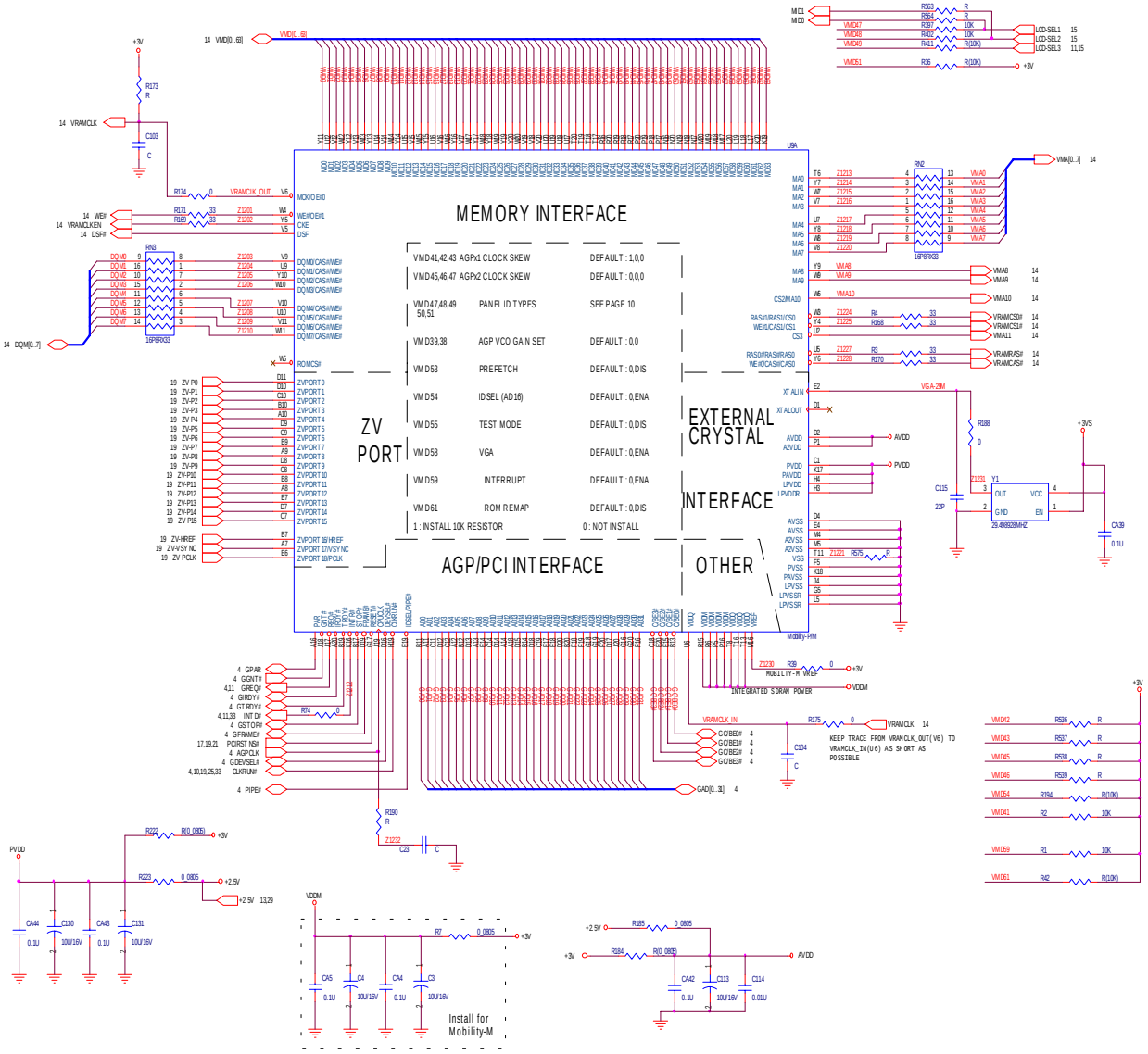
D

INTEL 82371MB PIIX4M2
REV. 2
FIG. D – 11



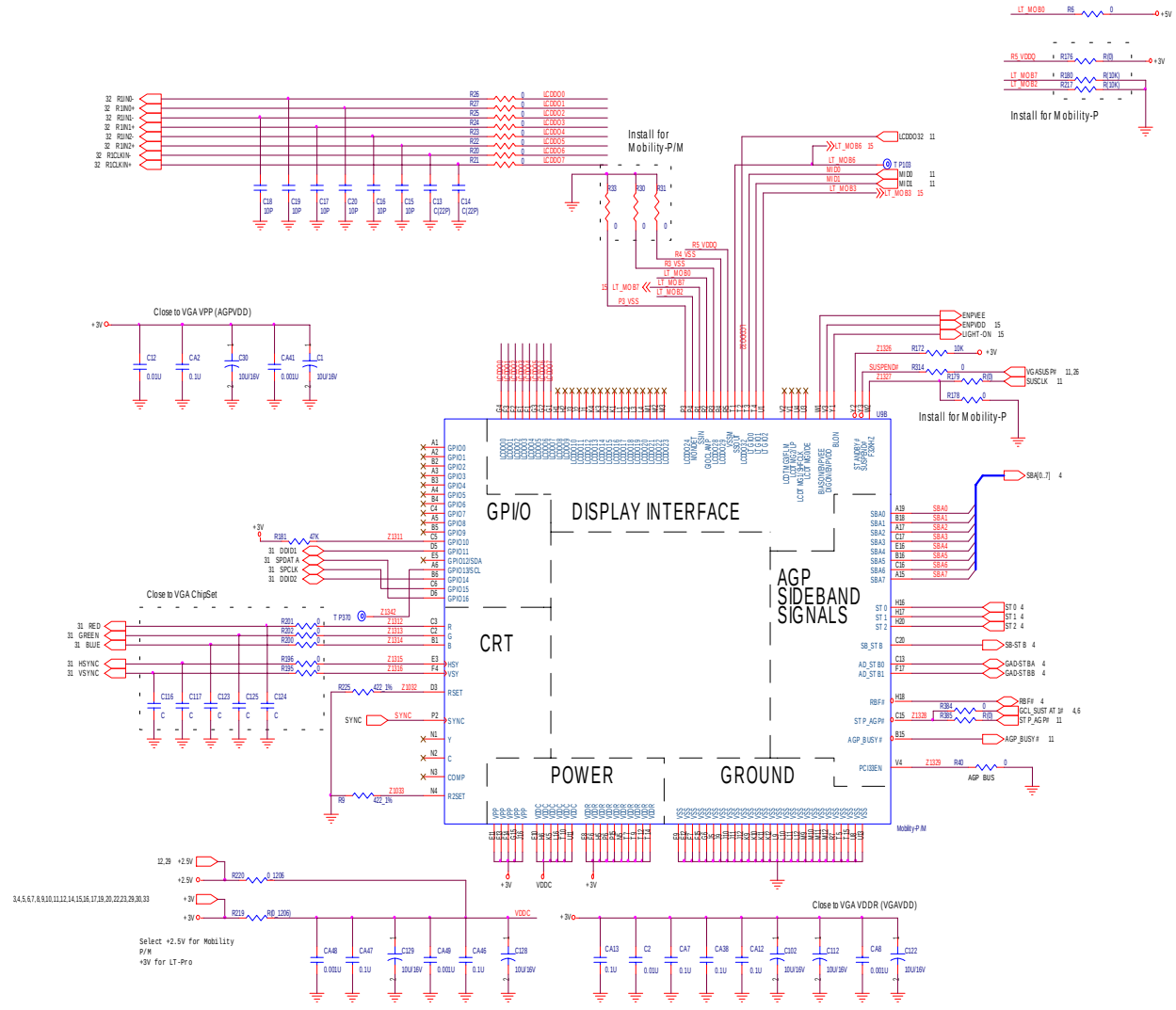
GPI5	GPI16	FUNCTION
0	0	IDE
0	1	HiFD
1	0	FDD
1	1	X

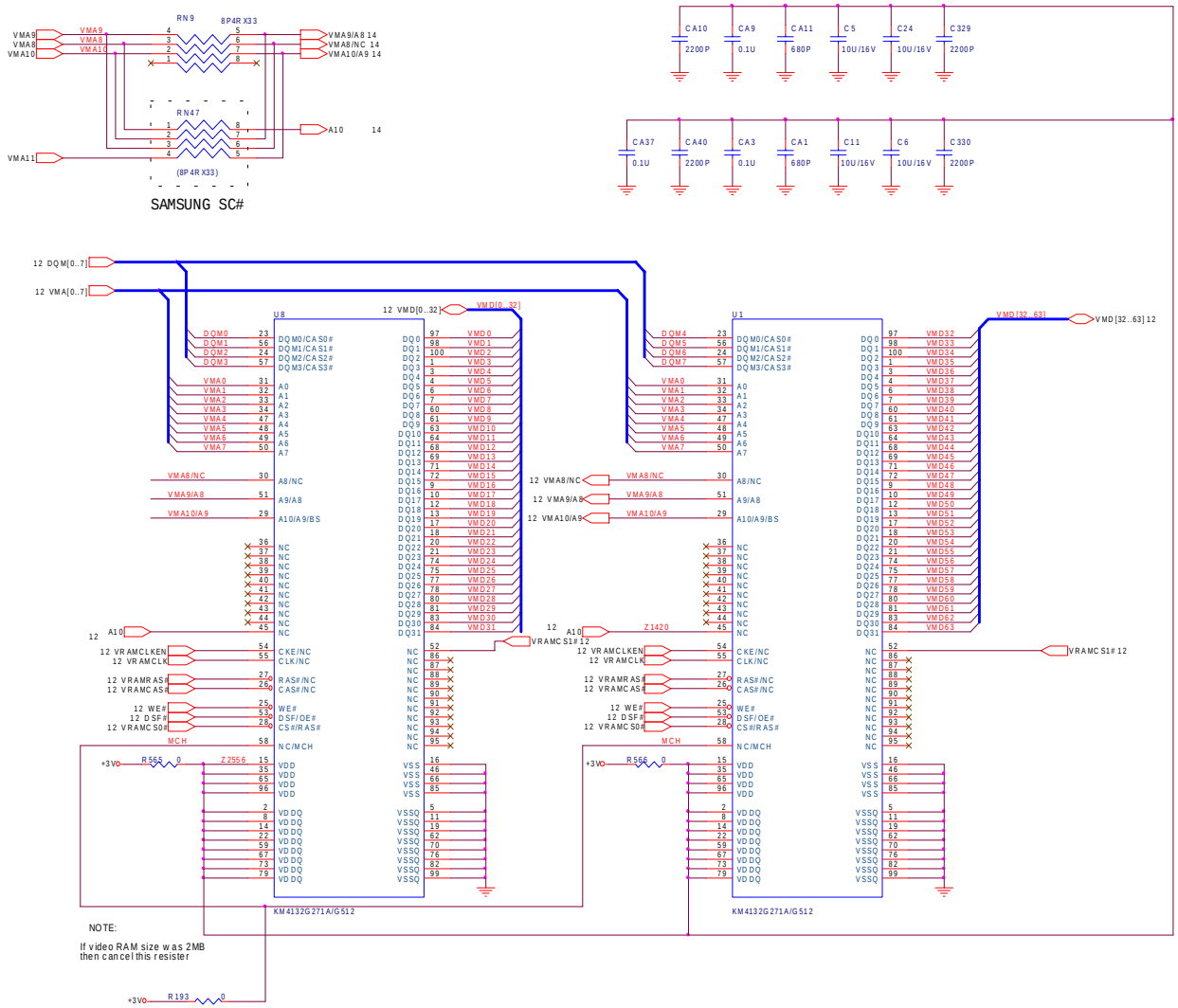
D



VGA CONTROLLER 1
REV. 2
FIG. D – 12

VGA CONTROLLER 2
REV. 2
FIG. D – 13





SGRAM 4MB
REV. 2
FIG. D – 14

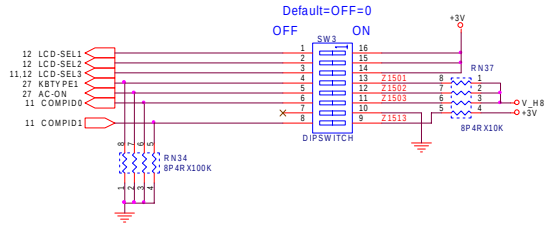
D

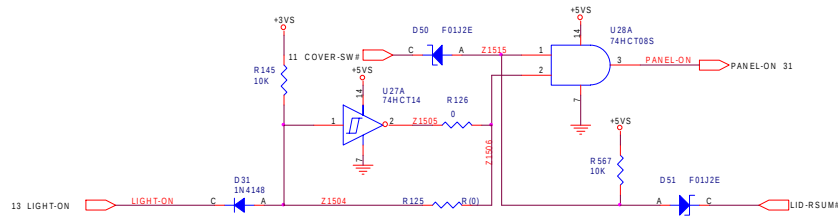
PANEL TYPE		SW-1	SW-2	SW-3
ID1	12.1" S-TFT FUJITSU-FLC31SVC6S-17	ON	OFF	OFF
ID2	13.3" X-TFT Hitachi-TX34D74VC1CAA	OFF	ON	OFF
ID3	14.1" X-TFT Hitachi-TX36D75VC1CAA	ON	ON	OFF
ID4				
ID5				

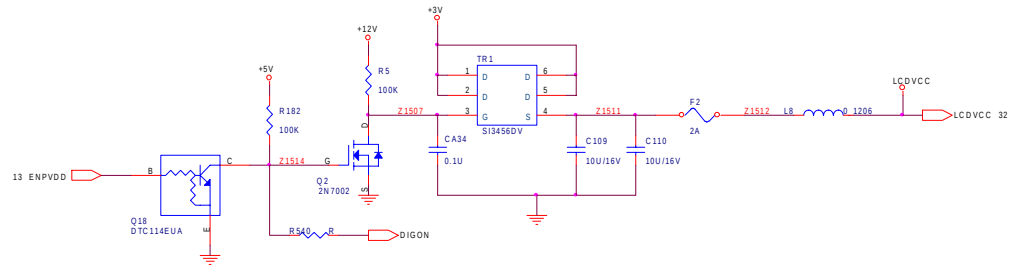
ON=1=H OFF=0=L

K/B TYPE	SW-4	SW-5
US	OFF	OFF
JP	ON	OFF

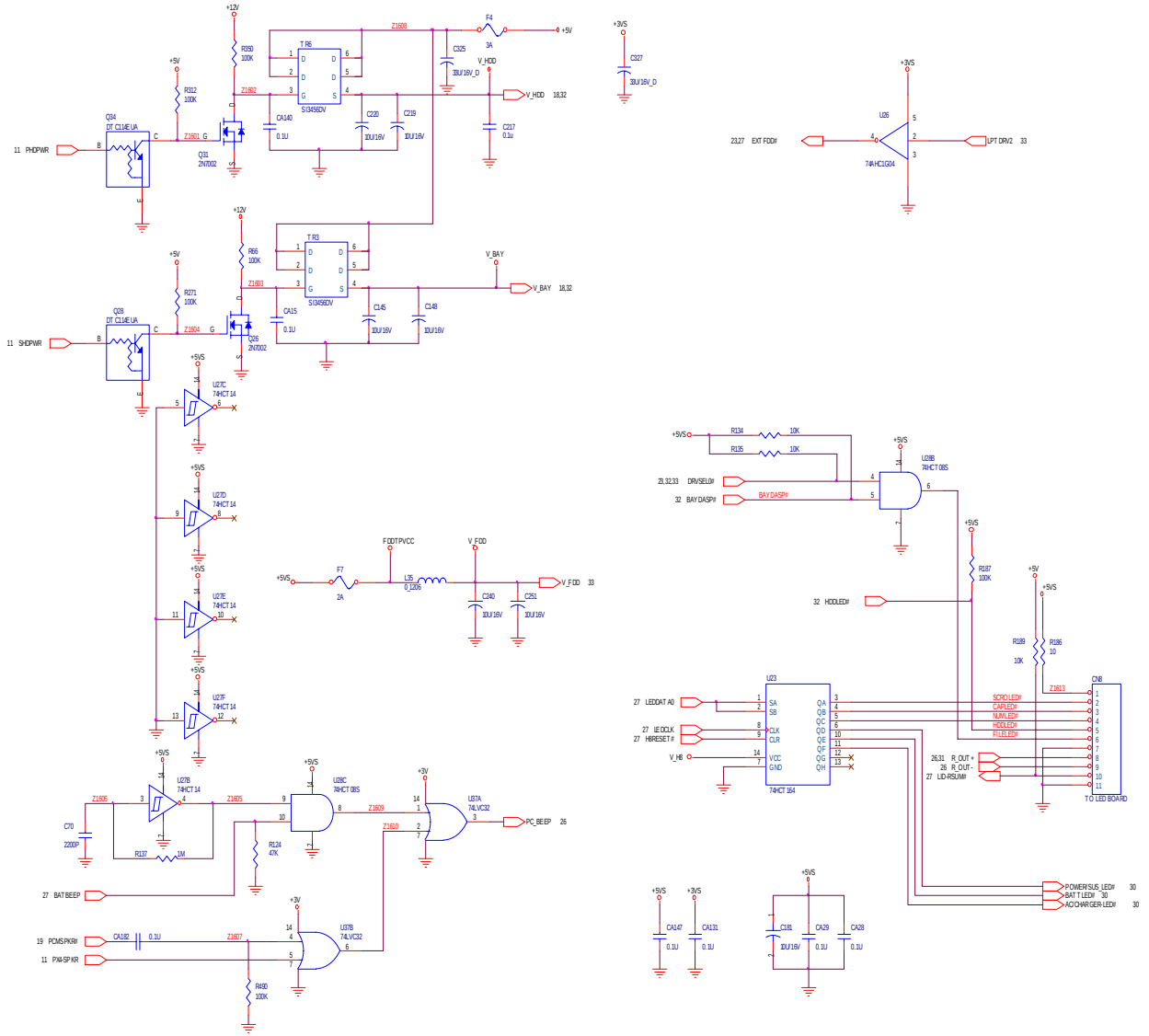
COMPANY ID	SW-6
HTC	OFF
CLEVO	ON







LCD INTERFACE
REV. 2
FIG. D – 15



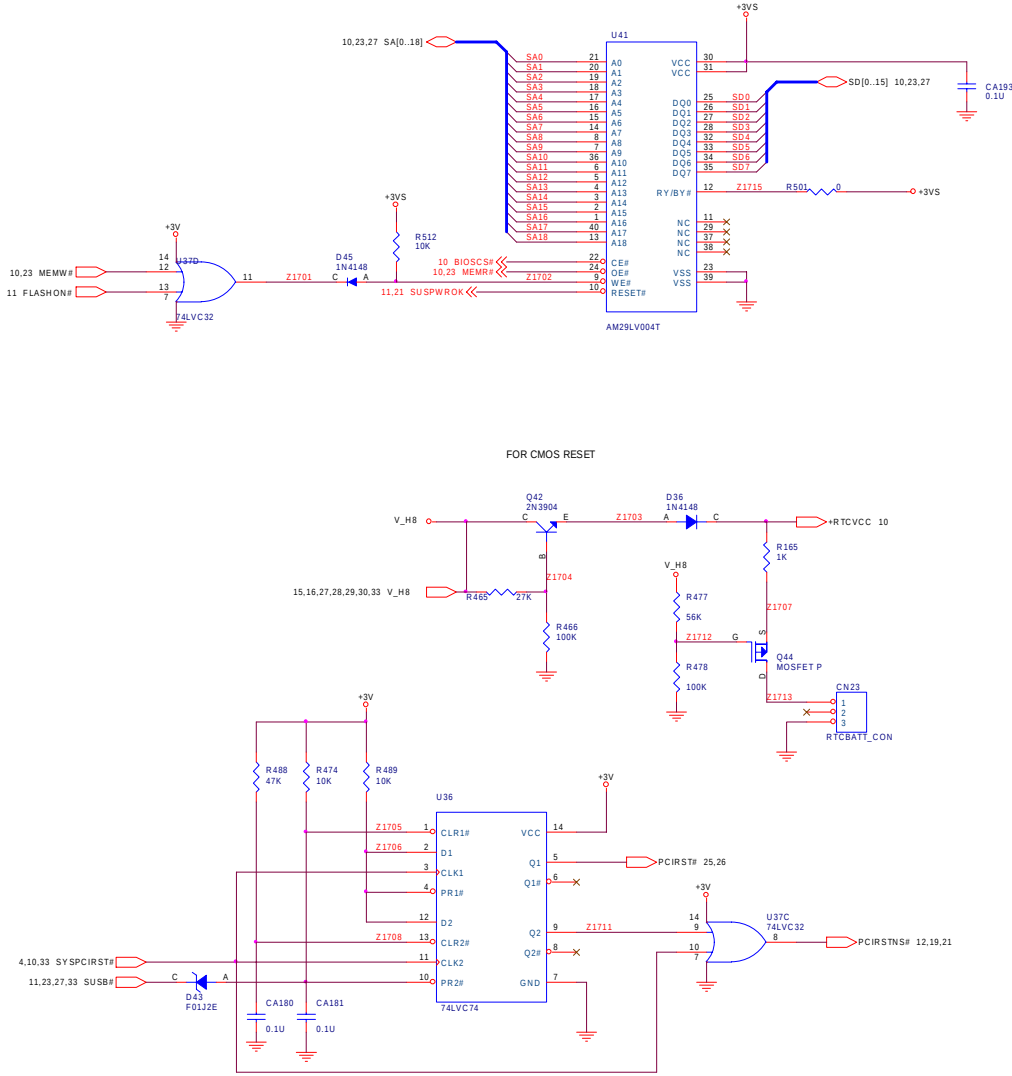
INDICATOR & MODEM CONNECTOR
REV. 2
FIG. D – 16

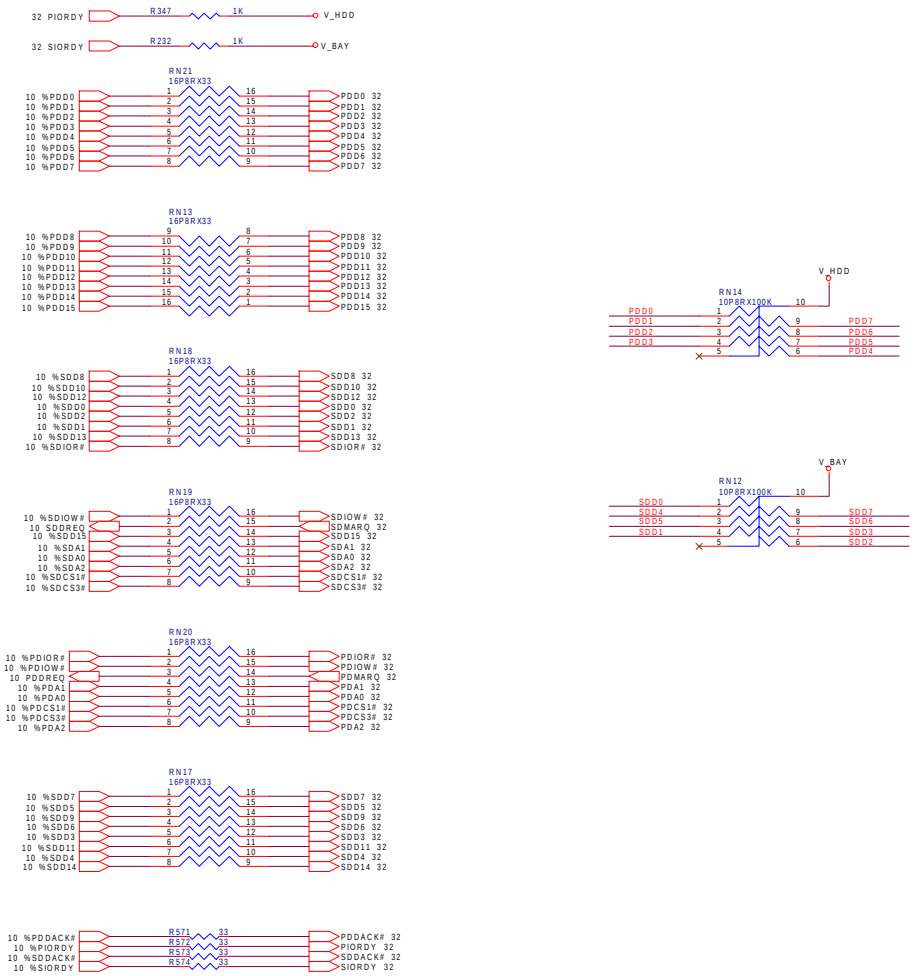
D

BIOS & RTC

REV. 2

FIG. D – 17

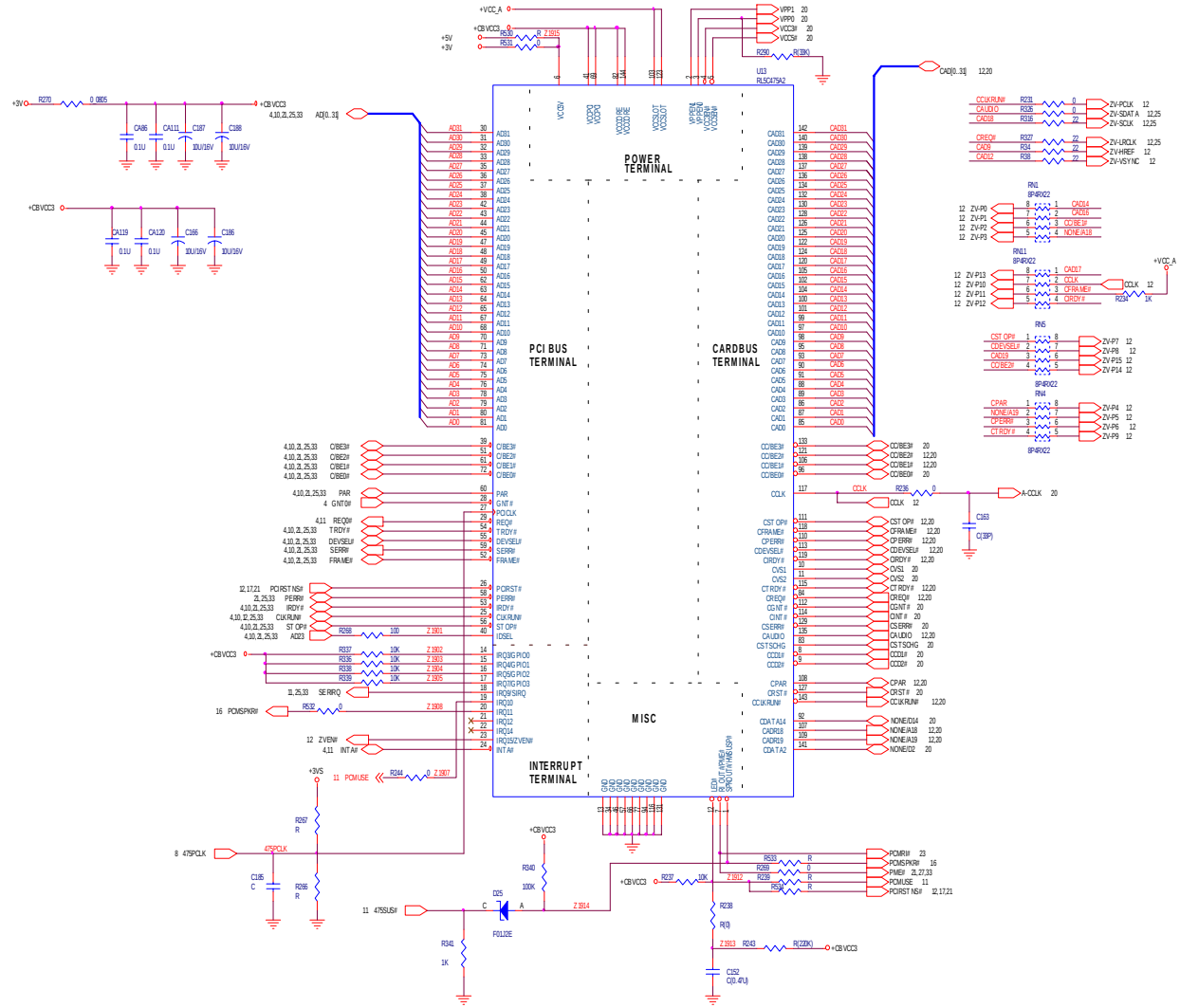


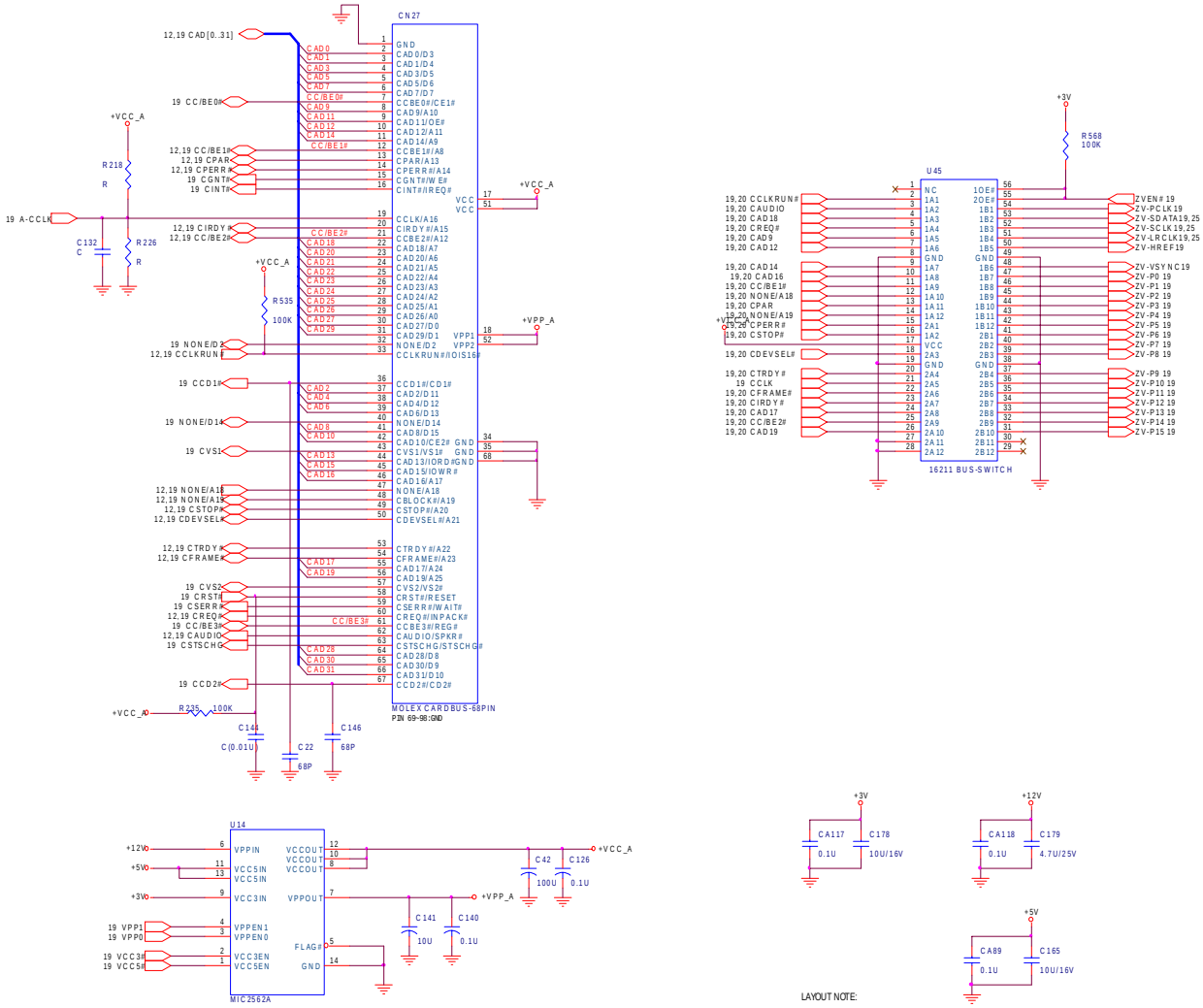


IDE INTERFACE
REV. 2
FIG. D – 18

D

CARDBUS CONTROLLER
REV. 2
FIG. D – 19





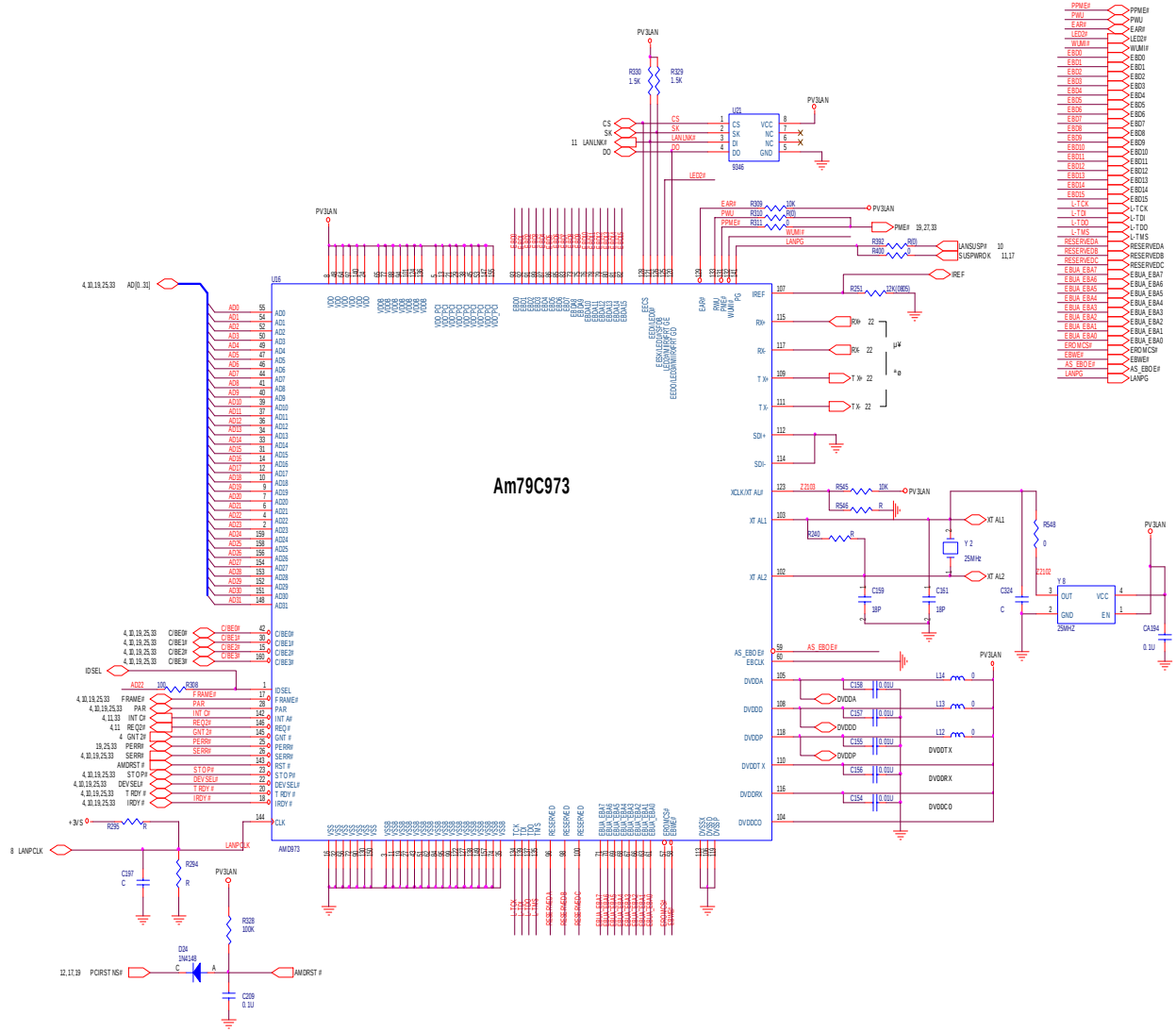
CARDBUS SLOT
REV. 2
FIG. D – 20

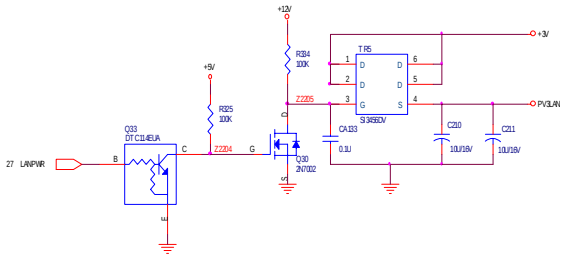
D

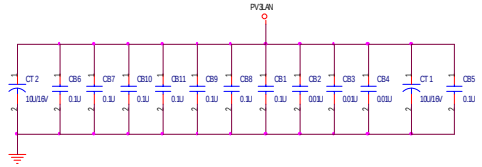
LAN CONTROLLER AM 973

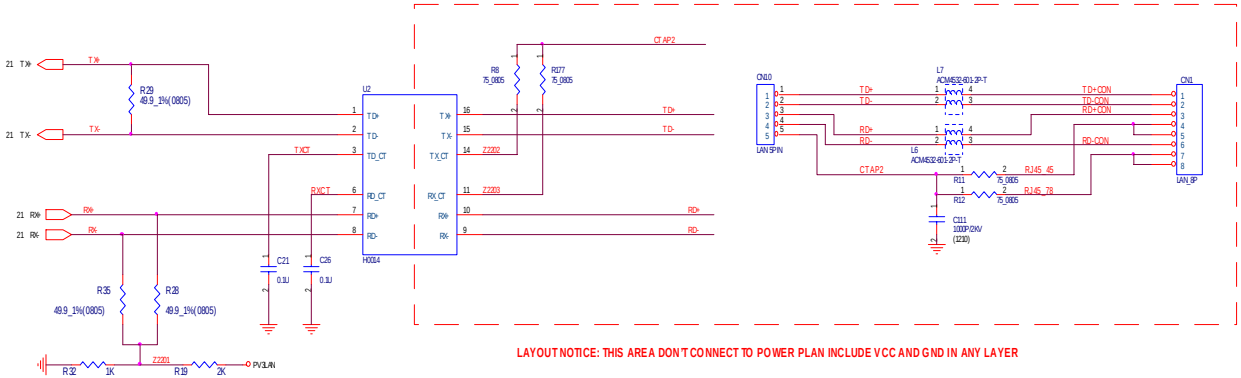
REV. 2

FIG. D – 21







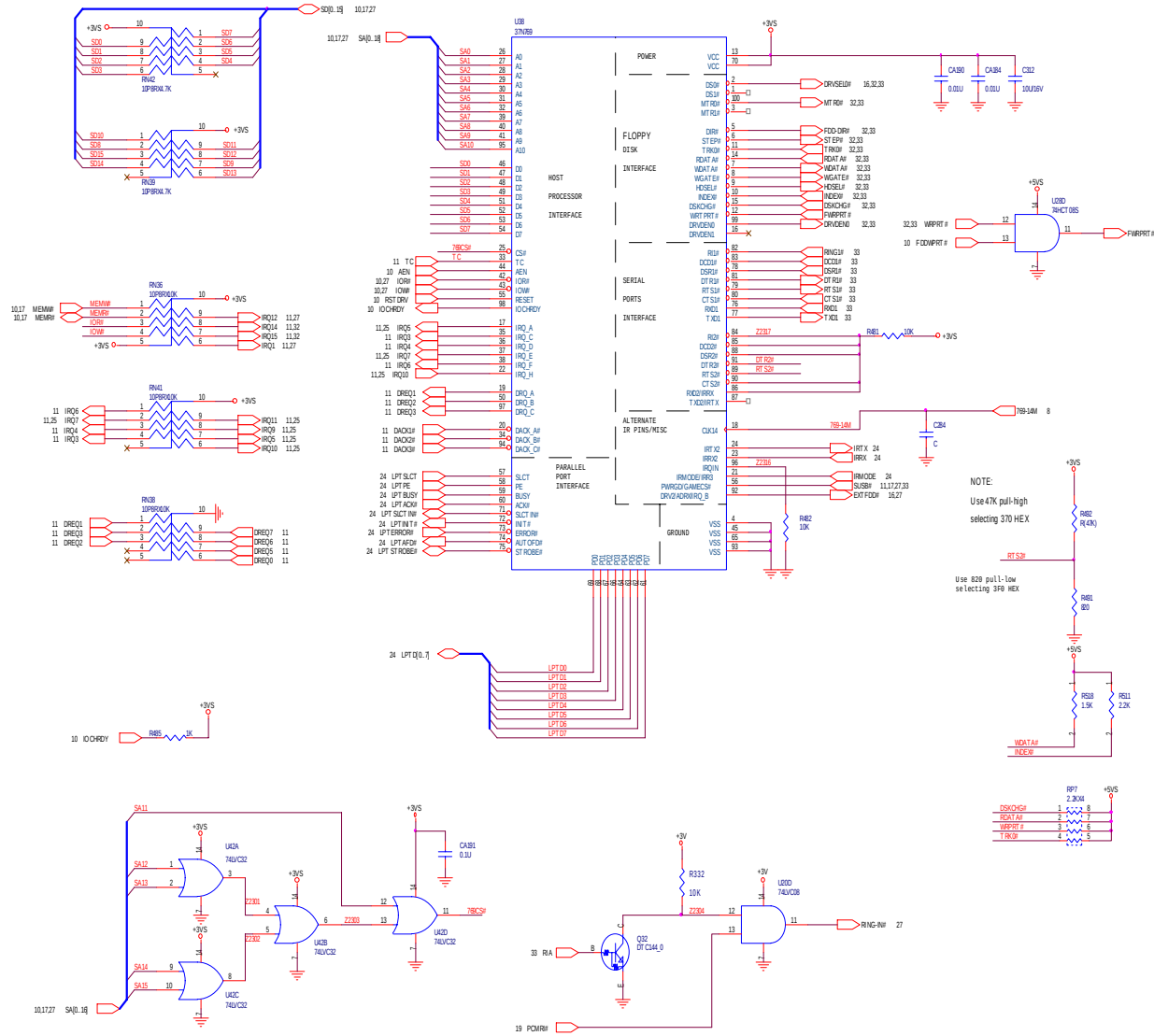


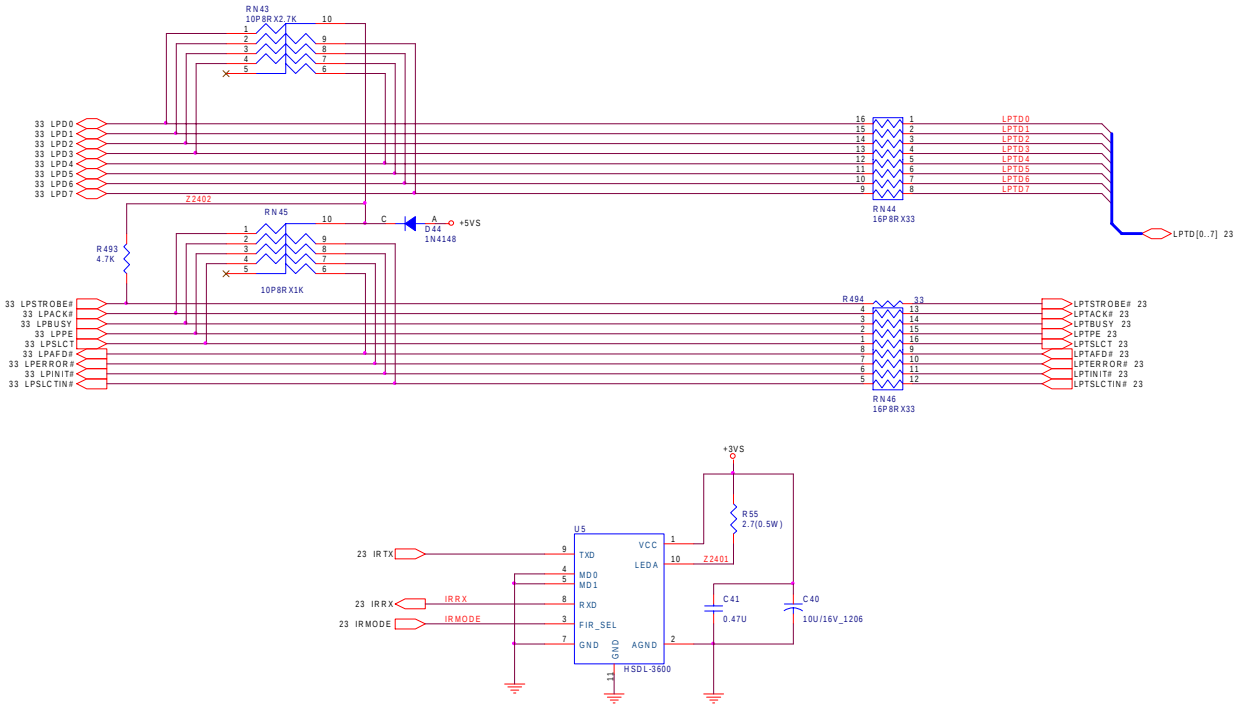
LAYOUT NOTICE: THIS AREA DON'T CONNECT TO POWER PLAN INCLUDE VCC AND GND IN ANY LAYER

LAN PHYSICAL
REV. 2
FIG. D – 22

D

I/O CONTROLLER
REV. 2
FIG. D – 23

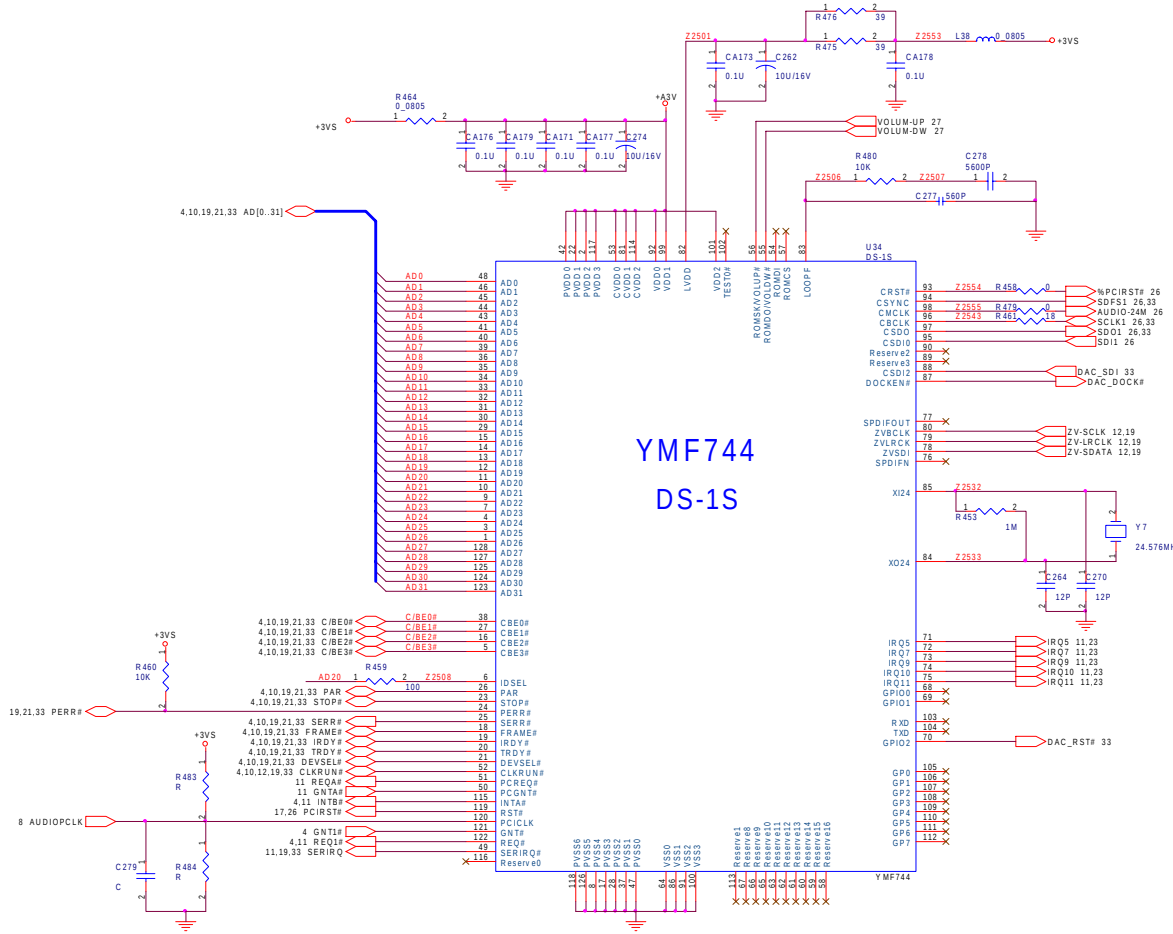


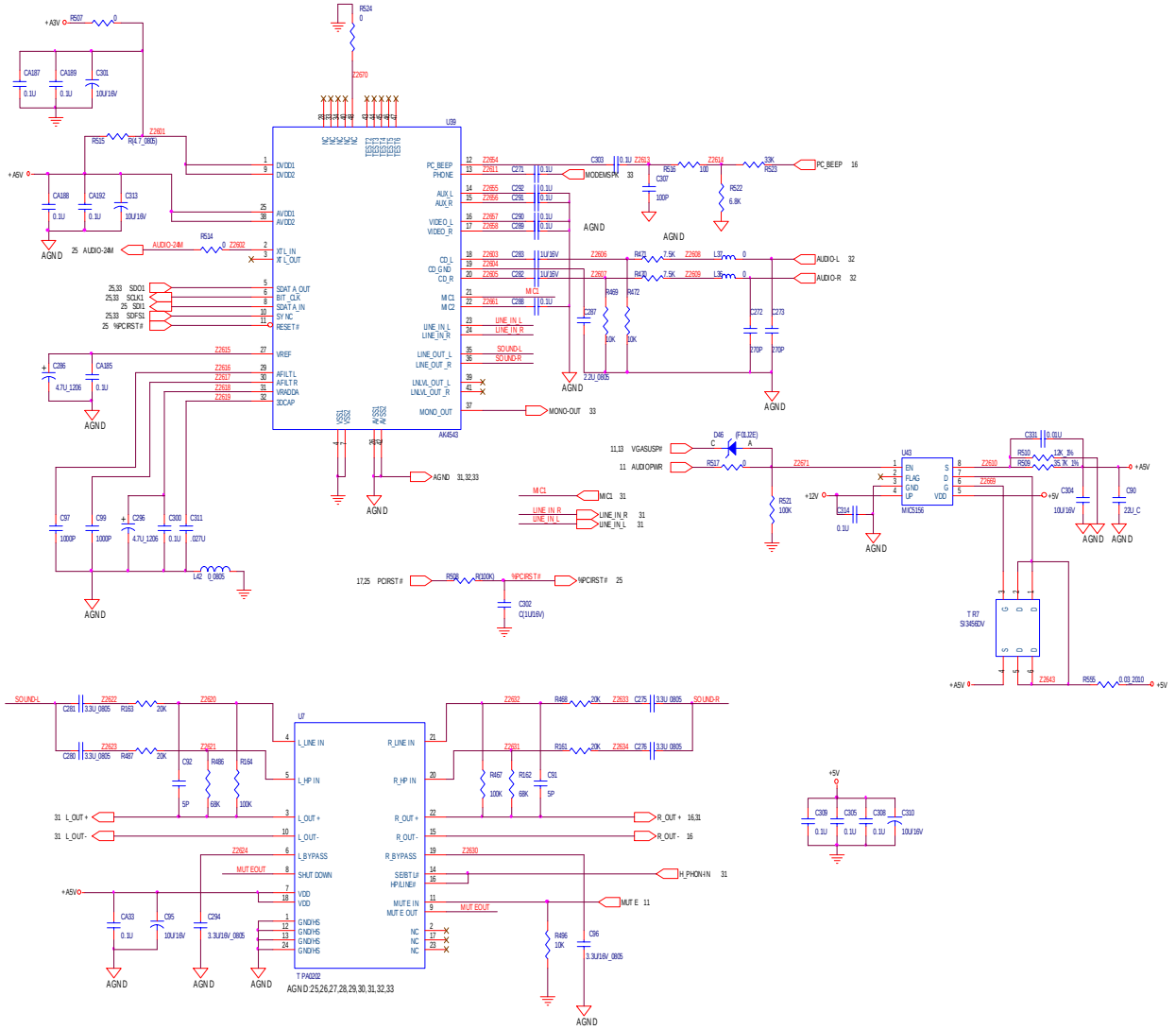


FOR & I/O INTERFACE
REV. 2
FIG. D – 24

D

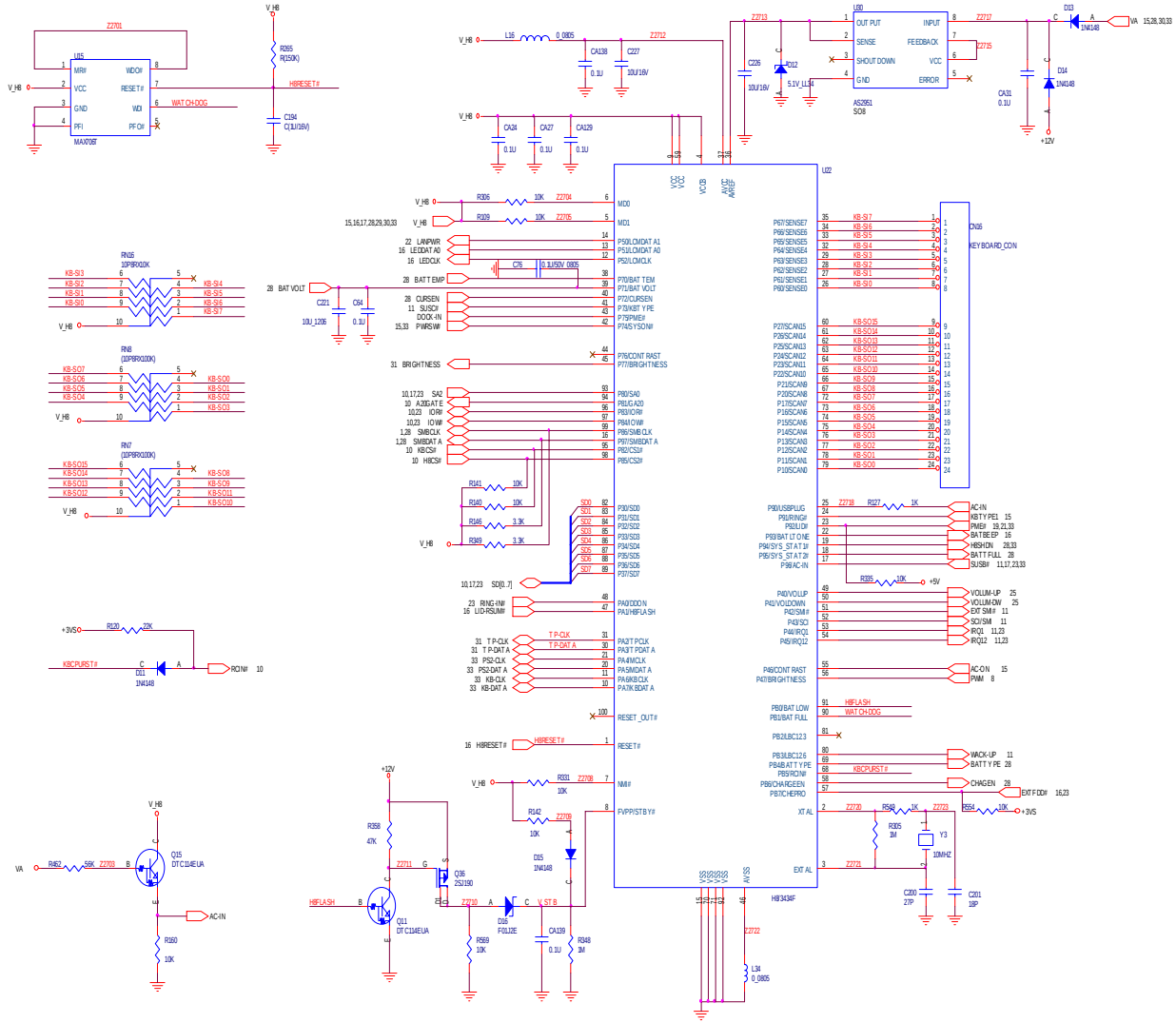
YAMAHA AUDIO CHIP
REV. 2
FIG. D – 25

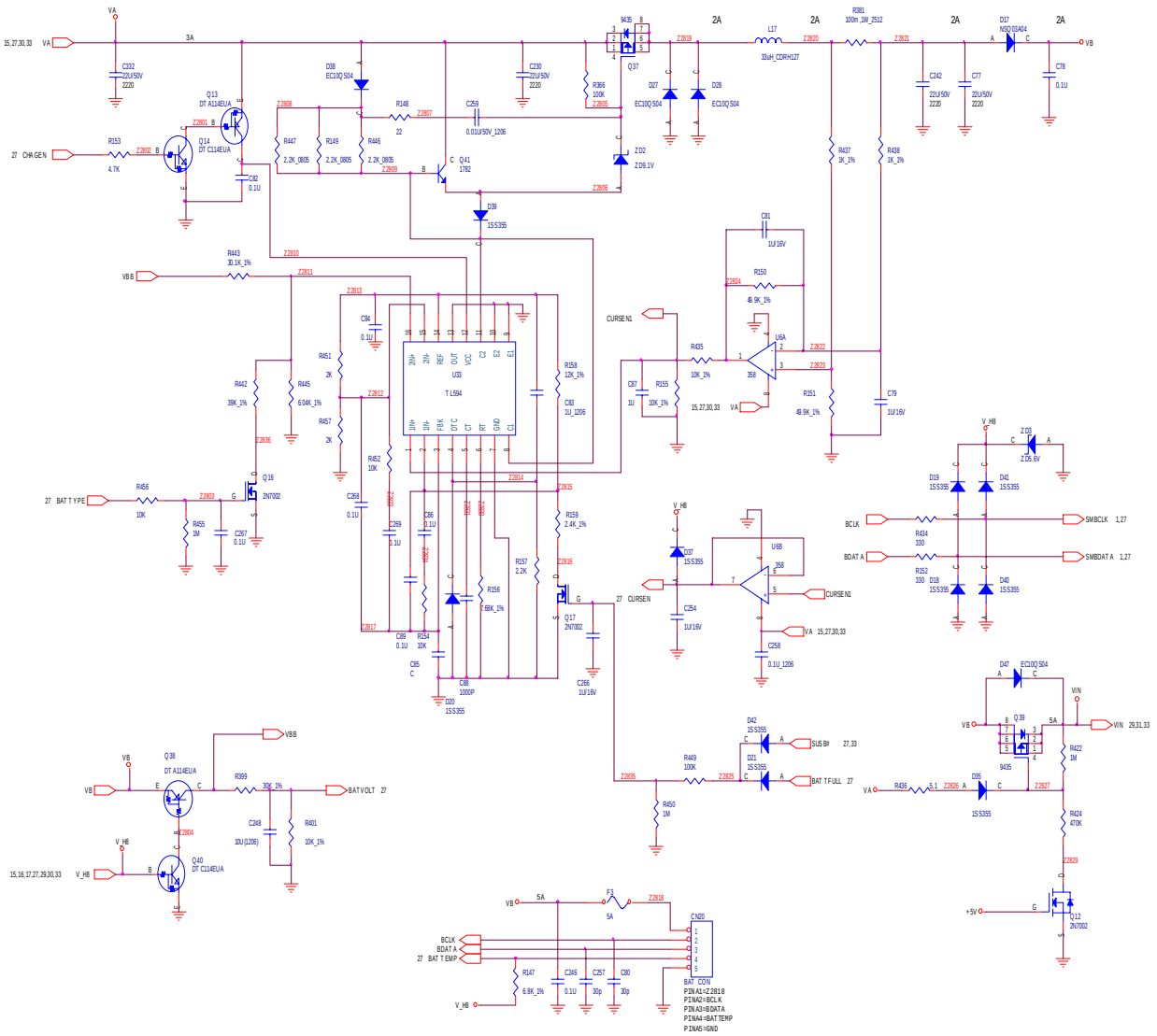




AUDIO CODEC & AMP
REV. 2
FIG. D – 26

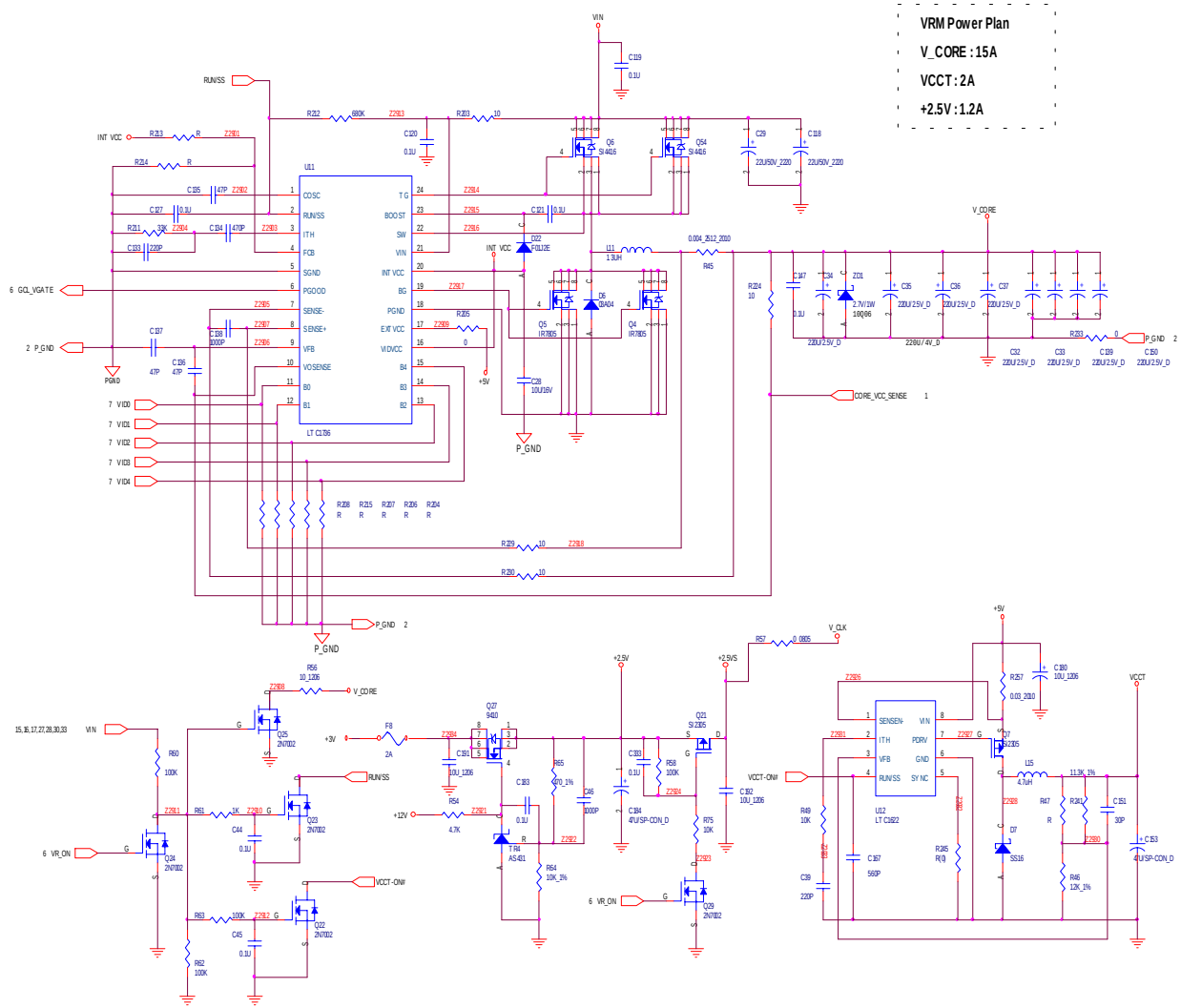
H8
REV. 2
FIG. D – 27



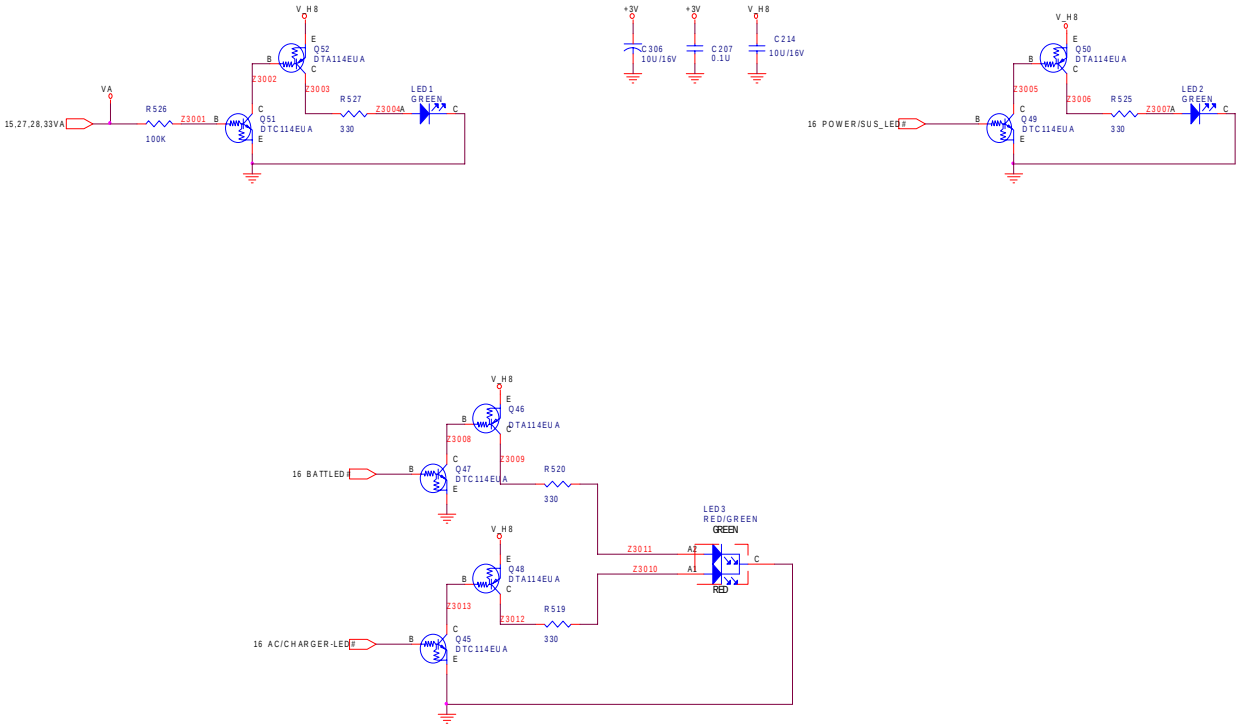


CHARGER
REV. 2
FIG. D – 28

D



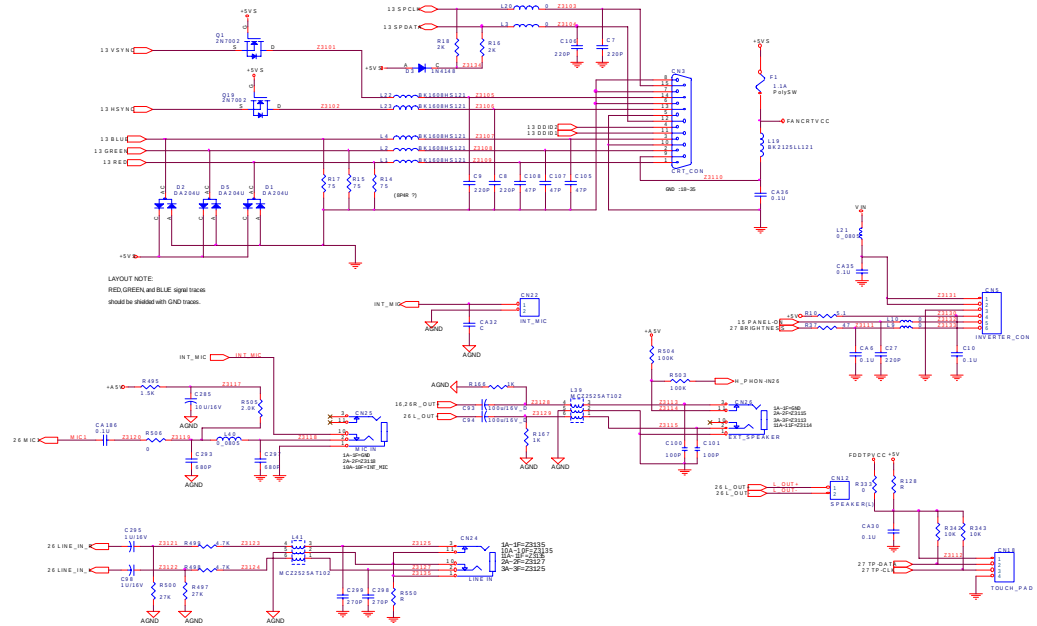
CPU VRM
REV. 2
FIG. D – 29

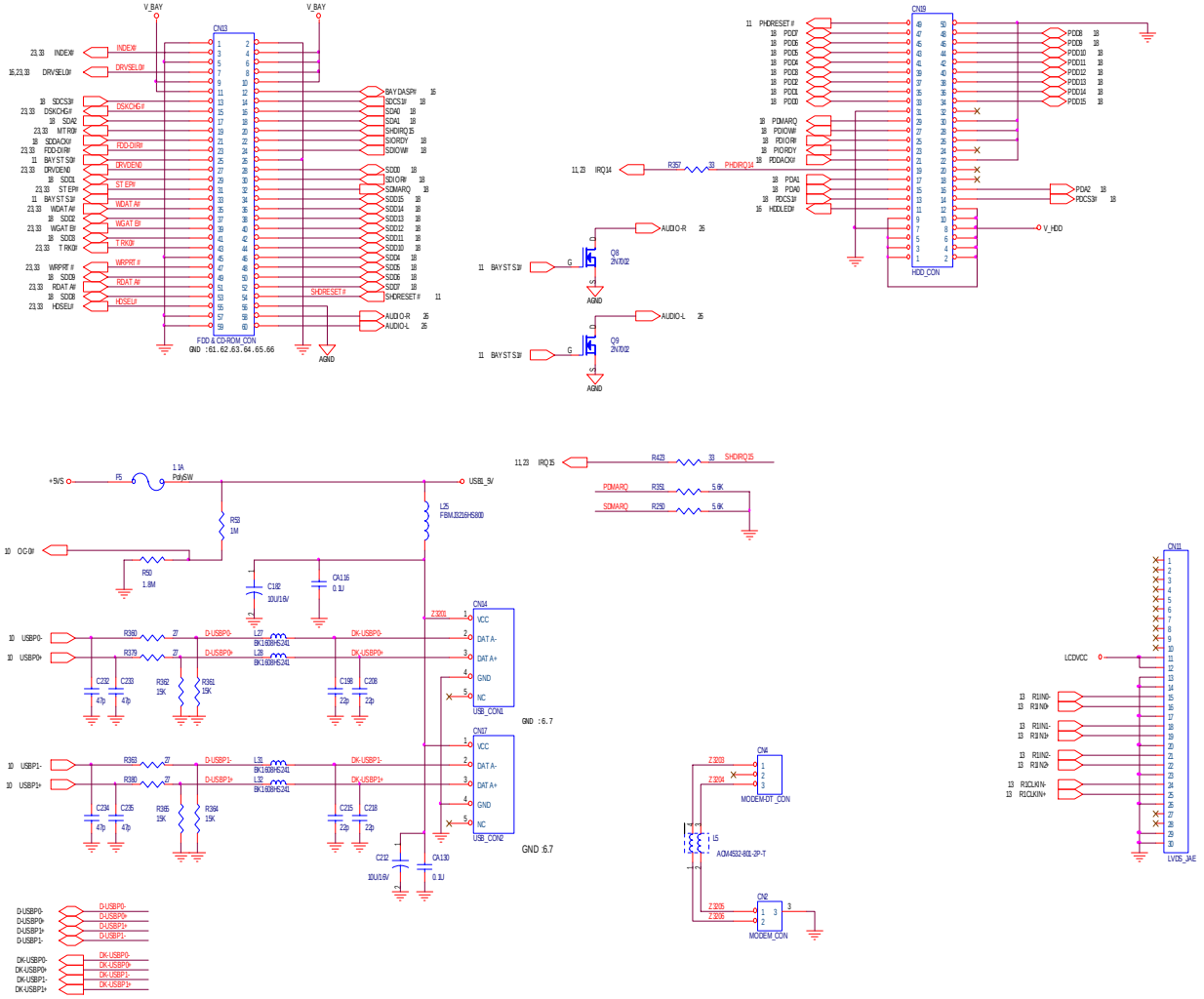


LED
REV. 2
FIG. D – 30

D

CRT & Audio Interface
rev. 2
Fig. D – 31

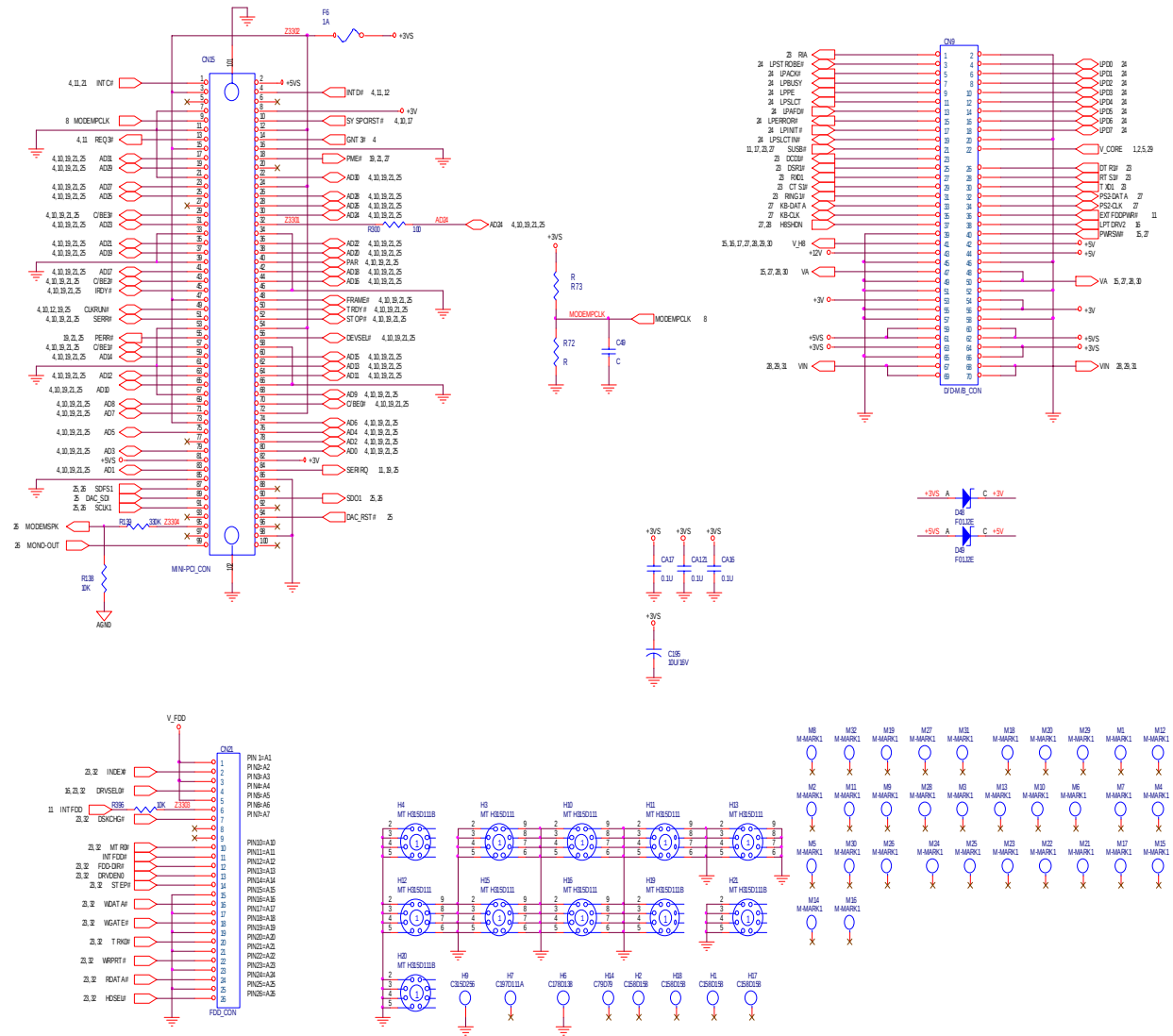


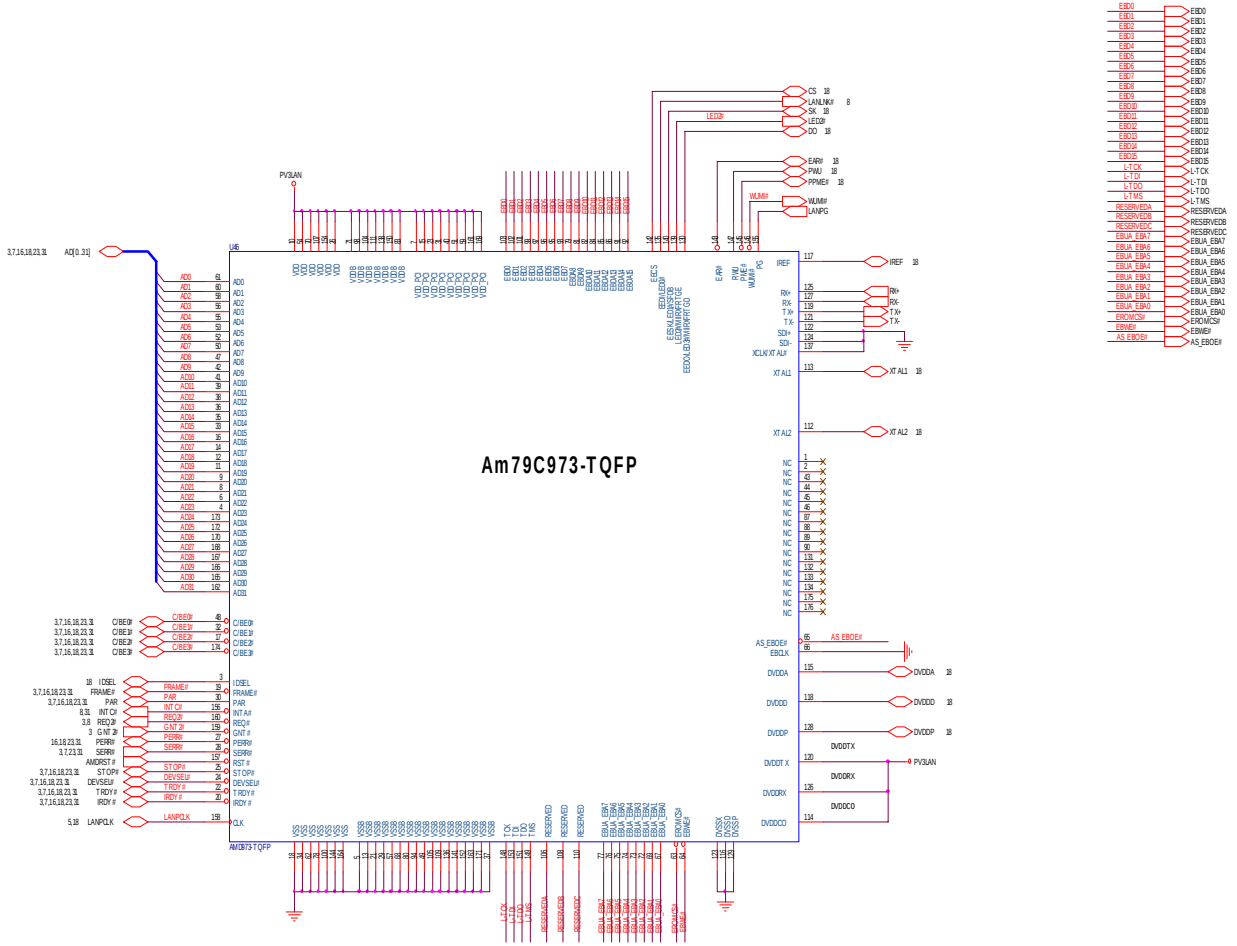


USB & LCD INTERFACE
REV. 2
FIG. D – 32

D

CONNECTOR
REV. 2
FIG. D – 33



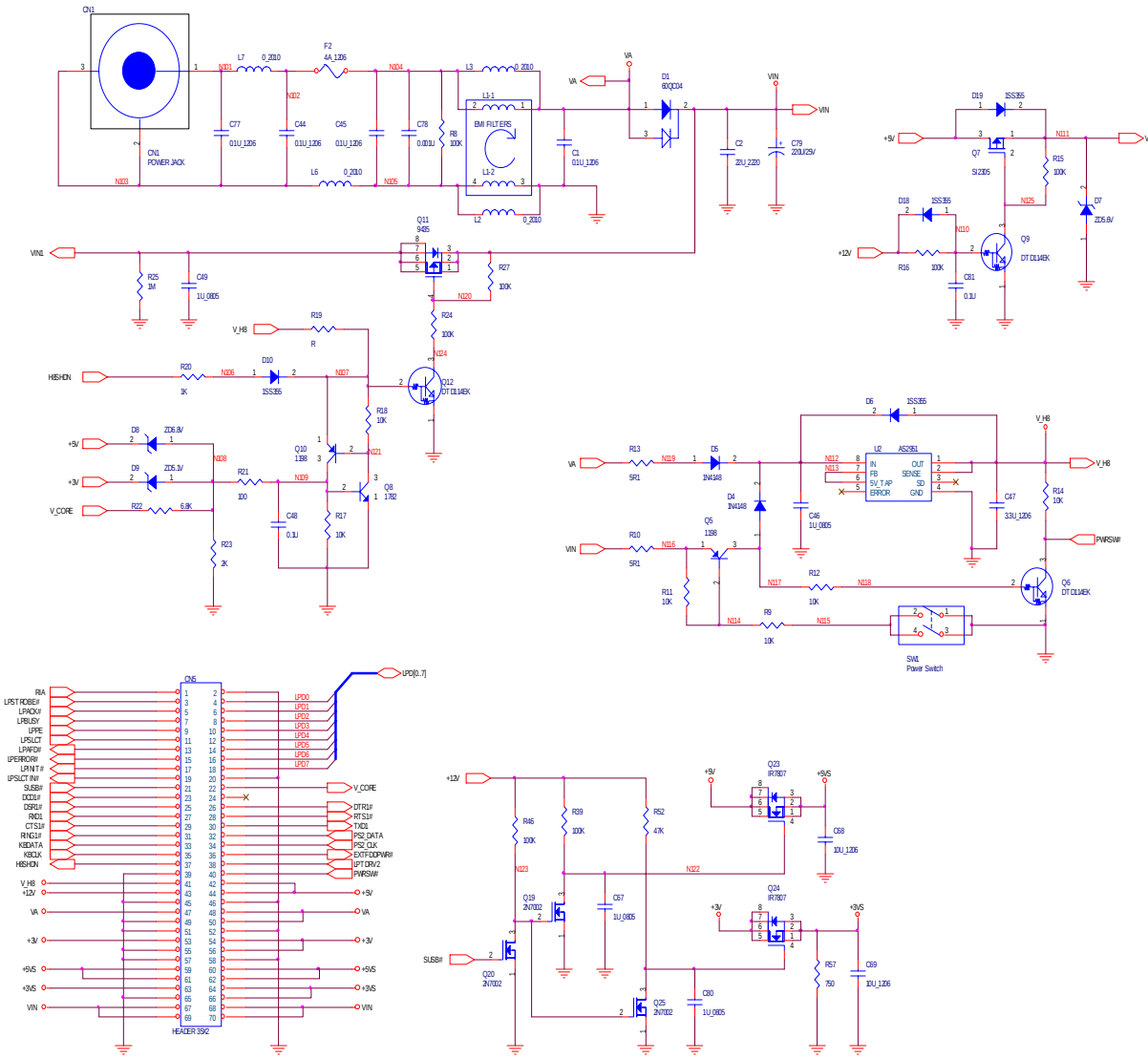


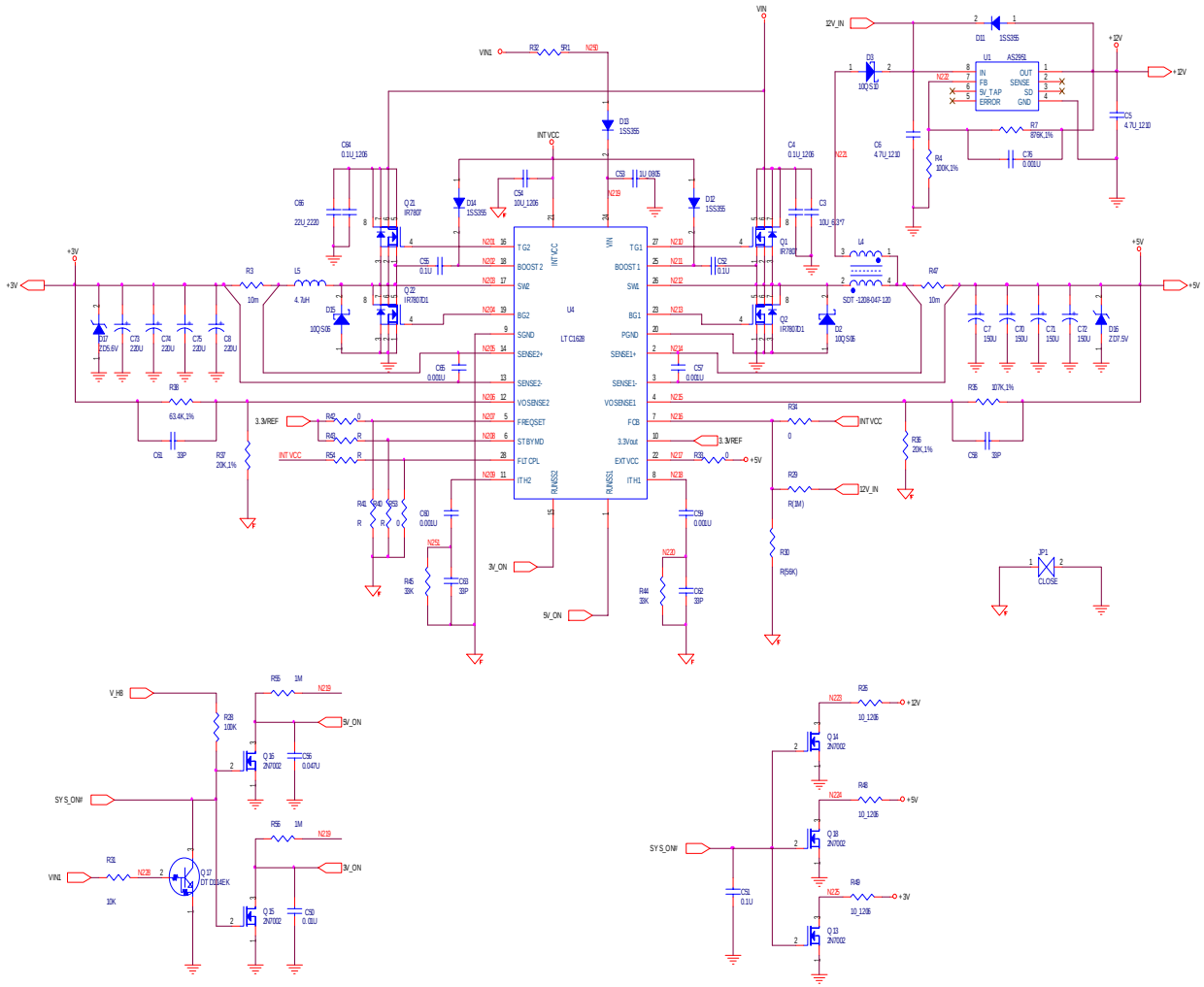
LAN CONTROLLER 973
REV. 2
FIG. D – 34

D

DC/DC BOARD

2820/2850 D/D
1 OF 3 REV. 1
FIG. D – 35

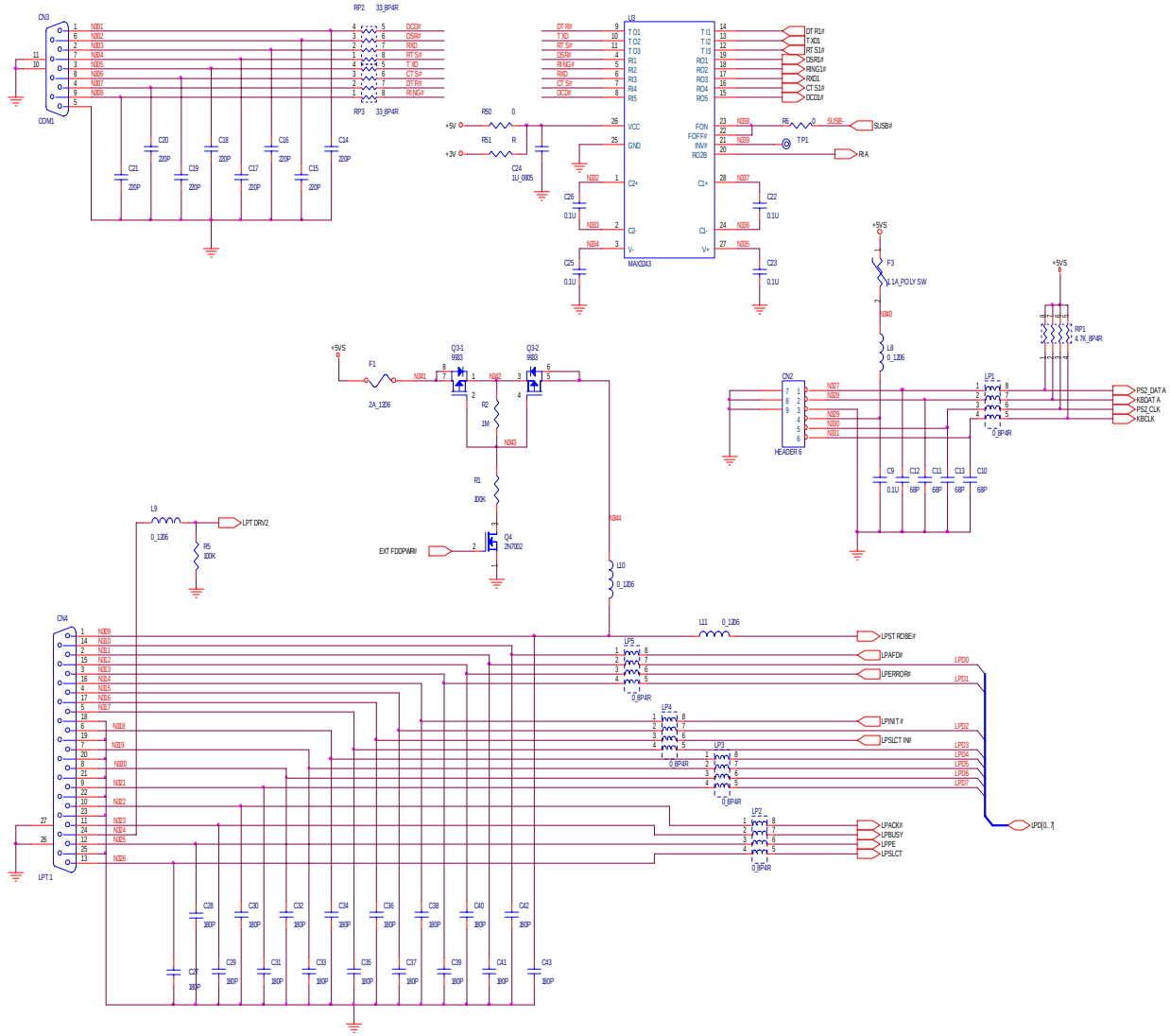


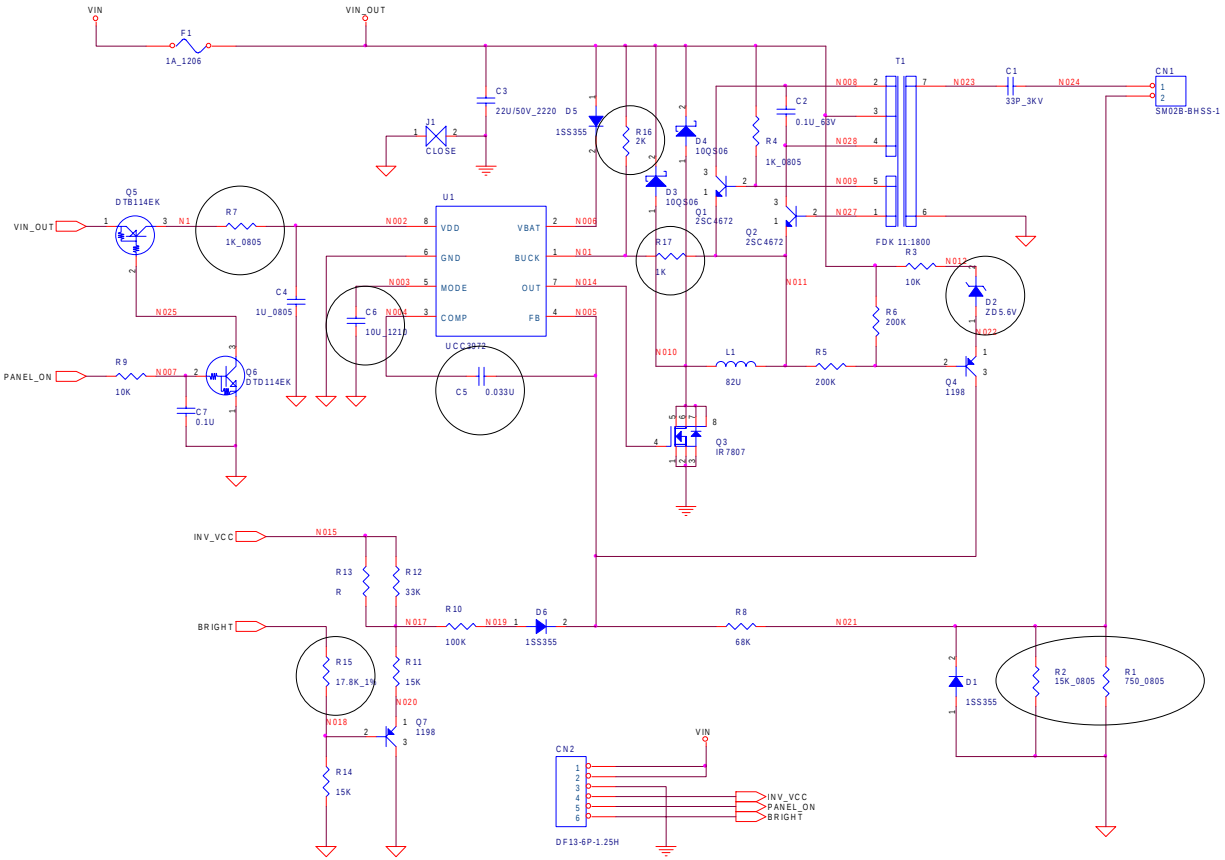


2820/2850 D/D
2 OF 3 REV. 1
FIG. D – 36

D

2820/2850 D/D
3 OF 3 REV. 1
FIG. D – 37





2820/2850 INVERTER
REV. 1
FIG. D – 38

D

NOTES: