Maintenance Manual

Extensa™ 60x & 65x Series Notebook Computers

9813564-0001, Rev. A

October 1996

TEXAS INSTRUMENTS

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Extensa™ 60x and 65x Series Notebook Computers
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Preface

Introduction

This manual provides installation, operation and servicing data for the Extensa™ 60x and 65x Series Notebook Computers.

Intended Audience

This manual is primarily intended for use by qualified service technicians but contains information useful to non-technical users.

Contents

This manual contains six sections that are common to all Extensa 60x and 65x Series Notebook Computers (differences described as they are covered):

- **Section 1: General Description** - Introduces the main features of the Extensa 60x and 65x Series Notebook Computers; identifies all options, provides physical and electrical specifications.
- **Section 2: Installation** - Describes how to unpack, install options and begin using the notebook.
- **Section 3: Operating Instructions** - Describes the notebook computer operating controls and indicators and basic operating procedures required to support maintenance operations.
- **Section 4: Theory of Operation** - Provides a block diagram level theory of operation for the Extensa Series Notebooks.
- **Section 5: Troubleshooting Procedures** - Provides troubleshooting procedures for the notebook computer series.
- **Section 6: Field Service** - Provides preventive and corrective maintenance procedures for the notebook computer series including FRU removal/ replacement procedures.

This manual also includes a set of appendices containing model-dependent maintenance data including;

- **Appendix A**: **60x Series Maintenance Data -** Contains listing of FRUs and set of schematics for the Extensa 60x Series Notebook Computers.
- **Appendix B**: **65x Series Maintenance Data -** Contains listing of FRUs and set of schematics for the Extensa 65x Series Notebook Computers.

Other Manuals About the System

The following documents provide additional information related to the Extensa Notebook Computer Series:

- *Extensa Series Notebook Computers Users Guide* - Contains user reference information for the Extensa 60x and 65x Series Notebook Computers.
- *PC-Doctor Help* and *Technical Reference* (online)

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Telephone Toll-free: **1-800-TI TEXAS**.

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1
General Description

1.1 Introduction

This manual contains field and factory level servicing information for the Extensa™ 60x and 65x Series Notebook Computers manufactured for Texas Instruments. The first six sections contain information common to all members of the Extensa 60x/65x Family of Notebook Computers (any differences are described); the appendices contain model dependent maintenance information.

This section provides a general overview of the Extensa 60x/65x Series, describes the standard and optional features, and identifies the major assemblies and subassemblies. This section also contains detailed functional and environmental specifications for the Extensa 60x/65x Series Notebook Computers.

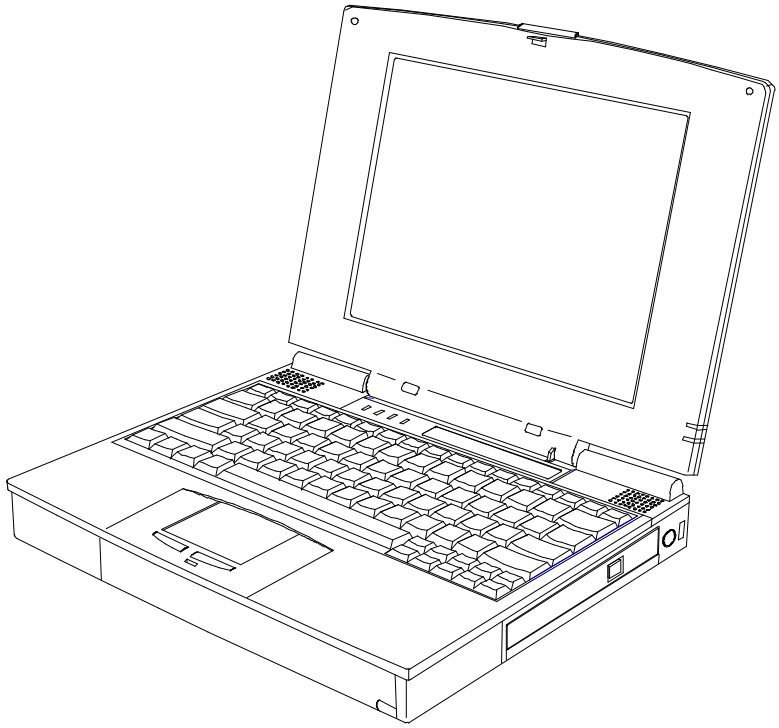


Figure 1-1 Extensa 60x/65x Series Notebook Computers

1.2 Product Overview

The Extensa Series contains two major product lines including:

- 60x Series
- 65x Series

Both notebook series are similar in construction and appearance, have similar operating controls and indicators and use the same software. Both notebook series use a similar startup self test program and diagnostics program (described in detail in Section 5 of this manual). There are differences at the board level which affect assembly/ disassembly as described in Section 6 of this manual. There are also differences in Field-Replaceable Units (FRUs), particularly the Printed Circuit Boards, so separate FRU lists and logic diagram sets are provided in the appendices.

Table 1-1 summarizes some of the major differences between the 60x Series and the 65x Series Notebook Computers.

Table 1-1 Feature Comparison for 60x/65x Series Notebooks

Feature	60x Series	65x Series
CPU	120 MHz Pentium	133 MHz Pentium
Standard Onboard Memory	8 MB	16 MB
Maximum Expandable Memory	64 MB	80 MB
HDD	810 MB	1.3 GB or 1.6 GB
LCD Display Type	ASTN or DSTN	DSTN or TFT
Video Memory	1 MB	2 MB
Infrared Port	115 Kb/s SIR	4 Mb/s FIR
Internal Microphone	No	Yes
Port Replicator Option	No	Yes
Advanced PCI Options	No	Yes

1.2.1 Notebook Model Summary

Table 1-2 contains a summary of the available models in the 60x and 65x Series.

Table 1-2 Extensa 60x/65x Model Summary

Characteristic	Model 600	Model 600CD	Model 605CD	Model 650CD	Model 655CD	Model 650CDT
Part Number	9811739	9811743	9811745	9811751	9811753	9811750
Product Code	050	051	052	053	054	055
CPU	Pentium 120 MHz	Pentium 120 MHz	Pentium 120 MHz	Pentium 133 MHz	Pentium 133 MHz	Pentium 133 MHz
HDD	810 MB	810 MB	810 MB	1.3 GB	1.3 GB	1.6 GB
Memory	8 MB	8 MB	8 MB	16 MB	16 MB	16 MB
FDD	Std	External	External	Std*	Std*	Std*
CD-ROM Drive	No	Std	Std	Std*	Std*	Std*
Display	11.3- inch ASTN	12.1-inch DSTN	12.1-inch DSTN	12.1-inch DSTN	12.1-inch DSTN	11.3-inch TFT
Software	Dual Load, Localized	Dual Load, Localized	Win 95	Dual Load, Localized	Win 95	Dual Load, Localized
Port Replicator Support	No	No	No	Yes	Yes	Yes
Feature Board	No	No	No	Yes	Yes	Yes

* Standard Module Bay

1.2.2 Extensa 60x Series

The Extensa 60x Series Notebook Computers are large screen, high-performance, multimedia notebooks powered by the Intel® P54CSLM Pentium® Processor Chip (120-MHz). Other major features of the 60x Series include:

- PCI Bus architecture
- 8 MB (Extended Data Out) memory
- 1 MB video memory

- Fast video graphics accelerator
- 0-Volt Suspend, 5-Volt Suspend and Standby power saving modes
- No-reboot setup function
- ASTN or DSTN color display
- 16-bit stereo audio
- Serial infrared communication
- Duracell NiMH (Nickel-Metal-Hydride) or optional Li-Ion (Lithium-Ion) battery pack
- 810 MB capacity hard disk drive with Local Bus
- Internal touchpad pointing device
- Small, lightweight AC adapter
- PS/2 port for connecting an external keyboard, numeric keypad, or mouse
- 9-pin serial port for connecting external devices such as a modem or mouse
- Simultaneous display with external CRT
- One Type III or two Type II/I Cardbus PC Card slots; lower slot accepts Zoomed Video port enabled PC cards
- Parallel port with EPP and ECP for connecting to a printer or the floppy disk drive module
- 8 MB, 16 MB and 32 MB EDO 64-bit type small outline dual inline memory module (soDIMM) upgrades

1.2.3 Extensa 65x Series Notebooks

Both the Extensa 60x Series and the 65x Series share a great deal of commonality (similar physical construction and operating system software). However, in contrast to the 60x Series, the Extensa 65x Series Notebooks feature a faster Pentium Processor (133 MHz), more onboard RAM (16 MB), and a greater maximum memory size (80 MB). The 65x Series also contain a Fast Infrared port (4 Mb/s FIR) and greater expandability through the Port Replicator and APCI Board (described in greater detail in the following paragraphs).

Some of the other features of the 65x Series include:

- PCI Bus architecture
- 16 MB (Extended Data Out) memory
- 2 MB video memory
- Fast video graphics accelerator
- 0-Volt Suspend, 5-Volt Suspend and Standby power saving modes
- No-reboot setup function
- STN or TFT color display (Model Dependent)
- 16-bit stereo audio
- Fast infrared communication
- Duracell NiMH (Nickel-Metal-Hydride) or optional Li-Ion (Lithium-Ion) battery pack
- 1.08 GB (or higher) capacity hard disk drive with Local Bus
- Internal touchpad pointing device
- Small, lightweight AC adapter
- Modular bay for expansion
- PS/2 port for connecting an external keyboard, numeric keypad, or mouse
- 9-pin serial port for connecting external devices such as a modem or mouse
- Simultaneous display with external CRT
- One Type III or two Type II/I Cardbus PC Card slots; lower slot accepts Zoomed Video port enabled PC cards
- Parallel port with EPP and ECP for connecting to a printer or the floppy disk drive module
- 8 MB, 16 MB and 32 MB EDO 64-bit type small outline dual inline memory module (soDIMM) upgrades
- Advanced PCI Card slot for installing a feature upgrade option

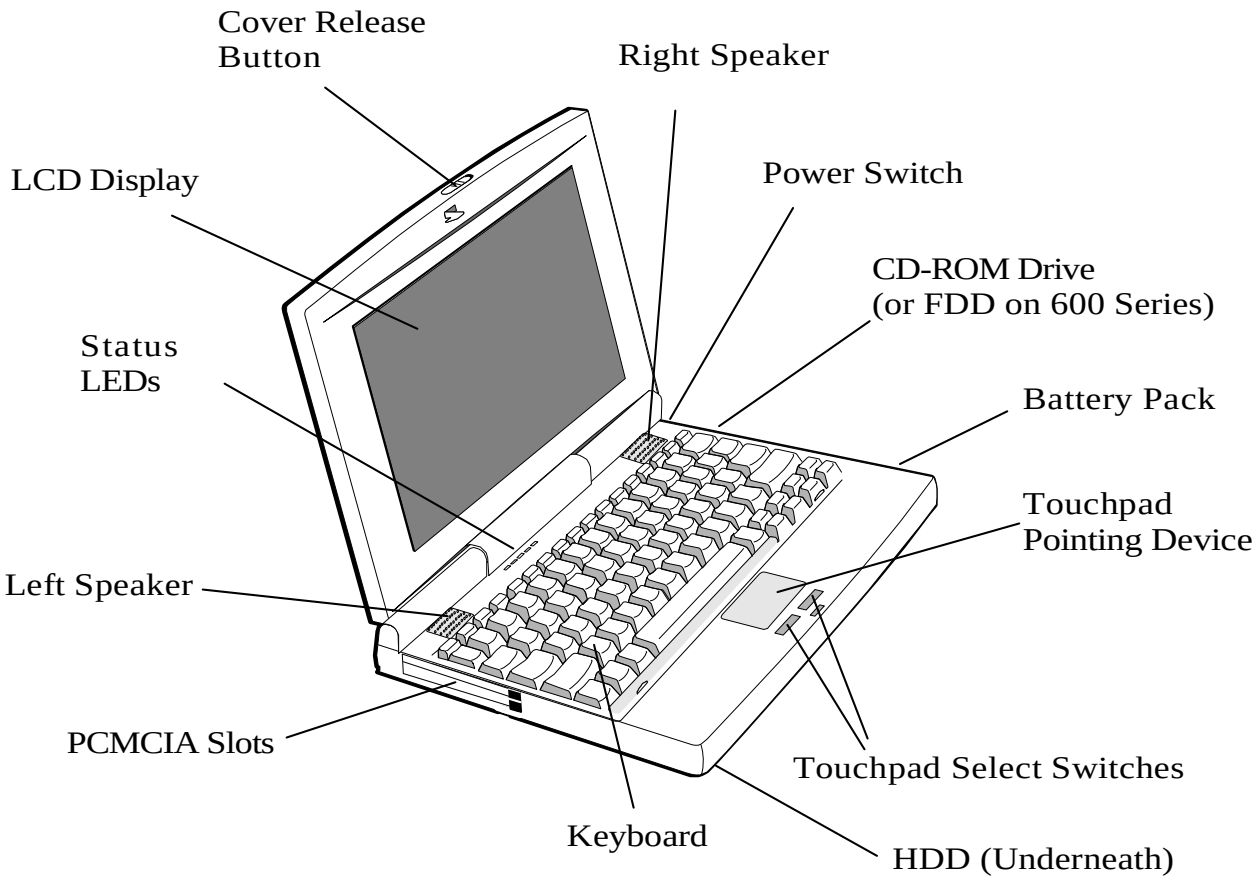


Figure 1-2 60x/65x Notebook External Features

1.2.4 Video Display Features

The Extensa 60x/65x Series Notebooks contain large screen internal LCD displays and can simultaneously drive an external CRT (**SimulSCAN**™ mode). On all Extensa models, the LCD screen brightness, contrast, video mode of operation, etc. are adjustable from the keyboard as described in Paragraph 1.2.4.3.

1.2.4.1 Internal LCD

The Extensa 60x/65x Series Notebooks contain one of the following LCDs (model dependent):

- 11.3-Inch ASTN display
- 12.1-Inch DSTN display

- 11.3-Inch TFT (650CDT only)

1.2.4.2 External CRTs

The Extensa 60x and 65x Series Notebooks are equipped with a 15-pin SVGA connector that can drive an external CRT (either alone or simultaneously with the internal LCD).

When the notebook is set to the SimulSCAN mode, a minimum resolution of 800 x 600 x 256 colors is supported. When operating in the External CRT Mode, resolutions up to 1280 x 1024 x 256 colors are supported.

1.2.4.3 Display Hot Key Sequences (All Extensa Models)

The display mode of operation (LCD only, Simultaneous LCD and external CRT and external CRT only modes) is keyboard-selectable using the following hot key sequences.

- **Fn-Up Arrow** and **Fn-Down Arrow -** control LCD screen brightness (higher brightness setting uses more battery energy)
- **Fn-Right Arrow** - lightens the LCD screen contrast
- **Fn-Left Arrow** - darkens the LCD screen contrast
- **Fn-F12** - alternates between display modes (LCD, External CRT or both)
- **Fn-F11** - turns off the LCD backlight; pressing any key turns the LCD backlight on.

Note: In addition to the hot keys that control the notebook display functions, there are several other hot key functions that control other notebook functions such as turning the Touchpad on/off, etc. For these sequences, refer to Section 3.

1.2.5 Software Features

As a standard feature, the Extensa 60x and 65x notebooks are factory loaded with either dual load (Windows® 95 or Windows for Workgroups) or Windows 95 only (model dependent) software to allow the user to configure the notebook's operating system environment as summarized in Table 1-3.

Table 1-3 User-Selectable Operating System Environments

Operating System	Description
Windows 95	Supports both desktop and mobile operation with Plug N Play capabilities and Advanced Power Management; customized to include TI startup screen, CSL Support information, Internet browser, multimedia options, and choice of wallpaper to customize different computer resources, TI utilities such as wBattery, wSetpower, TISetup, variety of device drivers including Cirrus® CL-GD7548, ESS 1888 Sound Device Drivers, WinModem Device Drivers, PC-Card Bus Socket Services and Card Services Device Drivers, and Windows 95 MPEG-1 Software Audio/Video Compression Device Drivers.
Windows/DOS 6.22	This environment has some limitations in the Plug N Play area; includes TI utilities and various device drivers including Cirrus CL-GD7548, ESS 1888 Sound Device Drivers, WinModem Device Drivers, PC-Card Bus Socket Services and Card Services Device Drivers, and TranXit™ Serial Infrared (IRDA™) Device Drivers, etc.

1.2.6 60x Series External Ports

The Extensa 60x Series notebooks have a variety of external ports (connectors) for the desktop environment as shown in Figure 1-3 and summarized in Table 1-4.

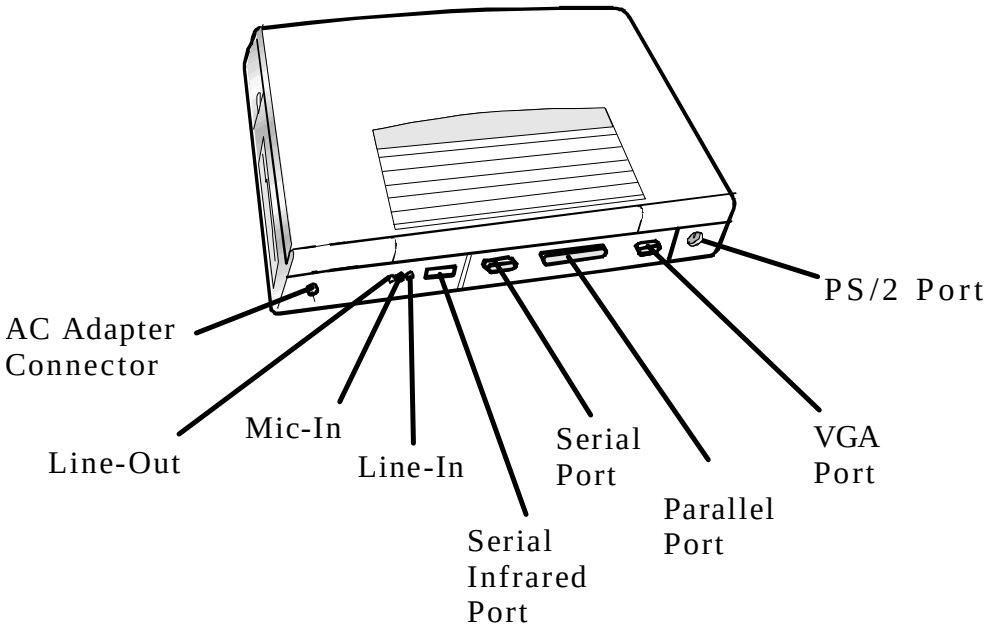


Figure 1-3 Extensa 60x External Ports

Table 1-4 Extensa 60x Notebook External Ports

Port Assignment	Description
External VGA Port	15-Pin Female connector used to attach an external SVGA monitor to the notebook.
Serial Port	9-Pin Male connector used to attach an RS-232 serial device to the notebook.
Parallel/Floppy Port	25-Pin Female connector used to attach a bidirectional printer or an external floppy disk drive (requires special cable for use with floppy disk drive).
PS/2® Port	6-Pin Circular connectors used to attach external keyboard/mouse devices to the notebook.

Table 1-4 Extensa 60x Notebook External Ports

Port Assignment	Description
DC-IN Connector	Power in connector used to attach the output of the AC adapter to the notebook.
Serial Infrared Port	Medium speed Serial Infrared Port (115 K/b) used for wireless communications between the notebook and an SIR-equipped device such as keyboard, another notebook, printer, etc.
Audio In/Out, Mic In Jacks	Provide for input of external sound source or audio output to drive external speakers

1.2.7 65x Series External Ports

The 65x Series notebook includes most of the ports defined for the 60x Series but also includes an Expansion Bus port for connection to an external Port Replicator and a Fast infrared (FIR) Port. The external ports for the 65x Series are shown in Figure 1-4 and described in Table 1-5.

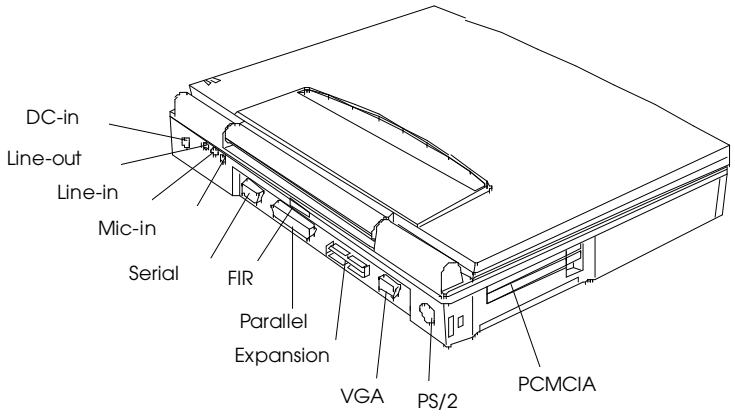


Figure 1-4 65x Series External Ports

Table 1-5 65x Series External Ports

Port Assignment	Description
External VGA Port	15-Pin Female connector used to attach an external SVGA monitor to the notebook.
Serial Port	9-Pin Male connector used to attach an RS-232 serial device to the notebook.
Parallel/Floppy Port	25-Pin Female connector used to attach a bidirectional printer or an external floppy disk drive (requires special cable for use with floppy disk drive).
PS/2® Port	6-Pin Circular connectors used to attach external keyboard/mouse devices to the notebook.
DC-IN Connector	Power in connector used to attach the output of the AC adapter to the notebook.
Fast Infrared Port	Fast Infrared Port (4 M/b) used for wireless communications between the notebook and an FIR-equipped device such as keyboard, another notebook, printer, etc.
Audio In/Out, Mic In Jacks	Provide for input of external sound source or audio output to drive external speakers
Expansion Bus	120-Pin PCI Bus that supports an external Port Replicator

1.2.8 Standard Peripheral Devices

As standard features, the Extensa notebooks include a user-removable internal hard drive and either a 3.5-inch floppy disk drive or CD-ROM drive and built-in point touchpad (mouse device). On the 65x Series, the FDD or CD-ROM drive is user removable.

1.2.9 Expansion Capabilities

The Extensa 60x and 65x Series Notebooks are designed with a variety of expansion features that permit substantial functionality and performance upgrades over the life of the product. The expansion capabilities built into the notebook are summarized in Table 1-6 and described in greater detail in the following paragraphs.

Table 1-6 Extensa 60x/65x Expansion Features Summary

Expansion Feature	Description
CD-ROM Drive	Reads from Audio CD, Photo CD or CD ROM
3.5-inch Diskette Drive Module	Provides convenient storage on a removable disk format
Memory Expansion Features	Main memory can be expanded from 8 MB to a maximum of 64 MB (60x Series) or 16 MB to maximum of 80 MB (65x Series) using soDIMM modules (8 MB, 16 MB or 32 MB configurations).
Flash ROM (hardware feature)	Permits new versions of BIOS to be downloaded into Flash ROM without physically having to replace the ROMs
PCMCIA Slots	Allows installation of any optional PCMCIA device such as speakerphone modems, Ethernet® cards, and full motion video cards.
Desktop Connectivity Ports	Permits attaching a variety of external devices to the notebook including external CRTs, keyboards, mouse devices, modems, printers, etc.
Port Replicator (65x Series only)	Device that attaches to the Expansion Bus on the 65x Series and provides the connectivity for the desktop environment. Removing and replacing the notebook from/to the desktop environment is greatly simplified using the Port Replicator option.

1.2.10 PCMCIA Card Options

The Notebook contains an onboard PCMCIA Controller and two 64-pin sockets that can accept up to two credit-card size (14.5 mm) Type I or Type II PCMCIA option cards or one Type III card. The PCMCIA Card options install on the left side of the notebook (Figure 1-4) and are removed using the PCMCIA Release Buttons.

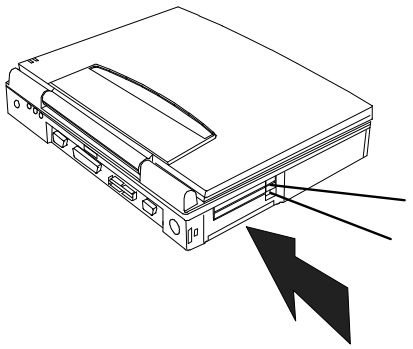


Figure 1-5 Installing PCMCIA Card Options

1.3 Standard Test Features

The Extensa 60x and 65x Series Notebook Computers use modular design and built-in test features to reduce the mean time to repair. A power on self test program automatically verifies the operational state of the primary circuits and a powerful suite of diagnostic tests (known as PC-Doctor) are available to further test selected parts of the system.

1.3.1 Power On Self Test

The Extensa line of notebook computers contain a BIOS-resident, Power On Self Test (POST) that automatically performs a test of memory and all major circuits each time the computer is powered up. In the event of a failure, the computer displays a descriptive error message and issues a series of coded beeps (in case the display subsystem is not functioning). If self test completes normally, the computer displays the amount of memory tested, loads the Operating System and Windows environment.

1.3.2 PC-Doctor Diagnostics Program

The Extensa 60x and 65x Series Notebooks are shipped with PC-Doctor for Windows, a powerful diagnostics tool that can help you scan a system for viruses, determine the hardware configuration of a local or remote system, benchmark its performance, analyze the performance of all subsystems, and perform a suite of interactive and non-interactive tests on attached devices (such as printers, joystick devices, VGA monitors, SCSI devices, CD-ROM drives). The test results are stored in a log which can be printed out (by pressing **F2**) or saved in a disk file (by pressing **F3**).

Features of the diagnostic program are accessed through a series of pull-down menus and basic keyboard keys (cursor keys to move highlighted pointer, Enter key to select a highlighted feature, **Esc** key to cancel a function and move back one level.

PC-Doctor is typically user friendly but if you don't understand a feature, context-sensitive help information is available at any time by pressing the **F1** function key; pressing the **F1** function key twice accesses the online Technical Reference Manual for PC-Doctor.

A powerful set of utilities within PC-Doctor (that can be run locally or remotely) simplify the task of determining system configuration data, allocating and using system memory, IRQ and DMA use, what device drivers are installed, what COM and LPT ports are assigned and what ports are available, identifying partitioning data for fixed disk drive(s), determining the VGA setup information, reading the software interrupts/ interrupt vectors, etc.

Note: Refer to the Troubleshooting Section (Section 5) for additional information regarding the Diagnostics Program.

1.4 International Product Models

The Extensa 60x and 65x Series Notebooks are available in various international configurations as listed in Table 1-7. The Models 600, 600CD, and 650CDT Dual Load systems are also available with localized software.

Table 1-8 Extensa International Models

Configuration	Dash No.
United States	-0001
UK Configuration	-0002
German Configuration	-0003
French Configuration	-0004
Spanish Configuration	-0005
Swiss/German Configuration	-0006
Italian Configuration	-0007
Portuguese Configuration	-0008
Western European Configuration	-0009
Swedish Configuration	-0010
Swiss/French Configuration	-0011
Danish Configuration	-0012
Norwegian Configuration	-0013
Finnish Configuration	-0014
Belgian Configuration	-0015
Austrian Configuration	-0016
Asia Pacific Configuration	-0017
Latin American Configuration	-0018
Chinese Configuration	-0019

1.5 Extensa 60x and 65x Series Specifications

General specifications for the Extensa 60x and 65x Series Notebooks are provided in Table 1-8.

Table 1-9 Extensa 60x and 65x Specifications

Characteristic	Model 600	Model 600CD	Model 605CD	Model 650CD	Model 655CD	Model 650CDT
CPU	Pentium P54CSLM, 120 MHz; 3.1 Volt,	Pentium P54CSLM, 120 MHz; 3.1 Volt,	Pentium P54CSLM, 120 MHz; 3.1 Volt,	Pentium P54CSLM, 133 MHz; 3.1 Volt,	Pentium P54CSLM, 133 MHz; 3.1 Volt,	Pentium P54CSLM, 133 MHz; 3.1 Volt,
Internal Hard Disk Drive						
Disk Storage Capacity:	810 MB	810 MB	810 MB	1.3 GB	1.3 GB	1.6 GB
Average access time:	12 ms or less	12 ms or less	12 ms or less	12 ms or less	12 ms or less	12 ms or less
Throughput	11+ Million I/O's per second	11+ Million I/O's per second	11+ Million I/O's per second	11+ Million I/O's per second	11+ Million I/O's per second	11+ Million I/O's per second
DRAM Memory						
Size	8 MB DRAM, 60-ns, page-interleaved,	8 MB DRAM, 60-ns, page-interleaved,	8 MB DRAM, 60-ns, page-interleaved,	16 MB DRAM, 60-ns, page-interleaved,	16 MB DRAM, 60-ns, page-interleaved,	16 MB DRAM, 60-ns, page-interleaved,
Maximum Expansion Size	64 MB	64 MB	64 MB	80 MB	80 MB	80 MB
Flash ROM:	256 KB	256 KB	256 KB	256 KB	256 KB	256 KB

Table 1-9 Extensa 60x and 65x Specifications

Characteristic	Model 600	Model 600CD	Model 605CD	Model 650CD	Model 655CD	Model 650CDT
FDD	Internal	Ext.(Parallel Interface)	Ext.(Parallel Interface)	Media Bay Modular	Media Bay Modular	Media Bay Modular
Disk Storage Capacity:	1.44 MB	1.44 MB	1.44 MB	1.44 MB	1.44 MB	1.44 MB
Disk Size	3.5-inch disk	3.5-inch disk	3.5-inch disk	3.5-inch disk	3.5-inch disk	3.5-inch disk
Drive Height	12.5 mm	12.5 mm	12.5 mm	12.5 mm	12.5 mm	12.5 mm
Mode	Choice of 720 KB/1.2 MB or 1.44 MB	Choice of 720 KB/1.2 MB or 1.44 MB	Choice of 720 KB/1.2 MB or 1.44 MB	Choice of 720 KB/1.2 MB or 1.44 MB	Choice of 720 KB/1.2 MB or 1.44 MB	Choice of 720 KB/1.2 MB or 1.44 MB
CD-ROM Drive	No	Standard	Standard	Media Bay	Media Bay	Media Bay
LCD Display	11.3- inch ASTN VGA	12.1-inch DSTN SVGA	12.1-inch DSTN SVGA	12.1-inch DSTN SVGA	12.1-inch DSTN SVGA	11.3-inch TFT SVGA
Software	Dual Load, Localized	Dual Load, Localized	Win 95	Dual Load, Localized	Win 95	Dual Load, Localized
Internal Keyboard	84/85-Key, PS/2 and AT-Compatible	84/85-Key, PS/2 and AT-Compatible	84/85-Key, PS/2 and AT-Compatible	84/85-Key, PS/2 and AT-Compatible	84/85-Key, PS/2 and AT-Compatible	84/85-Key, PS/2 and AT-Compatible
Numeric Keypad	Embedded	Embedded	Embedded	Embedded	Embedded	Embedded
Key Travel	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm
Localization Features	All major International Language Configurations	All major International Language Configurations	All major International Language Configurations	All major International Language Configurations	All major International Language Configurations	All major International Language Configurations
Key Spacing	19 mm	19 mm	19 mm	19 mm	19 mm	19 mm
Built-in Mouse Device	Touchpad built-in to the base of the keyboard (select buttons just below Touchpad)	Touchpad built-in to the base of the keyboard (select buttons just below Touchpad)	Touchpad built-in to the base of the keyboard (select buttons just below Touchpad)	Touchpad built-in to the base of the keyboard (select buttons just below Touchpad)	Touchpad built-in to the base of the keyboard (select buttons just below Touchpad)	Touchpad built-in to the base of the keyboard (select buttons just below Touchpad)

Table 1-9 Extensa 60x and 65x Specifications

Characteristic	Model 600	Model 600CD	Model 605CD	Model 650CD	Model 655CD	Model 650CDT
Video Subsystem						
LCD Aspect Ratio	1-1	1-1	1-1	1-1	1-1	1-1
Emulations:	SVGA	SVGA	SVGA	SVGA	SVGA	SVGA
Video Memory Size	1 MByte	1 MByte	1 MByte	2 MByte	2 MByte	2 MByte
Video Bus:	32 bits	32 bits	32 bits	32 bits	32 bits	32 bits
LCD Resolution:	640 x 480 pixels bit-mapped at 256 colors;	640 x 480 pixels bit-mapped at 256 colors; 600 x 800 at 256 colors.	640 x 480 pixels bit-mapped at 256 colors; 600 x 800 at 256 colors.	640 x 480 pixels bit-mapped at 16.77 million colors; 600 x 800 at 65K colors.	640 x 480 pixels bit-mapped at 16.77 million colors; 600 x 800 at 65K colors.	640 x 480 pixels bit-mapped at 16.77 million colors; 600 x 800 at 65K colors.
LCD Characters/Line	80	80	80	80	80	80
LCD Lines/ Screen:	25	25	25	25	25	25
LCD Brightness Control:	Function hot key brightness and contrast control and SimulSCAN control	Function hot key brightness and contrast control and SimulSCAN control	Function hot key brightness and contrast control and SimuSCAN control	Function hot key brightness and contrast control and SimulSCAN control	Function hot key brightness and contrast control and SimulSCAN control	Function hot key brightness and contrast control and SimulSCAN control

Table 1-9 Extensa 60x and 65x Specifications

Characteristic	Model 600	Model 600CD	Model 605CD	Model 650CD	Model 655CD	Model 650CDT
External CRT Monitor Interface						
Connector Type:	15-Pin, female, D-type connector	15-Pin, female, D-type connector	15-Pin, female, D-type connector	15-Pin, female, D-type connector	15-Pin, female, D-type connector	15-Pin, female, D-type connector
Monitors Supported:	640 x 480 with 16.7 million colors on CRT 800 x 600 with 65 K colors on CRT 1024 x 768 with up to 256 colors on CRT	640 x 480 with 16.7 million colors on CRT 800 x 600 with 65 K colors on CRT 1024 x 768 with up to 256 colors on CRT	640 x 480 with 16.7 million colors on CRT 800 x 600 with 16.7 million colors on CRT 1024 x 768 with up to 64K colors on CRT	640 x 480 with 16.7 million colors on CRT 800 x 600 with 16.7 million colors on CRT 1024 x 768 with up to 64K colors on CRT 1280 x 1024 with 256 colors on CRT (interlaced)	640 x 480 with 16.7 million colors on CRT 800 x 600 with 16.7 million colors on CRT 1024 x 768 with up to 64K colors on CRT 1280 x 1024 with 256 colors on CRT (interlaced)	640 x 480 with 16.7 million colors on CRT 800 x 600 with 16.7 million colors on CRT 1024 x 768 with up to 64K colors on CRT 1280 x 1024 with 256 colors on CRT (interlaced)

Table 1-9 Extensa 60x and 65x Specifications

Characteristic	Model 600	Model 600CD	Model 605CD	Model 650CD	Model 655CD	Model 650CDT
RS-232-D Serial Port:	9-Pin, male, sub-D-type connector	9-Pin, male, sub-D-type connector	9-Pin, male, sub-D-type connector	9-Pin, male, sub-D-type connector	9-Pin, male, sub-D-type connector	9-Pin, male, sub-D-type connector
Method:	EIA RS-232-D	EIA RS-232-D	EIA RS-232-D	EIA RS-232-D	EIA RS-232-D	EIA RS-232-D
Type:	Asynchronous transmission	Asynchronous transmission	Asynchronous transmission	Asynchronous transmission	Asynchronous transmission	Asynchronous transmission
Bits per second:	110, 200, 300, 600, 1200, 2400, 4800, 9600, 19200	110, 200, 300, 600, 1200, 2400, 4800, 9600, 19200	110, 200, 300, 600, 1200, 2400, 4800, 9600, 19200	110, 200, 300, 600, 1200, 2400, 4800, 9600, 19200	110, 200, 300, 600, 1200, 2400, 4800, 9600, 19200	110, 200, 300, 600, 1200, 2400, 4800, 9600, 19200
Parity: Transmit:	Odd, even, mark, space	Odd, even, mark, space	Odd, even, mark, space	Odd, even, mark, space	Odd, even, mark, space	Odd, even, mark, space
Receive:	Data check: odd, even	Data check: odd, even	Data check: odd, even	Data check: odd, even	Data check: odd, even	Data check: odd, even
Line control:	READY/ BUSY, DC1/ DC3	READY/ BUSY, DC1/ DC3	READY/ BUSY, DC1/ DC3	READY/ BUSY, DC1/ DC3	READY/ BUSY, DC1/ DC3	READY/ BUSY, DC1/ DC3
Data word:	7- or 8-bit	7- or 8-bit	7- or 8-bit	7- or 8-bit	7- or 8-bit	7- or 8-bit
16550 UART Support	Yes	Yes	Yes	Yes	Yes	Yes
Selectable Serial Port (BIOS Setup)	COM1(IRQ4, 3F8h)	COM1(IRQ4, 3F8h)	COM1(IRQ4, 3F8h)	COM1(IRQ4, 3F8h)	COM1(IRQ4, 3F8h)	COM1(IRQ4, 3F8h)
	COM2(IRQ3, 2F8h)	COM2(IRQ3, 2F8h)	COM2(IRQ3, 2F8h)	COM2(IRQ3, 2F8h)	COM2(IRQ3, 2F8h)	COM2(IRQ3, 2F8h)
	COM3(IRQ4, 3E8h)	COM3(IRQ4, 3E8h)	COM3(IRQ4, 3E8h)	COM3(IRQ4, 3E8h)	COM3(IRQ4, 3E8h)	COM3(IRQ4, 3E8h)
	COM4(IRQ4, 2E8h)	COM4(IRQ4, 2E8h)	COM4(IRQ4, 2E8h)	COM4(IRQ4, 2E8h)	COM4(IRQ4, 2E8h)	COM4(IRQ4, 2E8h)
	Disable	Disable	Disable	Disable	Disable	Disable

Table 1-9 Extensa 60x and 65x Specifications

Characteristic	Model 600	Model 600CD	Model 605CD	Model 650CD	Model 655CD	Model 650CDT
Parallel Port	EPP/ECP Bidirectional	EPP/ECP Bidirectional	EPP/ECP Bidirectional	EPP/ECP Bidirectional	EPP/ECP Bidirectional	EPP/ECP Bidirectional
Connector Type	25-Pin, DB-25 Connector	25-Pin, DB-25 Connector	25-Pin, DB-25 Connector	25-Pin, DB-25 Connector	25-Pin, DB-25 Connector	25-Pin, DB-25 Connector
FDD Support	Yes, Hot Pluggable & Auto-Detection if BIOS Setup is set to 1.44 MB	Yes, Hot Pluggable & Auto-Detection if BIOS Setup is set to 1.44 MB	Yes, Hot Pluggable & Auto-Detection if BIOS Setup is set to 1.44 MB	Yes, Hot Pluggable & Auto-Detection if BIOS Setup is set to 1.44 MB	Yes, Hot Pluggable & Auto-Detection if BIOS Setup is set to 1.44 MB	Yes, Hot Pluggable & Auto-Detection if BIOS Setup is set to 1.44 MB
Selectable Parallel Port (BIOS Setup)	LPT 1 (IRQ5, 278h) LPT 2 (IRQ7, 378h) Disable	LPT 1 (IRQ5, 278h) LPT 2 (IRQ7, 378h) Disable	LPT 1 (IRQ5, 278h) LPT 2 (IRQ7, 378h) Disable	LPT 1 (IRQ5, 278h) LPT 2 (IRQ7, 378h) Disable	LPT 1 (IRQ5, 278h) LPT 2 (IRQ7, 378h) Disable	LPT 1 (IRQ5, 278h) LPT 2 (IRQ7, 378h) Disable
Serial I/R Port	Yes	Yes	Yes	No	No	No
Transfer Data Rate	115 Kbaud	115 Kbaud	115 Kbaud			
Transfer Distance	100 cm	100 cm	100 cm			
Standard	IrDA	IrDA	IrDA			

Table 1-9 Extensa 60x and 65x Specifications

Characteristic	Model 600	Model 600CD	Model 605CD	Model 650CD	Model 655CD	Model 650CDT
Fast I/R Port	No	No	No	Yes	Yes	Yes
Transfer Data Rate				4M bit/sec	4M bit/sec	4M bit/sec
Transfer Distance				100cm	100cm	100cm
Standard				IrDA	IrDA	IrDA
Expansion Bus Port	No	No	No	128-pin	128-pin	128-pin

1.6 Regulatory Agency Approvals

All Extensa 60x and 65x Series products meet the following regulatory agency standards:

- Underwriter's Lab (UL) Standard 1950 (safety)
- Canadian Standards Association (CSA) Standard 950 or CUL (safety)
- FCC CFR 47, Part 15, Subpart B, FCC Level B (Emissions)
- Canadian Department of Communications (DOC) ICES, Class B (Emissions)
- VDE- EN60950 (Safety)
- EN 50082-1 (Immunity: ESD, RFI, EFT, and Surge)
- EN 50081-1 (Emissions: RFI, EMI, Harmonics, and Flicker)
- Approval Marks: UL, CUL, VDE, FCC, ICES, and CE

2
Installation

2.1 Introduction

This section contains unpacking and preparation for use instructions for the Extensa 60x and 65x Series Notebook Computers. This includes:

- ♦ Removing the computer and all manuals, options and accessories from the shipping container(s)
- ♦ Installing Internal Notebook Options
- ♦ Installing External Notebook Options
- ♦ Installing Battery Packs
- ♦ Installing Desktop Devices
- ♦ Installing the AC Adapter
- ♦ Checking Out the System
- ♦ Configuring the System
- ♦ Making Backups of System Software
- ♦ Loading Application Software

2.2 Unpacking Instructions

Unpack the computer using the following instructions:

1. Carefully cut the tape that seals the top flap of the shipping carton.
2. Remove the computer and the accessories Carton from the main shipping carton.
3. Remove all protective coverings from the computer.
4. Open the accessory box; remove the contents.

Note: Save the two shipping containers and packaging for later reuse.

2.3 Installing Internal Notebook Options

If you have no internal options to install at this time, skip to Paragraph 2.4. Otherwise, continue with Paragraph 2.3.1.

2.3.1 Installing Main Memory Expansion (Optional)

Main memory on the 60x/65x Series Notebooks can be expanded using EDO Small Outline Dual Inline Memory Modules (EDO soDIMMs). These modules currently are available in 8 MB, 16 MB or 32 MB sizes and install in expansion memory slot(s) on the Main Board accessed through the Memory Expansion Door on the bottom of the notebook. The installation process consists of the following steps:

Caution: The EDO soDIMM module option contains components that are sensitive to static electricity. When handling the module and the internal parts of the computer, protect against static electricity by using wrist or ankle grounding straps and grounded working mats. When moving or storing items, use the anti-static bags supplied with the items.

---

1. Ensure that the notebook is powered off and the AC adapter disconnected from the AC outlet. Also, ensure that the battery is out of the unit.
2. Disconnect any peripheral device interface cables from the external interface connectors and remove any installed PCMCIA options.
3. Turn the notebook over and locate the Expansion Memory Access Cover on the bottom of the notebook.
4. Remove the screw holding the Expansion Memory Access Cover and remove the cover.
5. Remove the EDO soDIMM module from its shipping container.
6. Refer to Figure 2-1. To install an soDIMM module, first align the connector edge of the memory module with the key in the connector. Insert the edge of the memory module board into the connector using a rocking motion to fully insert the module. Push downward on each side of the memory module until it snaps in place.
7. If installing a second soDIMM (65x Series only), repeat Step 6.
8. Reinstall the Expansion Memory Access Cover using the screw removed in Step 4.
9. Replace the Keyboard Assembly and any components previously removed. Replace the AC adapter.
10. Power up the notebook and reboot. If all of the installed memory is not recognized, try reseating the soDIMM module(s) and rebooting.

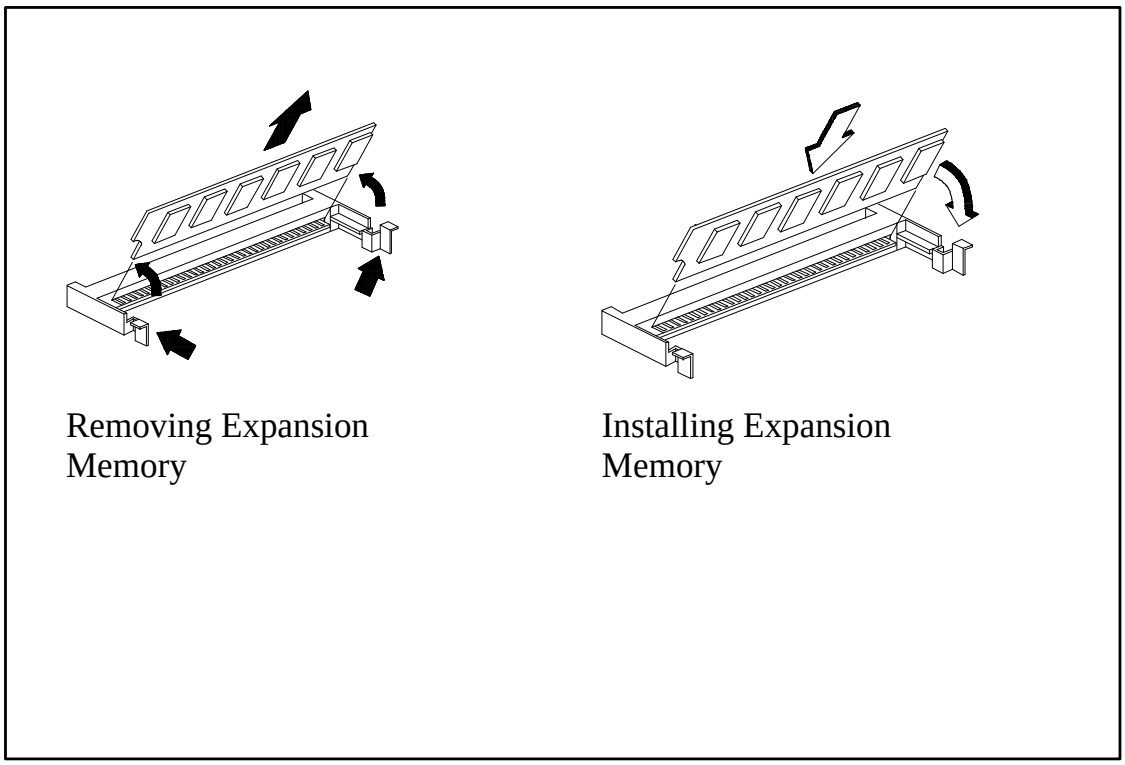


Figure 2-1 Memory Expansion Removal/Replacement

NOTE: After installing expansion memory in your notebook, you must run the *PHDISK* utility in order for the *Save-To-Disk* or *0V Suspend* functions to operate correctly.

2.3.2 Setting up the Software

After installing expansion memory, perform the following procedure:

1. Run **PHDISK**.

   ♦ **In Windows 95**

   1. From the **Taskbar**, select **Start**, then **Shut Down**.
   2. Select the "**Restart the Computer in MS-DOS mode**" option.
   3. Click on **Yes**.

4. Type **PHDISK/C/F** at the DOS prompt.

♦ **In Windows for Workgroups**

1. Exit all applications and exit Windows to DOS.

2. At the DOS command prompt, type **PHDISK/C/F**. This will create a file which can be used to save the contents of your memory system when you perform a *0V Suspend* operation.

2.4 Installing External Options

2.4.1 Installing PCMCIA Options

The Notebook has two connector slots for PCMCIA option cards. These two slots can be used to install one Type III or two Type I/II credit card size PCMCIA option cards. You can install a PCMCIA (PC card) without turning the computer off.

Use the following procedure to install a PCMCIA option:

1. Review the installation instructions supplied with the PCMCIA option card(s).
2. Hold the card at the end opposite the connector pins with the label side up. Insert the card into an unused slot on the left side of the Notebook.
3. If the option requires external cabling (e.g. Modem option), connect external cabling at this time.

Note : After installation of a PCMCIA option card, Windows 95 displays the **New Hardware Found** dialog box to help you configure the new device. To remove a card, click on the **PCMCIA** icon; then, press the appropriate PC Card Release Button (or press both buttons for a Type III device) and remove the option.

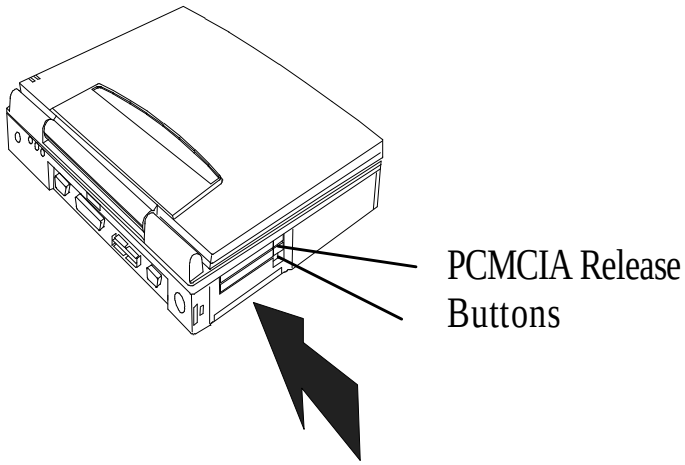
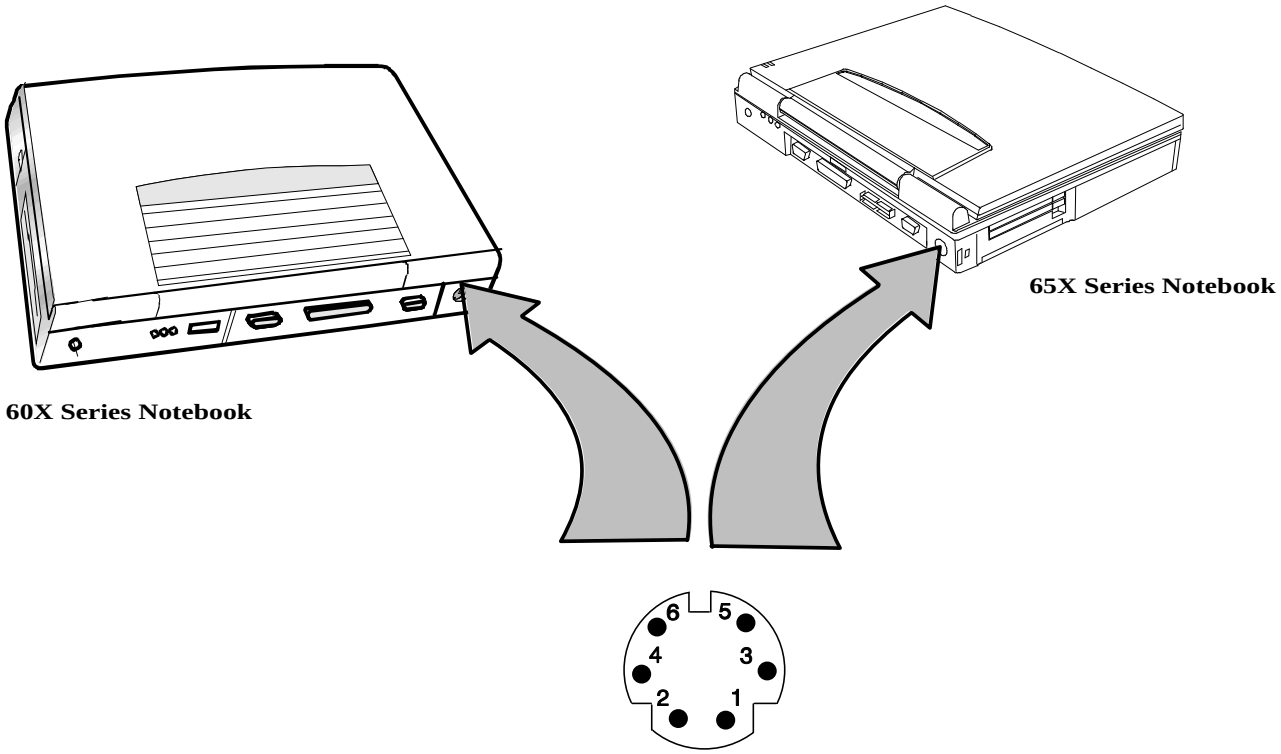


Figure 2-2 Installing PCMCIA Option Cards

2.5 Installing External Notebook Options

2.5.1 Installing Ext. Keyboard/Mouse/Numeric Keypad

A PS/2 compatible Keyboard, mouse or an optional PS/2-compatible numeric keypad may be installed on the notebook via the mouse connector on the left rear port as shown in Figure 2-4.

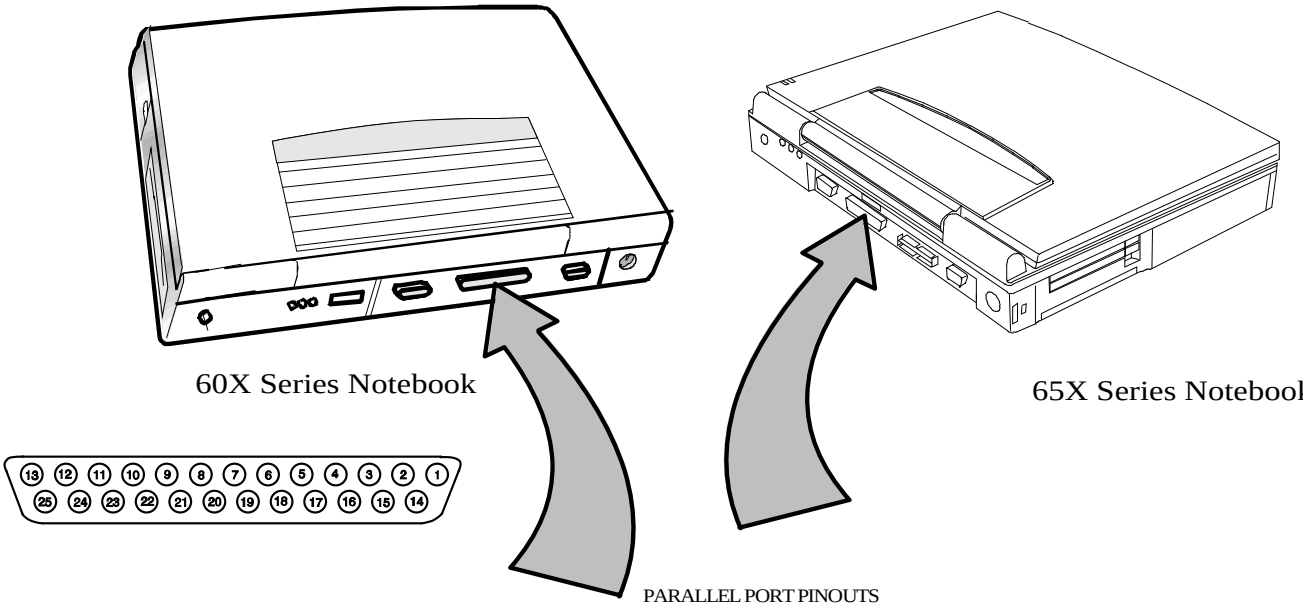


Mouse/Keyboard Connector	
Pin No.	Signal Name
1	MDATA/KDATA
2	
3	MSGND
4	MSVcc
5	MCLK/KCLK
6	

Figure 2-4 PS/2 Port Pinouts

2.5.2 Installing an External Parallel Printer or Floppy Drive

The Notebook is equipped with an external, bidirectional, ECC/EPP compatible, 25-pin parallel printer port. The connector pinouts and connector location are shown in Figure 2-5. When used with a special cable, an external floppy disk drive may also be attached to the notebook via the parallel port. When a floppy disk drive is connected to the parallel port, the floppy disk drive in the Modular Bay is disabled, if present.



PARALLEL PORT PINOUTS

	SIGNAL	SPP Mode
1	Strobe*	STB*
2	Data Bit 0	PD0
3	Data Bit 1	PD1
4	Data Bit 2	PD2
5	Data Bit 3	PD3
6	Data Bit 4	PD4
7	Data Bit 5	PD5
8	Data Bit 6	PD6
9	Data Bit 7	PD7
10	Acknowledge*	ACK*
11	Busy	BUSY
12	Paper Out	PE
13	Select	SLCT
14	Auto Line Feed*	AFD*
15	Error*	ERR*
16	Initialize Printer*	INIT*
17	Select In*	SLIN*
18	LPT 18	LPT18
19	VCC	VCC
20	PLP120	PLP120
21	PLP121	PLP121
22	PLP122	PLP122
23	FDD 5V	FDD 5V
24	FDD 5V	FDD 5V
25	LP125	LP125
26	Ground	Ground

Note: * Denotes Active Low

Figure 2-5 Parallel Port Pinouts

2.5.3 Installing an External Serial Port Device

The notebook contains an external RS-232 serial port with a 9-pin, male DB-9 connector as shown in Figure 2-6 (25-pin cables require the use of an adapter for use with the 9-pin port). The serial ports are used to interconnect such devices as:

- External Modem
- Serial Mouse
- Serial Printer
- Any device that uses an RS-232 interface

Caution: Never connect a parallel device to a serial port or a serial device to a parallel port or video port; this may cause damage to the notebook and/or external device. If you are uncertain of what type connector the external device has, refer to the technical manual for the external device.

SERIAL PORT PINOUTS

PIN	SIGNAL
1	DCD (CARRIER DETECT)
2	$\overline{\text{RXD}}$ (RECEIVE DATA)
3	$\overline{\text{TXD}}$ TRANSMIT DATA)
4	DTR (DATA TERMINAL READY)
5	GND (GROUND)
6	DSR (DATA SET READY)
7	RTS (REQUEST TO SEND)
8	CTS (CLEAR TO SEND)
9	RI (RING INDICATOR)

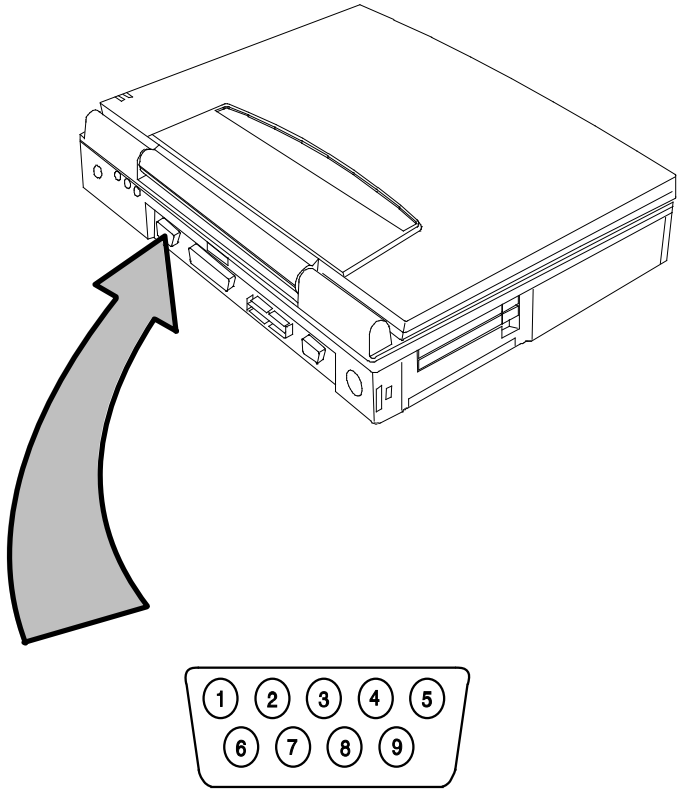
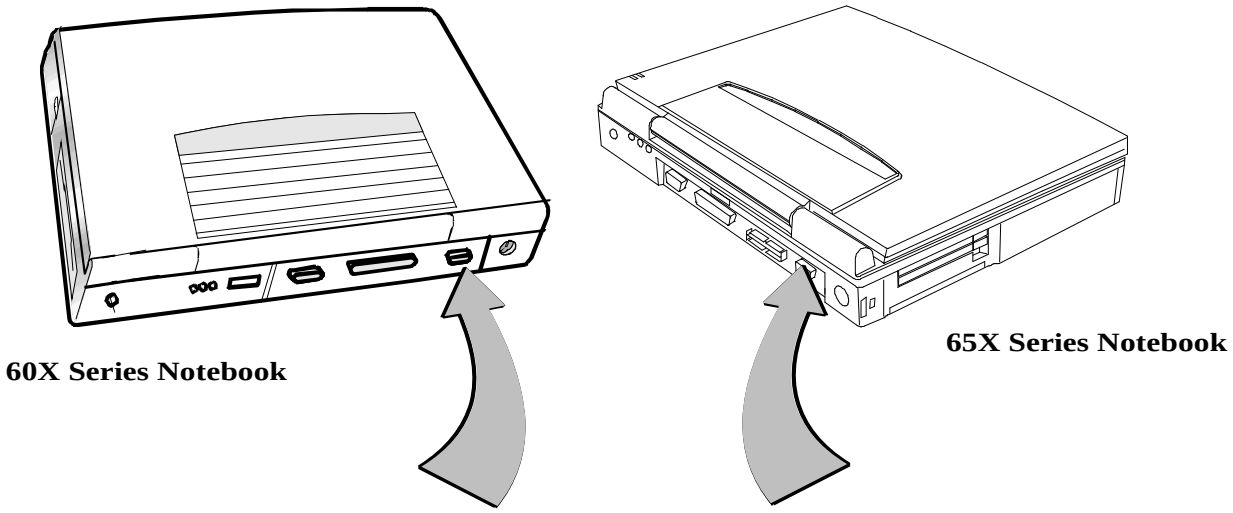
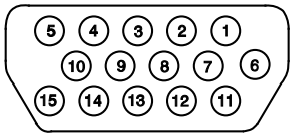


Figure 2-6 Serial Port Pinouts

2.5.4 Installing an External VGA Monitor

The notebook contains an external CRT port that can drive one of a variety of monitor resolutions and colors as summarized in Table 1-9. The associated connector location and pinouts are shown in Figure 2-7.





EXTERNAL VGA CONNECTOR PINOUTS

PIN	SIGNAL NAME	DIRECTION
1	RED VIDEO	OUTPUT
2	GREEN VIDEO	OUTPUT
3	BLUE VIDEO	OUTPUT
4	NOT USED	
5	GROUND	
6	RED RETURN	INPUT
7	GREEN RETURN	INPUT
8	BLUE RETURN	INPUT
9	NOT USED	
10	GROUND	
11, 12	NOT USED	
13	HORIZONTAL SYNC	OUTPUT
14	VERTICAL SYNC	OUTPUT
15	NOT USED	

Figure 2-7 External VGA Pinouts

Use the following procedure to install an external monitor:

1. Turn off power to both the notebook and monitor.
2. Connect the 15-pin external VGA cable from the monitor to the VGA connector on the notebook computer (refer to Figure 2-7).
3. Power up the notebook computer first; then turn on power to the monitor.
4. Setup the notebook display mode for **LCD only**, **simultaneous LCD and CRT** or **CRT only** (under Windows 95, select the **Change Display Utility**; under Windows for Workgroups, use the **WinMode Utility**.
5. Install the correct driver if required (refer to the Monitor Installation Instructions supplied by the CRT vendor).

2.5.5 Installing the Security Lock Option

Use the following procedure to install the optional Kensington® security lock.

1. Unpack the Kensington Lock Kit.
2. Secure the loop end of the lock to a permanent fixture located such that the notebook can be installed in a desired location.
3. Insert the lock into the slot on the left side of the computer.
4. Rotate the key to its locked position and remove the key.

This completes the options installation subsection.

2.6 Battery Pack Installation

1. Turn off the computer and disconnect the AC adapter if attached to the computer.
2. Unlatch the battery compartment door (right front corner of the unit) as shown in Figure 2-3.
3. Slide the battery compartment door out slightly and then swing the door outward as shown in Figure 2-3.
4. If changing batteries, grasp the loop attached to the battery and pull the battery out of the compartment.
5. Look for label "THIS SIDE UP" and insert the battery with label up until it snaps in place; then close the battery compartment door.

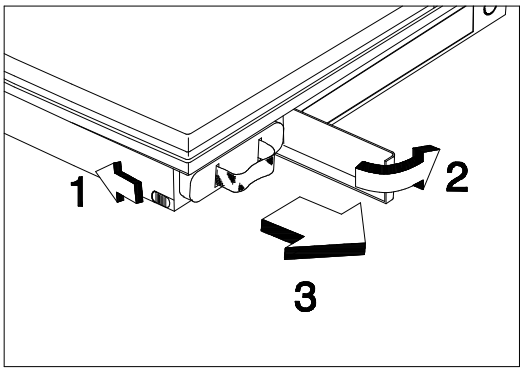


Figure 2-3 Battery Pack Installation

2.7 Installing the AC Power Adapter

Use the following procedures to connect the AC adapter to the system:

Caution: Use only the AC adapter supplied with the computer; other adapters can damage the unit.

1. Remove the AC adapter from the packaging. Connect the round coaxial connector supplied with the notebook to the **DC IN** power receptacle on the left rear of the notebook as shown in Figure 2-8.
2. Connect the female side of the AC power cord to the AC adapter and connect the male end to a grounded AC outlet.

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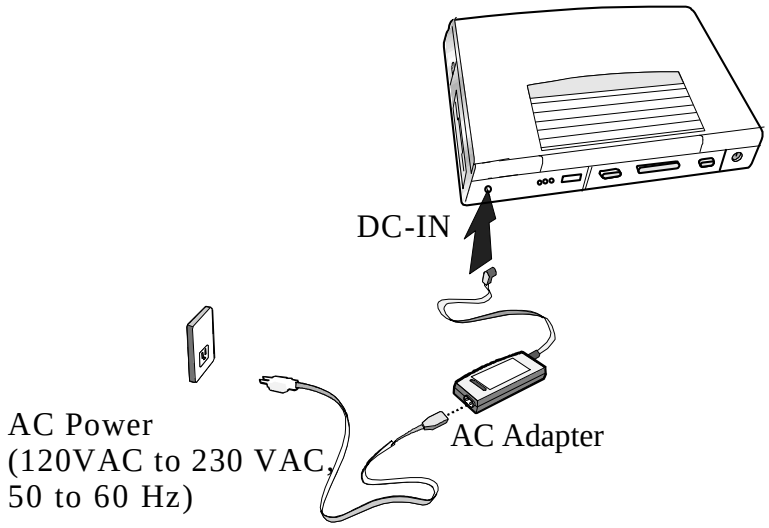


Figure 2-12 - Installing the AC Adapter

2.8 Initial System Checkout

After you've installed all internal options and external cabling, you're ready for system checkout and software configuration.

To check out the system, press the power button on the left side of the notebook which initiates self test. During self test execution, the computer checks the operation of all key hardware including memory and CPU (and displays copyright and version number data during test execution).

Upon successful conclusion of self test, the computer automatically loads its operating system and windows environment. If self test fails to complete and an error message is displayed, try powering down the computer for a couple of minutes and turning power

back on to repeat self test. If the error message persists, refer to Section 5 for troubleshooting information.

2.9 Making Backups of System Software

Immediately after completion of the installation procedures, make backups of all software. In the event of a disk problem, restore the system using the *System Files Recovery* disk and the set of backup disks.

Note: Refer to the *Extensa Series Notebook Computer User's Guide* for additional information.

3
Operating Instructions

3.1 Introduction

This section contains a summary of notebook operating procedures useful for maintenance operations. For additional detail, refer to the *Extensa Series Notebook Computer User's Guide* supplied with the notebook.

3.2 Controls/Indicators

The operating controls and indicators for the 60x and 65x Series Notebooks are identical (refer to Figure 3-1). A brief description of the controls and indicators is provided in the following paragraphs.

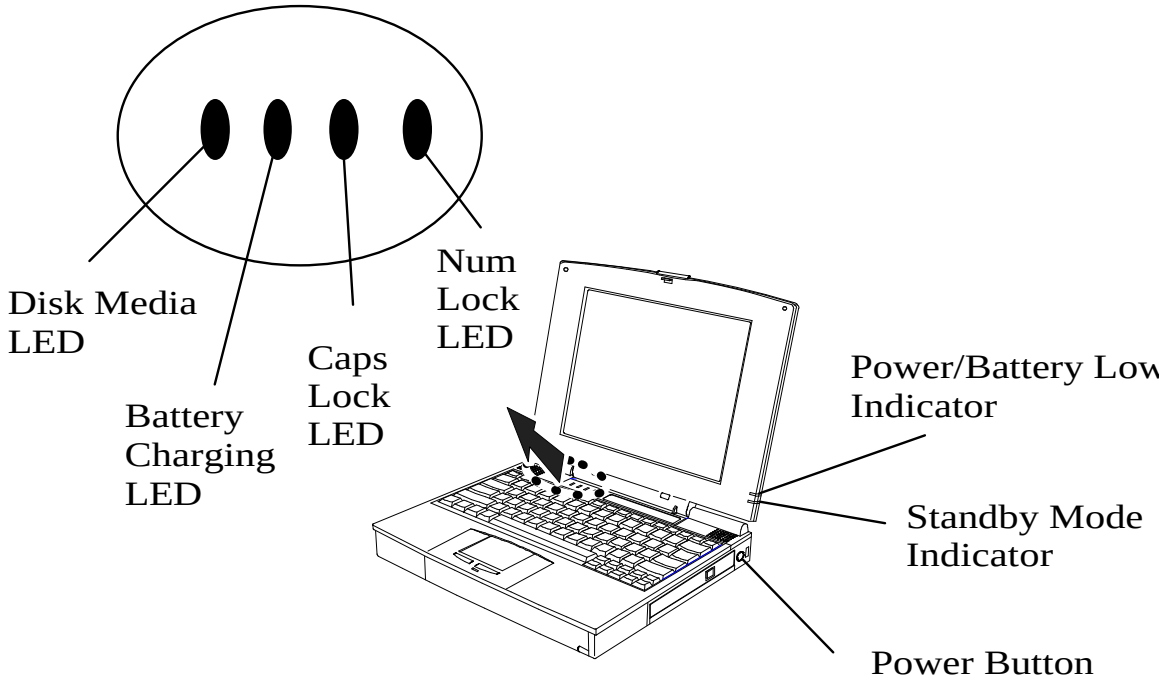


Figure 3-1 60x/65x Operating Controls and Indicators

3.2.1 Power On/Off Switch

The notebook contains an alternate action power button located on the right side of the notebook as shown in Figure 3-1. On the first button depression, power is turned on to the notebook. On the second depression, power is turned off.

3.2.2 Notebook LEDs

The notebook contains four front indicator LEDs and two right side LEDs as shown in Figure 3-1 and described in Table 3-1.

Table 3-1 60x/65x Series Indicators

Indicator Light	Description
Power/ Battery-low Indicator	Lights when the system is on and there is power to the system. Flashes when the battery power is low. Connect a powered AC adapter to the computer as soon as possible.
Standby Mode Indicator	Lights when the computer is in Standby mode. Flashes when the computer is in 5V Suspend mode. The computer enters Standby mode if the Standby hot key (**Fn+F4**) is pressed or the **STANDBY TIMEOUT** parameter in Setup is enabled and expires. The computer enters 5V Suspend mode when you press the **5V Suspend** hot key (**Fn+F3**), the **5 VOLT SUSPEND TIMEOUT** parameter in Setup is enabled and expires, or the display is closed.
Disk Media Indicator	Lights when the computer writes to or reads from the hard disk drive, or reads from the CD-ROM drive.
Battery Charging Indicator	Lights when a powered AC adapter connected to the computer is charging the battery. Flashes when there is a problem with the battery or the battery is not recognized by the smart charger. Turns off when there is no battery or the battery is fully charged.
Caps Lock Indicator	Lights when the caps lock function is toggled **ON** using the Caps Lock key.
Num Lock Indicator	Lights when the embedded numeric keypad is toggled **ON** using the Num Lock hot key (**Fn**+**F7**).

3.2.2.1 Hot Key Sequences

Table 3-2 contains a summary of hot key sequences useful when performing maintenance operations.

Table 3-2 Summary of Notebook Hot Key Sequences

Function	Key Sequence
Increase LCD screen brightness	**Fn-Up Arrow**
Decrease LCD screen brightness	**Fn-Down Arrow**
Lighten LCD screen contrast	**Fn-Right Arrow**
Darken the LCD screen contrast	**Fn-Left Arrow**
Alternate between display modes (LCD, Ext.l CRT or both)	**Fn-F12**
Enter 0V Suspend Mode	**Fn-F2**
Exit 0V Suspend Mode	Press **Power** Button
Enter Standby Mode	**Fn-F4**
Resume from Standby Mode	Press any key
Toggle speaker output on/off	**Fn-End**
Numeric Lock	**Fn-F7**
Turn off the LCD backlight	**Fn-F11**
Turn on the LCD backlight	Press any key
Stop a command or application	**Ctrl-Pause**
Resume a command or application	Press any key
Send the contents of the screen to the printer	**Shift-PrtSc**
Sets the notebook to echo keystrokes to the printer; prints a line when you press **Enter**; continues until you press **Ctrl-P**	**Ctrl-P**
Enable/disable the internal keypad	**Fn-T**
Toggle Scroll Lock function on/off	**Fn-F6**
Bring up the setup screen anytime	**Fn-F1**
Warm boot	**Ctrl-Alt-Del**
Start	**Windows logo key**
Activate next taskbar button	**Windows logo key-Tab**
Explore the computer	**Windows logo key-E**
Minimize all	**Windows logo key-M**
Display run dialog box	**Windows logo key-R**
Display the application’s context menu	**Application key**

4
Theory of Operation

4.1 Introduction

This section contains a general block diagram theory of operation description of the Extensa 60x/65x Series Notebook Computers.

Note: Various internal components may change on future models and busses/ bus speeds are subject to change.

4.2 Notebook Functional Overview

The Extensa 60x/65x Series Notebooks consist of eight major functions or sections including:

- System Processor - implemented on the Motherboard Assembly
- Memory Subsystem - implemented on the Motherboard Assembly
- Processor/Memory/I/O Control - implemented on the Motherboard Assembly
- Keyboard Subsystem - implemented on the Motherboard and the Keyboard Assemblies
- Video Subsystem - implemented on the Top Board and on the LCD Display Assembly
- Sound Subsystem - implemented on the Motherboard Assembly.
- Touchpad Mouse Subsystem- implemented on the Touchpad assembly and on the Motherboard Assembly
- Hard Disk Drive Subsystem - implemented on the Motherboard Assembly and the Hard Disk Drive Assembly
- Floppy Disk Drive Subsystem - implemented on the Motherboard and Floppy Disk Drive Assembly
- Power Subsystem - implemented on the Power Supply Board, Inverter Board, battery packs, and AC adapter

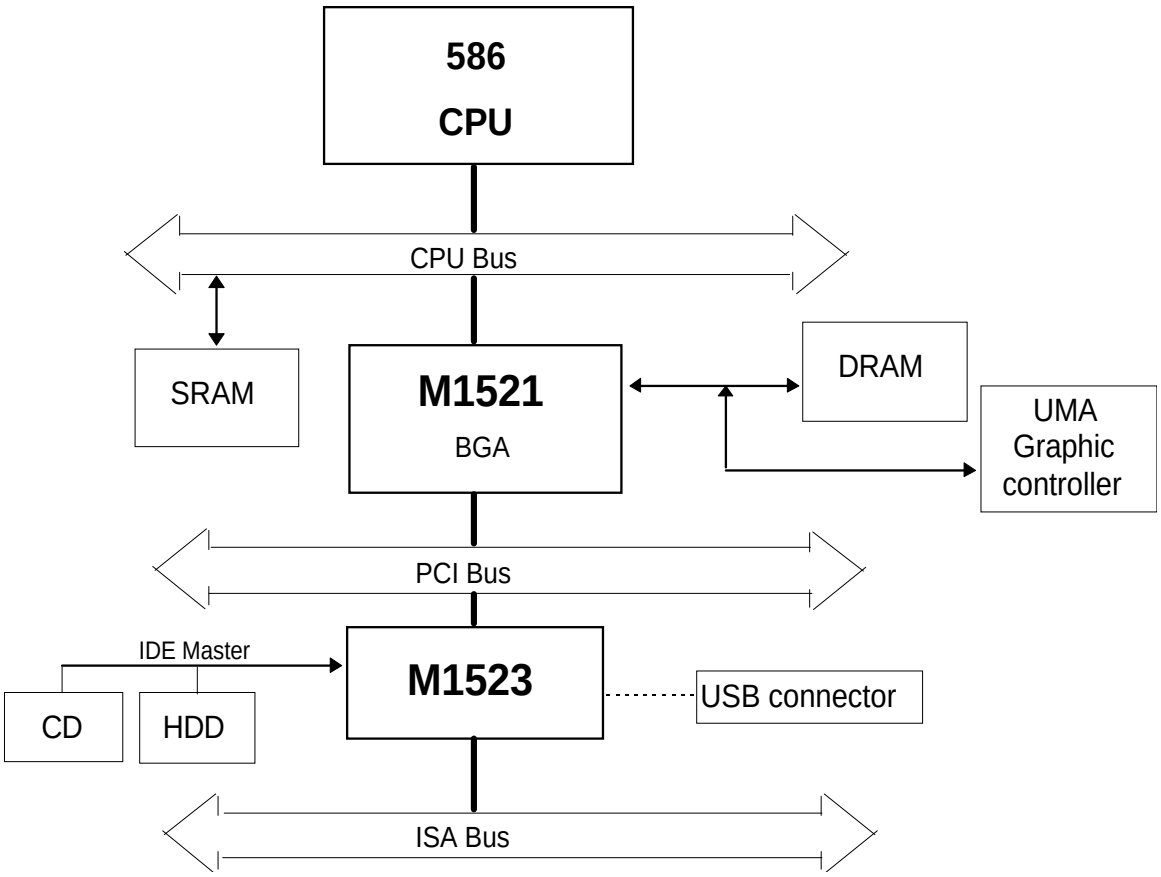


Figure 4-1 Extensa Functional Block Diagram

4.2.1 System Processor

The System Processor function for the notebook is implemented on the Motherboard in the form of an Intel Pentium P54-C Superscalar 586 Processor Chip. The processor operates in conjunction with RAM and ROM Memory and other control logic to process software instructions (BIOS, DOS, Windows, and applications). The processor communicates with the hard disk drive and the memory components using high speed busses.

The Processor also interacts with other hardware logic to provide the power savings features for the notebook. These features include controlling CPU clock speeds, reducing clock speeds whenever possible (e.g. when performing floppy disk drive accesses), powering down unused devices, etc.

4.2.2 Memory Subsystem

The memory subsystem comprises the following components:

- Main memory
- L2 Secondary Memory (cache)
- Flash ROM

The Extensa Series uses fast Extended Data Out (EDO) DRAM for main and video memory and high-speed synchronous, pipelined burst SRAM for L2 cache memory. Main BIOS and Video BIOS are stored in Flash ROM.

4.2.2.1 Main Memory

The standard 60x Series notebook comes with 8 MB of Main memory installed on the attached soDIMM. Memory expansion accommodations are provided via a standard soDIMM connector on the bottom of the Motherboard Assembly.

The 65x Series Notebooks come standard with 16 MB main memory, expandable to 80 MB.

4.2.2.2 Flash ROM

All versions of the Extensa notebook family use a "Flash" ROM that contains both the main system BIOS and the VGA BIOS. The Flash ROM contains "Boot Block" logic that allows downloading new versions of BIOS without destroying the Boot Load area.

The Flash ROM execution is 8 bits wide. However, better performance can be attained by enabling the Shadow ROM in the CMOS setup routine or by selecting the Windows Control Panel Applet. When the Shadow ROM is enabled, BIOS is copied into 32-bit high speed system.

4.2.3 Video Subsystem

The video subsystem is implemented on the VGA Video Board and on the Motherboard Assemblies.

The notebook contains a built-in 10.4 inch (or larger) LCD and features simultaneous LCD and external VGA display.

The video subsystem includes a 1 MB (60x Series) or 2 MB (65x Series) DRAM memory, 32-bit DRAM bus, and separate display and memory clocks. An additional frame buffer/ accelerator DRAM increases the available memory band width for CPU accesses. The

video section also uses additional levels of write FIFOs, a read cache, page mode DRAM.

4.2.4 Sound Subsystem

The Extensa Series Notebook is equipped with a sound chip set that is Sound Blaster™ and Sound Blaster Pro compatible. Internal stereo speakers provide the Notebook with sound generation capabilities. A set of 3.5 mm connectors allow for external microphone and line inputs and headphone/speaker outputs.

The sound subsystem also includes a variety of sound utilities that combine to provide additional multi-media functions:

4.2.5 Keyboard Subsystem

The keyboard subsystem, implemented on the Keyboard Assembly and the Motherboard Assemblies Board, consists of the following major sections:

- Keyboard Assembly
- Keyboard Scanner
- Status LED Interface

4.2.6 Hard Disk Drive Subsystem

The Hard Disk Drive Subsystem, implemented on the Motherboard Board and on the associated hard disk drive module(s), provides disk storage for all system software and user files.

The notebook is equipped with an 810 MB or larger hard disk drive. The hard disk drive also features built-in power conservation features configured from the standard CMOS Setup Routine. An Automatic Power Down mode can be selected which powers down the drive motor during periods of inactivity. An additional level of power conservation may also be selected which powers down the motor plus all control circuits.

The hard disk drives are factory formatted as a single drive (Drive C:) and are preloaded with installation versions of Windows 95 or Windows for Workgroups (in dual load versions, the user selects operating system during software installation).

4.2.6.1 Hard Disk Drive Power Management

Both the internal hard disk drive and the hard disk drive installed in the media bay

implement power savings features. From the CMOS setup routine, an automatic power down mode can be selected which enables the drive to turn off its motor after a specified period of inactivity. Additional Sleep modes can direct additional power savings during inactive periods by powering down the control circuitry.

4.2.7 Floppy Disk Drive Subsystem

The Extensa 60x and 65x Series notebooks contain provisions for supporting a Floppy Disk Drive installed internally or externally connected to the parallel port. The Floppy Disk Drive Subsystem consists of a Floppy Controller and the Floppy Disk Drive located either in the media bay or external to the notebook (not both).

The 3.5-inch floppy disk drive can read/write standard 3.5-inch disks (either1.44 MB or 2 MB capacity). The drive can also read a 720 KB disk (for interchange of data with other computers).

The data transfer rate for the floppy disk drive is 500 Kbits per second for high-density disks and 250 Kbits per second for double-density disks.

4.2.8 Power Subsystem

The notebook is equipped with a software/hardware monitored/controlled Power Subsystem that minimizes battery usage for prolonged battery operation and automatically recharges the batteries when the notebook is used with an AC adapter.

4.2.8.1 AC Power Adapter

The computer is equipped with a universal AC power adapter that converts AC voltage into DC voltage (approx. 46 Watts of power) used to operate the notebook and charge the batteries. The specifications for the AC adapter include:

- **Input Voltage:** 100 to 250 VAC
- **Input Current:** Approximately 1.5 Amps
- **Input Frequency**: 50 to 60 Hz

4.3 Detailed Circuit Theory

The remainder of this section provides chip-level circuit description for the Extensa Series Notebooks.

4.3.1 Major Components

Table 4-1 shows a listing the of the major components used in the Extensa Series Notebooks.

Table 4-1 Major Chips List

Component	Vendor	Description
M1521	Acer	System data buffer
M1523	Acer	System controller chip
M6377	Acer	Power management unit
65550	C&T (Chips & Technology)	Video controller
TI1130	Texas Instruments	PCMCIA controller
NS87336VJG	NS (National Semiconductor)	Super I/O controller
ESS1688	ESS Technology	Sound controller
T62.045.C.00	Ambit	Battery Charger
T62.041.C.00	Ambit	DC-DC Converter
DAC-07B008	Delta	DC-AC Inverter
M38802	Phoenix	Keyboard encoder & controller

4.3.2 System Architecture

Figure 4-2 shows the Extensa system architecture. The remainder of this section provides a detailed description of the major chips used in the Extensa Notebooks.

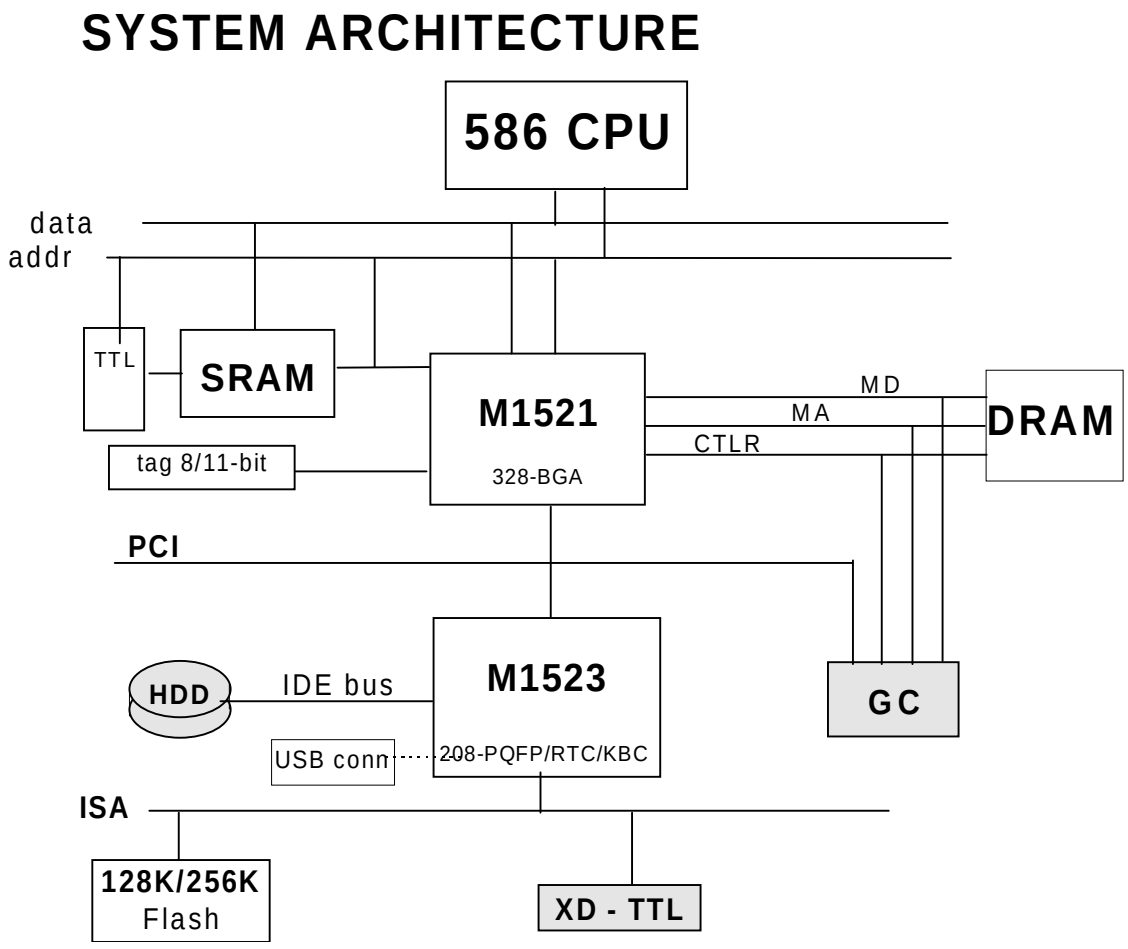


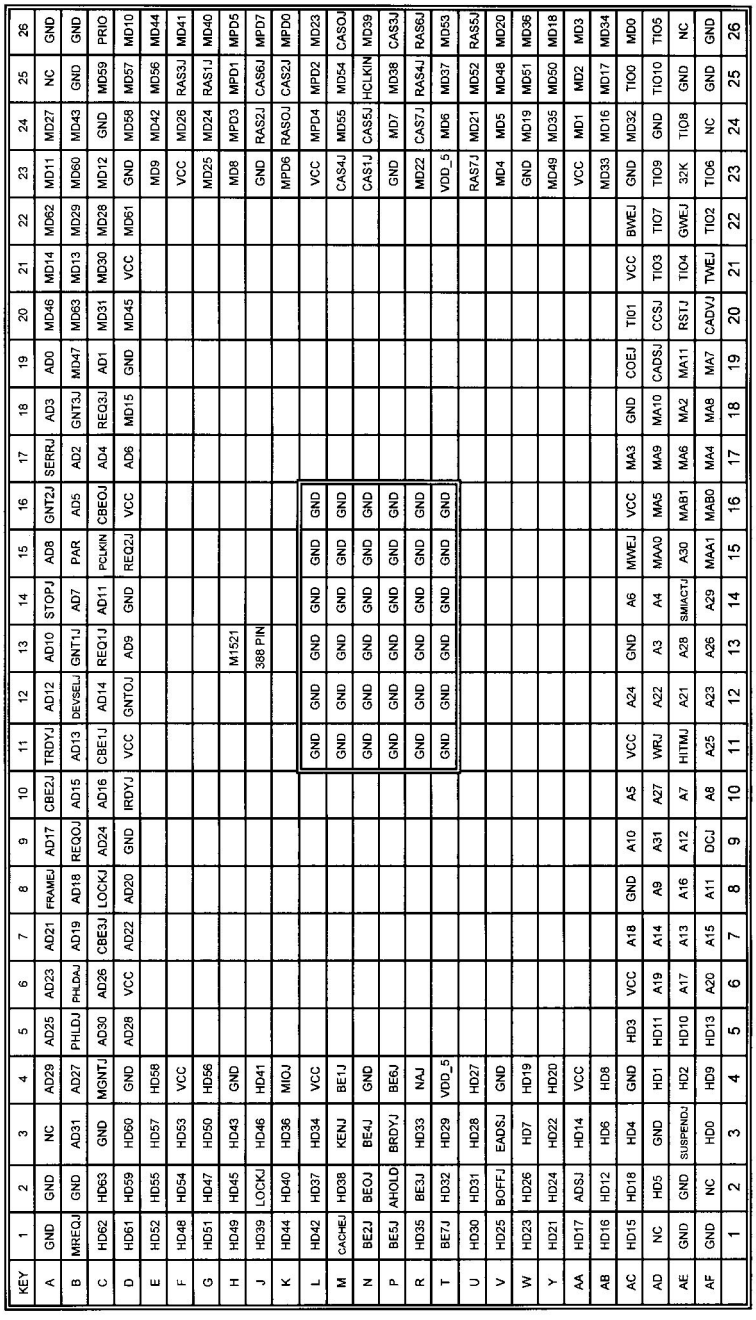
Figure 4-2 Extensa Series System Architecture Diagram

ALI M1521 (PCI, Cache, and Memory Controller)

The ALADDIN-III consists of two chips, ALI M1521 and M1523 to give a 586 class system the complete solution with the most up-to-date feature and architecture for the new multimedia/multithreading operating system. It utilizes the BGA package to improve the AC characterization, resolves system bottleneck and make the system manufacturing easier. The ALADDIN-III gives a highly-integrated system solution and a most up-to-date system architecture including the UMA, ECC, PBSRAM, SDRAM/BEDO, and multi-bus with highly efficient, deep FIFO between the buses, such as the HOST/PCI/ISA dedicated IDE bus.

The M1521 provides a complete integrated solution for the system controller and data path components in a Pentium-based system. It provides 64-bit CPU bus interface, 32-bit PCI bus interface, 64/72 DRAM data bus with ECC or parity, secondary cache interface including pipeline burst SRAM or asynchronous SRAM, PCI master to DRAM interface, four PCI master arbiters, and a UMA arbiter. The M1521 bus interfaces are designed to interface with 3V and 5V buses.

The signal descriptions for the M1521 are provided in Table 4-2. The chip pinouts are provided in Figure 4-3.



KEY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
A	GND	GND	NC	AD29	AD25	AD23	AD21	FRAMEJ	AD17	CBE2J	TRDYJ	AD12	AD10	STOPJ	AD8	GNT2J	SERRJ	AD3	AD0	MD46	MD14	MD62	MD11	MD27	NC	GND
B	MREQJ	GND	AD31	AD27	PHLDJ	PHLDAJ	AD19	AD18	REQ0J	AD15	AD13	DEVSELJ	GNT1J	AD7	PAR	AD5	AD2	GNT3J	MD47	MD63	MD13	MD29	MD60	MD43	GND	GND
C	HD62	HD63	GND	MGNTJ	AD30	AD26	CBE3J	LOCKJ	AD24	AD16	CBE1J	AD14	REQ1J	AD11	PCLKIN	CBEOJ	AD4	REQ3J	AD1	MD31	MD30	MD28	MD12	GND	MD59	PRIO
D	HD61	HD59	HD60	GND	AD28	VCC	AD22	AD20	GND	IRDYJ	VCC	GNT0J	AD9	GND	REQ2J	VCC	AD6	MD15	GND	MD45	VCC	MD61	GND	MD58	MD57	MD10
E	HD52	HD55	HD57	HD58																			MD9	MD42	MD56	MD44
F	HD48	HD54	HD53	VCC																			VCC	MD26	RAS3J	MD41
G	HD51	HD47	HD50	HD56																			MD25	MD24	RAS1J	MD40
H	HD49	HD45	HD43	GND									M1521										MD8	MPD3	MPD1	MPD5
J	HD39	LOCKJ	HD46	HD41									388 PIN										GND	RAS2J	CAS6J	MPD7
K	HD44	HD40	HD36	MIOJ																			MPD6	RASOJ	CAS2J	MPD0
L	HD42	HD37	HD34	VCC							GND	GND	GND	GND	GND	GND							VCC	MPD4	MPD2	MD23
M	CACHEJ	HD38	KENJ	BE1J							GND	GND	GND	GND	GND	GND							CAS4J	MD55	MD54	CAS0J
N	BE2J	BEOJ	BE4J	GND							GND	GND	GND	GND	GND	GND							CAS1J	CAS5J	HCLKIN	MD39
P	BE5J	AHOLD	BRDYJ	BE6J							GND	GND	GND	GND	GND	GND							GND	MD7	MD38	CAS3J
R	HD35	BE3J	HD33	NAJ							GND	GND	GND	GND	GND	GND							MD22	CAS7J	RAS4J	RAS6J
T	BE7J	HD32	HD29	VDD_5							GND	GND	GND	GND	GND	GND							VDD_5	MD6	MD37	MD53
U	HD30	HD31	HD28	HD27																			RAS7J	MD21	MD52	RAS5J
V	HD25	BOFFJ	EADSJ	GND																			MD4	MD5	MD48	MD20
W	HD23	HD26	HD7	HD19																			GND	MD19	MD51	MD36
Y	HD21	HD24	HD22	HD20																			MD49	MD35	MD50	MD18
AA	HD17	ADSJ	HD14	VCC																			VCC	MD1	MD2	MD3
AB	HD16	HD12	HD6	HD8																			MD33	MD16	MD17	MD34
AC	HD15	HD18	HD4	GND	HD3	VCC	A18	GND	A10	A5	VCC	A24	GND	A6	MWEJ	VCC	MA3	GND	COEJ	TIO1	VCC	BWEJ	GND	MD32	TIO0	MD0
AD	NC	HD5	GND	HD1	HD11	A19	A14	A9	A31	A27	WRJ	A22	A3	A4	MAA0	MA5	MA9	MA10	CADSJ	CCSJ	TIO3	TIO7	TIO9	GND	TIO10	TIO5
AE	GND	GND	SUSPENDJ	HD2	HD10	A17	A13	A16	A12	A7	HITMJ	A21	A28	SMIACTJ	A30	MAB1	MA6	MA2	MA11	RSTJ	TIO4	GWEJ	32K	TIO8	GND	NC
AF	GND	NC	HD0	HD9	HD13	A20	A15	A11	DCJ	A8	A25	A23	A26	A29	MAA1	MAB0	MA4	MA8	MA7	CADVJ	TWEJ	TIO2	TIO6	NC	GND	GND
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

Figure 4-3 M1521 Pin Assignments

4.3.2.1 ALI M1523 (PCI-ISA Bridge)

The M1523 is a bridge between PCI and ISA bus, providing full PCI and ISA compatible functions. The M1523 has Integrated System Peripherals (ISP) on-chip and provides advanced features in the DMA controller. This chip contains the keyboard controller, real-time clock and IDE master controller. This chip also supports the Advanced Programmable Interrupt controller (APIC) interface.

One eight-byte bidirectional line buffer is provided for ISA/DMA master memory read/writes. One 32-bit wide posted-write buffer is provided for PCI memory write cycles to the ISA bus. It also supports a PCI to ISA IRQ routing table and level-to-edge trigger transfer.

The chip has two extra IRQ lines and one programmable chip select for motherboard Plug-and-Play functions. The interrupt lines can be routed to any of the available ISA interrupts.

The on-chip IDE controller supports two IDE connectors for up to four IDE devices providing an interface for IDE hard disks and CD-ROMs. The ATA bus pins are dedicated to improve the performance of IDE master.

The M1523 supports the Super Green feature for Intel and Intel compatible CPUs. It implements programmable hardware events, software event and external switches (for suspend/turbo/ring-in). The M1523 provides CPU clock control (STPCLKJ). The STPCLKJ can be active (low) or inactive (high) in turn by throttling control.

A simplified block diagram of the M1523 chip is shown in Figure 4-4 and the associated pinouts are provided in Figure 4-5.

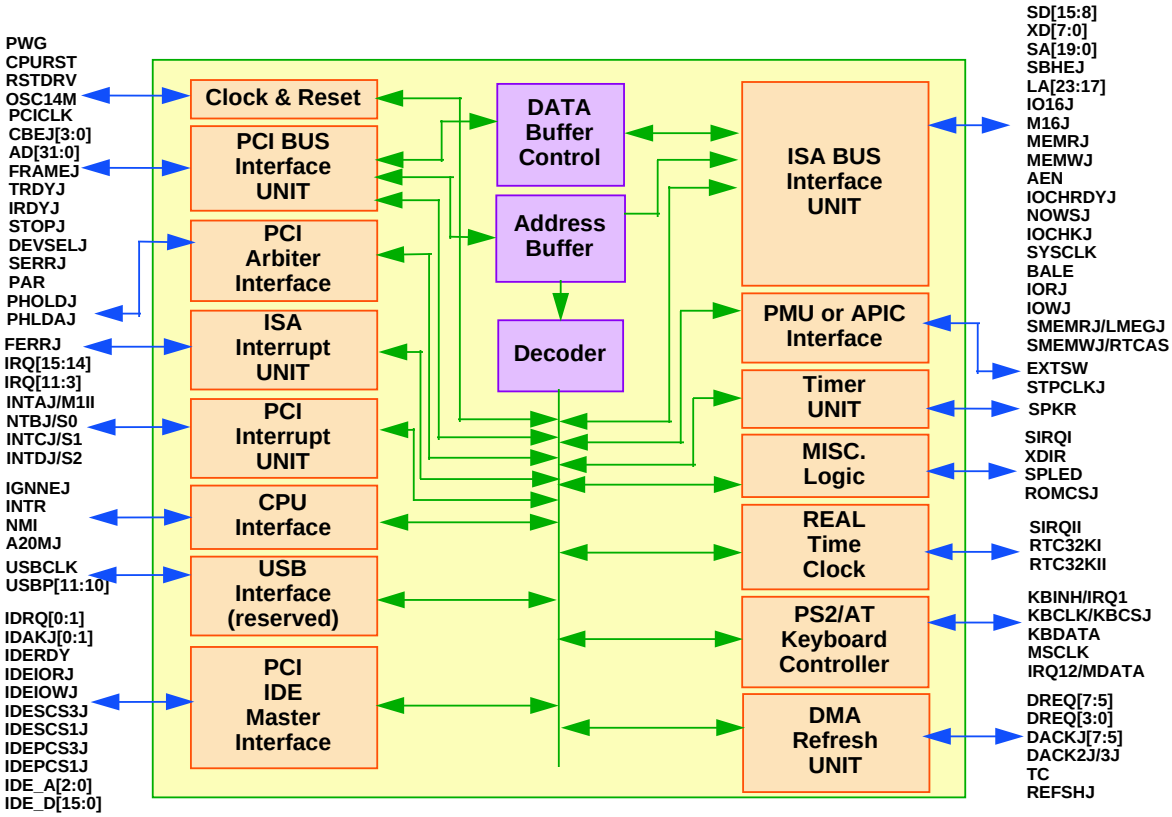


Figure 4-4 M1523 Chip Simplified Block Diagram

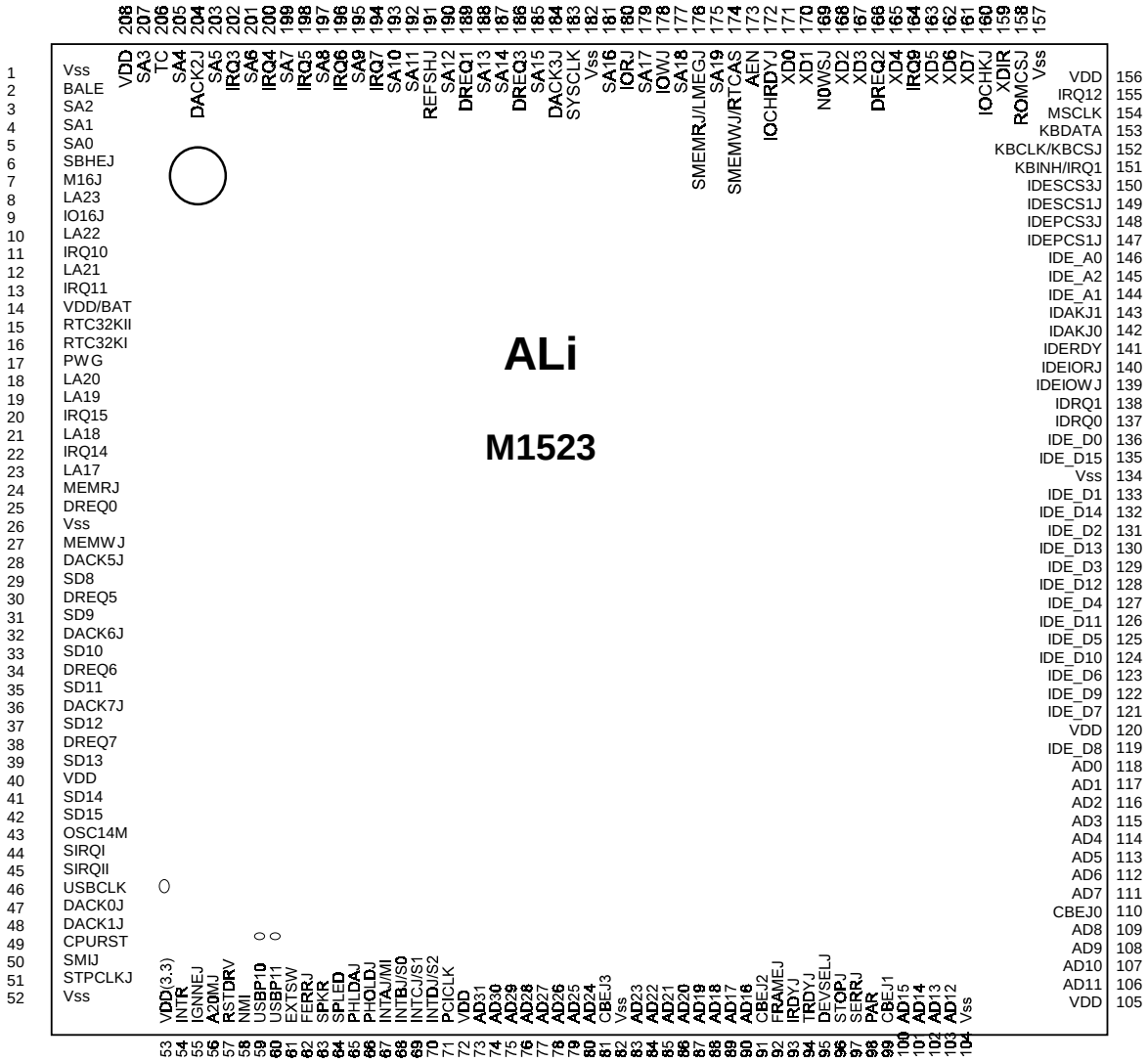


Figure 4-5 M1523 Pinouts

4.3.2.2 ALI M6377 (Power Management Unit)

- Three operation states
  - ON state
  - DOZE state
  - SLEEP state
- Programmable DOZE and SLEEP timers
- Programmable EL timer for backlight control
- Three output pins depending on operation state, each pin is programmable and power configurable.
- Provide system activity monitoring, including:
  - video
  - hard disk
  - floppy disk
  - serial port
  - keyboard
  - parallel port
  - two programmable I/O groups activity monitor, each group contains 16/8 I/O addresses.
  - one predefined I/O group activity monitor
- Multiple external wake up events from DOZE and SLEEP states
  - External push button
  - RTC alarm
- Two levels battery warning monitor
- AC power monitoring to disable PMU function

A simplified block diagram of the M6377 Power Management Unit is provided in Figure 4-6. The chip pinouts are provided in Figure 4-7.

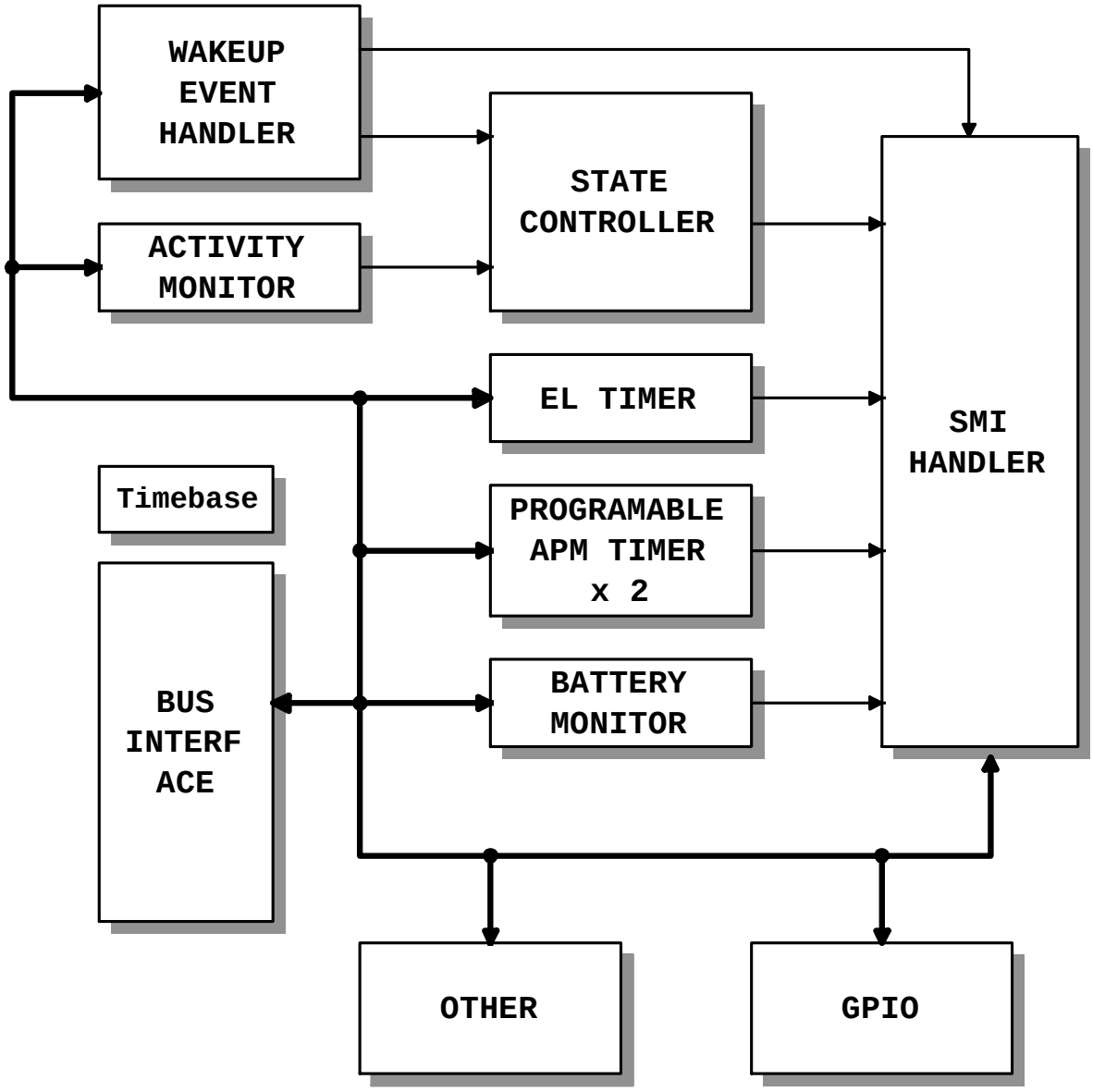


Figure 4-6 M6377 Simplified Block Diagram

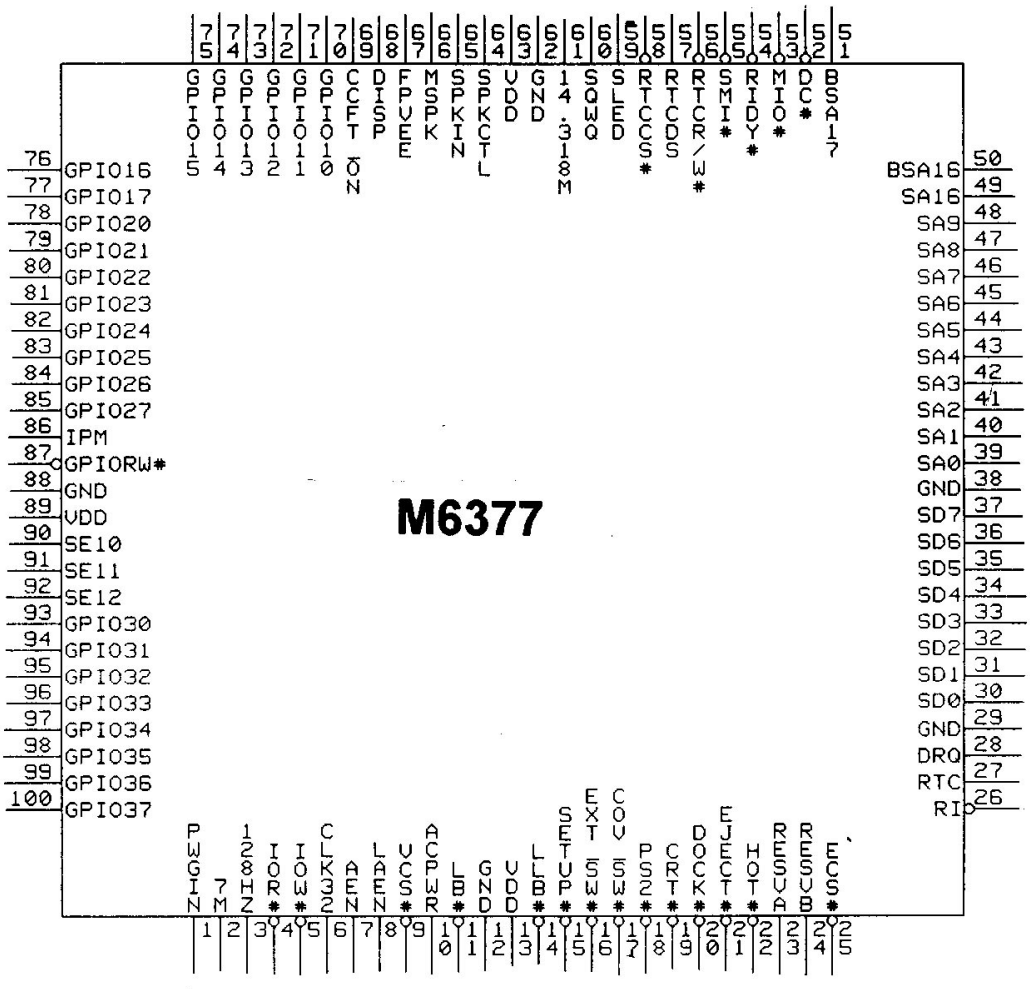


Figure 4-7 M6377 Chip Pinouts

4.3.2.4 C&T 65550 High Performance Flat Panel / CRT VGA Controller

The C&T65550 of high performance multimedia flat panel / CRT GUI accelerators extend CHIPS' offering of high performance flat panel controllers for full-featured note books and sub-notebooks. The C&T65550 offers 64-bit high performance and new hardware multimedia support features.

HIGH PERFORMANCE

Based on a totally new internal architecture, the C&T65550, integrates a powerful 64-bit graphics accelerator engine for Bit Block Transfer (BitBLT), hardware cursor, and other functions intensively used in graphical User Interfaces (GUls) such as Microsoft Windows™. Superior performance is also achieved through a direct 32-bit interface to the PCI Local Bus. The C&T65550 offers exceptional performance when combined with CHIPS advanced linear acceleration driver technology .

HARDWARE MULTIMEDIA SUPPORT

The C&T65550 implements independent multimedia capture (and display systems on-chip. The capture system places data in display memory (usually off screen) and the display system places it in a window on the screen.

The capture system can receive data from either the system bus or from the ZV enabled video port in either RGB or YUV format. The input data can also scaled down before storage in display memory (c.g., from any size larger than 320x240 down to 352x248). Capture of input data may also be double buffered for smoothing and to prevent image tearing.

The display system can independently place either RGB or YUV data from any where in display memory into an on-screen window which can be any size and located at any pixel boundary (YUV data is converted to RGB "on-the-fly" on out put). Non-rectangular windows .are supported via color keying. The data can be functionally zoomed on output up to 8x to fit the onscreen window and can be horizontally and vertically inter polated to scale or zoom artifacts. Interlaced and non-interlaced data are supported in both capture and display systems.

VERSATILE PANEL SUPPORT

The C&T65550 supports a wide variety of monochrome and color Single-Panel, Single-Drive (SS) and Dual-Panel, Dual Drive (DD) standard and high-resolution passive STN and active matrix TFT/MIM LCD, and EL panels. For monochrome panels, up to 64 gray scales are supported. Up to 4096 different colors can be displayed on passive STN LCDs and up to 16M colors on 24-bit active matrix LCDs.

LOW POWER CONSUMPTION

The C&T65550 employs a variety of advanced power management features to reduce power consumption of the display sub-system and extend battery life. Although optimized for 3.3V operation, The C&T65550 controller's internal logic. memory interface, bus interface, and panel interfaces can he independently configured to operate at either 3.3V or 5V.

SOFTWARE COMPATIBILITY/FLEXIBILITY

The C&T65550 are fully compatible with VGA at the register, and BIOS levels. CHIPS and third-party vendors supply fully VGA-compatible BIOS, end-user utilities and drivers for common application programs

Pin names in parentheses (...) indicate alternate functions.

A simplified block diagram of the C&T65550 is shown in Figure 4-8.

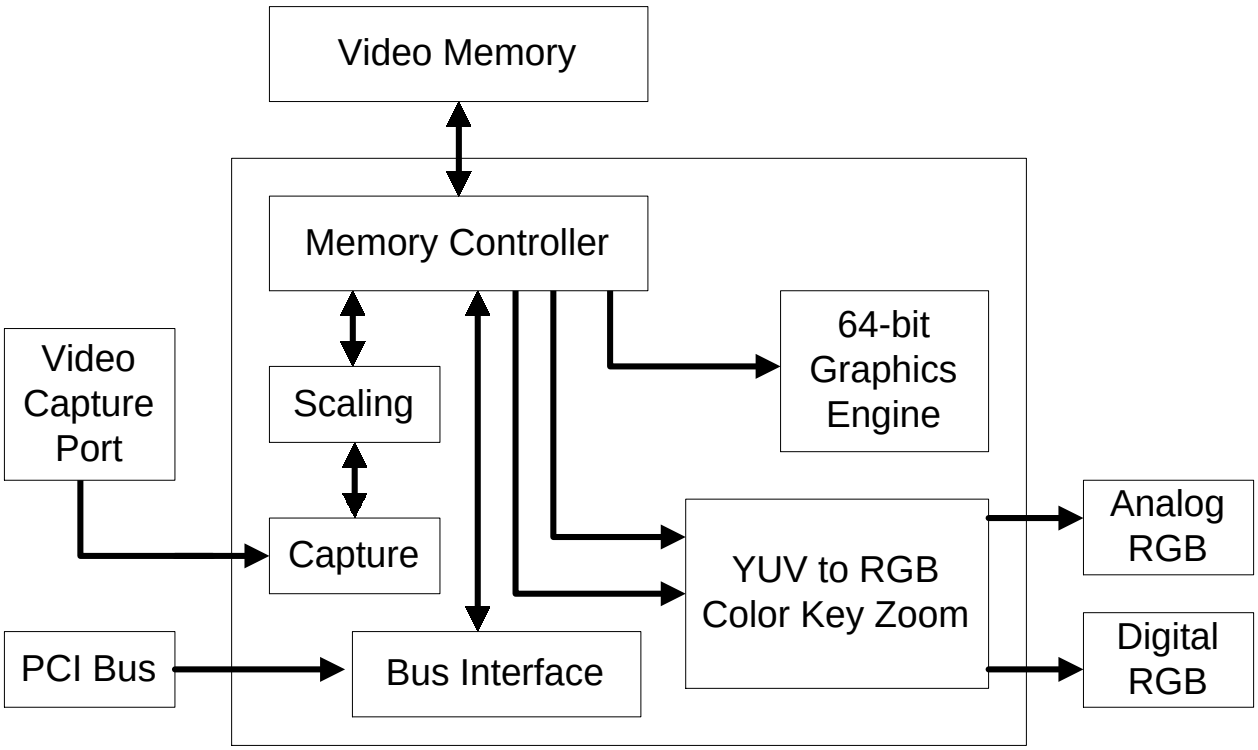


Figure 4-8 C&T65550 Simplified Block Diagram

4.3.2.5 TI1130 PCMCIA Controller

The Tl PCI1130 is a high-performance PCI-to-PC Card controller that supports two independent PC Card sockets compliant with the 1995 PC card standard. The PCI1130 provides a set of features that make it ideal for bridging between PCI and PC Cards in both notebook and desktop computers. The 1995 PC Card standard retains the 16-bit PC Card specification defined in PCMCIA release 2.1 and defines the new 32-bit PC Card, called CardBus, capable of full 32-bit data transfers at 33 MHz. The PCI1130 supports any combination of 16-bit and CardBus PC Cards in its two sockets, powered at 3.3 V or 5 V as required.

The PCI 1130 is compliant with the PCI local bus specification revision 2.1, and its PCI interface can act as either a PCI master device or a PCI slave device. The PCI bus mastering is initiated during 16-bit PC Card DMA transfers or CardBus PC Card bus mastering cycles.

All card signals are internally buffered to allow hot insertion and removal without external buffering. The PCI1130 internal data path logic allows the host to access 8-, 16-, and 32-bit cards using full 32-bit PCI cycles for maximum performance. Independent 32-bit write buffers allow fast-posted writes to improve system-bus utilization.

An advanced CMOS process is used to achieve low system-power consumption while operating at PCI clock rates up to 33 MHz. Several low-power modes allow the host power-management system to further reduce power consumption.

A simplified block diagram of the PCMCIA Controller is shown in Figure 4-9.

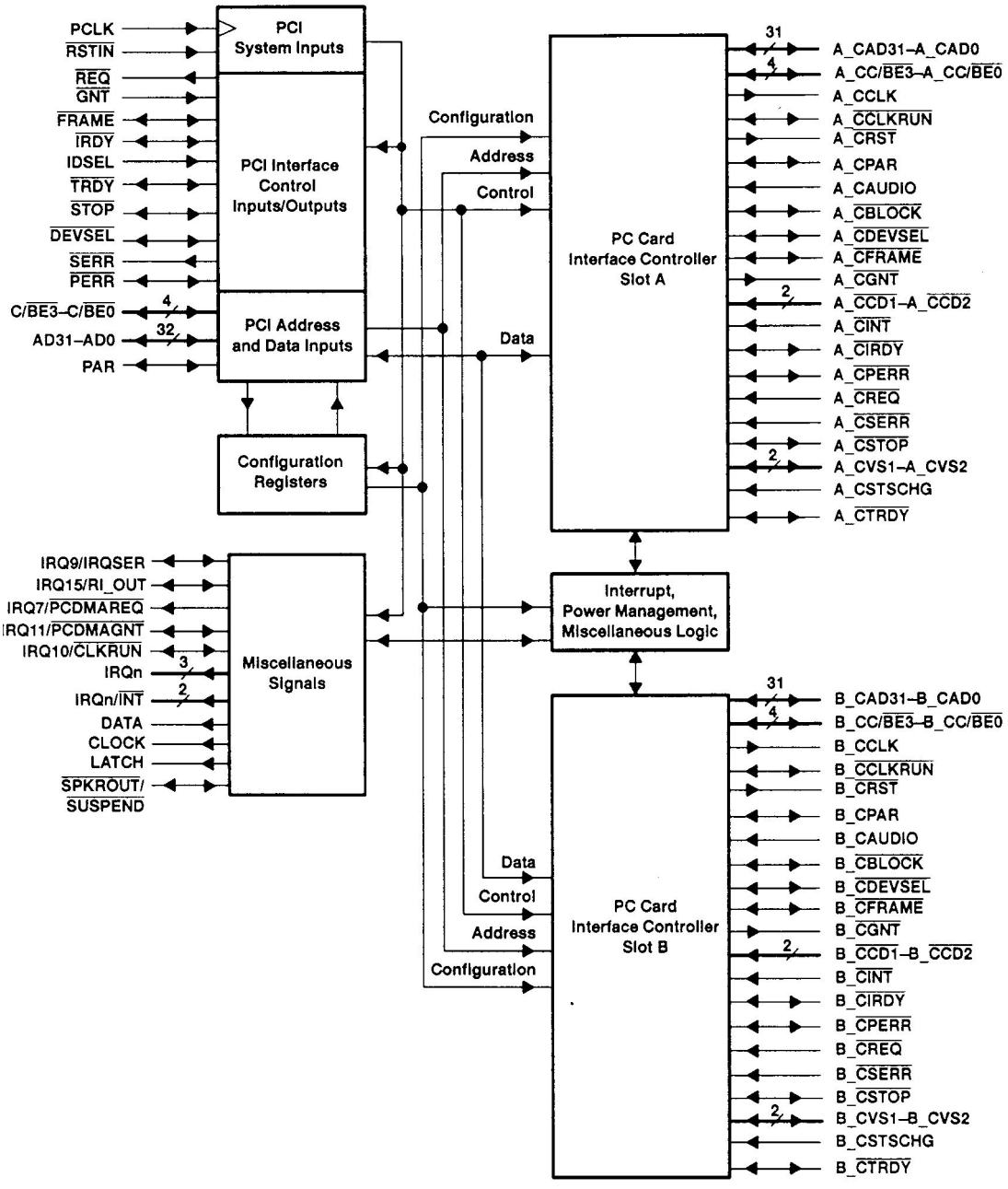


Figure 4-9 PCMCIA Controller, Simplified Block Diagram

4.3.2.6 NS87336VJG Super I/O Controller

The PC87336VJG is a single chip solution for most commonly used I/O peripherals in ISA, and EISA based computers. It incorporates a Floppy Disk Controller(FDC), two full featured UARTs, and an IEEE 1284 compatible parallel port Standard PC-AT address decoding for all the peripherals and a set of configuration registers are also implemented in this highly integrated member of the Super l/O family. Advanced power management features, mixed voltage operation and integrated Serial-lnfrared(both IrDA and Sharp) support makes the PC87336 an ideal choice for low-power and/or portable personal computer applications.

The PC87336 FDC uses a high performance digital data separator eliminating the need for any external filter components. It is fully compatible with the PC8477 and incorporates a superset of DP8473, NEC PD765 and N82077 floppy disk controller functions. All popular 5.25' and 3.5' floppy drives, including the 2.88 MB 3.5' floppy drive, are supported. In addition, automatic media sense and 2 Mbps tape drive support are provided by the FDC.

The two UARTs are fully NS16450 and NS16550 compatible. Both ports support MIDI baud rates and one port also supports IrDAs the HP SIR and Sharp SIR compliant signaling protocol.

The parallel port is fully IEEE 1284 level 2 compatible. The SPP(Standard Parallel Port) is fully compatible wit ISA and EISA parallel ports. In addition to the SPP, EPP(Enhanced Parallel Port) and ECP(Extended Capabilities Port) modes are supported by the parallel port.

A set of configuration registers are provided to control the Plug and Play and other various functions of the PC87336. These registers are accessed using two 8-bit wide index and data registers. The ISA I/O address of the register pair can be relocated using a power-up strapping option and the software configuration after power-up.

When idle, advanced power management features allows the PC87336 to enter extremely low power modes under software control. The PC87336 car operate from a 5V or a 3.3V power supply. An unique I/O cell structure allows the PC87336 to interface directly with 5V external components while operating from a 3.3V power supply.

Some of the major features include:

- 100% compatible with ISA, and EISA architectures
- The Floppy Disk Controller:
  - Software compatible with the DP8473, the 765A and the N82077
  - 16-byte FlFO(disabled by default)
  - Burst and Non-Burst modes
  - Perpendicular Recording drive support
  - New high-performance internal digital data separator(no external filter components required)
  - Low-power CMOS with enhanced power-down mode
  - Automatic media-sense support, with full IBM TDR(Tape Drive Register) implementation
  - Supports fast 2 Mbps and standard 1 Mbps/500 kbps/250 kbps tape drives

- Parallel Port
  - Enhanced Parallel Port(EPP) compatible
  - Extended Capabilities Port(ECP) compatible, including level 2 support
  - Bidirectional under either software or hardware control
  - Compatible with ISA, and EISA, architectures
  - Ability to multiplex FDC signals on parallel port pins allows use of an external Floppy Disk Drive(FDD)
  - Includes protection circuit to prevent damage to the parallel port when a connected printer is powered up or is operated at a higher voltage
- The UARTs:
  - Software compatible with the PC16550A and PC16450
  - MIDI baud rate support
  - Infrared support on UART2(IrDA and Sharp-compliant)
- The Address Decoder
  - 6 bit or 10 bit decoding
  - External Chip Select capability when 10 bit decoding
  - Full relocation capability(No limitation)
- Enhanced Power Management
  - Special configuration registers for power-down
  - Enhanced programmable power-down FDC command
  - Auto power-down and wake-up modes
  - 2 special pins for power management
  - Typical current consumption during power-down is less than 10 uA
  - Reduced pin leakage current
- Mixed Voltage support
  - Supports standard 5V operation
  - Supports 3.3V operation
  - Supports mixed internal 3.3V operation with 3.3V/5V external configuration
- The General Purpose Pins:
  - 2 pins The Bidirectional Parallel Port:, for 2 separate programmable chip select decoders, can be programmed for game port control

- Plug and Play Compatible:
  - 16 bit addressing(full programmable)
  - 10 selectable IRQs
  - 3 selectable DMA Channels
  - 3 SIRQ Inputs allows external devices to mapping IRQs

100-Pin TQFP package - PC87336VJG

A simplified block diagram of the Super I/O controller is provided in Figure 4-10.

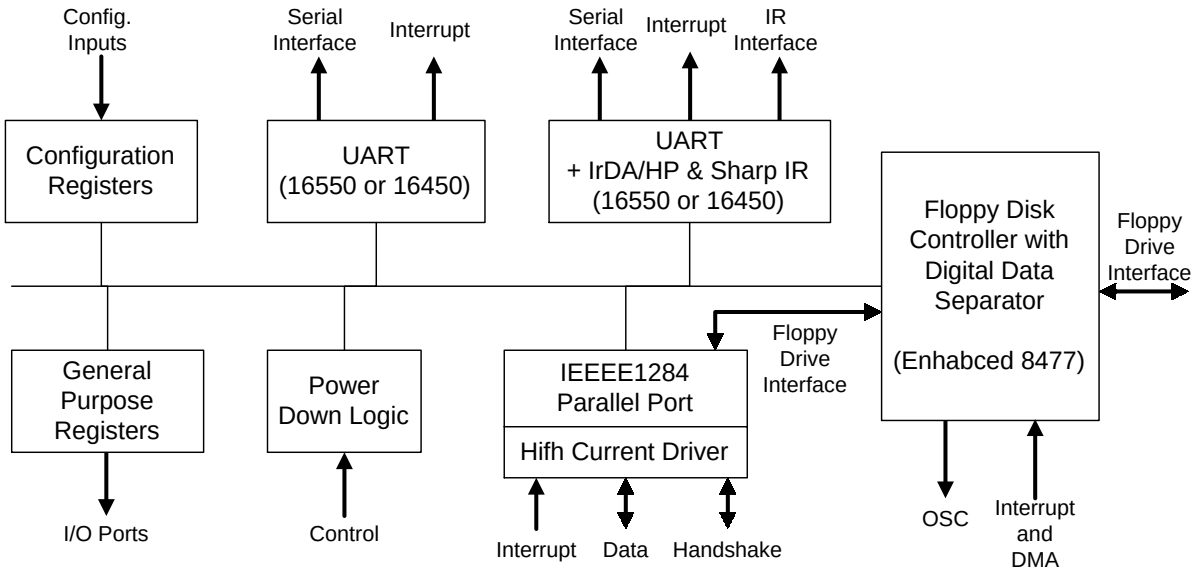


Figure 4-10 Super I/O Controller Block Diagram

4.3.2.6 ESS1688 Audio Controller

ESS Technology has developed the ES1688 AudioDrive®, a single chip solution for adding 16-bit stereo audio and four-operator FM music synthesis to personal computers. It has integrated all the major blocks of audio in to a single chip that can be designed into a motherboard, notebook PC, add-on card, or integrated onto other peripheral cards such as VGA, LAN, I/O, etc.

The ES1688 AudioDrive can record, compress, and playback voice, sound and music with built-in mixer controls. It consists of an embedded microprocessor, 16-bit stereo A/D and D/A, 20-voice FM music synthesizer, MIDI serial port compatible with MPU401 UART mode, DMA control, and ISA bus interface logic. A DSP serial interface allows an external DSP to take over analog resources such as the D/A or A/D converters. Control of I/O address, DMA, and interrupt selection can be by jumper or by control of system software. Interface to analog inputs is extremely simple. There are stereo inputs for CD-audio, line-in, and an external music synthesis chip, and a mono microphone input to an internal pre-amp. A digital PC speaker input is converted to an analog signal with volume control and is available as an analog output signal. Address decode outputs simplify interfacing to a game port. Advanced power management features such as Suspend/Resume and partial power-down are supported.

The ES1688 AudioDrive is compatible with Sound Blaster PRO™ version 3.01 voice and music functions as documented in the Sound Blaster Series Developer Kit. The ES1688 is pin-compatible with the ES688 AudioDrive.

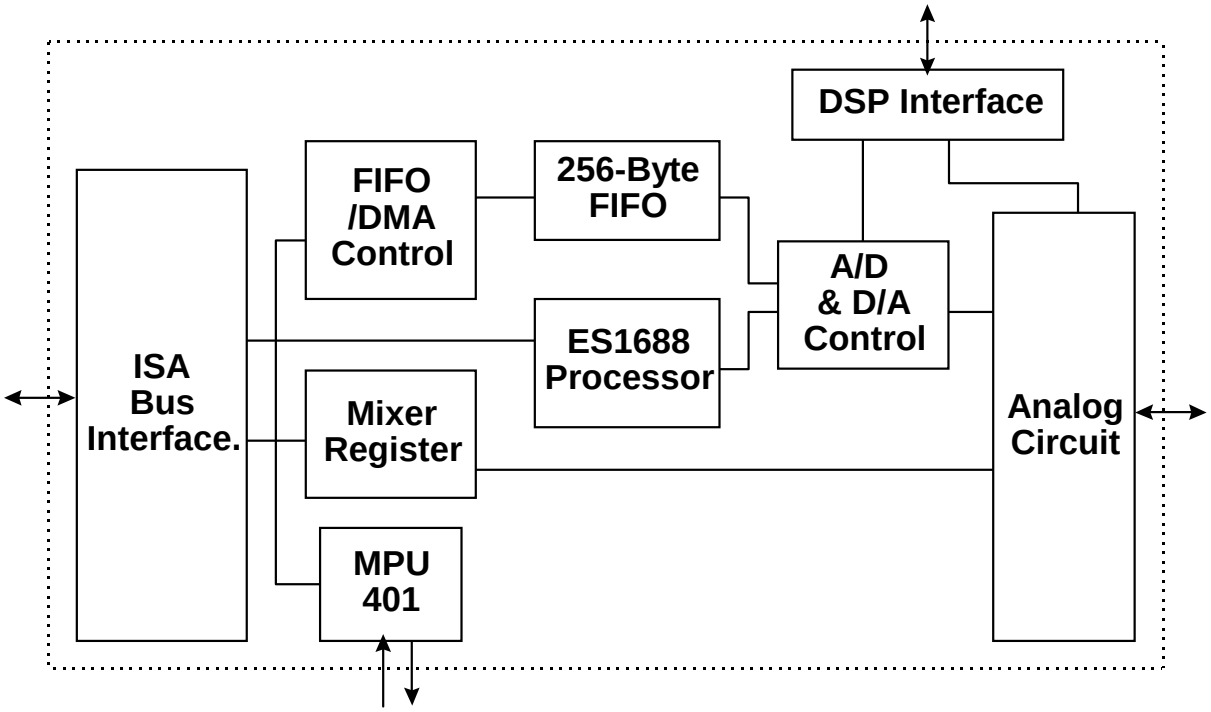


Figure 4-11 ES1688 Sound Chip Block Diagram

5
Troubleshooting Procedures

5.1 Introduction

This section provides an overview of the fault isolation process, provides guidelines for isolating 60x/65x Series computer malfunctions to replaceable subassemblies and provides instructions for executing diagnostics and interpreting error messages.

5.2 Overview of Fault Isolation Process

The fault isolation process (summarized in Figure 5-1) consists of the following steps:

- Notebook power system (including battery packs and AC adapter connections) - refer to Paragraph 5.4.
- Switch settings (ensure **Power** is On)
- Press the **Shift** key to ensure that Notebook is not in **Suspend mode**
- Verify if computer is configured to boot from the A: Drive or C: Drive.
- Check LCD brightness adjustment (press **Fn-Up Arrow** keys to increase brightness)
- Ensure that computer is not set for external monitor (press **Fn-F12** to select internal screen)
- Record and attempt to resolve any displayed error messages or error beeps (refer to Paragraph 5.2.3.1 and Tables 5-1 and 5-2)
- Try rebooting the system (**Ctrl-Alt-Del**)
- If the computer is capable of running the Setup program; check the serial and parallel port configurations, Sound System enable/disable, and other features that may affect system operation.
- Run PC-Doctor Diagnostics to further isolate problem area (refer to Paragraph 5.4). For indicated hardware failures, cycle power and repeat self test to verify that a hard failure has occurred.
- Remove and replace suspect hardware (as described in Section 6 of this manual) and retest the system using the diagnostic tests as described in Paragraph 5.4.5.

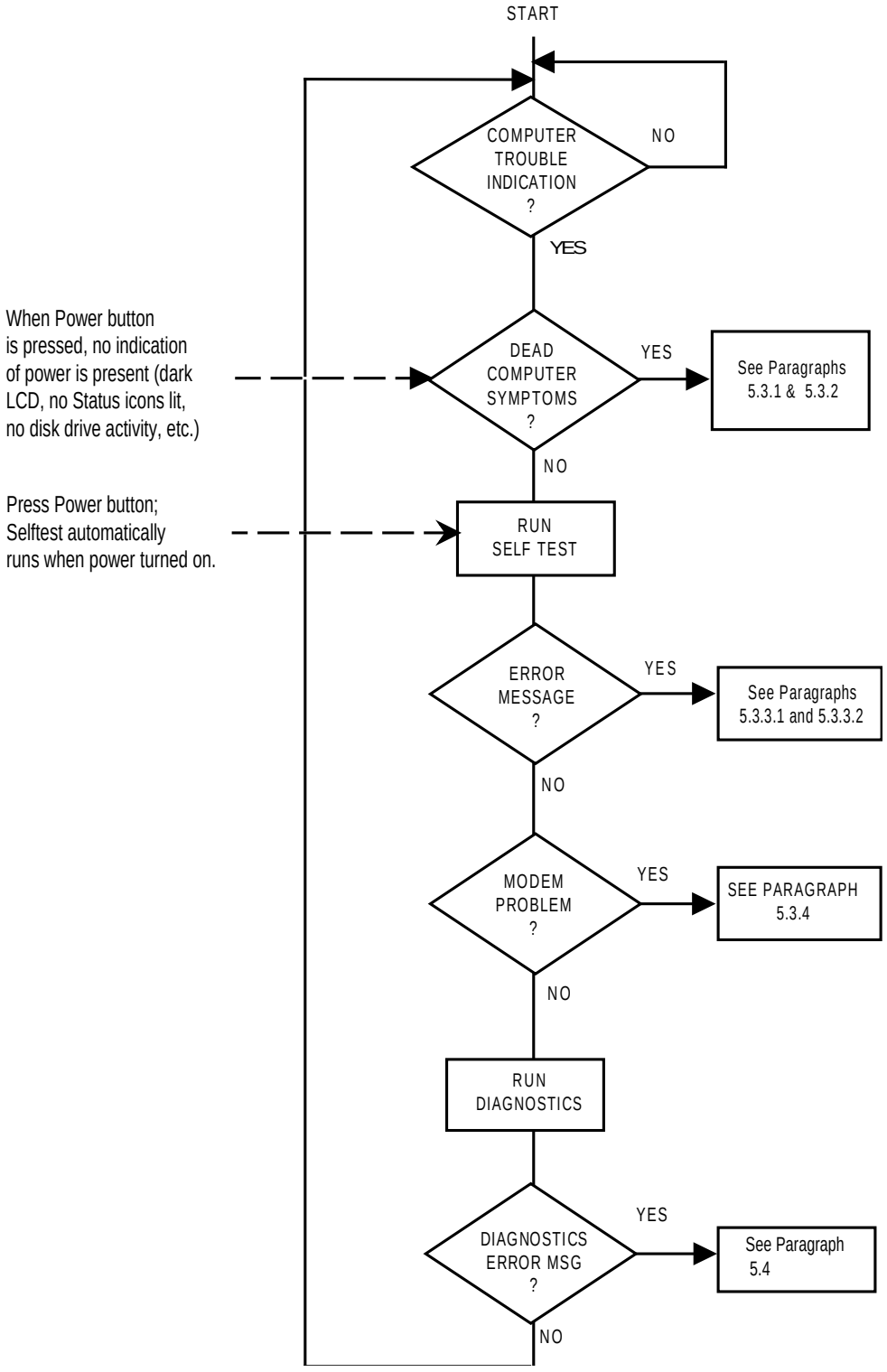


Figure 5-1 Notebook Computer Troubleshooting Flow Chart

5.3 Troubleshooting Procedures

The built-in self test program and the disk resident diagnostics program (PC-Doctor) are useful tools in computer troubleshooting. However, if the computer has a power, keyboard or display problem, you must first solve this problem before running diagnostics. If the computer powers up and displays messages on the LCD or emits a series of beeps, skip to Paragraph 5.3.3 for further instructions.

5.3.1 Troubleshooting a Power Supply Problem

If the computer does not power up when the Power Switch is set to the ON position, you most likely have a malfunction in the power subsystem (loss of power at the AC outlet, faulty AC adapter, discharged Battery Packs, or faulty Power Supply on the Main Board). With a power problem, all LEDs are extinguished, the LCD screen is blank, the system does not respond when the suspend switch is pressed several times consecutively and no drive activity can be heard. The computer is unable to load software and displays no visible signs of activity. To fault isolate a power problem, check the following:

- AC adapter and Battery - Plug in the AC adapter and double-check all connections on the adapter and computer. Ensure that the Notebook **Power** switch is set to the On position and that the system is not in **Suspend** or **sleep** mode.
- Measure the voltage at the AC outlet or plug in a known good appliance (e.g. a lamp) to verify that voltage is present. If the voltage is ok, try replacing the AC adapter.
- Check to see that the battery packs are installed correctly and that the battery charge indicators on the front of the battery packs indicate the batteries are charged (try using a new battery pack if batteries are discharged).
- If the AC outlet voltage, AC adapter, and battery packs test normal but the computer will not power up, try disconnecting the display cable from the base (refer to Section 6 for disassembly instructions) to see if a short in the display assembly has occurred.
- If the display assembly appears to be normal, replace the Bottom Board as described in Section 6 and retest system.

5.3.2 Troubleshooting a Display Problem

If the LCD remains blank when you turn on the computer, and the status indicators

light, check the following controls on the display):

- LCD suspend mode - press **Shift** to terminate Suspend mode.
- Brightness set too low - press **Fn-Up Arrow** keys to increase screen brightness
- Notebook Set for External Monitor - press **Fn-F12** to switch to the internal screen.
- Faulty LCD - Replace the cover-display assembly as described in Section 6 of this manual.
- Low battery - Use a fully charged battery and/or plug in the AC adapter.

Table 5-1 contains fault isolation information for Display Problems on the notebook. Symptoms are listed along the left side of the chart and the various Display FRUs are listed along the top of the chart. Within the body of the table are the probabilities of each of the FRUs causing that particular problem. For example, a single display line on the screen is most likely caused by the LCD Panel or Display Cable; other components have a low probability of causing the problem.

Table 5-1 Display Troubleshooting Guide

Problem Description	Inverter Board	LCD Panel	Display Cable	Mother Board	BIOS
Single line on LCD display (horizontal or vertical)	Low	High	Medium	Low	Low
Multiple lines on display (horizontal or vertical)	Low	Medium	Medium	Low	Low
Sections of the display are missing characters	Low	Medium	Medium	Low	Low
Scrambled Display	Low	Medium	Low	Medium	Medium
Intermittent characters on display	Low	Medium	Medium	Medium	Low
Bright display, no visible characters	Low	Medium	Medium	Medium	Low
Brightness level fluctuating or display blinking on/off	High	Low	Medium	Low	Low
Display goes dim over time	High	Medium	Low	Low	Low
Dim display but characters very visible	Medium	Medium	Low	Low	Low

Table 5-1 Display Troubleshooting Guide

Problem Description	Inverter Board	LCD Panel	Display Cable	Mother Board	BIOS
Very dark display and characters are slightly visible when a light is directed at surface of the display	High	Low	Low	Low	Low
Very dark display and no characters are visible	Low	High	High	Medium	Low

5.3.3 Fault Isolation Using Self Test

When the computer is first powered up, it automatically performs a self test of its central hardware and memory functions. During self test (which lasts for a few seconds), the display shows copyright and version number information.

Note: Some procedures in this paragraph require you to use keystroke sequences, such as **Ctrl-Alt-Del**. To execute a keystroke sequence such as this, you must press all three keys simultaneously.

5.3.3.1 Self Test Error Messages

Upon successful completion of the self test, the computer automatically loads its operating system and other built-in utilities. If the self test fails to complete successfully, the display shows one of the error messages described in Table 5-2.

Note: In the event of a hardware problem that affects the display, the Notebook also communicates errors via a series of beeps. The interpretation of the beep codes is provided in Table 5-3.

Table 5-2 Self Test Error Messages

Diskette drive 0 failure

This message indicates the internal floppy disk (drive A) has failed (or is not installed on the computer). Press **Ctrl-Alt-Esc** to ensure that drive type is correctly set (3.5 inch, 1.44 MB).

Run the Diagnostics to check Drive A as described in Paragraph 5.4. Also try using a new, correctly formatted disk.

Diskette read failure - strike F1 to try to retry boot

This message indicates the disk is defective or not formatted.

Try another known good formatted disk and press **F1**. Fixed disk failure

This message indicates the system disk drive failed to complete the self test or that the nonvolatile random-access memory (NVRAM) is configured incorrectly for the installed drive type.

Ensure that the notebook is configured to boot from the C: Drive.

Press **Ctrl-Alt-Esc** to ensure that the hard disk drive type is correctly identified in Setup (should be default for the internal hard disk drive).

Press the **Ctrl-Alt-Del** keys to attempt to reboot the system. If the error occurs a second time, run the diagnostics as described in Paragraph 5.4.

Fixed disk read failure - strike F1 to retry boot

This message indicates that the hard disk drive improperly formatted, or that a hardware failure has occurred in the hard disk drive subsystem.

Press **Ctrl-Alt-Esc** to ensure that the hard disk drive type is correctly identified in Setup (should be default for the internal hard drive).

If the booting process still fails, run the diagnostics as described in Paragraph 5.4.

Invalid configuration information

This message indicates the computer has been configured incorrectly. Check the settings in the Setup program menu. Also, NVRAM battery failure (resulting in loss of configuration data) can generate this error message. Install an AC adapter and recharge the system. If the problem persists, replace Top Board.

Keyboard clock/data line failure

This message indicates either the keyboard or the external keyboard (if one is installed) is defective. If the computer has an external keyboard connected, check the connection to ensure that it is connected correctly. If the problem still exists, run the diagnostics as described in Paragraph 5.4.

Keyboard stuck key failure

This message indicates the self test has detected a stuck key on the keyboard.

Table 5-2 Self Test Error Messages (Continued)

Try the keyboard keys to determine if they appear to be working properly and reboot the computer.

Note: Also, ensure that no key is pressed during power up and that no keys are jammed.

If the self test still fails, execute the diagnostics as described in Paragraph 5.4.

No boot device available - press F1 to retry boot

This message indicates the system disk, the disk drive, or the disk is defective (if loading MS-DOS[â] from disk) or that the NVRAM is not correctly configured for the installed disk drive type. Replace the disk and reboot the computer. If the self test still fails, run the diagnostics as described in Paragraph 5.4.

No boot sector on system disk - press F1 to retry boot

This message indicates the system disk is not formatted. Try powering down the system and re-running the self test. Press **Ctrl-Alt-Esc t**o ensure that the drive type is correctly set in Setup. Also, press **F1** to try loading MS-DOS from the hard disk drive again. If the message persists, the disk must be reformatted and software reloaded from disks (refer to Section 3).

Non-System Disk or Disk error. Replace and press any key when ready.

This message indicates the disk installed in floppy disk Drive A is not a bootable disk. Format an MS-DOS bootable disk and install the disk in Drive A, Reboot the computer. Also try pressing **Ctrl-Alt-Esc** to ensure the disk drive type is correctly set in Setup.

Time-of-day clock stopped

This message indicates that the battery sustaining the system configuration has failed. Reset the configuration.

Note: The following messages are informational messages that do not necessarily indicate a self test failure.

NNN Main Memory, NNN Extended

This message lists the amount of standard memory and optional extended memory that has tested successfully during self test execution. This message is only displayed if Quick Boot is off in System Setup.

Table 5-2 Self Test Error Messages (Continued)

Memory tests terminated by keystroke

This message tells you that you have pressed the Space Bar while the memory tests were running. Pressing the Space Bar during memory testing stops the tests.

Press F1 to continue

This message tells you that an error was found during self test execution. Press **F1** to attempt to reboot the computer.

Save-to-Disk file is too small

This message occurs when you add memory. Use the MS-DOS program PHDISK to increase the size of the save-to-disk file.

Save-to-disk file is missing

Use the MS-DOS program PHDISK to create a new save-to-disk file.

Swap File is missing

Use the MS-DOS program PHDISK to create a new swap file.

5.3.3.2 Self Test Beep Error Messages

In the event of a hardware problem that affects the display, the Notebook also communicates errors via a series of beeps. These codes may be heard over the system's speaker as three bursts of beeps. The interpretation of the beep codes is provided in Table 5-3.

To recover from a self test error, try cycling power to the computer. Also, press **Ctrl-Alt-Esc** to ensure that the Setup configuration is correct. In general, most of the failures are associated with the Upper and Lower Electronics Boards and may require board removal/replacement.

Try running PC-Doctor (Paragraph 5.4) if possible to verify the source of problem.

Table 5-3 Self Test Beep Messages

Beep Code	Port 80h	Description
None	01h	CPU Register Test in Progress
1-1-3	02h	CMOS Write/Read Failure
1-1-4	03h	ROM BIOS Checksum Failure
1-2-1	04h	Programmable Interval Timer Failure
1-2-2	05h	DMA Initialization Failure
1-2-3	06h	DMA Page Register Write/Read Failure
1-3-1	08h	DRAM Refresh Verification Failure
None	09h	1ST 64K RAM Test in Progress
1-3-3	0Ah	1ST 64K RAM Chip or Data line Failure
1-3-4	0Bh	1ST 64K RAM Odd/Even Logic Failure
1-4-1	0Ch	Address Line Failure, 1ST 64K RAM
1-4-2	0Dh	Parity Failure, 1ST 64K RAM
2-1-1	10h	Bit 0, 1ST 64K RAM Failure
2-1-2	11h	Bit 1, 1ST 64K RAM Failure
2-1-3	12h	Bit 2, 1ST 64K RAM Failure
2-1-4	13h	Bit 3, 1ST 64K RAM Failure
2-2-1	14h	Bit 4, 1ST 64K RAM Failure
2-2-2	15h	Bit 5, 1ST 64K RAM Failure
2-2-3	16h	Bit 6, 1ST 64K RAM Failure
2-2-4	17h	Bit 7, 1ST 64K RAM Failure
2-3-1	18h	Bit 8, 1ST 64K RAM Failure
2-3-2	19h	Bit 9, 1ST 64K RAM Failure
2-3-3	1Ah	Bit A, 1ST 64K RAM Failure
2-3-4	1Bh	Bit B, 1ST 64K RAM Failure
2-4-1	1Ch	Bit C, 1ST 64K RAM Failure
2-4-2	1Dh	Bit D, 1ST 64K RAM Failure
2-4-3	1Eh	Bit E, 1ST 64K RAM Failure
2-4-4	1Fh	Bit F, 1ST 64K RAM Failure
3-1-1	20h	Slave DMA Register Failure
3-1-2	21h	Master DMA Register Failure
3-1-3	22h	Master Interrupt Mask Register Failure

Table 5-3 Self Test Beep Codes (continued)

Beep Code	Port 80h	Description
3-1-4	23h	Slave Interrupt Mask Register Failure
None	25h	Interrupt Vector Loading In Progress
3-2-4	27h	Keyboard Controller Test Failure
None	28h	CMOS Power Failure and Checksum in Progress
None	29h	CMOS Configuration Validation in Progress
3-3-4	2Bh	Screen Memory Test Failure
3-4-1	2Ch	Screen Initialization Failure
3-4-2	2Dh	Screen Retrace Test Failure
None	2Eh	Search for Video ROM in progress
1-2	2Eh	Cirrus Video Chip Failure
1-3	2Eh	Cirrus RAM DAC or Video RAM Failure
None	30h	Screen Believed Operable; running with Video ROM
None	31h	Monochrome Monitor Believed Operable
None	32h	Color Monitor (40 Column) Believed Operable
None	33h	Color Monitor (80 Column) Believed Operable
4-2-1	34h	No Time Tick
4-2-2	35h	Shutdown Failure
4-2-3	36h	Gate A20 Failure
4-2-4	37h	Unexpected Interrupt in Protected Mode
4-3-1	38h	Memory High Address Line Failure at 010000h-0A0000h
4-3-3	3Ah	Timer Chip Counter 2 Failed
4-3-4	3Bh	Time of Day Clock Stopped
4-4-1	3Ch	Serial Port Failure
4-4-2	3Dh	Parallel Port Failure
4-4-3	3Eh	Math Coprocessor Failure

5.3.4 PCMCIA Modem Problems

If an optional PCMCIA modem does not work properly, check the following items:

- Dialing problem or wrong number - Try dialing a number that you have previously dialed successfully.
- Faulty phone line - Connect a telephone to the line and listen for a dial tone.
- Software program - Check to ensure that you have installed the software correctly.

5.4 Fault Isolation Using Diagnostics

PC-Doctor, supplied with the Extensa Series Notebooks, is a powerful diagnostics tool that can help you determine the hardware configuration of a local or remote system, benchmark its performance, analyze the performance of all subsystems, and perform a suite of interactive and non-interactive tests on attached devices (such as printers, joystick devices, VGA monitors, SCSI devices, CD-ROM drives). The test results are stored in a log which can be printed out or saved in a disk file.

5.4.1 PC-Doctor (In DOS Mode or DOS Window)

Features of the diagnostic program are accessed through a series of pull-down menus and basic keyboard keys (cursor keys to move highlighted pointer, **Enter** key to select a highlighted feature, **Esc** key to cancel a function and move back one level.

PC-Doctor is typically user friendly but if you don't understand a feature, context-sensitive "help" information is available at any time by pressing the **F1** function key; pressing the **F1** function key twice accesses the online Technical Reference Manual for PC-Doctor.

A powerful set of utilities within PC-Doctor (that can be run locally or remotely) simplify the task of determining system configuration data, allocating and using system memory, IRQ and DMA use, what device drivers are installed, what COM and LPT ports are assigned and what ports are available, identifying partitioning data for fixed disk drive(s), determining the VGA setup information, reading the software interrupts/ interrupt vectors, etc.

Functionally, PC-Doctor includes the following:

- Group of non-Interactive diagnostic tests that perform a non-destructive test of the major hardware functions in the notebook (Processor, Memory, System board, video section, serial and parallel ports (when loopback adapters are installed), hard disk drive and floppy disk drive).
- Group of Interactive tests (require operator input) for testing the keyboard, video sections, sound subsystem, mouse, joystick, disk drive, printer subsystem and the SCSI/CD-ROM Drive subsystems supported by the docking station options.

- Utility that provides detailed system information such as configuration data, allocation and use of system memory, IRQ and DMA use, what device drivers are installed, what COM and LPT ports are assigned and what ports are available, partitioning data for fixed disk drive(s), VGA setup information, software interrupts and interrupt vectors, and installed SCSI options.
- Group of special purpose utilities to run other tests from PC-Doctor, perform a virus scan of the system, edit configuration files, surface scan hard drives, measure system performance, open a DOS prompt, provides terminal access to devices connected to serial ports, supports memory debug operations, enables remote operations, permits deep discharge of notebook batteries and provides an extensive test reporting function.

5.4.2 Supporting Online Documentation

The PC-Doctor Diagnostic contains the following online information sources:

- ***Online Technical Manual*** - selected at any time by pressing **F1** key twice or by clicking on the Question Mark in the upper left hand corner of any PC-Doctor Menu
- **On-line Help system** - provides context sensitive information from every PC-Doctor screen- accessed by pressing **F1** key once (pressing **F1** twice gets you into the online manual)

5.4.3 User Interface to PC-Doctor

PC-Doctor is structured as a text-mode, windowed user interface with pull-down menus. Program operation requires the use of the following keys:

- **Cursor Keys** - Moves the highlighted pointer
- **Enter** Key - Selects the highlighted option
- **Esc** Key - Cancels current function and goes back one step
- **F1** Key - Activates the context-sensitive help feature (pressing **F1** twice in a row calls up the online Technical Reference Manual for PC-Doctor)

Scrolling windows, which show the results of various operations, use the following keys:

- **Page Up/Page Down** - Moves the screen one page at a time
- **F2** - Prints the log to PRN
- **F3** - Saves the log to a file

You can also use the mouse or Point to interact with PC-Doctor. The leftmost **Select** key is used to choose objects (menu entries and action codes typically enclosed in brackets). The rightmost **Select** key is equivalent to the **Esc** key which takes you back to your previous step.

5.4.4 Quitting PC-Doctor

To exit PC-Doctor, select the **Quit** pull down menu and then select the **Quit** option.

Note: For additional information, access the *Online Reference Manual* for PC-Doctor.

6
Field Service

6.1 Introduction

This section contains general preventive and corrective maintenance procedures that apply to all members of the Extensa 60x and 65x Series Notebook Computers. The first part of the section describes the computer cleaning procedures and preferred handling procedures for sensitive components (e.g. disk drives, batteries).

The second part of the section identifies all field-replaceable parts; the remainder of the section contains removal and replacement procedures for the field-replaceable parts.

6.2 Preventive Maintenance

Preventive maintenance is limited to cleaning the plastic case, keyboard and the display screen.

6.2.1 Cleaning the Computer

When it is necessary to clean the plastic case and keyboard use a soft, lint-free cloth, slightly dampened with a mild detergent solution or use the contents of any commercially available computer cleaning kit.

Caution: Never spray any liquids directly on the computer case, keyboard, or screen. If the liquid-crystal display (LCD) screen has become smeared or dusty, clean the screen first with a soft, clean, lint-free cloth and gently wipe the glass. If the glass is still smeared, use distilled water or a 25% solution of alcohol and distilled water.

Caution: Do not use paper towels to clean the display screen. Paper can scratch the display screen matte.

6.2.2 Handling the Computer

The notebook computer requires reasonable care and handling for extended life. Some of the precautions to follow to protect your computer against accidental damage include:

- Never pick up or carry the unit by the cover
- Do not force the cover beyond its fully opened position (about 180 degrees)
- Never subject the computer to harsh environments (dusty areas or areas of rapidly changing temperatures)
- Never place anything on top of the computer, particularly when it is operating or charging (could result in overheating and damage to the computer).
- Never move the computer while the hard drive is rotating (press the **Suspend** button to put the computer in a **Sleep** mode before closing cover).
- Never expose the computer hard disk drive(s) or disks to strong magnetic fields such as those generated by transformers, speakers, or telephone handsets.

6.2.3 Handling the Computer Battery Pack

The battery pack furnished with the computer requires reasonable care and handling to ensure efficient operation and maximum life. Periodically inspect the battery terminals and the batteries for evidence of corrosion and oxide build-up; clean if necessary.

To ensure that the battery packs endure normal life cycle, always observe the following precautions when handling the battery packs:

- Do not drop the battery pack or subject it to excessive shock and vibration.
- Do not expose the battery pack to direct sunlight, moisture, or chemical compounds.
- Do not disassemble the battery pack.
- Do not use the battery pack to power other devices.
- Do not short the battery leads or connect the battery with reversed polarity.
- Never attempt to charge the battery pack in any way other than as described in this manual.
- Always charge the battery pack as soon as possible after a low battery indication.

6.2.4 Password Caution

The notebook computer can be password protected to prevent unauthorized use. However, if the password is lost, the notebook must be returned to the Texas Instruments manufacturing facility in Temple, Texas U.S.A. to restore access. This service is not covered by warranty.

6.3 Required Tools and Equipment

All Extensa 60x and 65x Series Notebook corrective maintenance procedures can be performed using the following tools:

- Tweezers
- Plastic Stick
- Small flat-blade screwdriver
- Small Phillips screwdriver

Caution: All boards, options and peripherals contain components that are sensitive to static electricity. When handling any of these items, protect against static electricity by using wrist grounding straps and grounded working mats. When moving or storing items, use the anti-static bags supplied with the items.

6.4 Notebook FRUs

For a listing and description of the notebook Field Replacement Units (FRUs), refer to the appendices in this manual for the appropriate models (e.g. Appendix A contains maintenance data from the 60x Series; Appendix B contains maintenance data for the 65x Series.)

6.5 FRU Removal/Replacement Procedures

The following paragraphs contain field service-level removal/replacement procedures for the 60x/65x Series Notebook Computers.

Most FRU removal/replacement procedures involve connecting and disconnecting

cable connectors. The Extensa series uses two types of connectors including:

- Locking-type connectors - use a plastic stick to unlock and lock these type of connectors as shown in Figure 6-1.
- Non-locking connectors

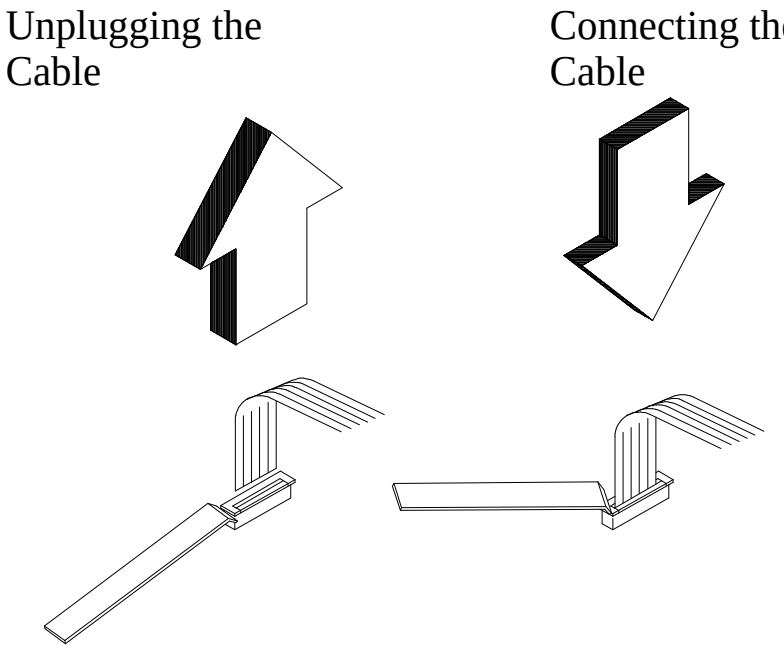


Figure 6-1 Removing/Installing Cables with Locking-Type Connectors

6.5.1 Removing/Replacing the Notebook Battery Pack

Before performing any of the assembly/disassembly procedures, **always** disconnect the AC adapter from the notebook and remove the battery pack. The procedure for removing and replacing the battery pack is as follows:

1. Turn off the computer and disconnect the AC adapter from the computer.
2. Unlatch the battery compartment door (right front corner of the unit) as shown in Figure 6-2.
3. Slide the battery compartment door out slightly and then swing the door outwards as shown in Figure 6-2.
4. Grasp the loop attached to the battery and pull the battery out of the

compartment.

5. Insert the replacement battery with "THIS SIDE UP" label facing upwards until it snaps in place and then close the battery compartment door (reverse of Steps 2 and 3.

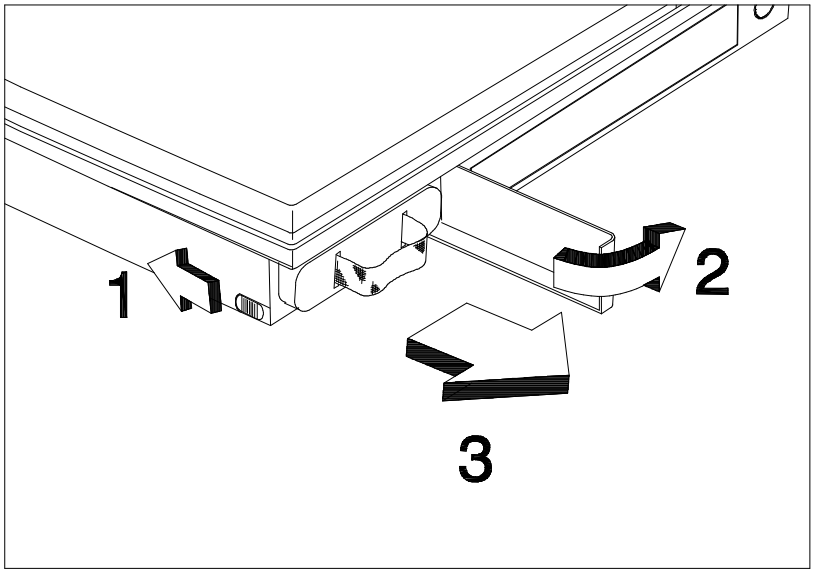


Figure 6-2. Battery Removal/Replacement

6.5.2 Removing/Replacing PCMCIA Options

The procedure for removing and replacing the PCMCIA options is as follows:

1. Turn off the computer and remove the battery pack as described in Paragraph 6.5.1.
2. Press the upper card eject button to eject the upper card, lower button controls the lower card and use both buttons for Type III devices.
3. To replace the PCMCIA device, remove any filler cards present and insert the device. Reinstall any external cabling required for the device.

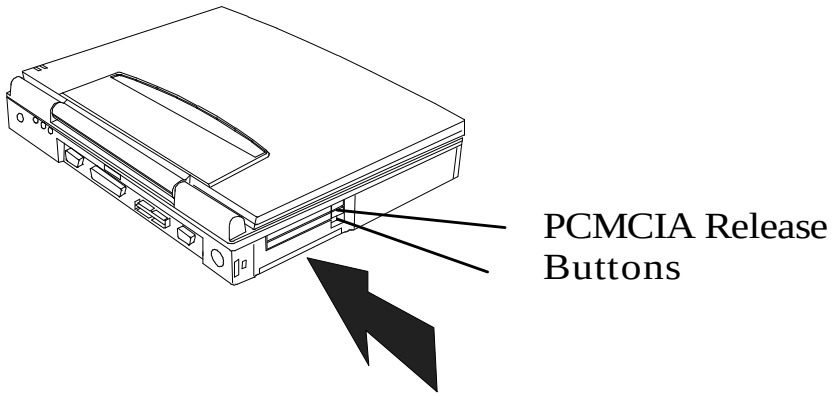


Figure 6-3 Installing/Removing PCMCIA Options

6.5.3 Removing/Replacing the Hard Disk Drive Assembly

The procedure for removing and replacing the Hard Disk Drive assembly is as follows:

1. Power down the notebook, disconnect the AC adapter, if installed, and remove the battery pack as described in Paragraph 6.5.1.
2. Disconnect any peripheral device interface cables from the external interface connectors and remove any installed PCMCIA options.
3. Turn the computer over and locate the release tab for the hard disk drive bay cover (refer to Figure 6-4).
4. While pressing slightly on the release tab (Figure 6-4), slide the cover to the right and set aside.

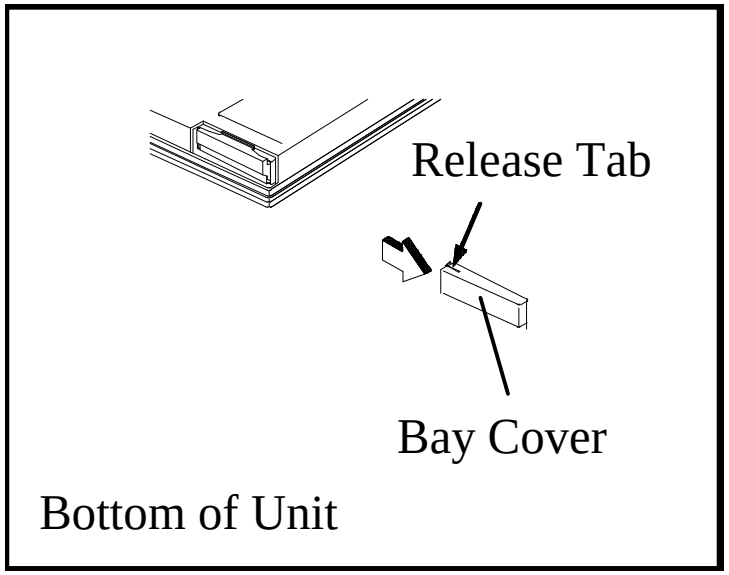


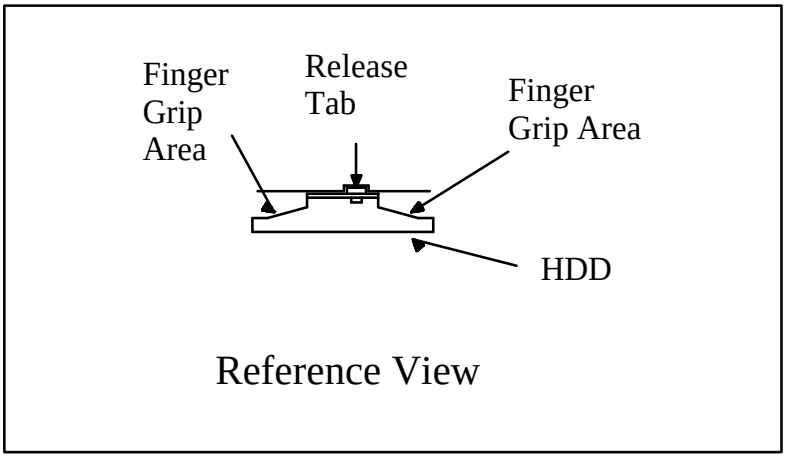
Figure 6-4 Removing the HDD Bay Cover

5. While lifting upward on the HDD release tab (using your fingernails), use both finger grip areas (Figure 6-5) and pull the HDD module out of the notebook.

CAUTION: Exercise care to only handle the drive by its sides to prevent damage to the drive.

6. Store the HDD in an antistatic bag.

7. Replacement is the reverse of Steps 1 through 5.



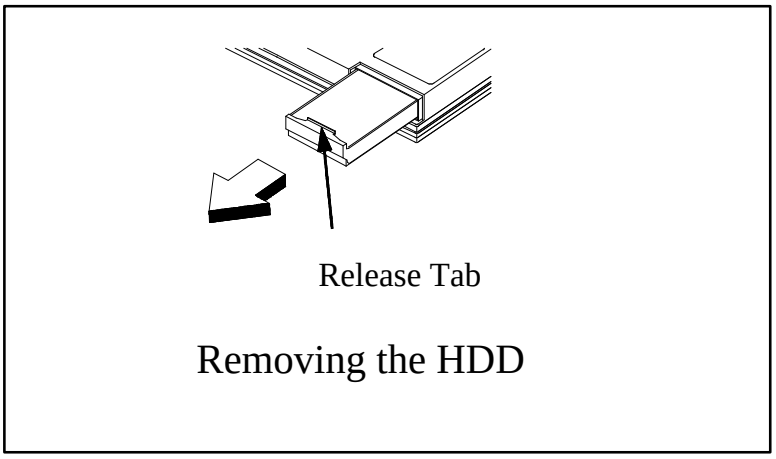


Figure 6-5 Removing/Replacing the Hard Disk Drive Module

6.5.4 Removing/Replacing the Keyboard Assembly

The procedure for removing and replacing the keyboard assembly is as follows:

1. Turn off the computer; disconnect the AC power adapter (if it is attached), and remove the battery pack as described in Paragraph 6.5.1.
2. Press the Cover Release Latch and open the notebook to a full 180 degree position as shown in Figure 6-6.
3. Slide each of the two display hinge covers out and pull upward to remove from the notebook.

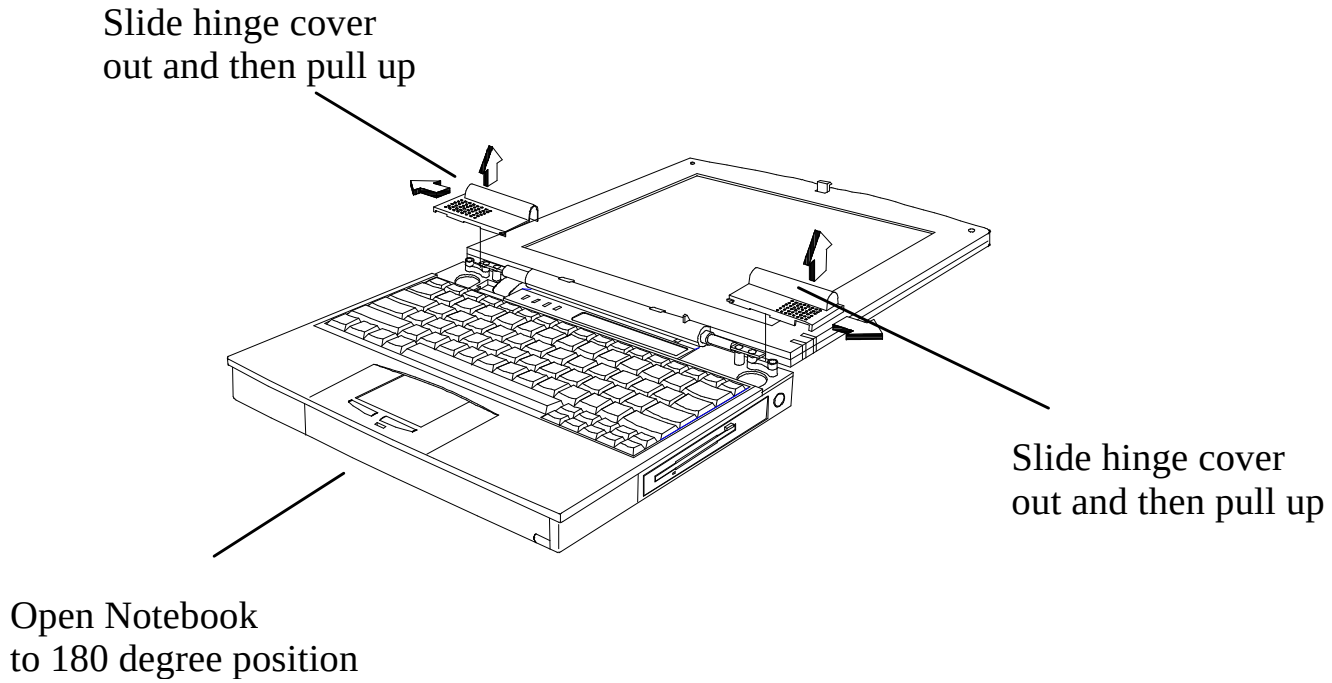


Figure 6-6 Removing the Display Hinge Covers

4. Pull up on the keyboard as shown in Figure 6-7 and disconnect the Touchpad cable connector J0104.

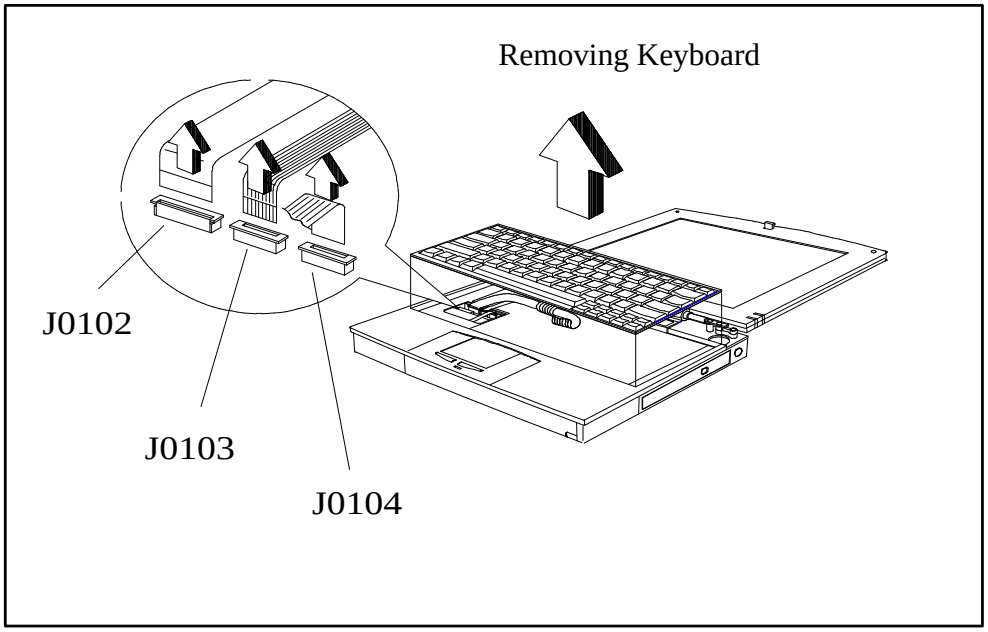


Figure 6-7 Removing/Replacing the Keyboard Assembly

5. Unplug the keyboard connectors J0102 and J0103 from the Keyboard Transfer Board and remove the keyboard and keyboard transfer board from the notebook.
6. Install the replacement keyboard assembly by reversing Steps 1 through 5.

6.5.5 Removing/Replacing Expansion Memory

To remove and replace an expansion memory module (soDIMM), perform the following procedure:

1. Power down the notebook, disconnect the AC adapter, and any installed battery packs.
2. Disconnect any peripheral device interface cables from the external interface connectors and remove any installed PCMCIA options.
3. Turn the notebook over and locate the Expansion Memory Access Cover on the bottom of the notebook.
4. Remove the screw holding the Expansion Memory Access Cover and remove the cover.
5. To remove a memory module, first release the slot locks located on each side of the Expansion Memory Connector to release the DIMM. Then pull the

memory module out (refer to Figure 6-8).

6. To replace or install a DIMM module, first align the connector edge of the memory module with the key in the connector. Insert the edge of the memory module board into the connector using a rocking motion to fully insert the module. Push downward on each side of the memory module until it snaps in place.

7. Reinstall the Expansion Memory Access Cover using the screw removed in Step 4.

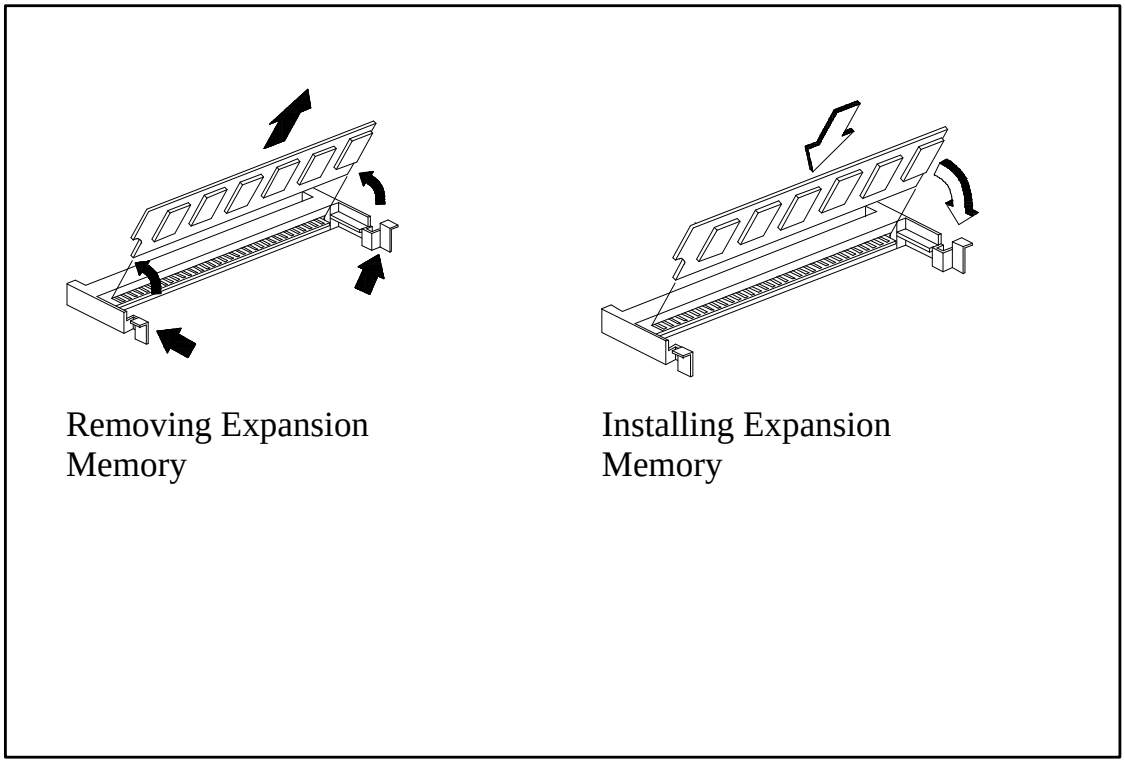


Figure 6-8 Memory Expansion Removal/Replacement

NOTE: After installing expansion memory in your notebook, you must run the PHDISK utility in order for the Save-To-Disk or 0V Suspend functions to operate correctly (refer to the procedure in Section 2 of this manual).

6.5.6 Removing the Heat Sink Assembly

Use the following procedure to remove and replace the Heat Sink Assembly:

1. Remove the Keyboard Assembly as described in Paragraph 6.5.4.
2. Remove the two screws that secure the heat plate to the housing as shown in Figure 6-9.
3. Replacement is the reverse of Steps 1 and 2.

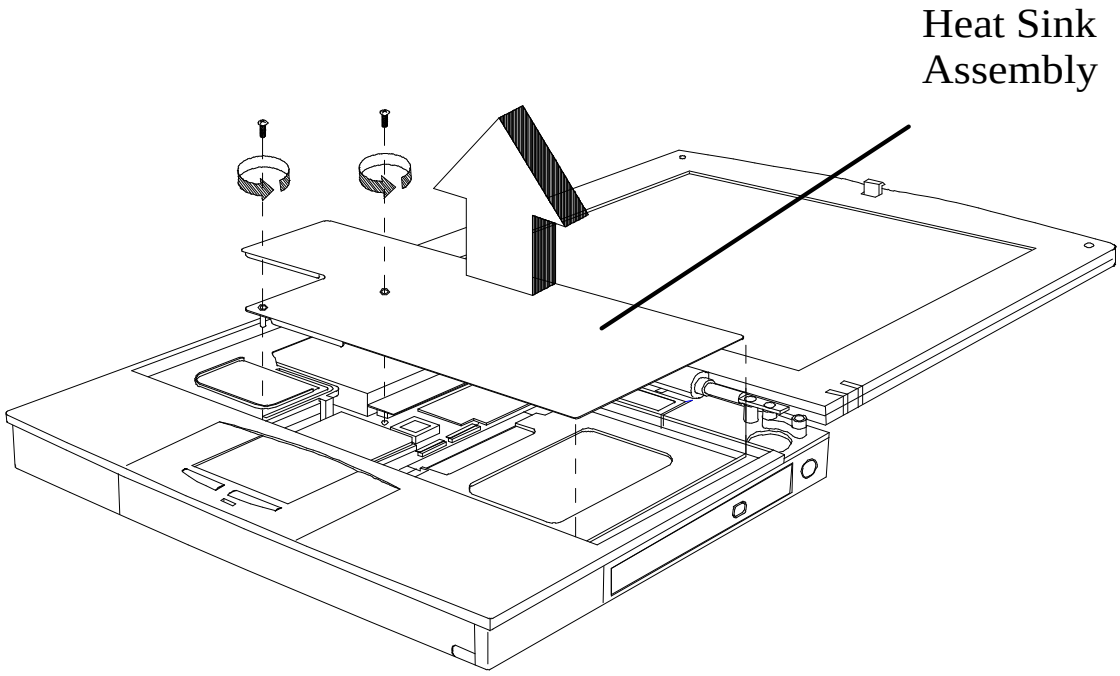


Figure 6-9 Removing/Replacing the Heat Sink Assembly

6.5.7 Removing/Replacing the CPU Chip

The CPU chip is installed in a Zero Insertion Force type socket to facilitate removal and replacement. To remove the CPU, refer to Figure 6-10 and use the following procedure:

1. Power down the notebook, remove the battery packs, and disconnect the AC Adapter, and remove the Heat Sink Assembly as described in Paragraph 6.5.7.
2. Refer to Figure 6-10. Insert a flat-blade screwdriver into the opening at the left end of the socket labeled OPEN and push toward the other end of the socket.
3. Pull out the CPU and insert the replacement unit. Ensure that the CPU is properly keyed before pressing it into the socket.
4. Insert a flat-bladed screwdriver into the opening at the right end of the socket labeled LOCK and push toward the opposite end to lock the socket.

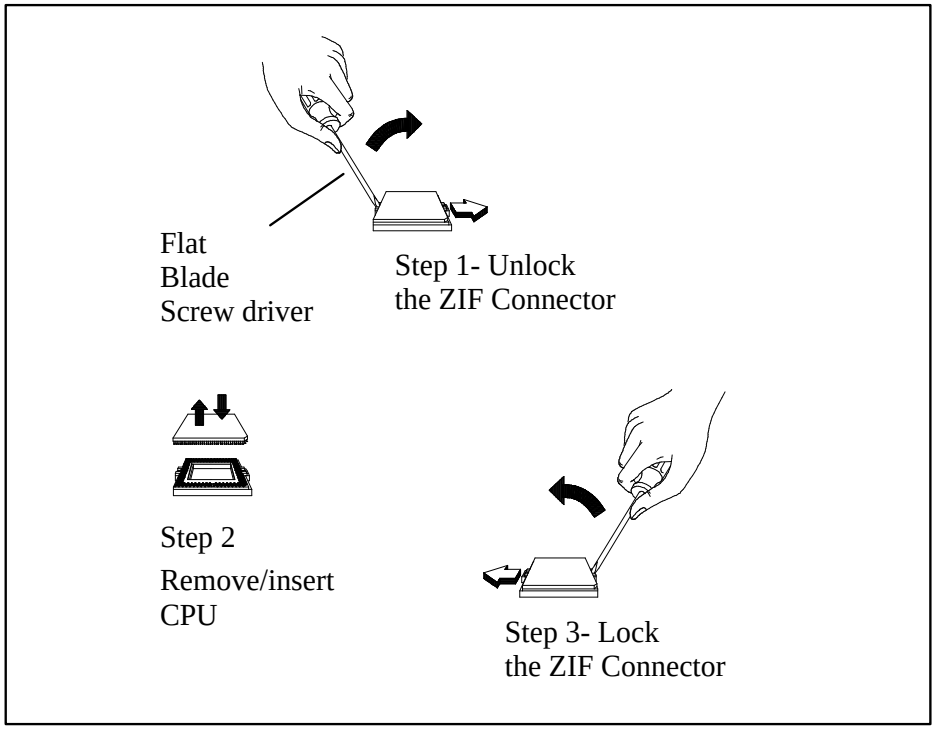


Figure 6-10 Removing/Replacing the CPU Chip

6.5.8 FDD/CD-ROM Drive Removal

6.5.8.1 60x Series Drive

Use the following procedure to remove/replace the internal drive (either Floppy Disk Drive or CD-ROM Drive) from a 60x Series Notebook:

1. Remove the battery and AC adapter as described in Paragraph 6.5.1.
2. Remove the keyboard assembly as described in Paragraph 6.5.5.
3. Remove the Heat Sink Assembly as described in Paragraph 6.5.10.
4. Refer to Figure 6-14 and unplug the two internal drive cables, J18 and J20.
5. Remove the FDD/CD-ROM Module Latches as shown in Figure 6-11 and pull out the internal drive (store in an anti-static bag for ESD protection).
6. Reassembly is the reverse of Steps 1 through 5.

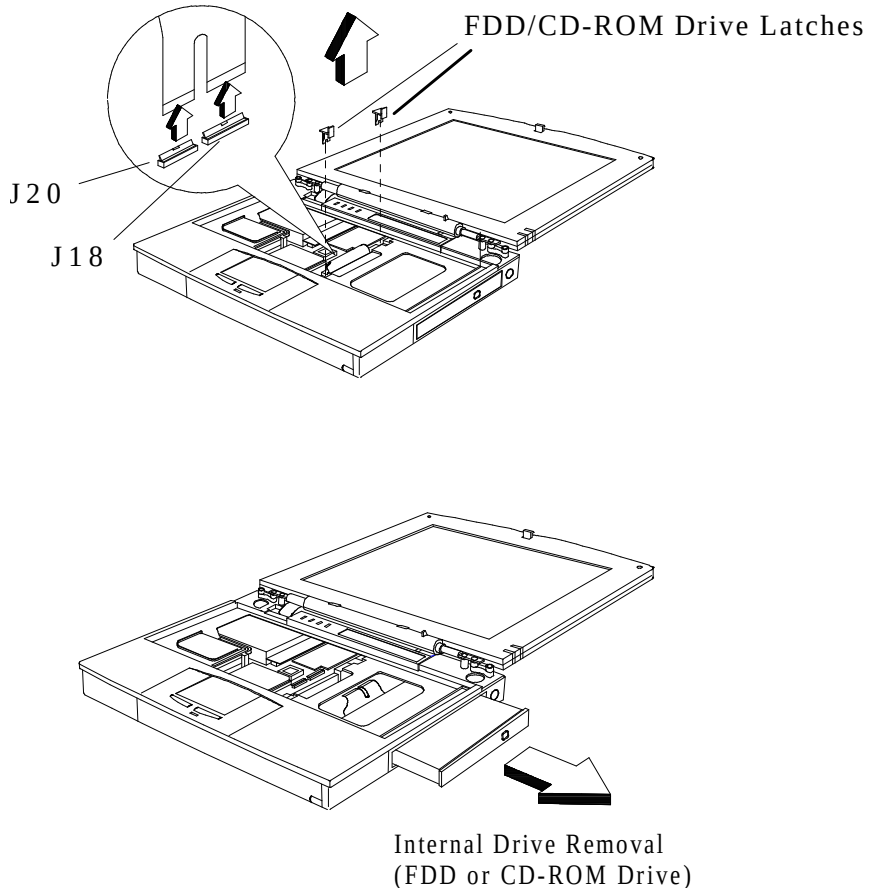


Figure 6-11 Removing/Replacing Internal Drive (FDD or CD-ROM) (60x Series)

6.5.8.2 Removing/Replacing 65x Series Module

1. Remove the battery and AC adapter as described in Paragraph 6.5.1.
2. Unlatch the module by pushing the Module Lock (Figure 6-12) toward the unlock icon.
3. Grasp the recessed grip area on the module and pull the module straight out.
4. Reinstall the module by reversing Step 3.

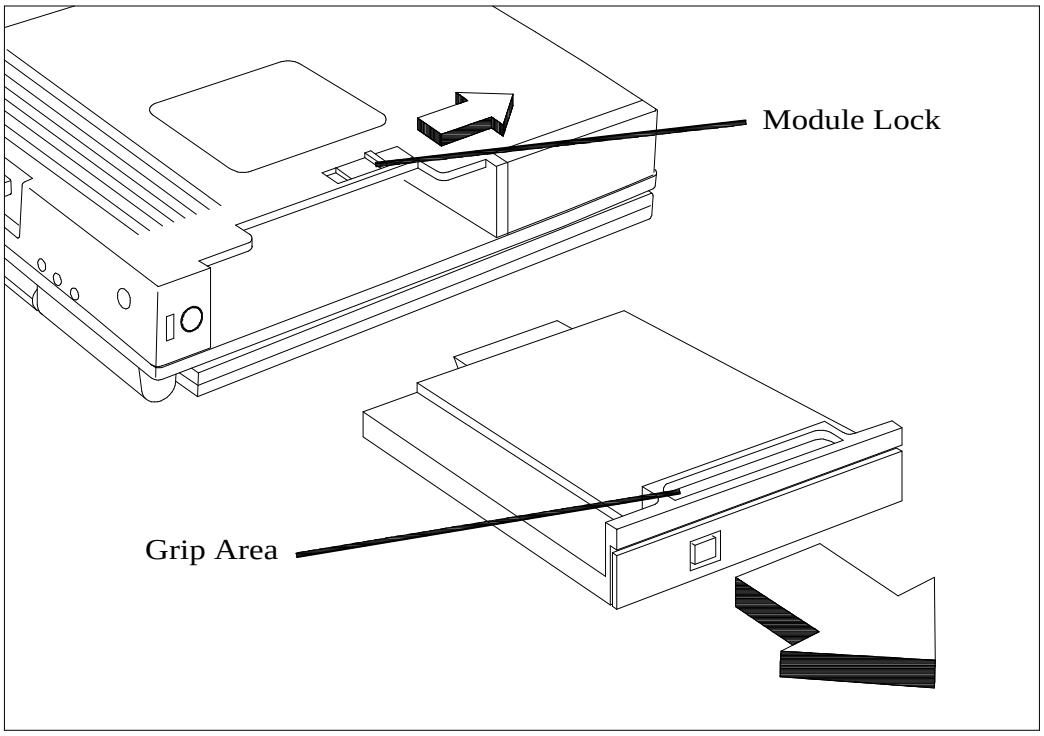


Figure 6-12 Removing/Replacing a 65x Series Module

6.5.9 Removing/Replacing the Display Assembly

Use the following procedure to remove/replace the display assembly:

1. Remove the battery and AC adapter as described in Paragraph 6.5.1.
2. Refer to Figure 6-13 and remove the two screws that secure the display cable to the Motherboard assembly. Then unplug display cable J19

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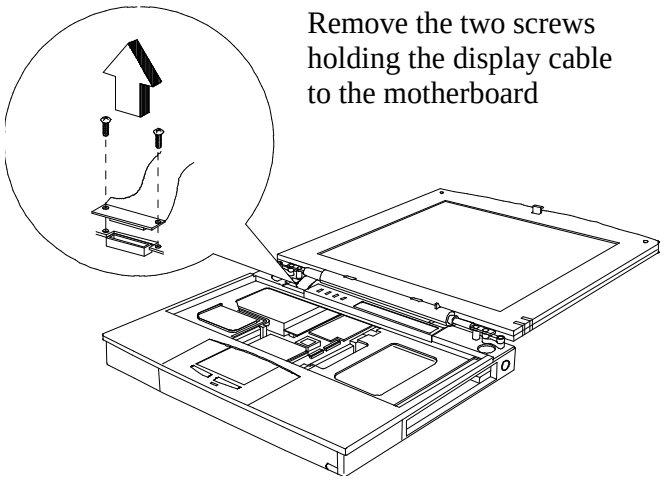


Figure 6-13 Unplugging the Display Cable

3. Remove the four display hinge screws (Figure 6-14) and separate the Display Assembly from the Base Assembly.

4. Installation is the reverse of Steps 1 through 3.

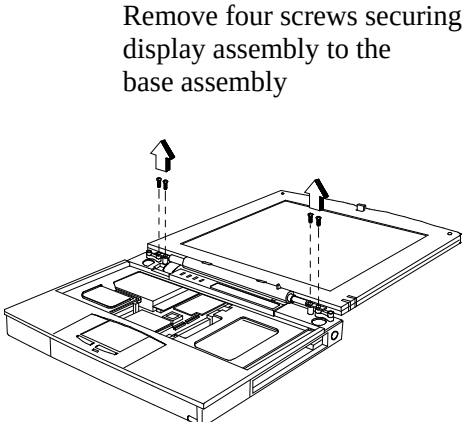


Figure 6-14 Removing the Display Hinge Screws

6.5.10 Removing/Replacing the Top Cover

Use the following procedure to detach the top cover from the Base Assembly:

1. Separate the Display Assembly from the Base Assembly as described in Paragraph 6.5.9.

2. Remove the two screws that secure the heat sink to the base assembly.

3. Remove the two screws on the top and ten screws on the bottom that hold the top cover in place; unsnap and remove the top cover (refer to Figure 6-15).

4. Replacement of the top cover is the reverse of Steps 1 through 3.

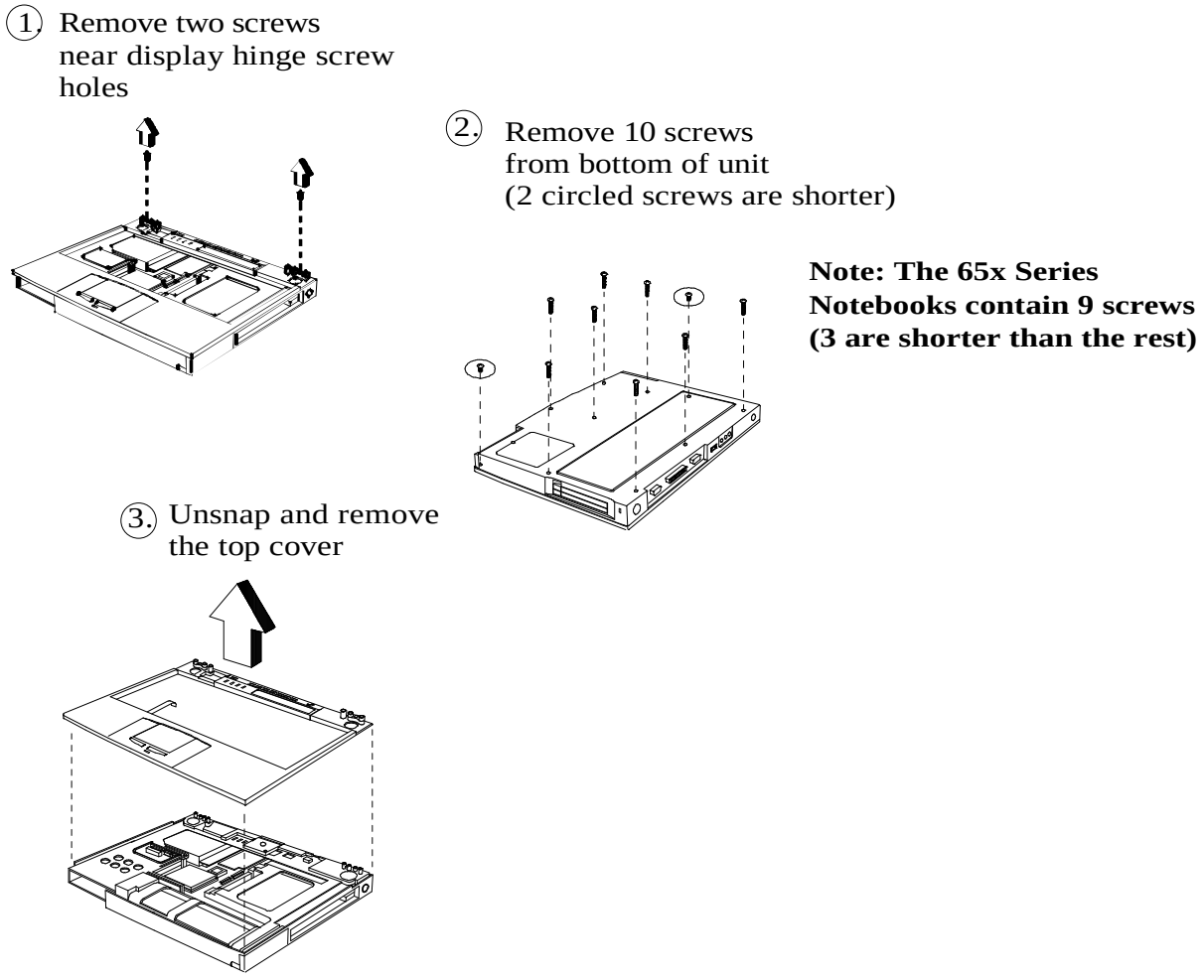


Figure 6-15 Removing/Replacing the Top Cover

6.5.11 Removing/Replacing the Fan Assembly

6.5.11.1 (60x Series)

To remove and replace the fan assembly, perform the following procedure:

1. Remove the Top Cover Assembly as described in Paragraph 6.5.10.

2. Remove the single screw holding the fan assembly in place and unplug the fan cable as shown in Figure 6-16.

3. Remove the Fan Assembly.

4. Replacement is the reverse of Steps 1 through 3.

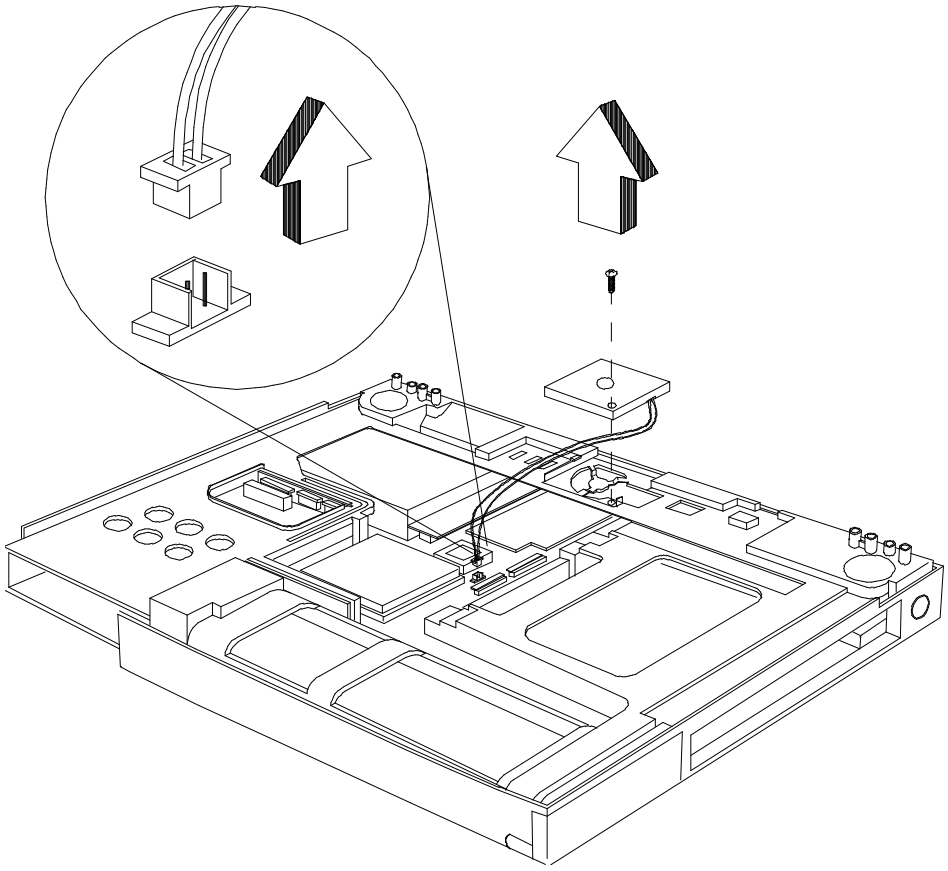


Figure 6-16 Removing/Replacing the Fan Assembly (60x Series)

6.5.11.2 Removing Fan Assembly (65x Series)

To remove and replace the fan assembly on the 65x Series notebook, perform the following procedure:

1. Remove the Top Cover Assembly as described in Paragraph 6.5.10.

2. Remove the two screws that secure the cover plate to the FIR/Audio Board.

3. Remove the two screws holding the fan assembly in place and unplug the fan cable connector from the FIR/Audio Board.

4. Remove the Fan Assembly.

5. Replacement is the reverse of Steps 1 through 4.

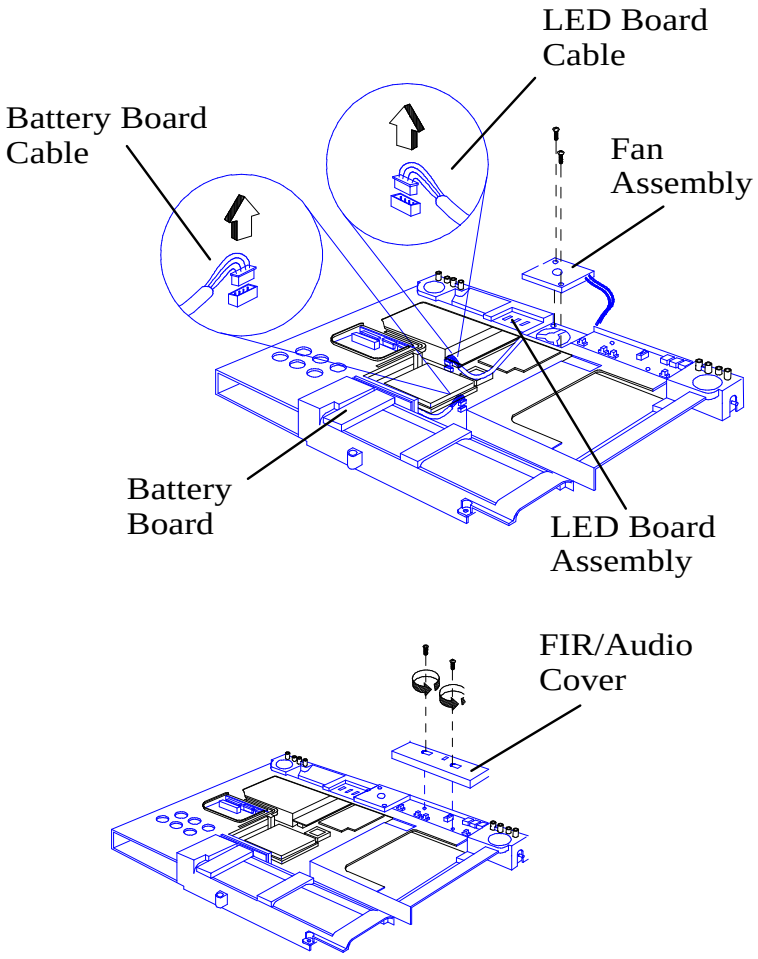


Figure 6-17 Internal PWB Assemblies, Removal/Replacement (65x Series)

6.5.12 Removing/Replacing the LED Board (65x Series)

1. Remove the Top Cover Assembly as described in Paragraph 6.5.10.
2. Disconnect the LED cable from the Main Board (refer to Figure 6-17).
3. Remove the screw holding the LED Board and remove the LED Board Assembly.
4. Replacement is the reverse of Steps 1 through 3.

6.5.13 Removing/Replacing the Battery Board (65x Series)

1. Remove the Top Cover Assembly as described in Paragraph 6.5.10.
2. Disconnect the Battery Board Cable from the Main Board (refer to Figure 6-17).
3. Remove the two screws holding the Battery Board and remove the Battery Board Assembly.
4. Replacement is the reverse of Steps 1 through 3.

6.5.14 Removing/Replacing Inside Frame Assy. (60x Series)

Use the following procedure to separate the inside frame assembly from the base assembly:

1. Remove the Top Cover and Fan Assemblies as described in Paragraphs 6.5.10 and 6.5.11 respectively.
2. Separate the inside frame assembly from the base assembly as shown in Figure 6-18.
3. Replacement is the reverse of Steps 1 and 2.

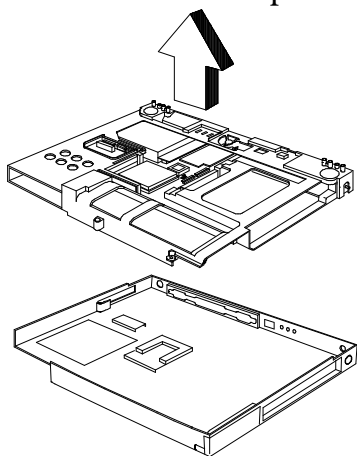


Figure 6-18 Detaching Base Assembly from Inside Frame Assembly

6.5.15 Removing/Replacing Inside Frame Assy (65x Series)

Use the following procedure to separate the inside frame assembly from the base assembly on a 65x Series Notebook Computer:

1. Remove the Top Cover and Fan Assemblies as described in Paragraphs 6.5.10 and 6.5.11 respectively.

2. Separate the inside frame assembly from the base assembly as shown in Figure 6-19.

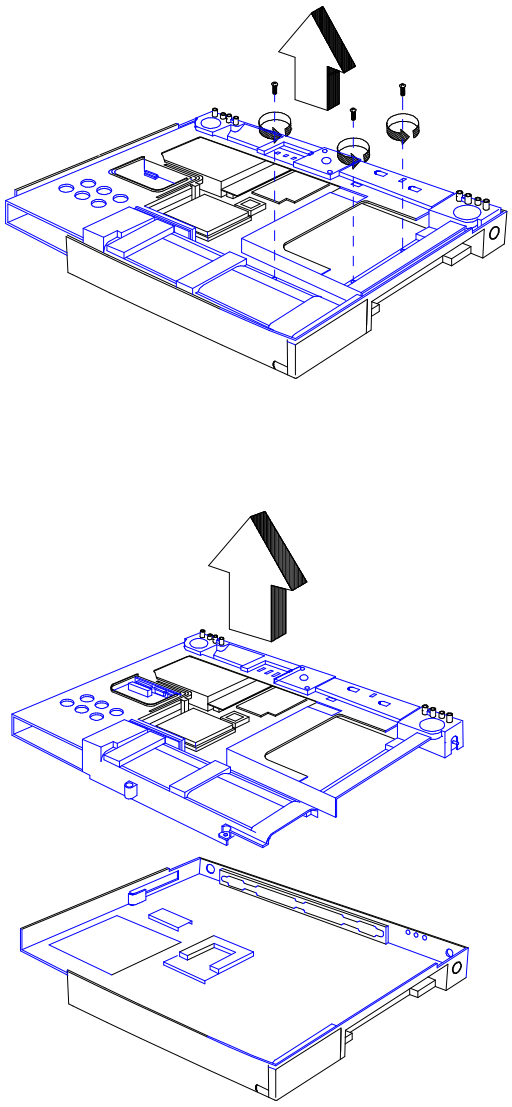


Figure 6-19 Removing/Replacing the Inside Frame Assembly (65x Series)

6.5.16 Removing/Replacing the Power Supply Board

Use the following procedure to remove/replace the Motherboard Assembly:

1. Remove the Top Cover and Fan Assemblies as described in Paragraphs 6.5.10 and 6.5.11 respectively.
2. Separate the inside frame assembly from the base assembly as shown in Figure 6-19.
3. Turn the unit over and remove the screw holding the Power Supply Board to the inside of the Frame Assembly (Figure 6-20). Remove the Power Supply Board.
4. To reinstall the Power Supply Board, reverse the removal procedure.

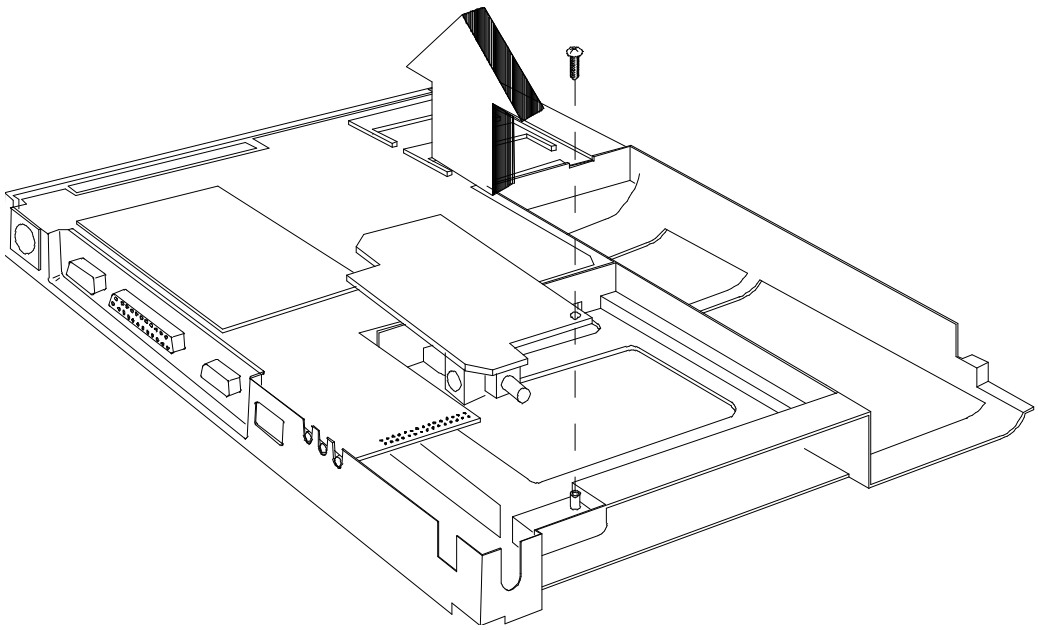


Figure 6-20 Removing/Replacing the Power Supply Board Assembly

6.5.17 Removing/Replacing the Motherboard Assembly

6.5.17.1 60x Series Motherboard Assembly

Use the following procedure to remove/replace the Motherboard Assembly in a 60x Series Notebook:

1. Remove the Top Cover and Fan Assemblies as described in Paragraphs 6.5.10

and 6.5.11 respectively.

2. Separate the inside frame assembly from the base assembly.

3. Refer to Figure 6-21 and remove the following connectors:

—Battery Connector Board Cable J21

—Speaker Cables J12 and J13

—Cover Closed Switch Cable J14

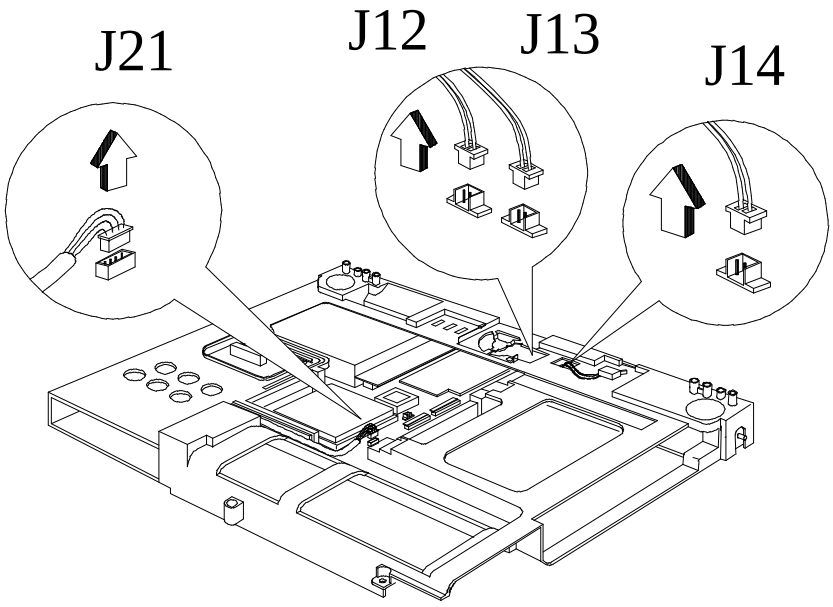


Figure 6-21 Unplugging Cables on 60x Series Motherboard

4. Refer to Paragraph 6.5.13 and remove the Power Supply Board Assembly.

5. Remove the four screws that secure the motherboard to the inside assembly frame. Pull up on the Motherboard Assembly to release it from the inside assembly frame (refer to Figure 6-22).

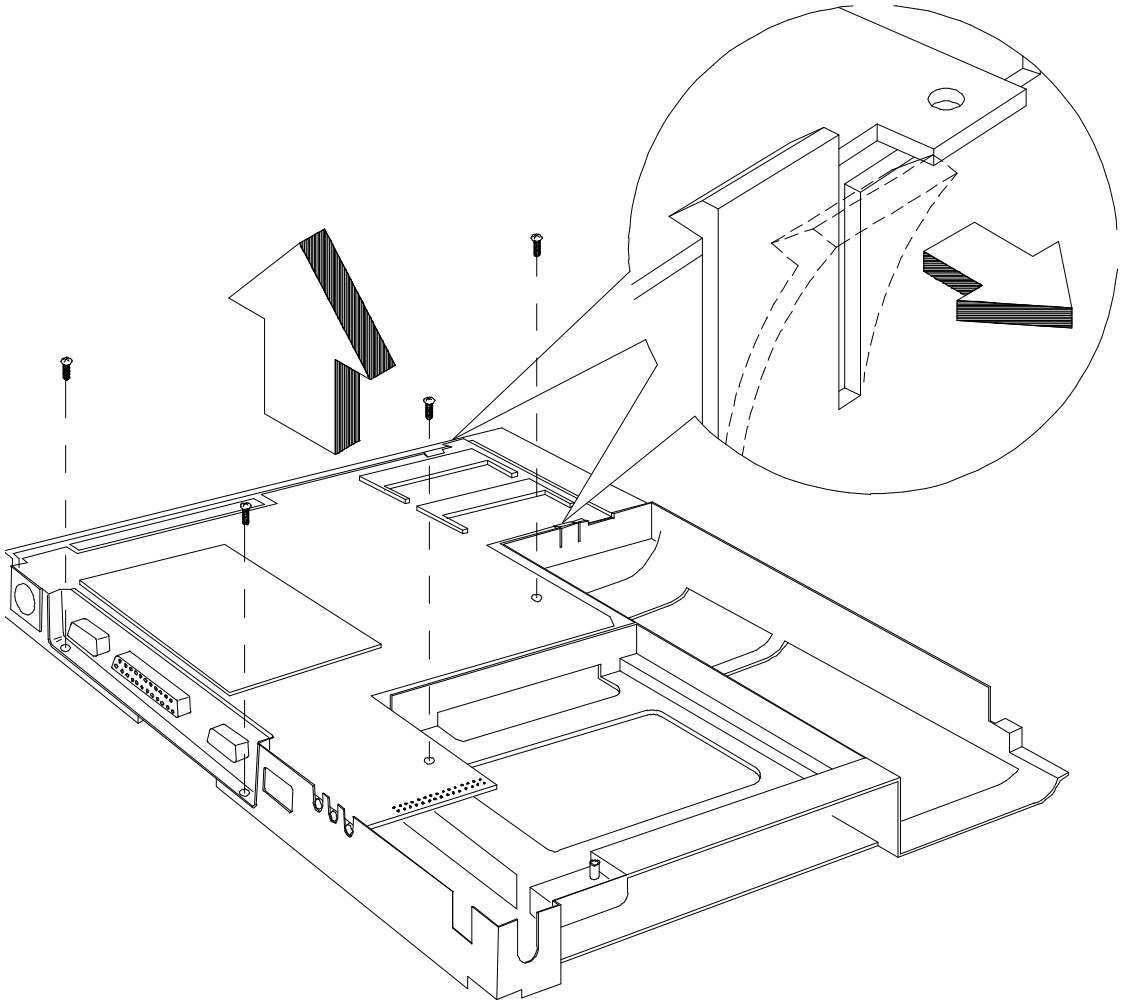


Figure 6-22 Detaching Motherboard from Inside Frame Assembly

6.5.17.2 Removing/Replacing Motherboard on 65x Series

Use the following procedure to remove/replace the Motherboard Assembly in a 65x Series Notebook:

1. Remove the Top Cover and Fan Assemblies as described in Paragraphs 6.5.10 and 6.5.11 respectively.
2. Remove the FIR/Audio Board as described in Paragraph 6.6.15.

4. Refer to Paragraph 6.5.13 and remove the Power Supply Board Assembly.

5. Remove the five screws that secure the motherboard to the inside assembly frame. Pull up on the Motherboard Assembly to release it from the inside assembly frame (refer to Figure 6-23).

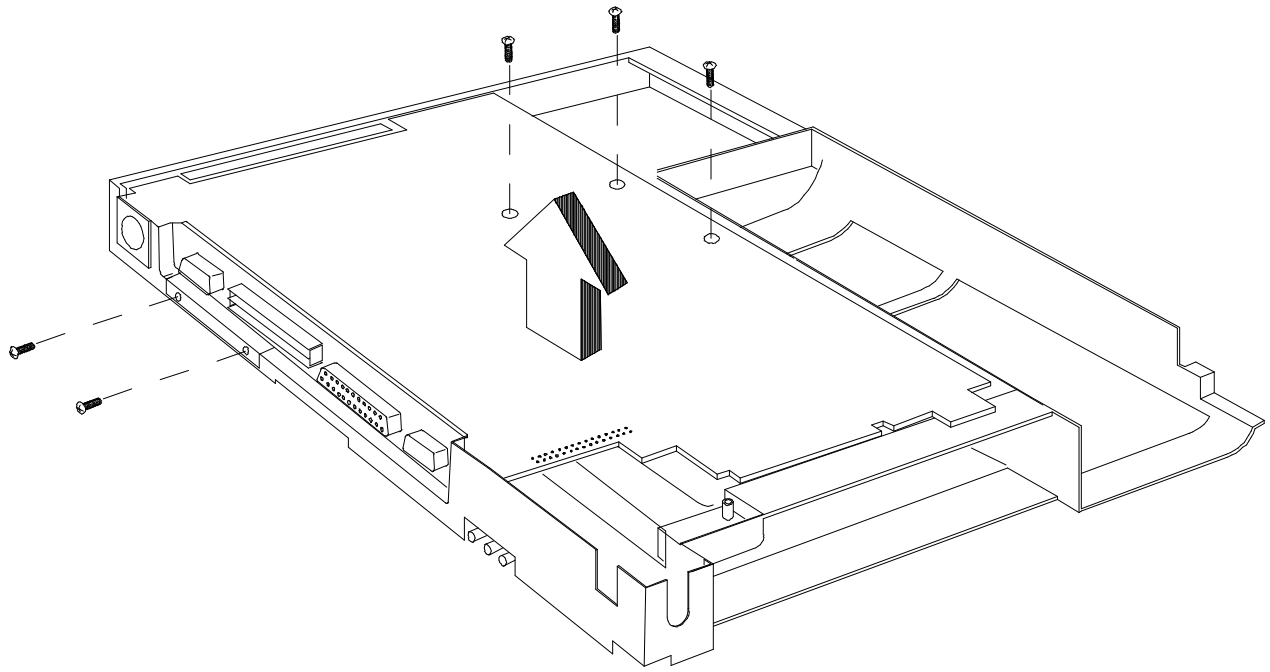


Figure 6-23 Detaching Motherboard from Inside Frame Assembly

6.5.18 Removing/Replacing FIR/Audio Board (65x Series)

Use the following procedure to remove/replace the FIR/Audio Board Assembly:

1. Separate the Inside Frame Assembly from the Base Assembly as described in Paragraph 6.5.10.

2. Separate the inside frame assembly from the base assembly.

3. Refer to Figure 6-24 and remove the following connectors:

—Left Speaker Cable J4

—Internal Microphone Cable J5

—Right Speaker Cable J7

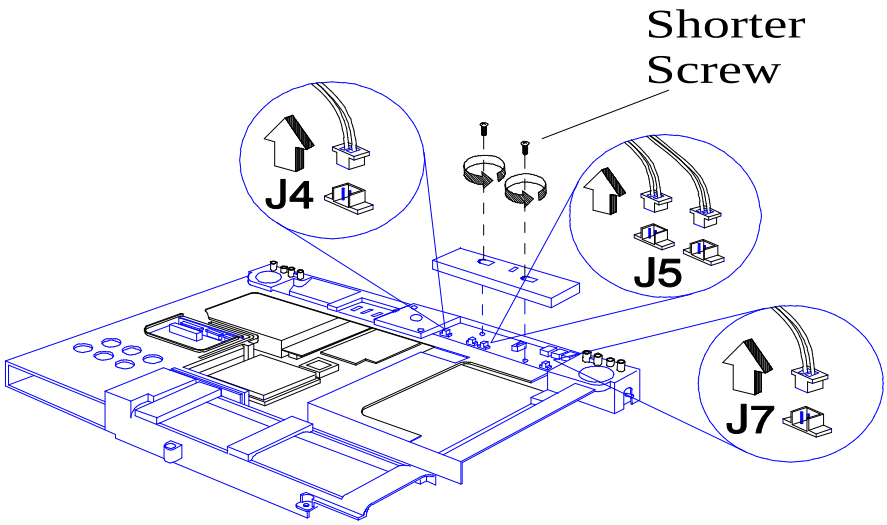


Figure 6-24 Unplugging Cables on Motherboard (65x Series)

4. Remove the two screws that secure the FIR/Audio Board to the Motherboard and remove the cover plate (refer to Figure 6-24).

5. Pull up and remove the FIR/Audio Board (Figure 6-25).

6. Replacement is the reverse of Steps 1 through 5.

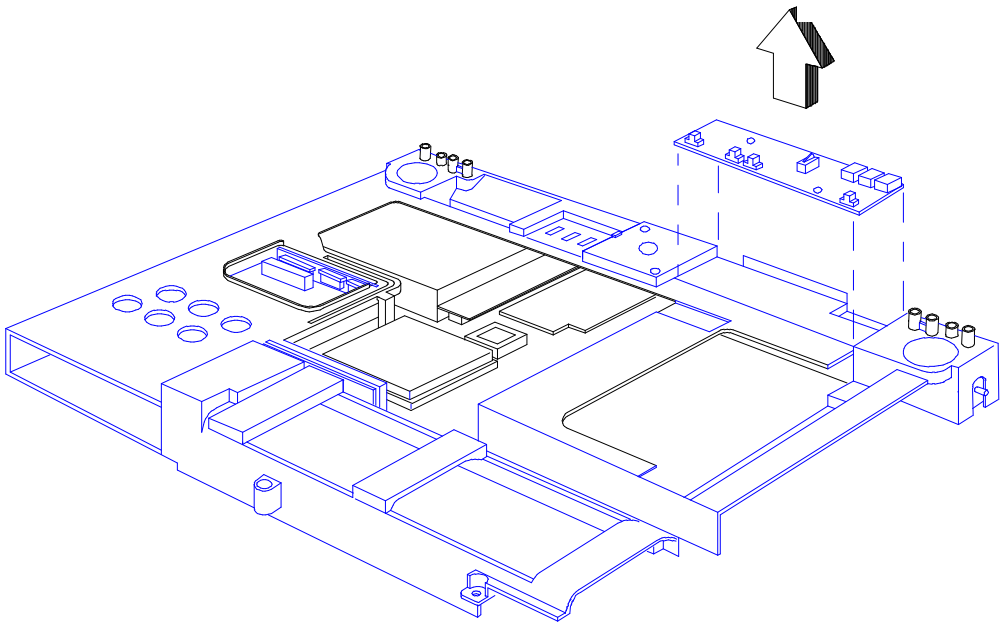


Figure 6-24 Removing/Replacing the FIR/Audio Board

6.5.19 Removing/Replacing the VGA Video Board (60X Only)

Use the following procedure to remove/replace the Motherboard Assembly:

1. Remove the Motherboard Assembly as described in Paragraph 6.5.17.

2. Remove the two screws securing the Video Board to the Motherboard and remove the Video Board (refer to Figure 6-26).

3. Replacement is the reverse of Steps 1 and 2.

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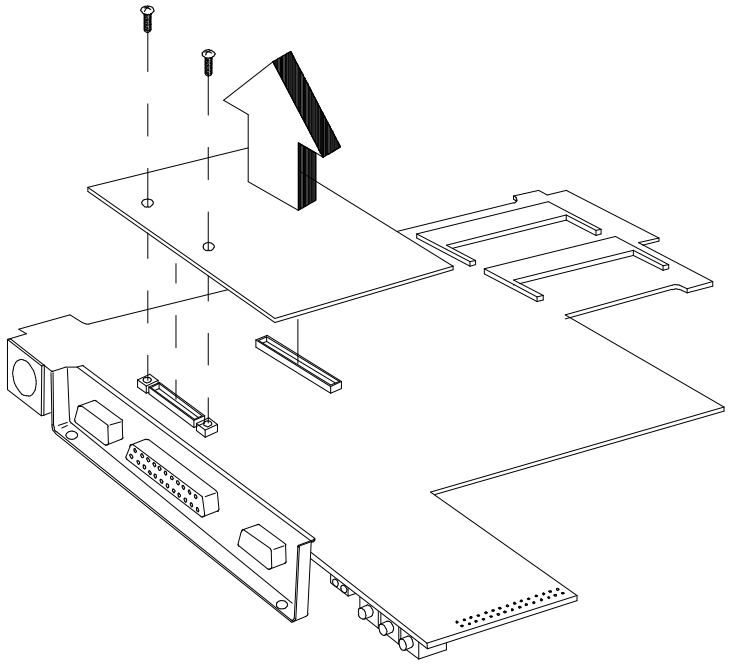


Figure 6-26 Removing/Replacing the VGA Video Board

6.5.20 Removing/Replacing the PCMCIA Connector Module

Use the following procedure to remove/replace the PCMCIA Connector Module:

1. Remove the Motherboard Assembly as described in Paragraph 6.5.17.

2. Remove the Video Board Paragraph 6.5.19)

3. Remove the four screws securing the PCMCIA Module to the Motherboard Assembly (refer to Figure 6-27).

4. Replacement is the reverse of Steps 1 through 3.

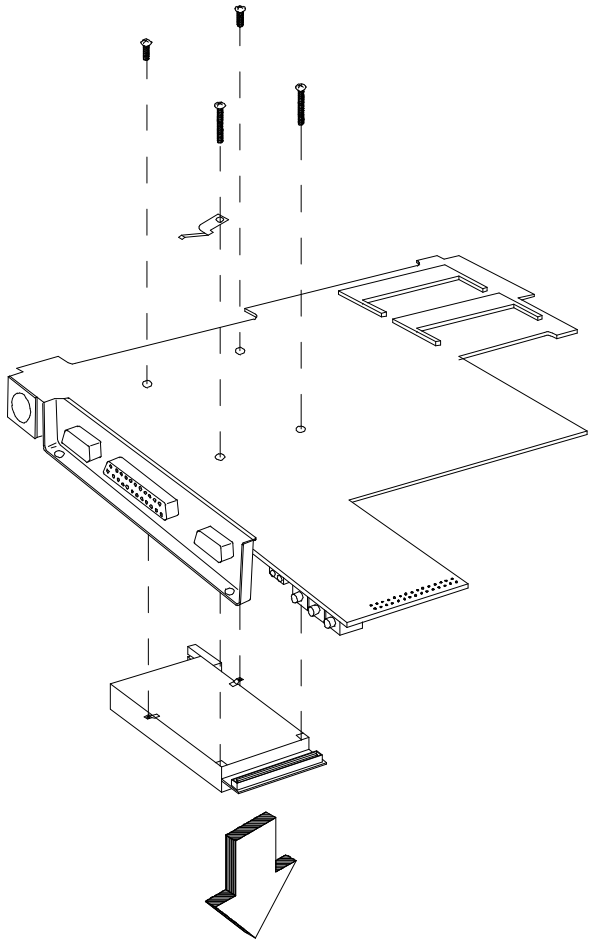


Figure 6-26 Removing/Replacing the PCMCIA Module

6.5.21 Removing/Replacing the Touchpad Assembly

Use the following procedure to remove/replace the Touchpad Assembly:

1. Remove the Keyboard Assembly as described in Paragraph 6.5.4.

2. Remove the Top Cover Assembly as described in Paragraph 6.5.11.

3. Refer to Figure 6-28; remove the center screw and disconnect the Touchpad cable J1.

4. Remove the Touchpad main sensor and connector unit.

5. Remove the two side screws and remove the metal plate.

6. Lift up and remove the Touchpad buttons.
7. Lift up and remove the Touchpad.
8. Replacement is essentially the reverse of Steps 1 through 7.

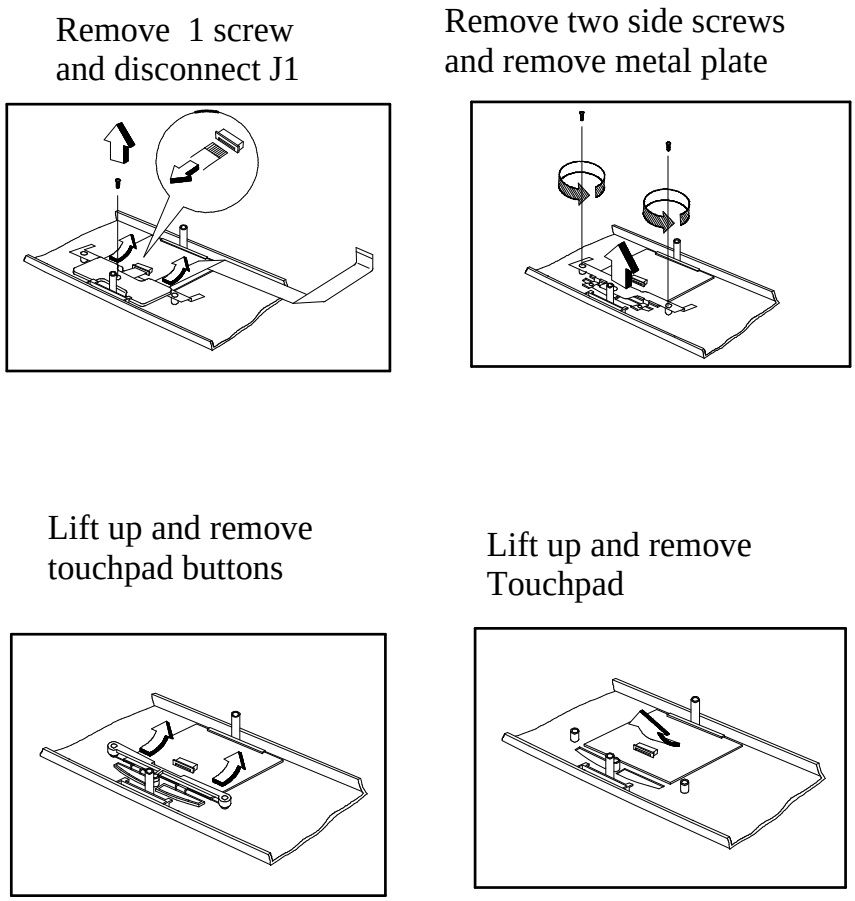


Figure 6-28 Removing/Replacing the Touchpad Assembly

Caution: If the notebook is powered up with the LCD bezel removed, you can be exposed to high voltages which could result in shock and equipment damage. Ensure that the batteries and AC adapter are removed from the notebook when working on the LCD/Display assembly.

6.5.22 Removing/Replacing the Display Bezel

To remove/replace the Display Bezel, use the following the procedure;

1. Remove the AC adapter and Battery Pack as described in Paragraph 6.5.1.
2. Remove the round LCD bumpers at the top of the display (refer to Figure 6-29).
3. Remove the left and right screws near the display hinges (note that the screw covers are not identical).
4. Remove four screws on the Display Bezel (Figure 6-29).
5. Pull out and remove the Display Bezel.

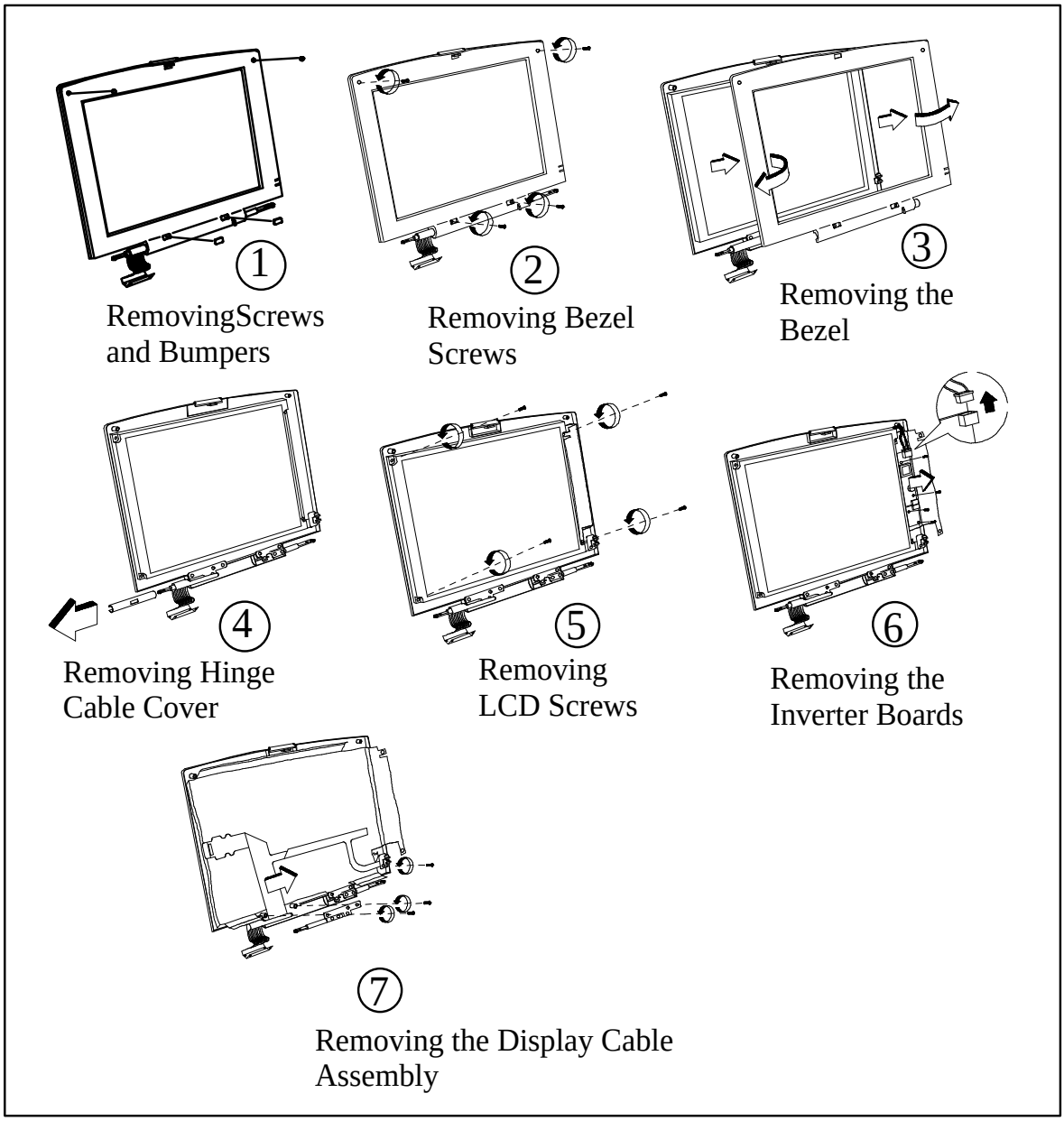


Figure 6-29 Display Unit Disassembly

6.5.23 Removing/Replacing the Display Inverter Boards

To remove/replace the DC-AC Inverter (large PWB) or the DC-DC Inverter Board (smaller PWB), use the following the procedure;

1. Remove the Display Bezel as described in Paragraph 6.5.22.
2. Gently fold back the foil around the LCD and unplug Inverter Cable CN2 (refer to Figure 6-29).
3. Remove the screws that secure the two Inverter Boards to the display back cover and remove the boards.
4. Replacement is essentially the reverse of Steps 1 through 3.

6.5.24 Removing/Replacing the LCD Panel

To remove/replace the LCD Panel, use the following the procedure;

1. Remove the Display Bezel as described in Paragraph 6.5.22.
2. Slide out and remove the Hinge Cable Cover (Figure 6-29).
3. Remove four screws on the four sides of the LCD panel (Figure 6-29).
4. Gently fold back the foil around the LCD and unplug Inverter Cable CN2.
5. Remove the screws that secure the two Inverter Boards to the display back cover and remove the boards.
6. Refer to Figure 6-29 and tilt the LCD panel away from the Display Cover.
7. Unplug the LCD Panel from the Display Cable Assembly and remove the LCD Panel.
7. Replacement is the reverse of Steps 1 through 7.

A
Model 60x Maintenance Data

A.1 Introduction

This section contains model-dependent maintenance data for the Extensa Model 60x Series Notebook Computers. For information common to all members of the Extensa 600 Series, refer to Sections 1 through 6 of this manual.

A.2 Model 60x Features Summary

The Extensa 60x Series Notebook Computers has either a 10.4-inch VGA or 12.1-inch SVGA Display, comes standard with a 810 MB Hard Drive and is powered by a 120 MHz Pentium processor. Refer to Section 1 for a more detailed description of Extensa 600 Series features.

A.3 Field-Replaceable Units (FRUs)

Table A-1 lists and describes the various FRUs for the Extensa 60x Series. For FRU removal/replacement procedures, refer to Section 6 of this manual.

As shown in Figure A-1, all members of the Extensa 60x Series Notebook Computers contain two major assemblies:

- System Base Assembly
- Cover-Display Assembly

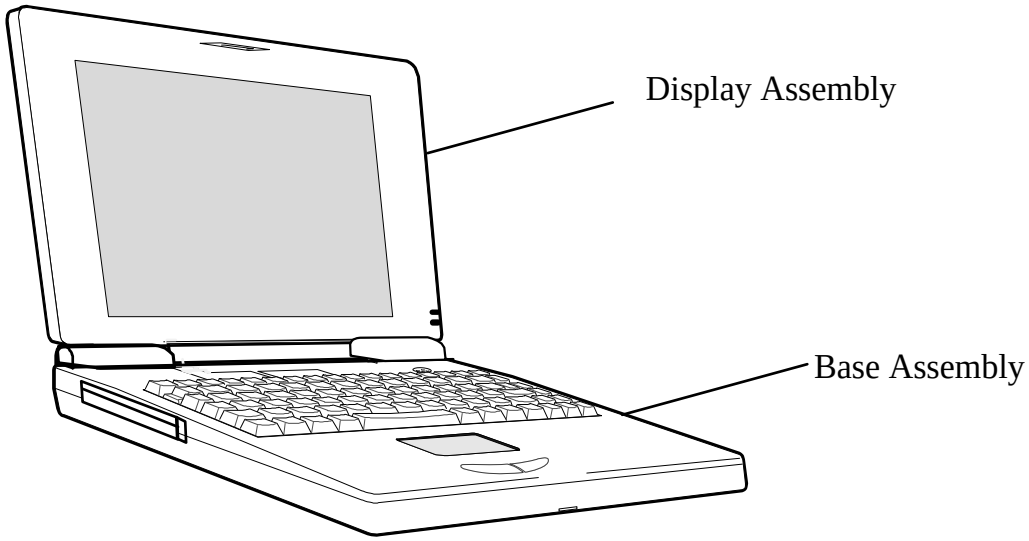


Figure A-1 Extensa 600 Series Assemblies

A.3.1 Cover-Display Assembly

The Cover-Display Assembly shown in Figure A-2, contains the LCD screen, DC-AC Inverter Board, DC-DC Inverter Board, bezel LCD cover and various other components as listed in Table A-1.

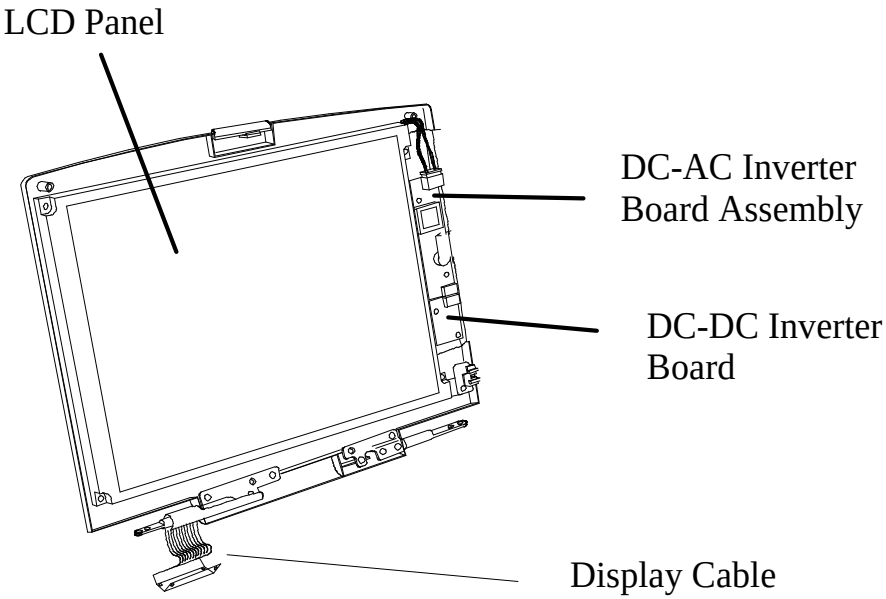


Figure A-2 Display FRUs

Table A-1 Top Cover Assembly Field-Replaceable Units (FRUs)

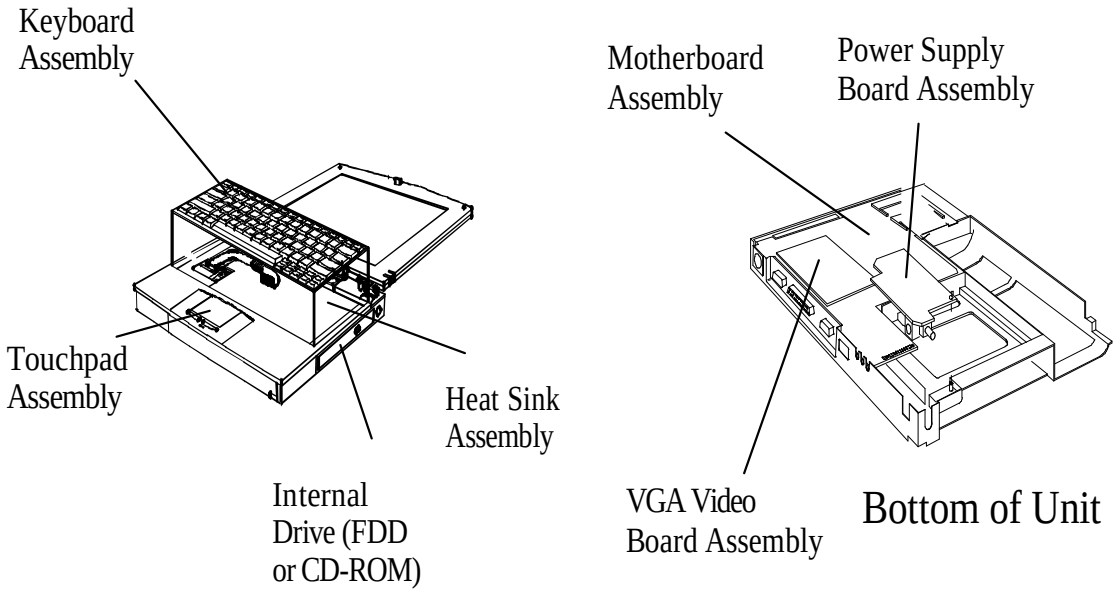
FRU Description	Assembly/ Disassembly Paragraph	TI Part No.
LCD Panel, 10.3", ASTN	6.5.24	9813525-0001
Display Back Cover, 10.4"	Ref	9813503-0001
Display Back Cover, 12.1"	Ref	9813548-0001
LCD Round Bumper	Ref	9813550-0001
AC-DC Inverter Board	6.5.23	9811361-0001
DC-DC Inverter Board	6.5.23	9813531-0001
Display Cable Assembly, 10.4" Display	Ref	9813502-0001
Display Cable Assembly, 12.1" Display	Ref	9813548-0001
Display Bezel, 10.4"	6.5.22	9804448-0003

Table A-1 Top Cover Assembly Field-Replaceable Units (FRUs)

FRU Description	Assembly/ Disassembly Paragraph	TI Part No.
Display Bezel, 12.1"	6.5.22	9813480-0001
LCD Screw Cover Right	Ref	9813551-0001
LCD Screw Cover Left	Ref	9813552-0001
Left Hinge, ASTN 10.4"	Ref	9813526-0001
Right Hinge, DSTN, 12.1"	Ref	9813521-0001

A.3.2 System Base Assembly

As shown in Figure A-3, the System Base Assembly houses a variety of field-replaceable subassemblies and components. The various assemblies and reference paragraph numbers containing removal/replacement procedures are listed in Table A-2.



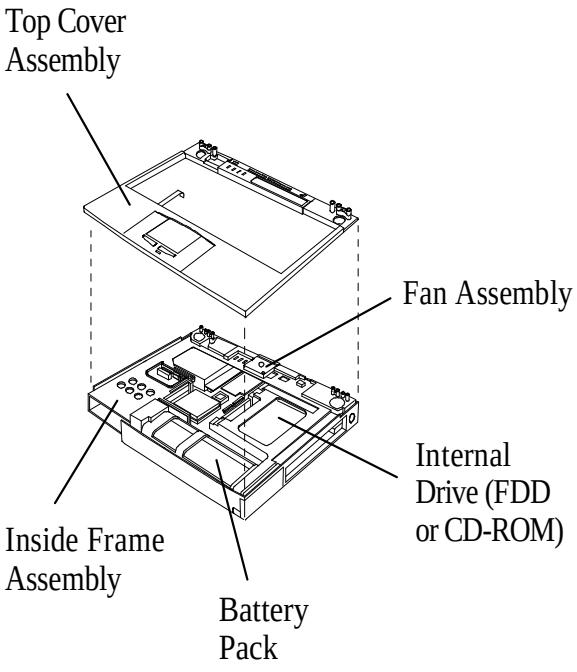


Figure A-3 Base Assembly FRUs

Table A-2 Base Assembly Field-Replaceable Units (FRUs)

Base Assembly FRU Description	Assembly/ Disassembly Paragraph	TI Part No.
PWB Assemblies		
Motherboard PWB Assembly	6.5.17	9813528-0001
Power Supply PWB Assembly	6.5.16	9813534-0001
Battery Connector PWB W/Cable	Ref	9813529-0001
Keyboard Transfer PWB Assembly	Ref	9813532-0001
VGA Video PWB Assembly	6.5.19	9804437-0001
Touchpad Assembly	6.5.21	9813516-0001
Button Board w/Cable Assembly	Ref	9813501-0001
Keyboard Assemblies		
Keyboard Assembly (U.S.)	6.5.4	9805758-0001
Keyboard Assembly (UK)	6.5.4	9805758-0002
Keyboard Assembly (German)	6.5.4	9805758-0003
Keyboard Assembly (French)	6.5.4	9805758-0004
Keyboard Assembly (Spanish)	6.5.4	9805758-0005
Keyboard Assembly (Swiss/German)	6.5.4	9805758-0006
Keyboard Assembly (Italian)	6.5.4	9805758-0007
Keyboard Assembly (Portuguese)	6.5.4	9805758-0008
Keyboard Assembly (Sweden)	6.5.4	9805758-0010
Keyboard Assembly (Danish)	6.5.4	9805758-0012
Keyboard Assembly (Norwegian)	6.5.4	9805758-0013
Keyboard Assembly (Finnish)	6.5.4	9805758-0014
Keyboard Assembly (Belgian)	6.5.4	9805758-0015
Keyboard Assembly (Chinese)	6.5.4	9805758-0019
Keyboard Assembly (Korean)	6.5.4	9805758-0020
Keyboard Assembly (Japanese)	6.5.4	9805758-0021

Table A-2 Base Assembly Field-Replaceable Units (FRUs)

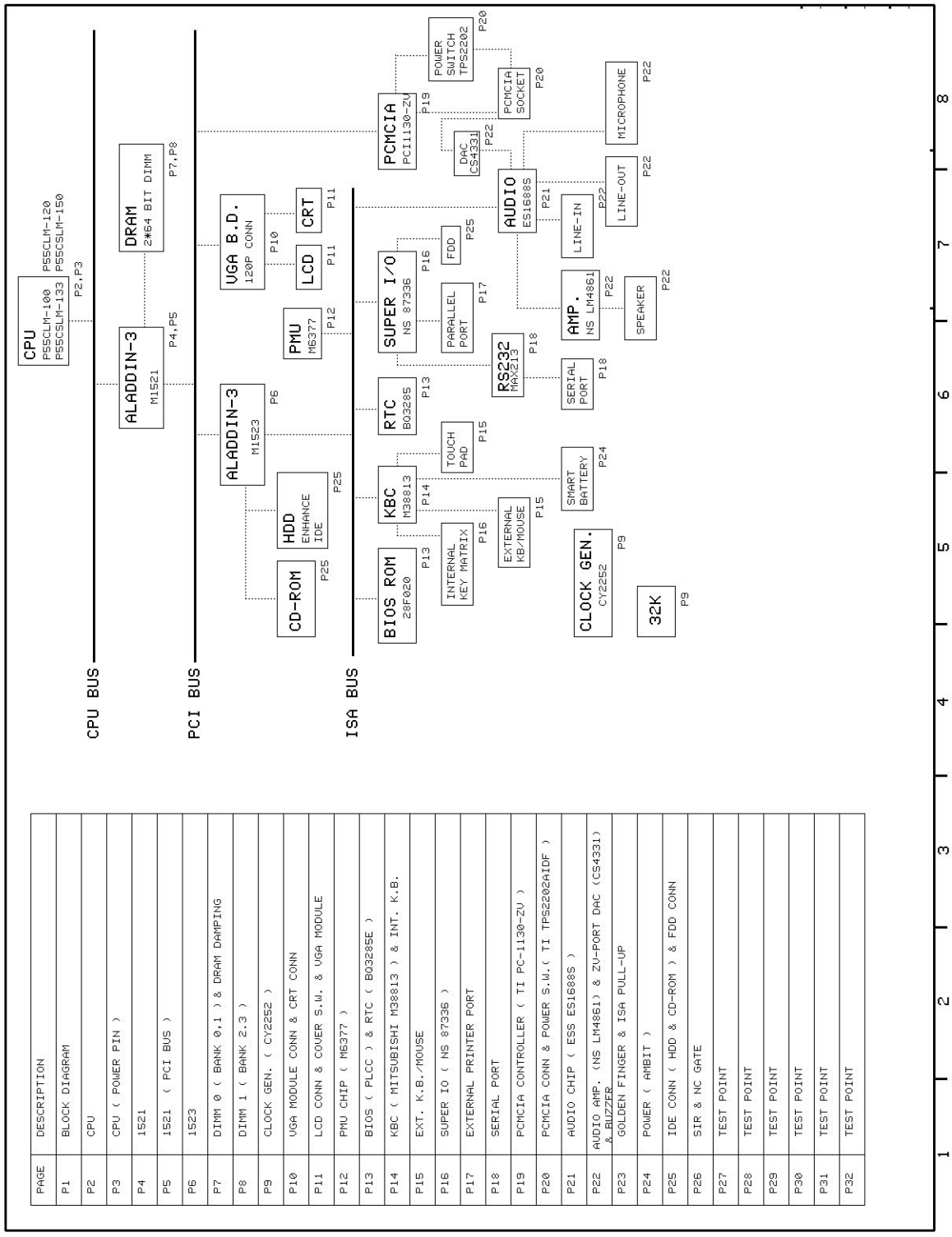
Base Assembly FRU Description	Assembly/ Disassembly Paragraph	TI Part No.
Cables		
CD-ROM Cable	6.5.8	9813523-0001
Peripherals		
Microfloppy Drive (FDD)	6.5.8	9813513-0001
HDD, 810 MB	6.5.3	9813517-0001
CD-ROM Drive, 6X	6.5.8	9813486-0001
Covers, Doors, Buttons		
Top Cover Assembly	6.5.10	9813511-0001
Memory Expansion Cover	6.5.5	9813510-0001
Left Hinge Cover	6.5.4	9813508-0001
Right Hinge Cover	6.5.4	9813509-0001
Hinge Cable Cover	Ref	9813507-0001
HDD Cover	6.5.3	9813506-0001
Misc		
Base Assembly	6.5.9	9813499-0001
Battery, Duracell, Ni-MH, SMB, (10.8V, 2800 mah)	6.5.1	9813495-0001
AC Power Adapter, 45W, ADP-45HB	Ref	9813497-0001
Nameplate Label	Ref	
Fan with connector cable	6.5.11	9813538-0001
Inside Frame	6.5.14	9813522-0001
Heat Sink Assembly	6.5.6	9813519-0001
CPU IC (P54CSLM-120 MHz, 3.1V	6.5.7	9813526-0001
FDD/CD-ROM Latch	6.5.8	9813524-0001
Mouse Buttons	6.5.21	9813527-0001
Nameplate, Extensa 600	Ref	9813553-0001
Nameplate, Extensa 600CD	Ref	9813553-0002
Nameplate, Extensa 605CD	Ref	9813553-0003

Table A-2 Base Assembly Field-Replaceable Units (FRUs)

Base Assembly FRU Description	Assembly/ Disassembly Paragraph	TI Part No.
PCMCIA Connector Module	6.5.20	9813549-0001
Left Speaker with cable	Ref	9813535-0001
Cover-closed switch	Ref	9813537-0001

A.4 Logic Diagrams

Logic diagrams for the Extensa 60x Series Motherboard PWB Assembly are provided in Figure A-4.



PAGE	DESCRIPTION
P1	BLOCK DIAGRAM
P2	CPU
P3	CPU (POWER PIN)
P4	1521
P5	1521 (PCI BUS)
P6	1523
P7	DIMM 0 (BANK 0,1) & DRAM DAMPING
P8	DIMM 1 (BANK 2,3)
P9	CLOCK GEN. (CY2252)
P10	VGA MODULE CONN & CRT CONN
P11	LCD CONN & COVER S.W. & VGA MODULE
P12	PMU CHIP (M6377)
P13	BIOS (PLCC) & RTC (BQ3285E)
P14	KBC (MITSUBISHI M38813) & INT. K.B.
P15	EXT. K.B./MOUSE
P16	SUPER IO (NS 87336)
P17	EXTERNAL PRINTER PORT
P18	SERIAL PORT
P19	PCMCIA CONTROLLER (TI PC-1130-ZV)
P20	PCMCIA CONN & POWER S.W.(TI TPS2202AIDF)
P21	AUDIO CHIP (ESS ES1688S)
P22	AUDIO AMP. (NS LM4861) & ZV-PORT DAC (CS4331) & BUZZER
P23	GOLDEN FINGER & ISA PULL-UP
P24	POWER (AMBIT)
P25	IDE CONN (HDD & CD-ROM) & FDD CONN
P26	SIR & NC GATE
P27	TEST POINT
P28	TEST POINT
P29	TEST POINT
P30	TEST POINT
P31	TEST POINT
P32	TEST POINT

Figure A-4 Motherboard PWB Logic Diagrams (Sheet 1 of 32)

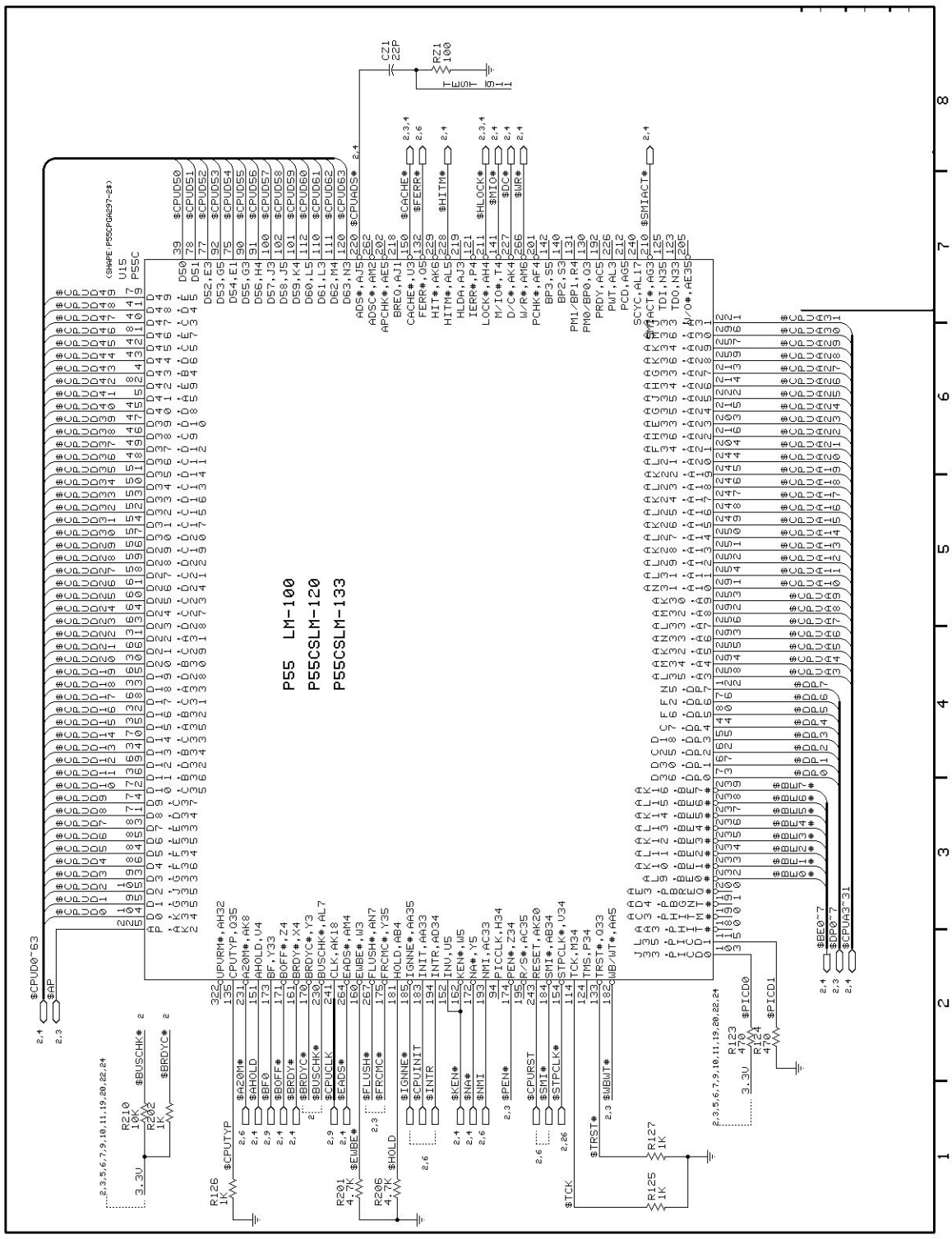


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 2 of 32)

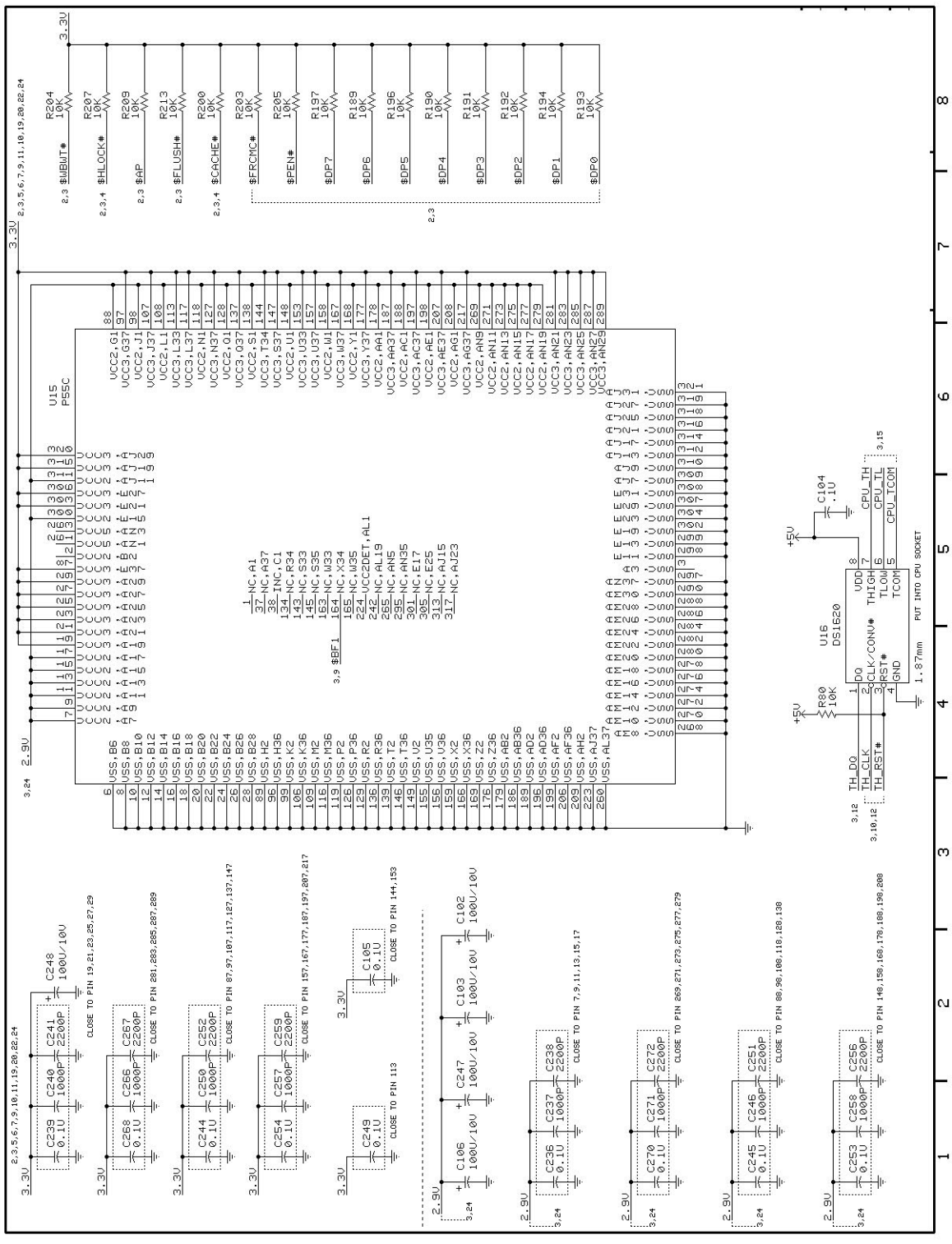


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 3 of 32)

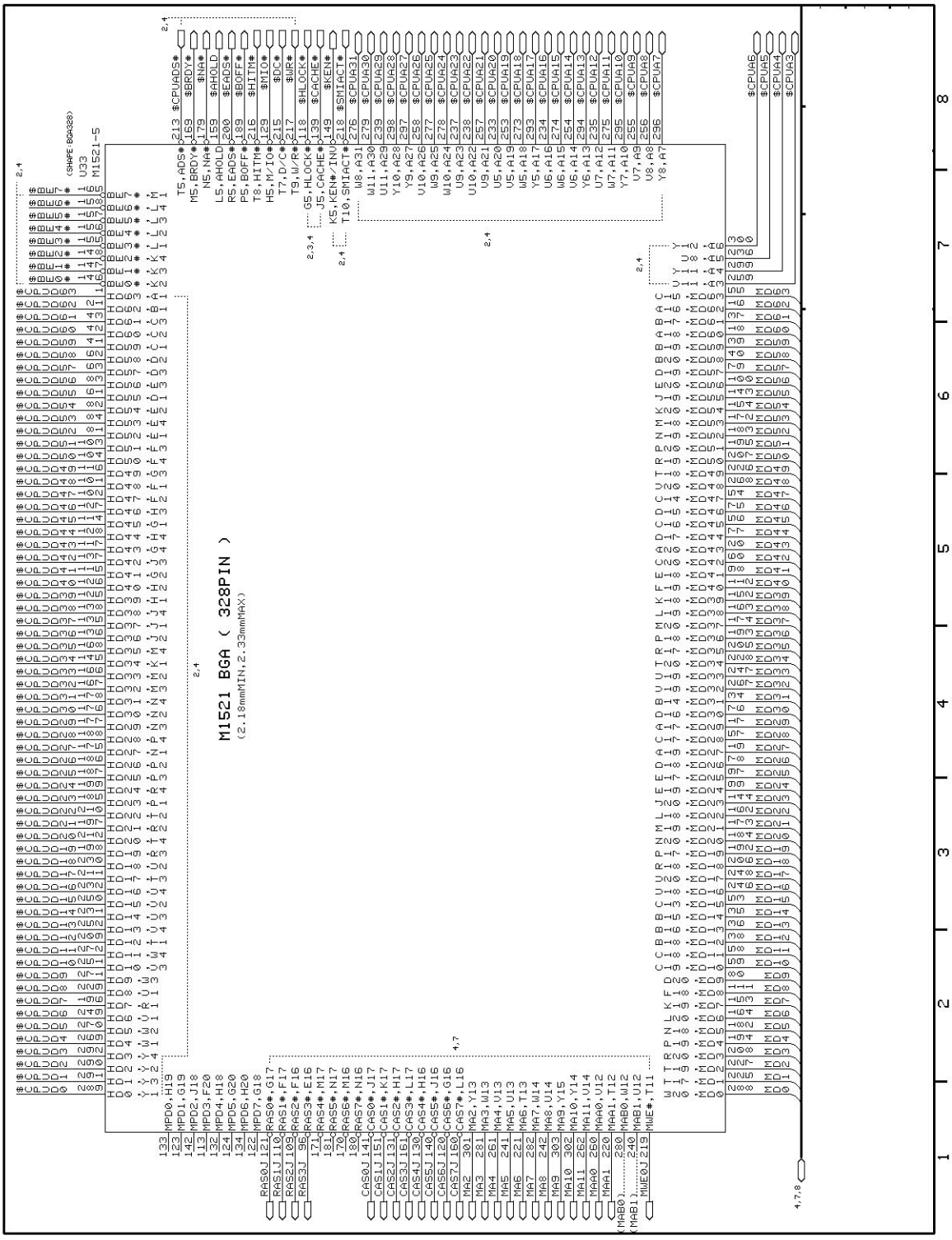


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 4 of 32)

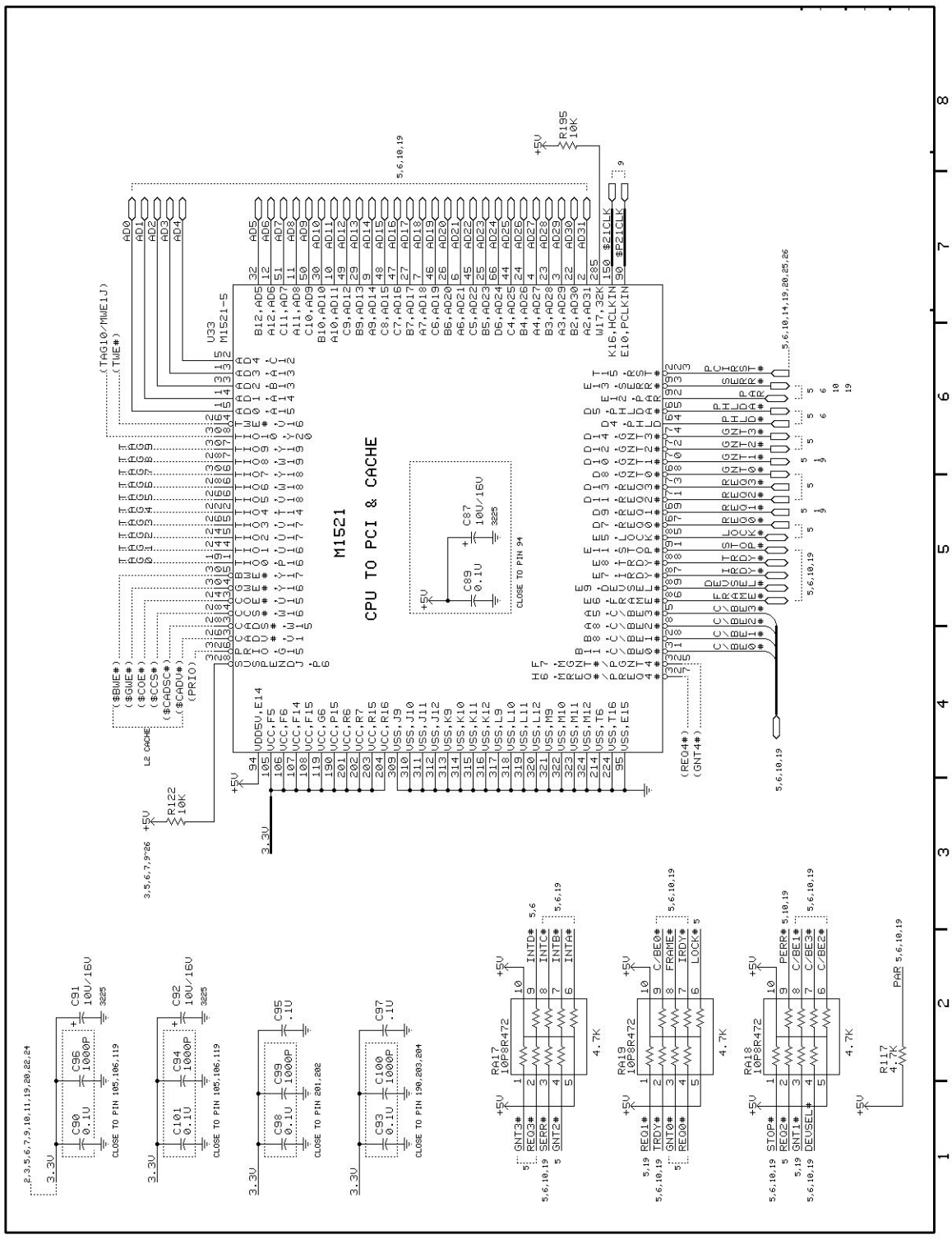


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 5 of 32)

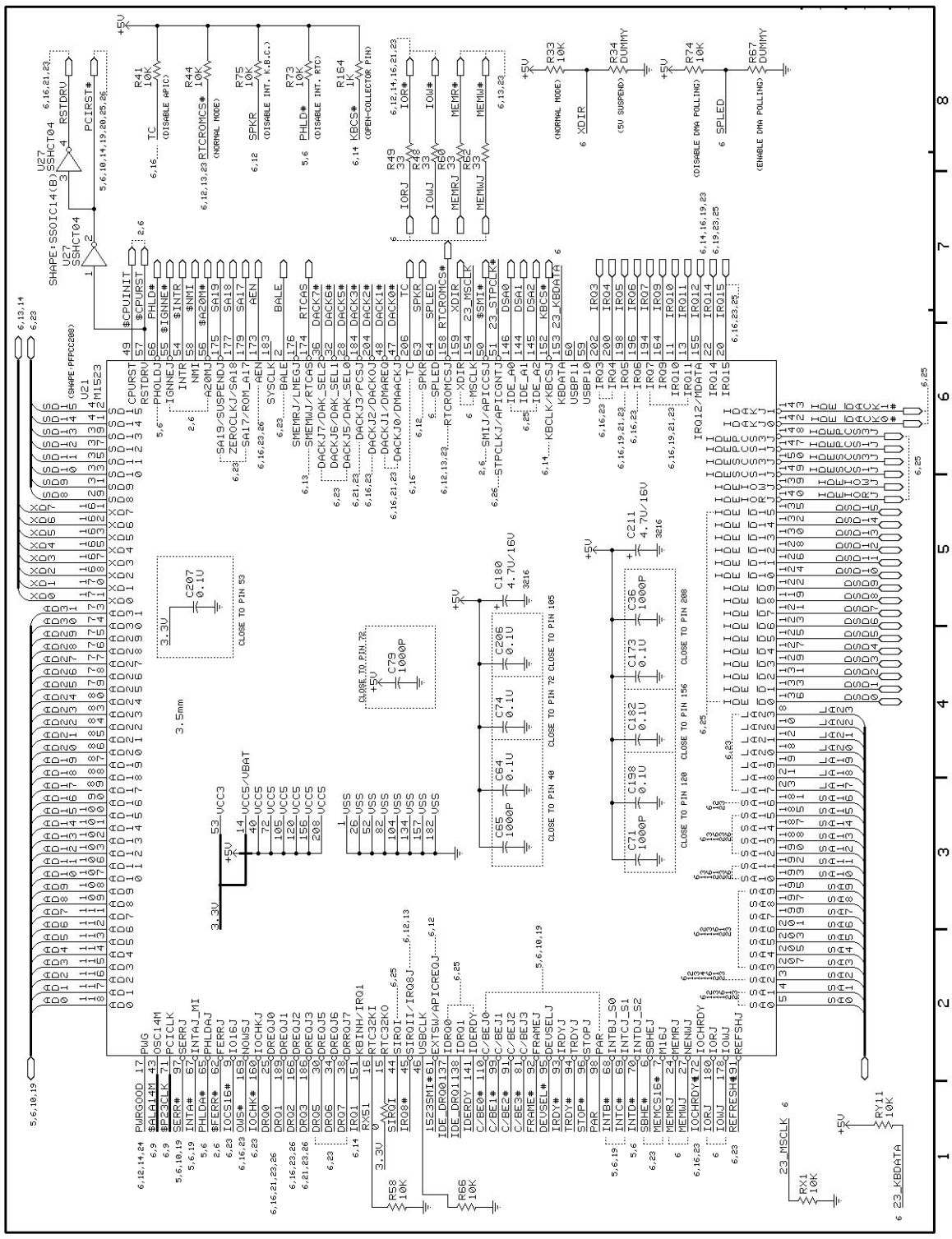


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 6 of 32)

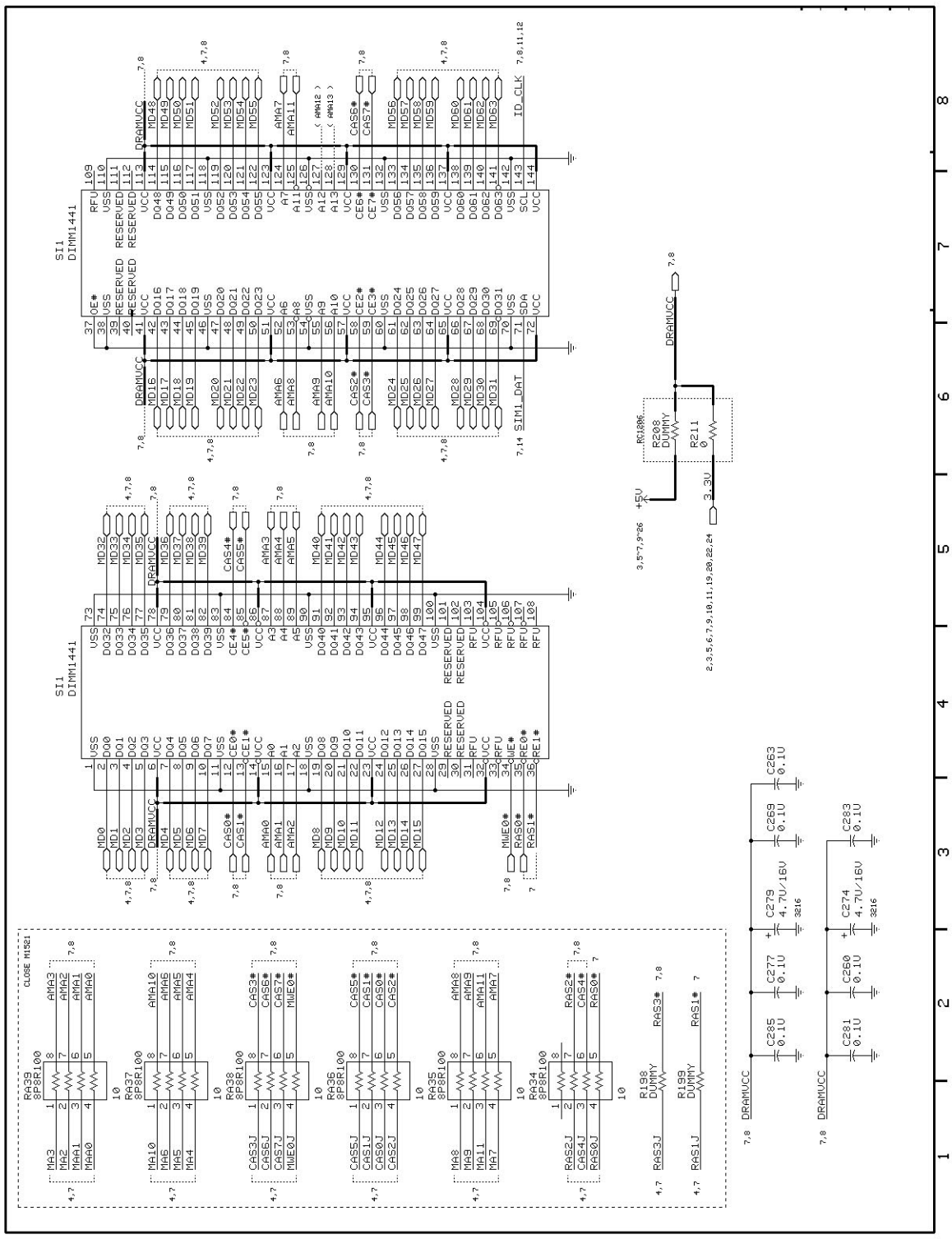


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 7 of 32)

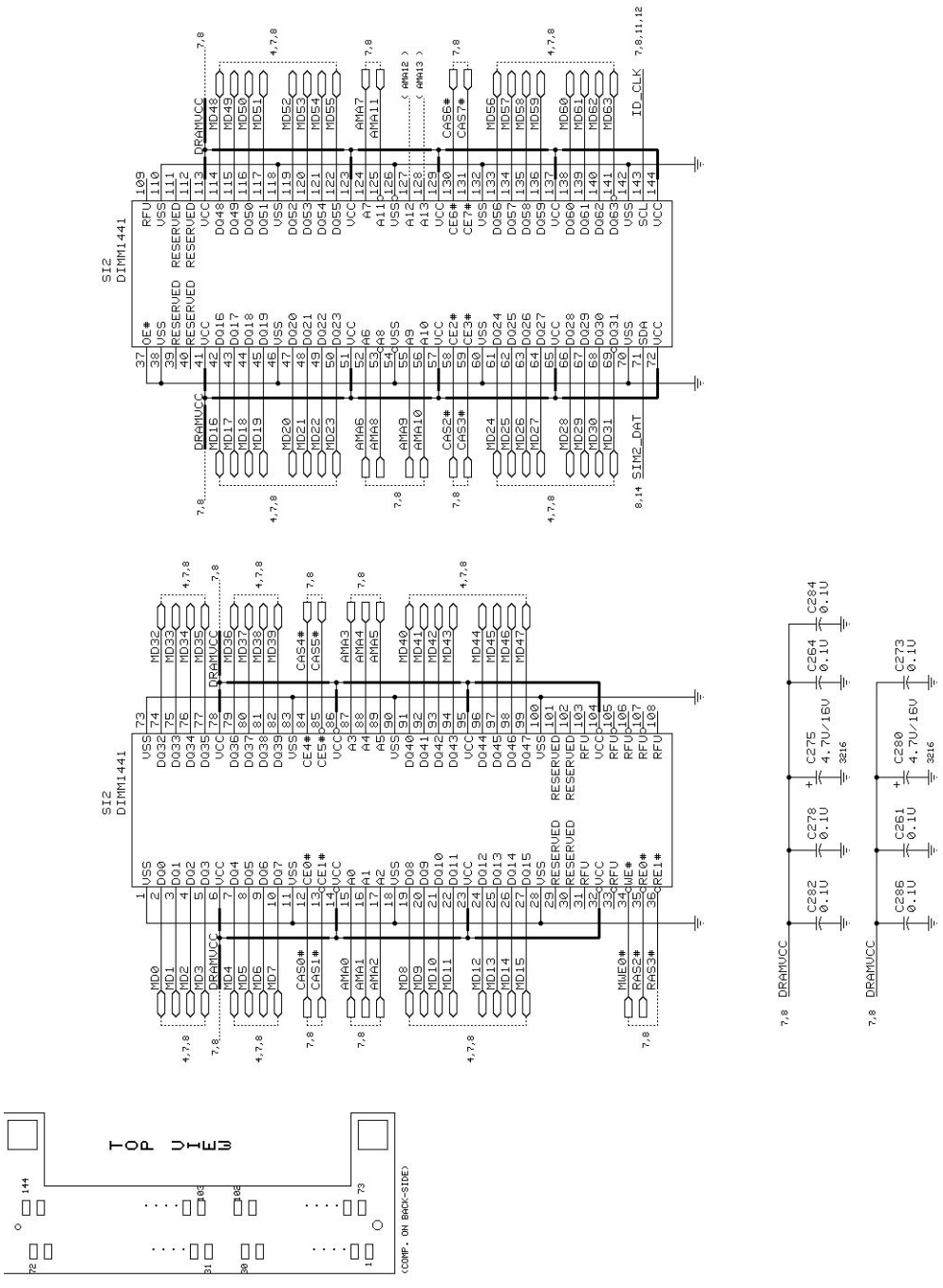


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 8 of 32)

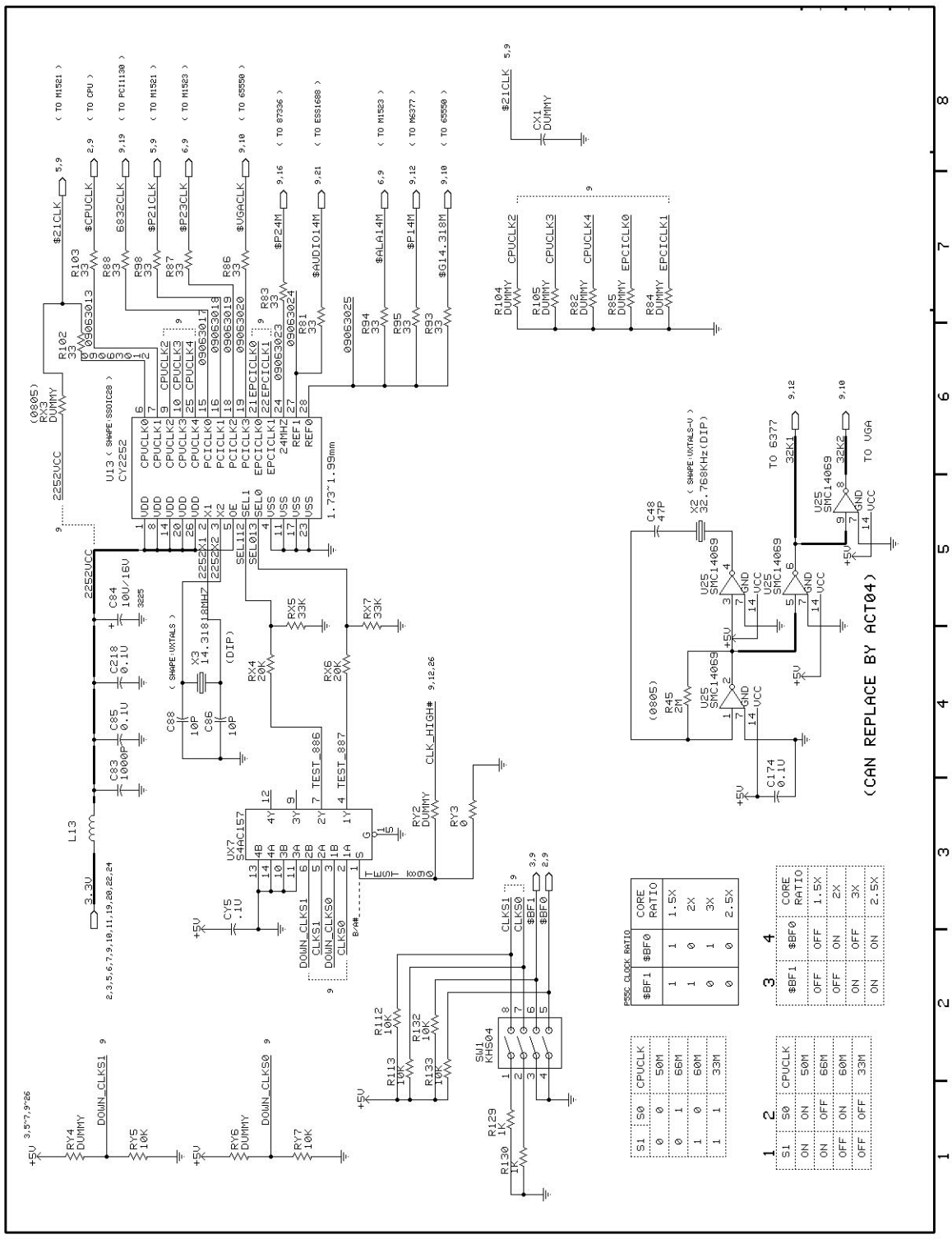


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 9 of 32)

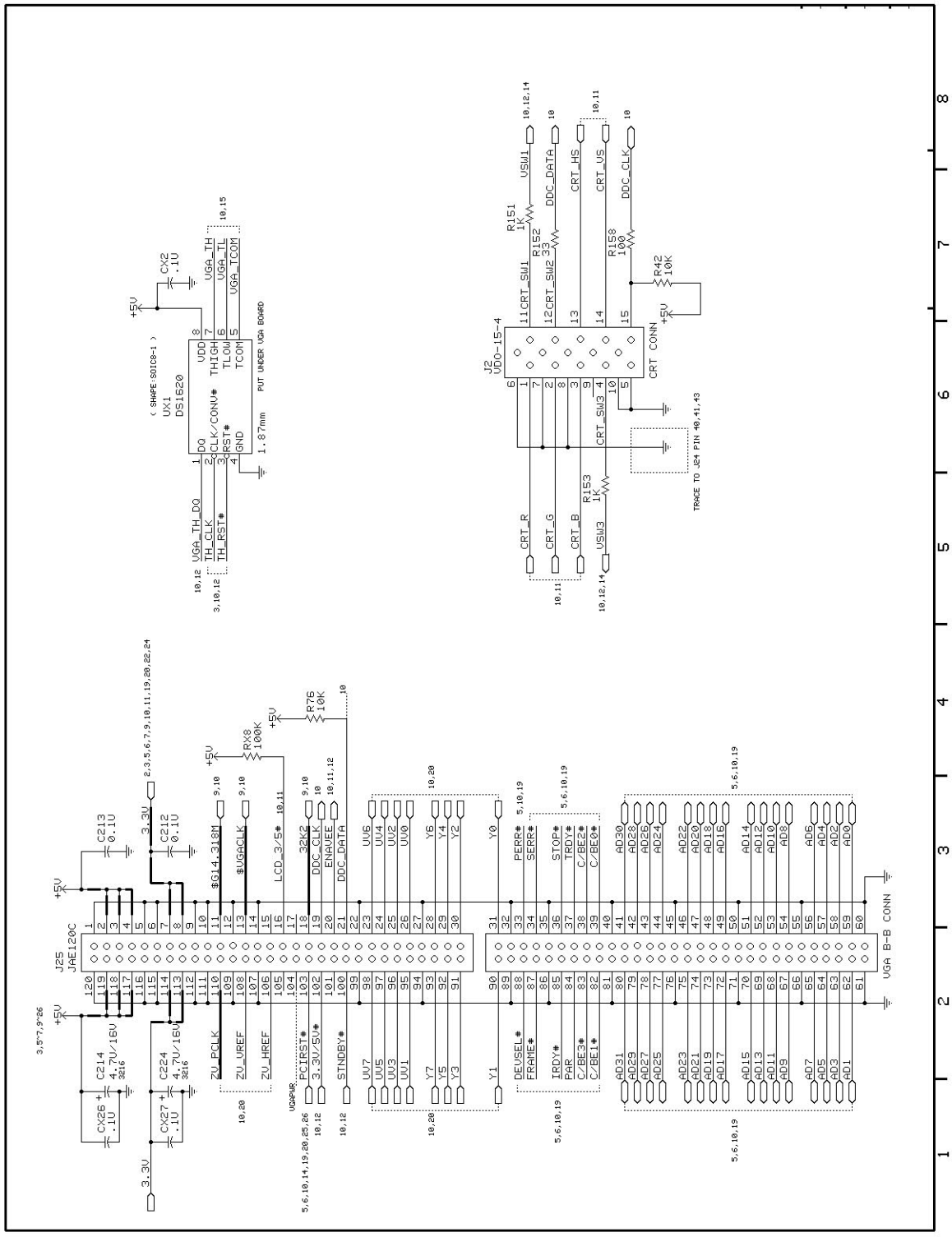


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 10 of 32)

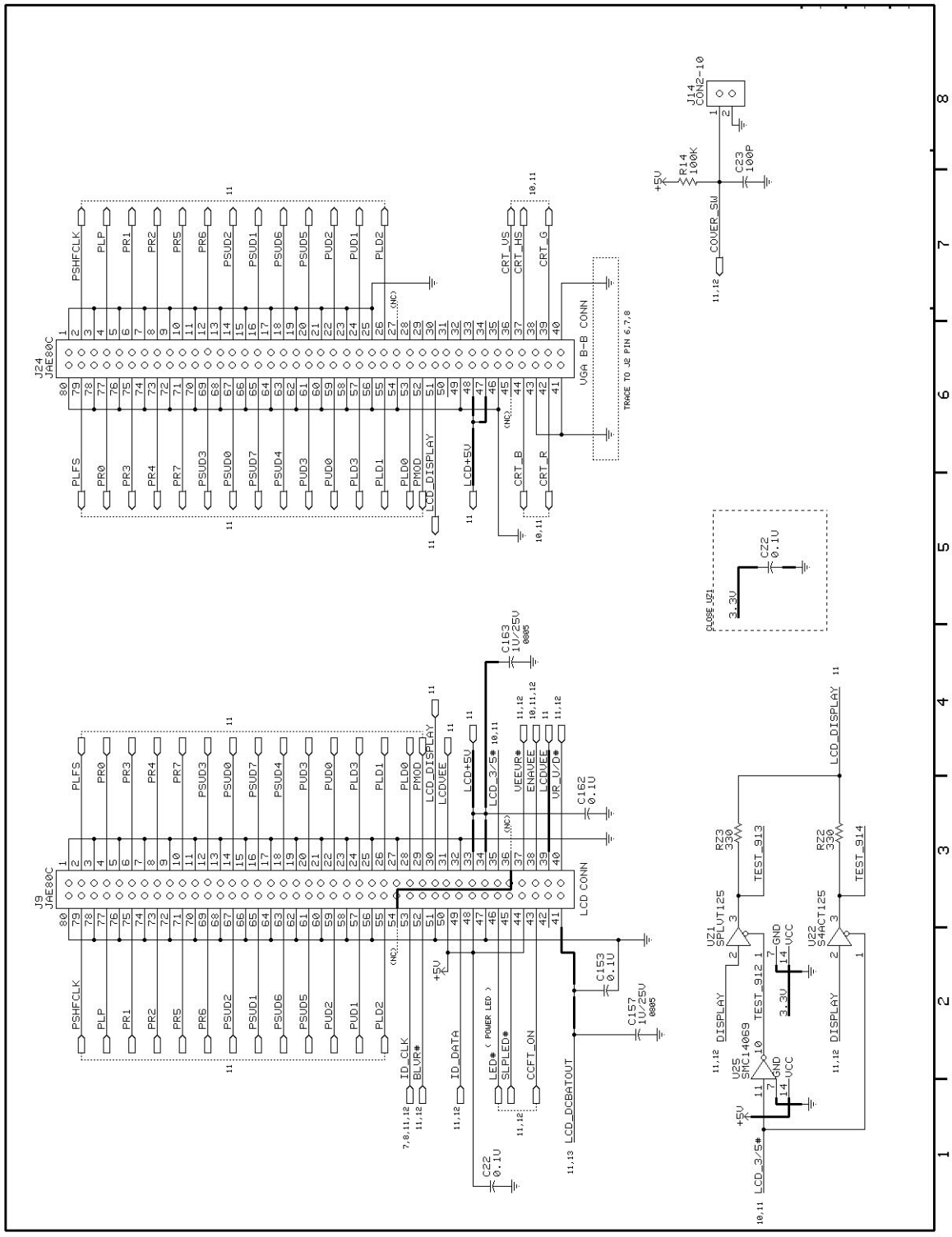


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 11 of 32)

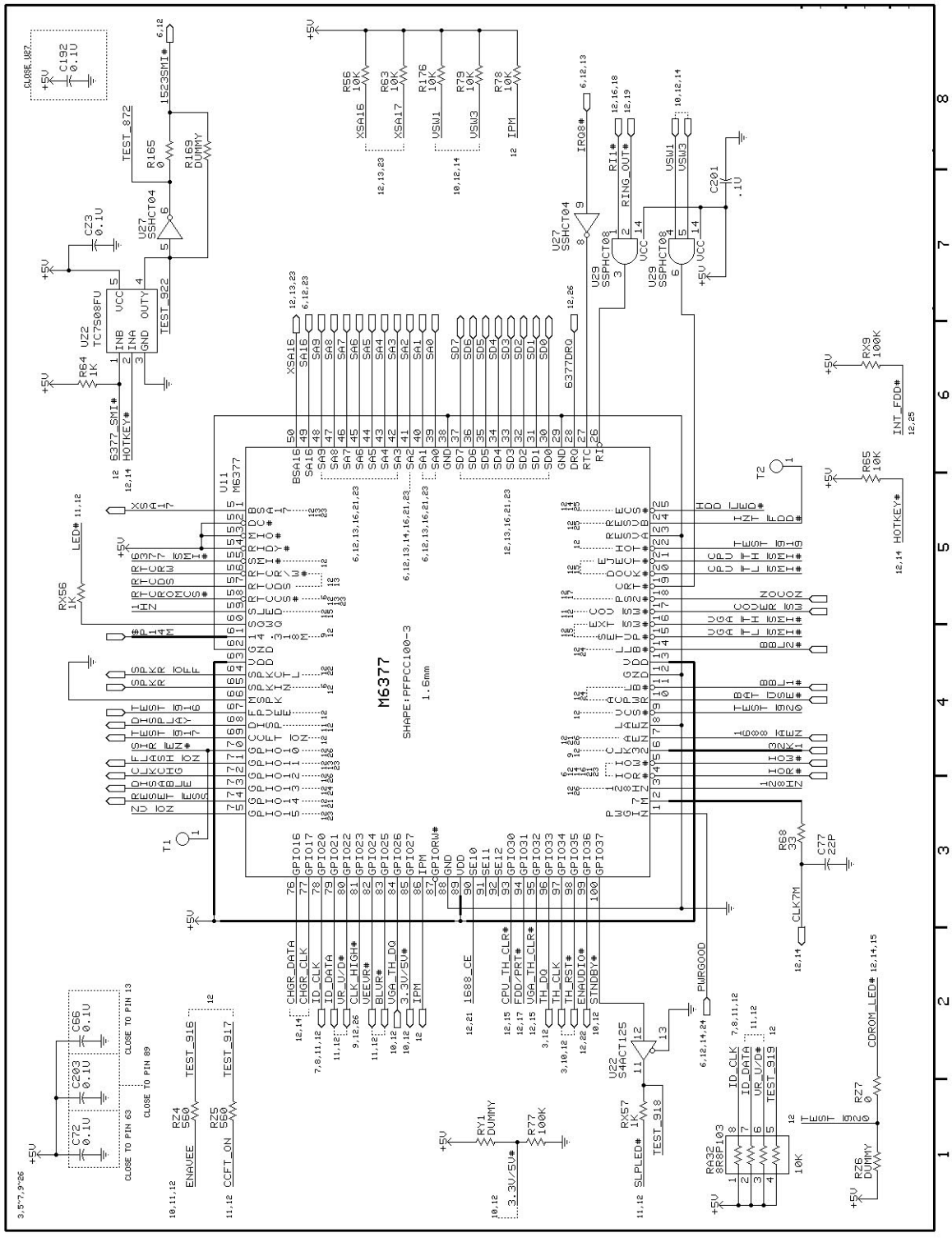


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 12 of 32)

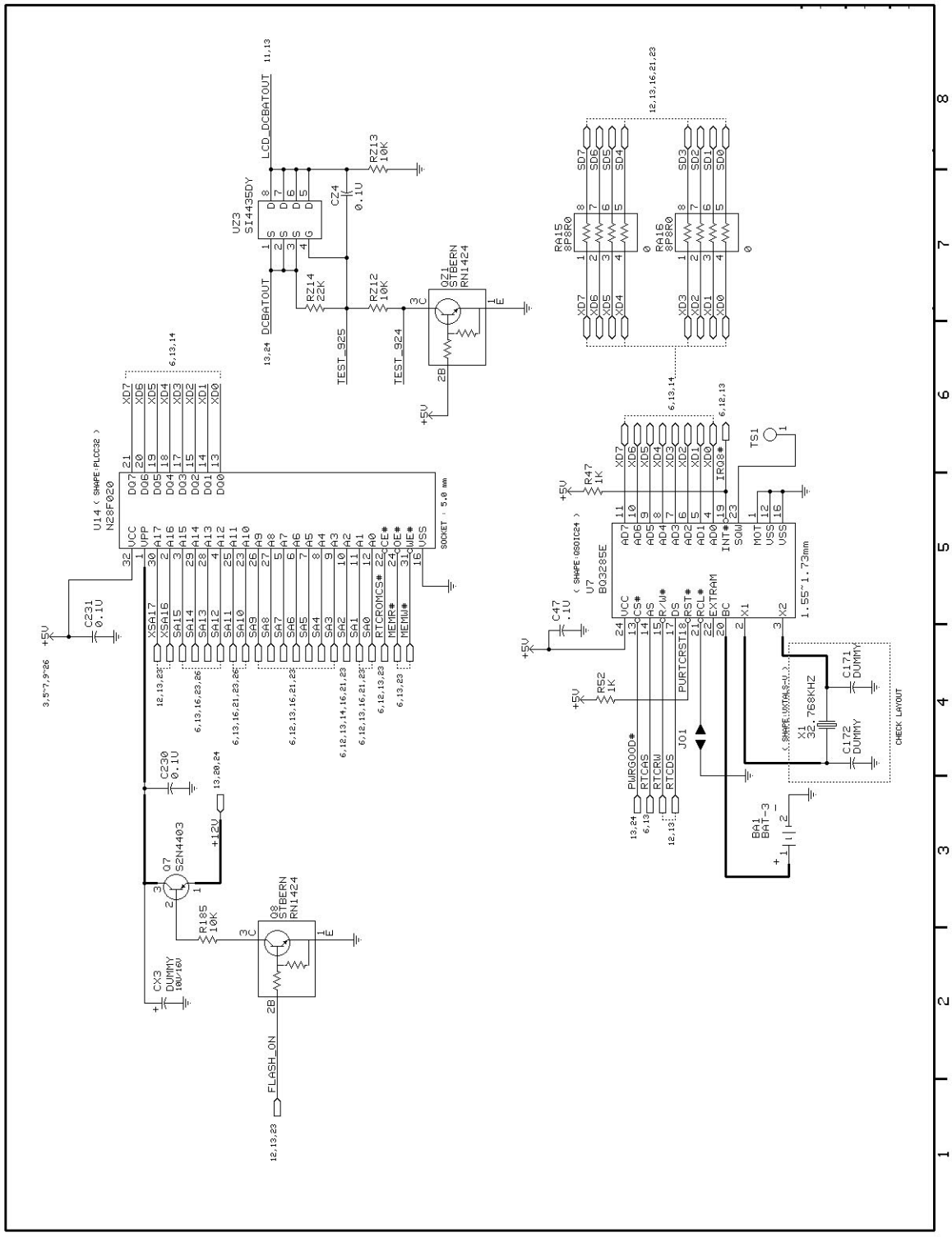


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 13 of 32)

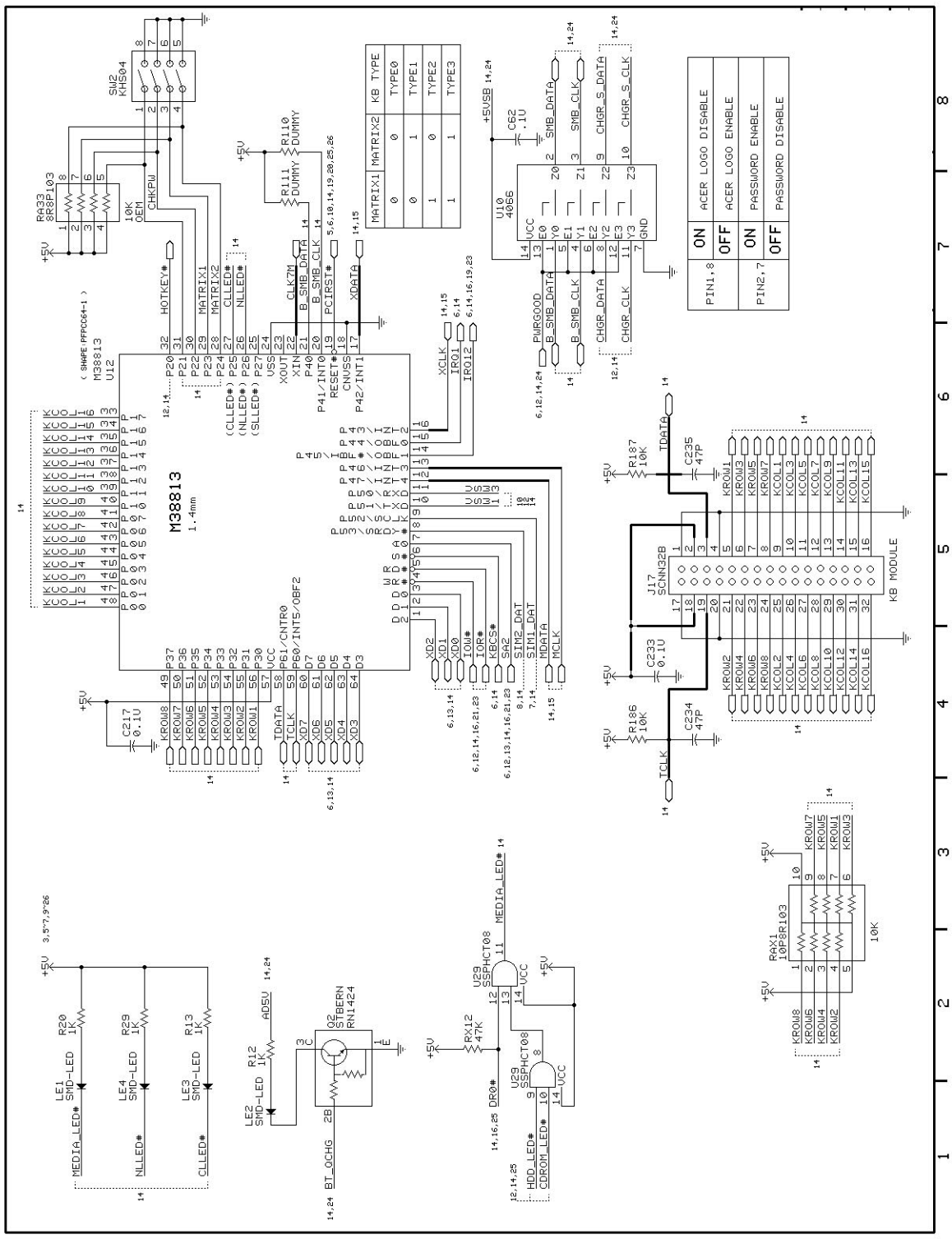


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 14 of 32)

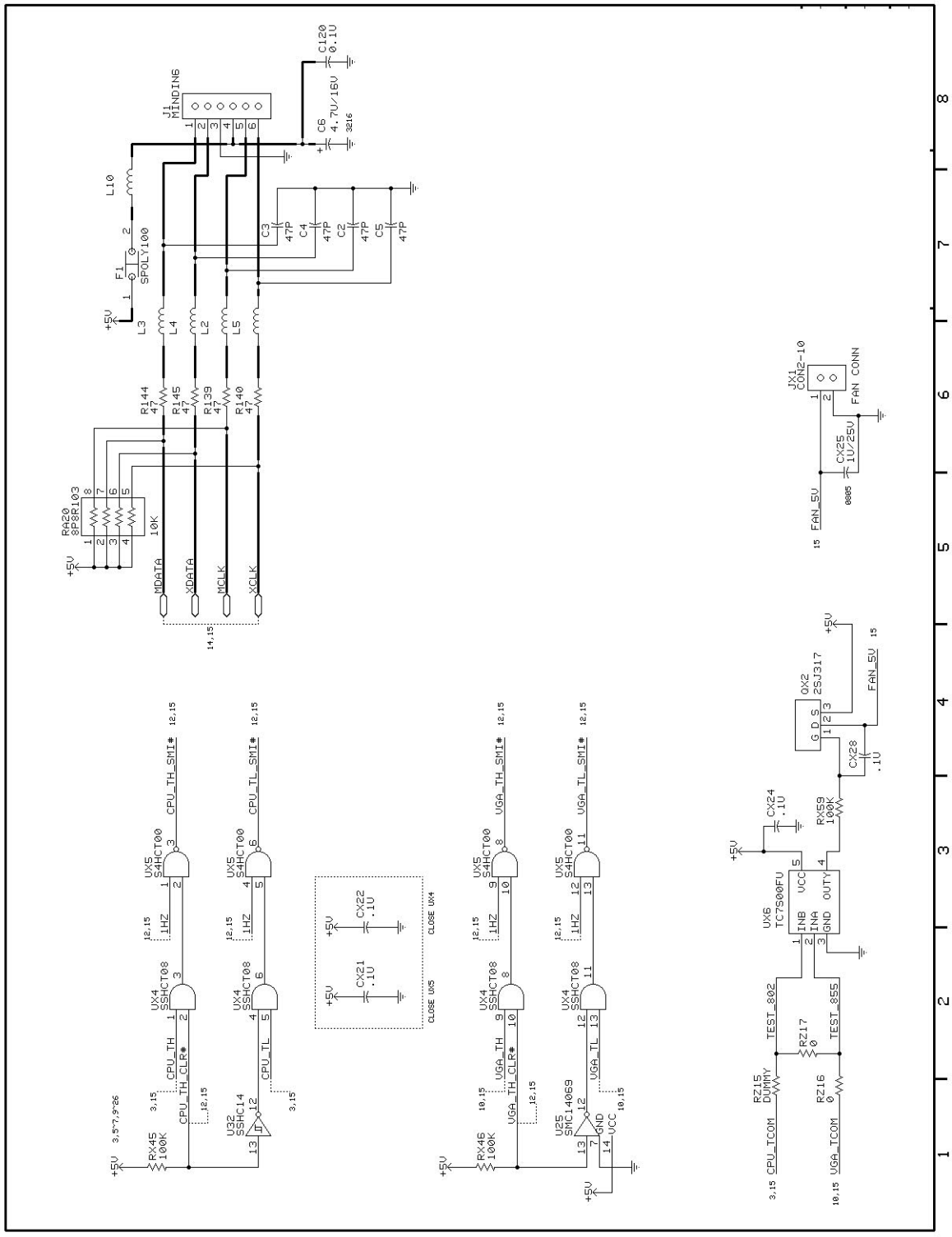


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 15 of 32)

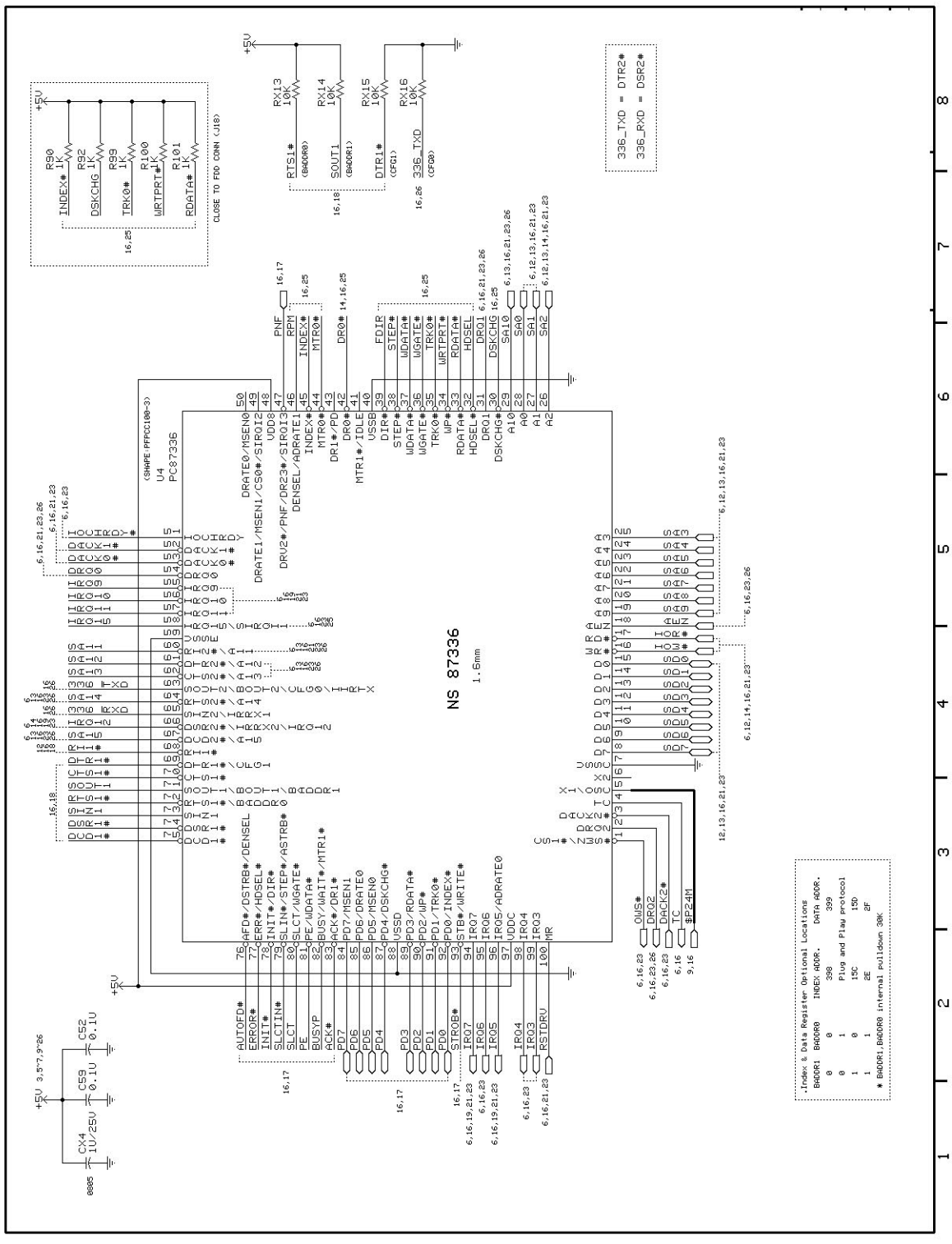


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 16 of 32)

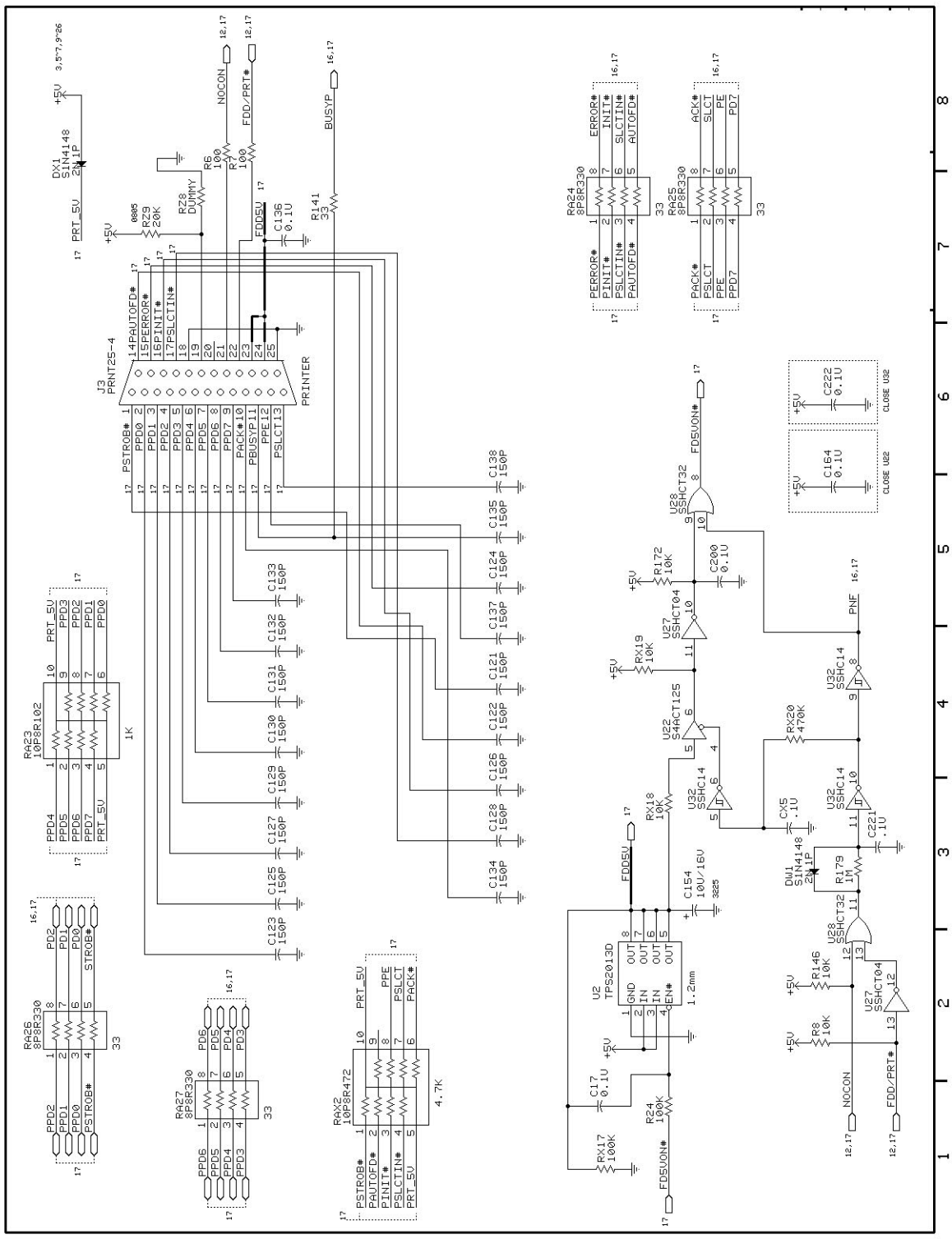


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 17 of 32)

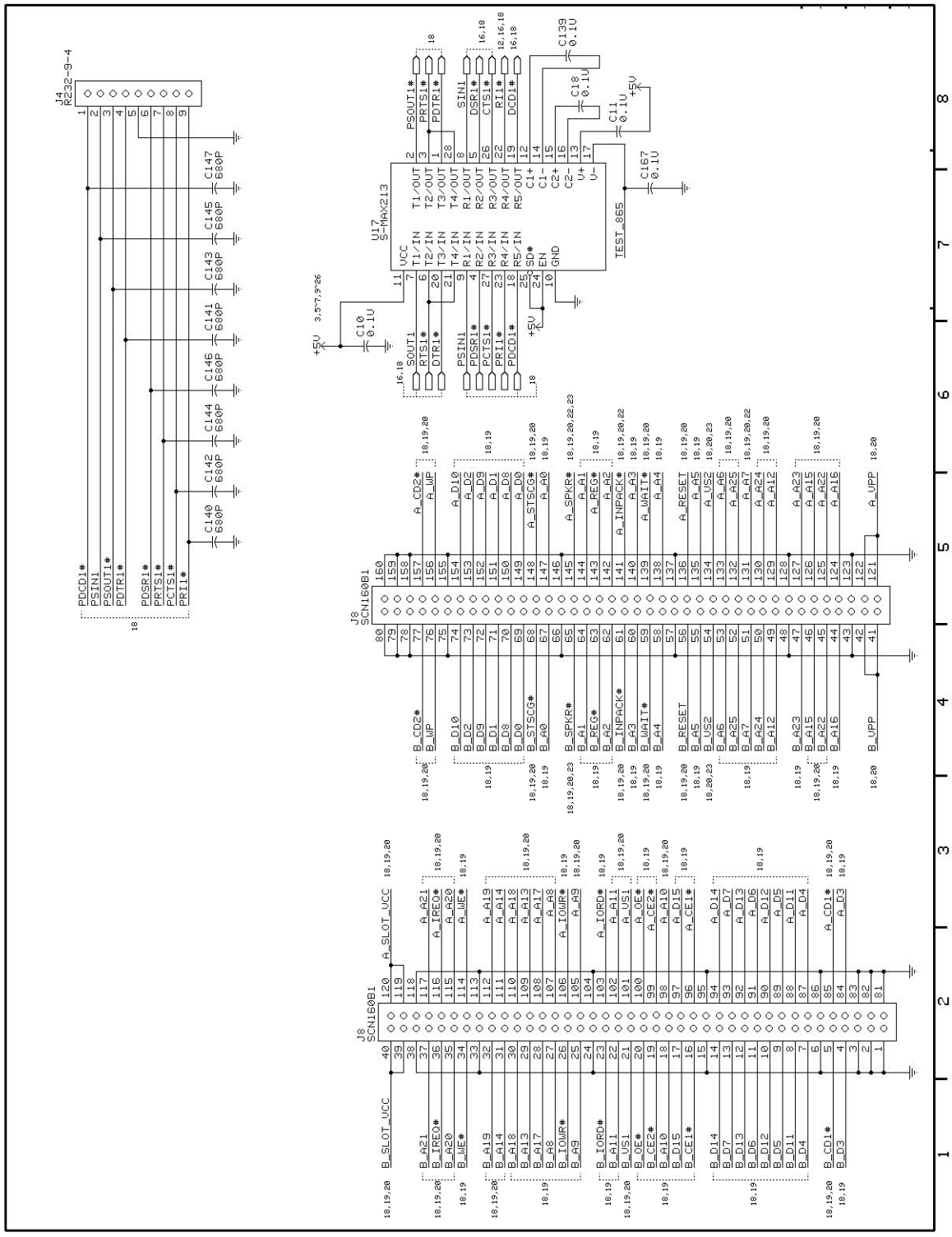


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 18 of 32)

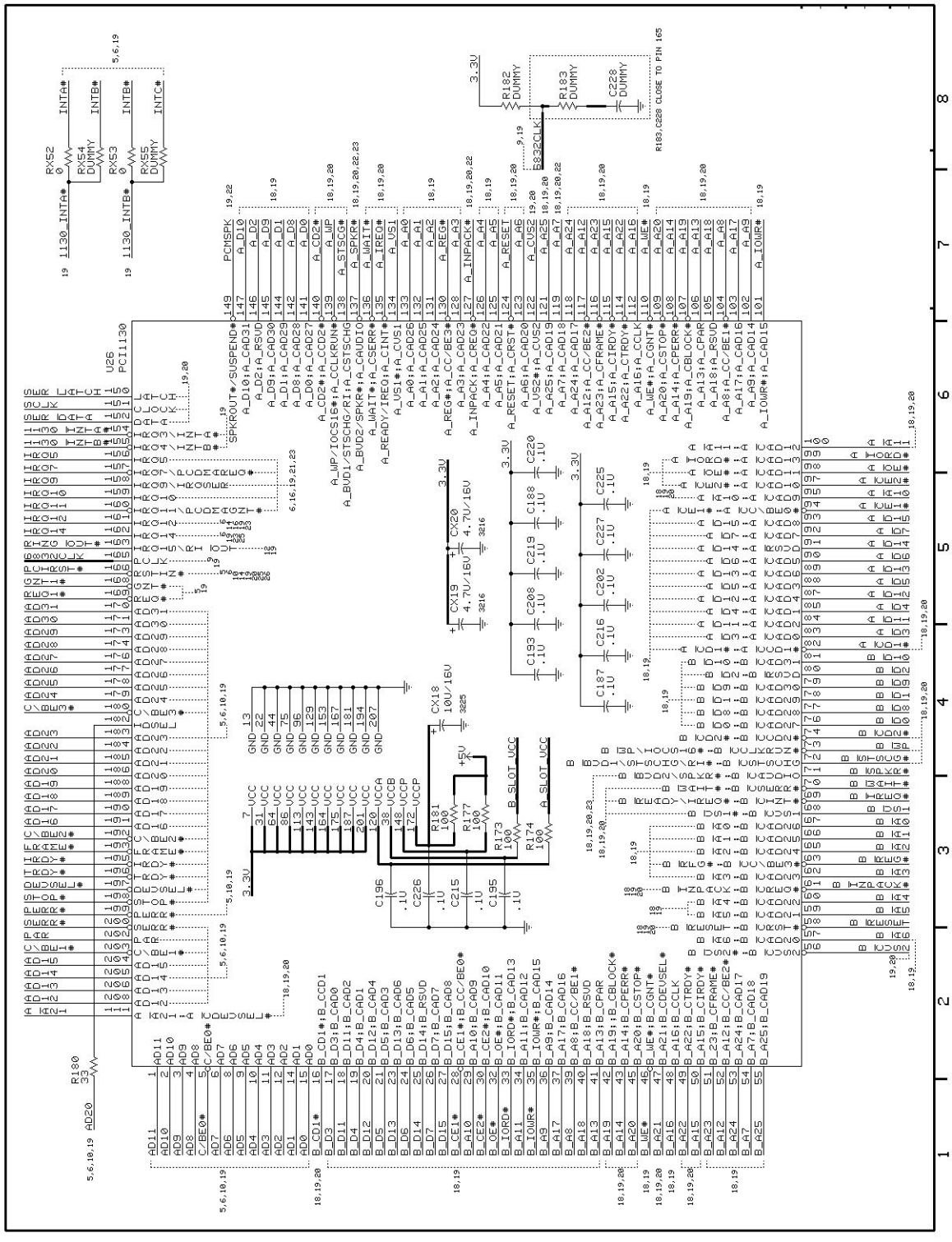


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 19 of 32)

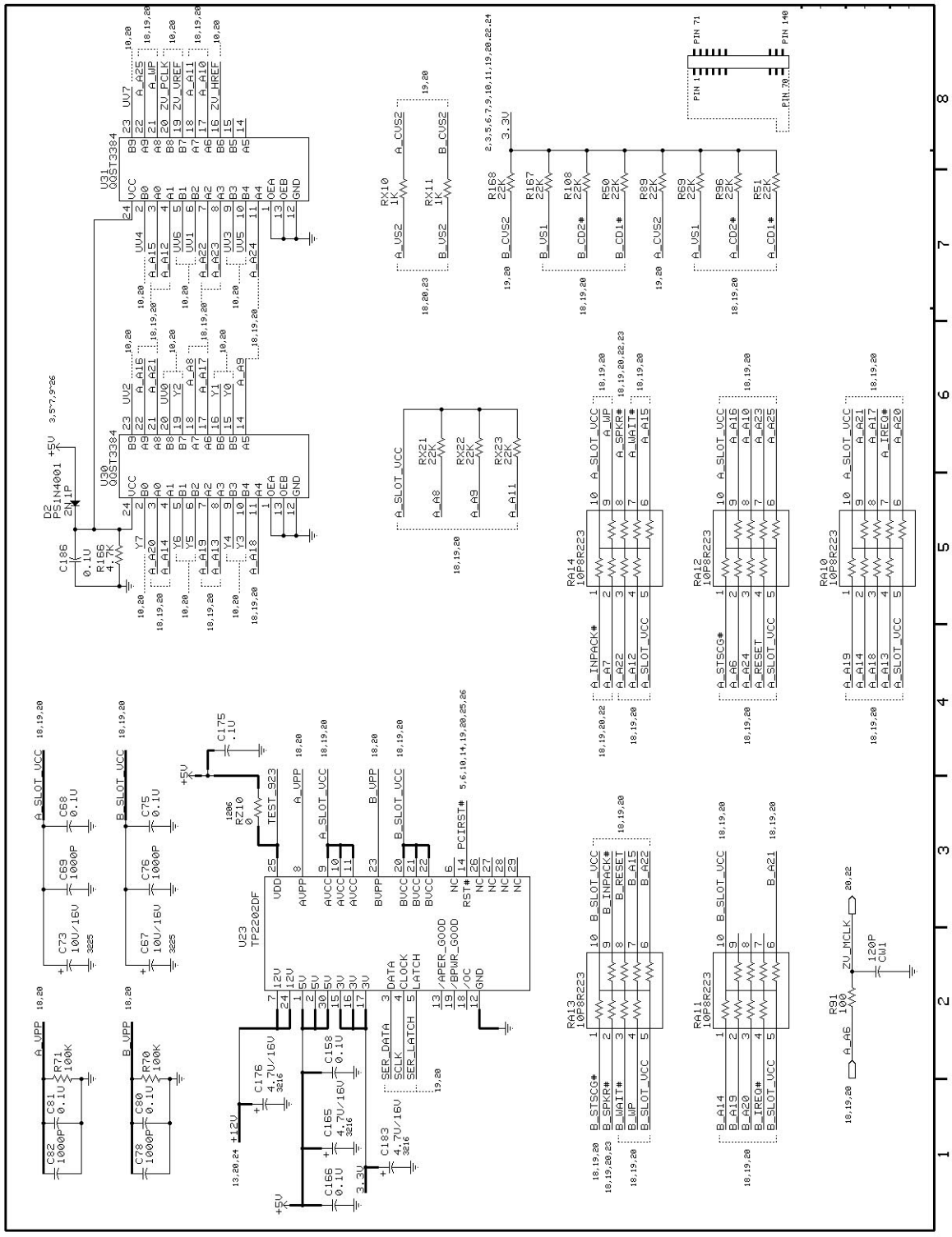


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 20 of 32)

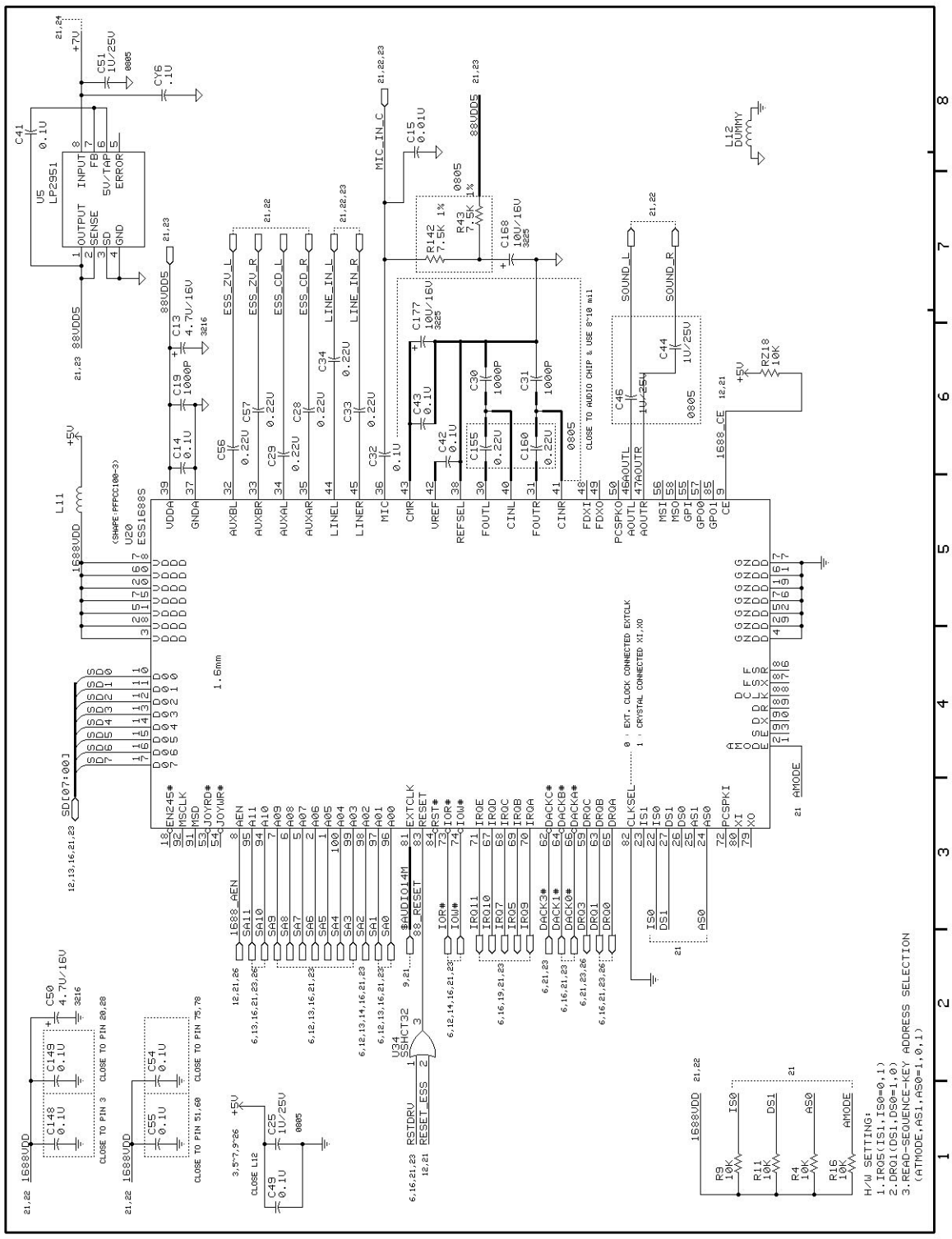


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 21 of 32)

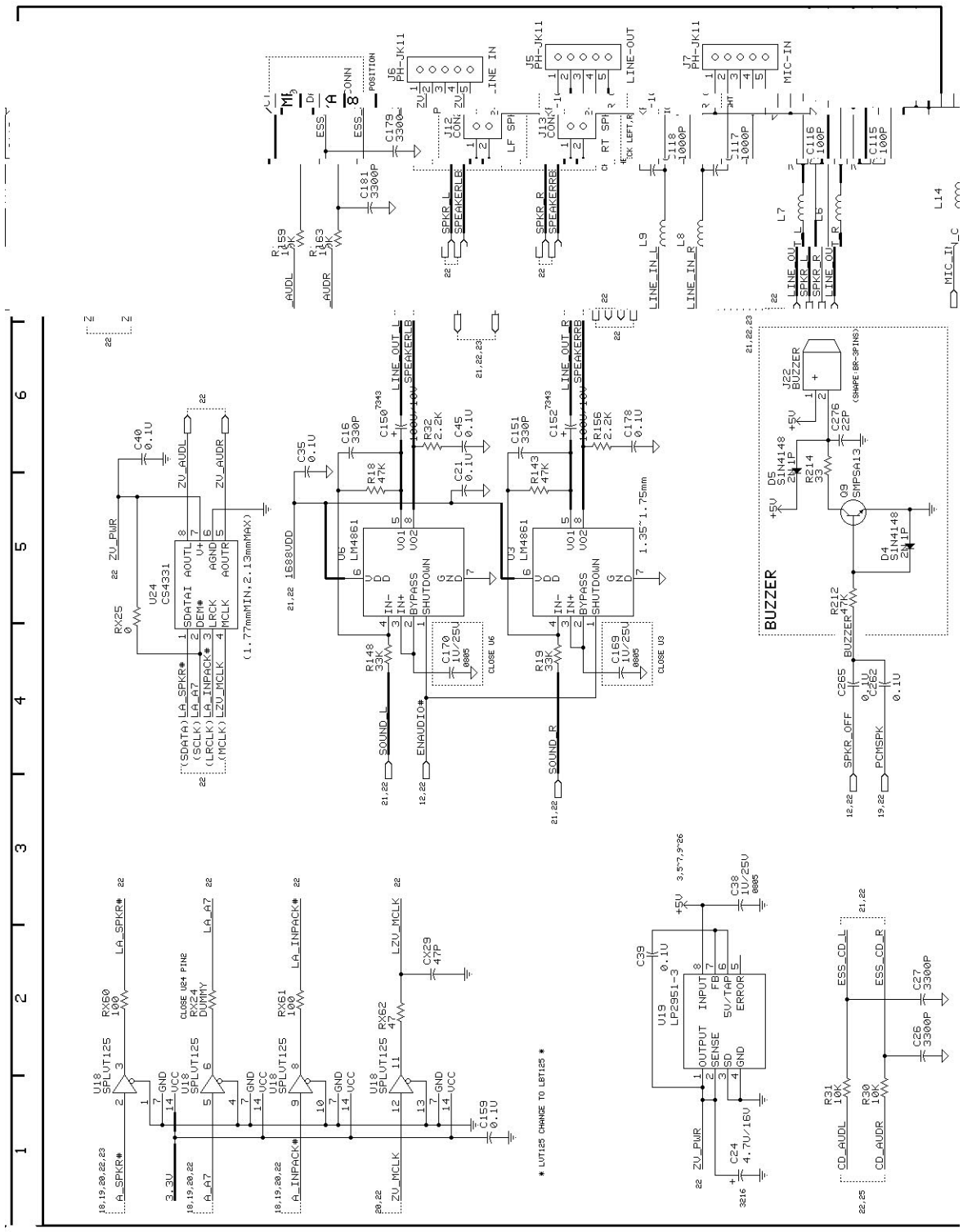


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 22 of 32)

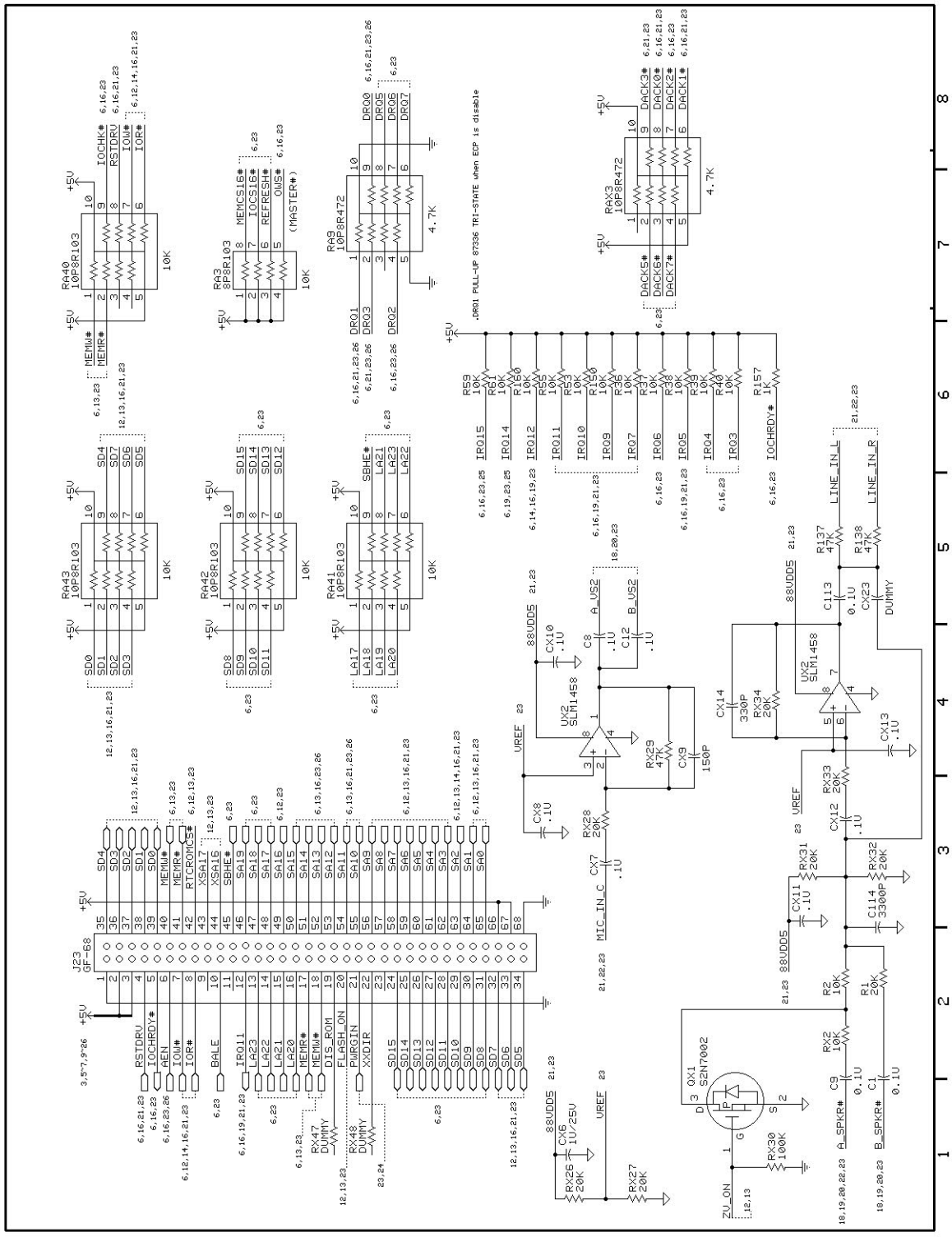


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 23 of 32)

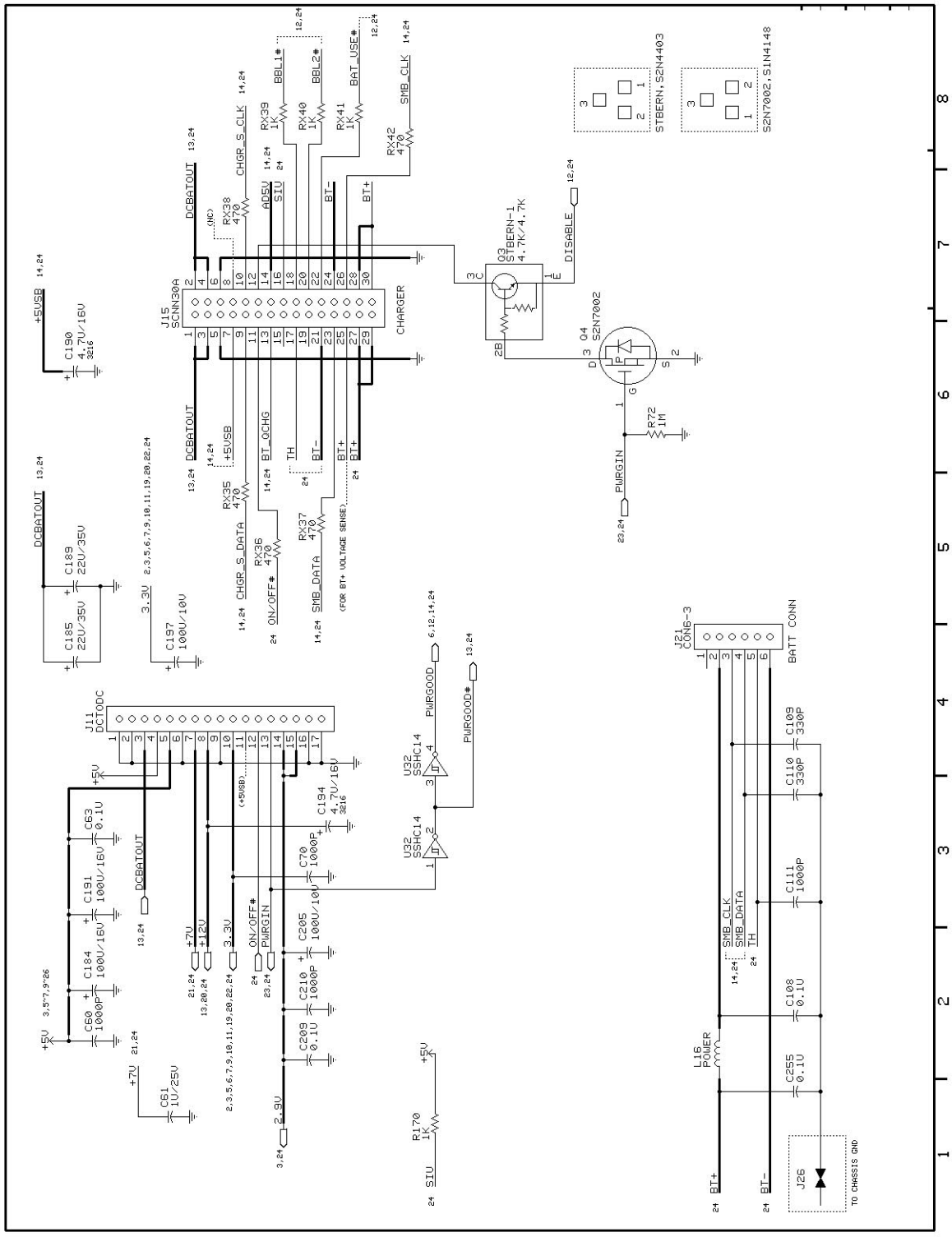


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 24 of 32)

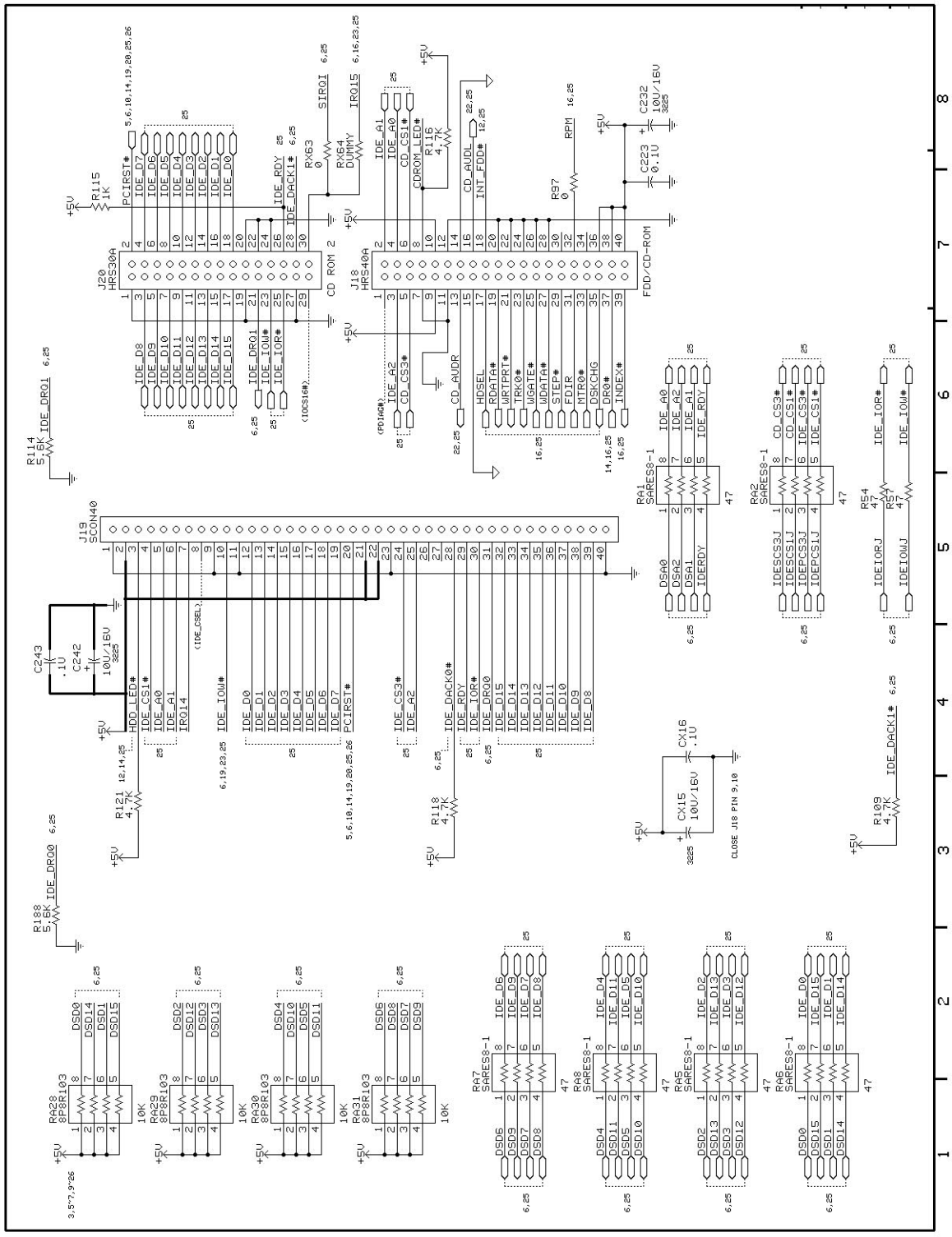


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 25 of 32)

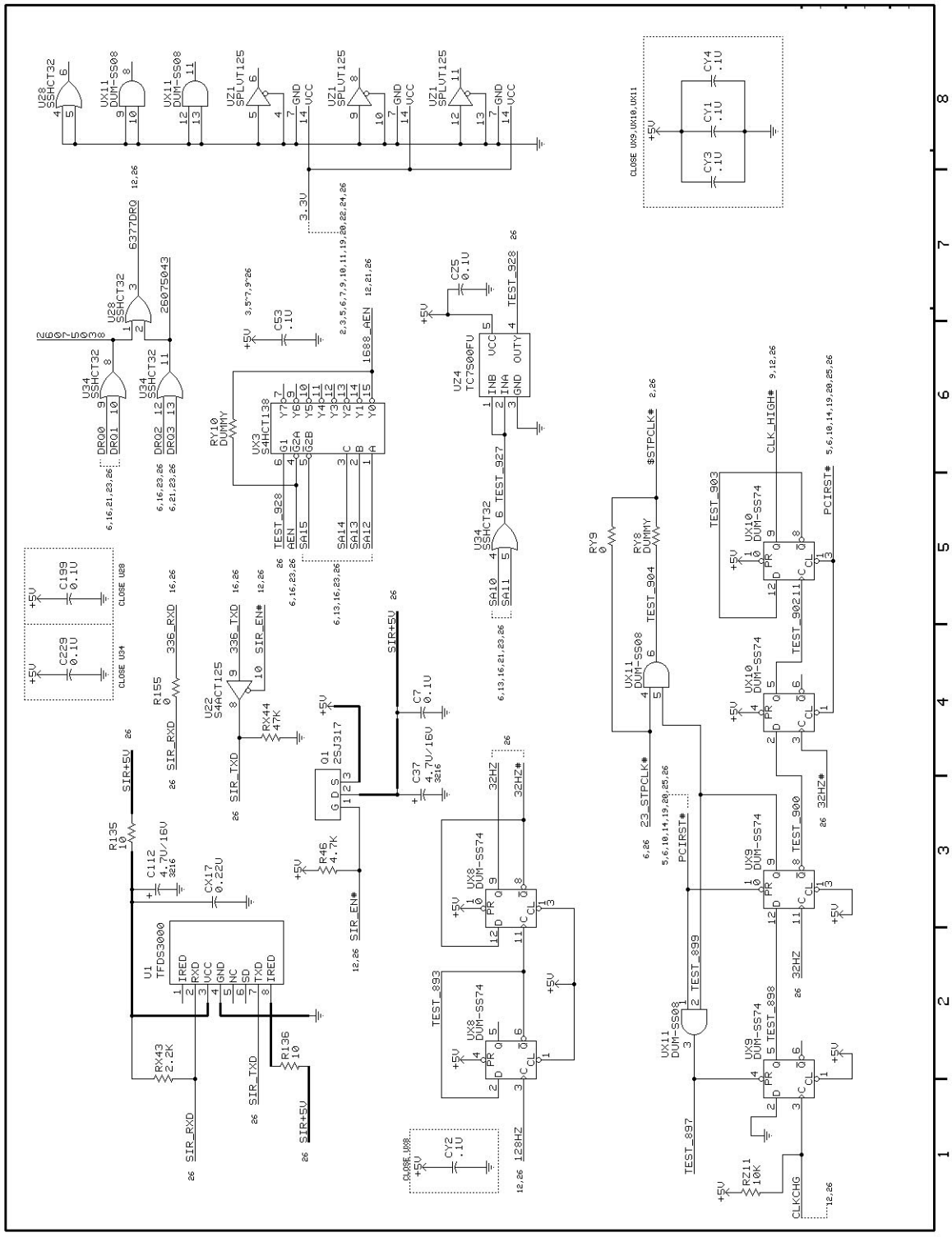


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 26 of 32)

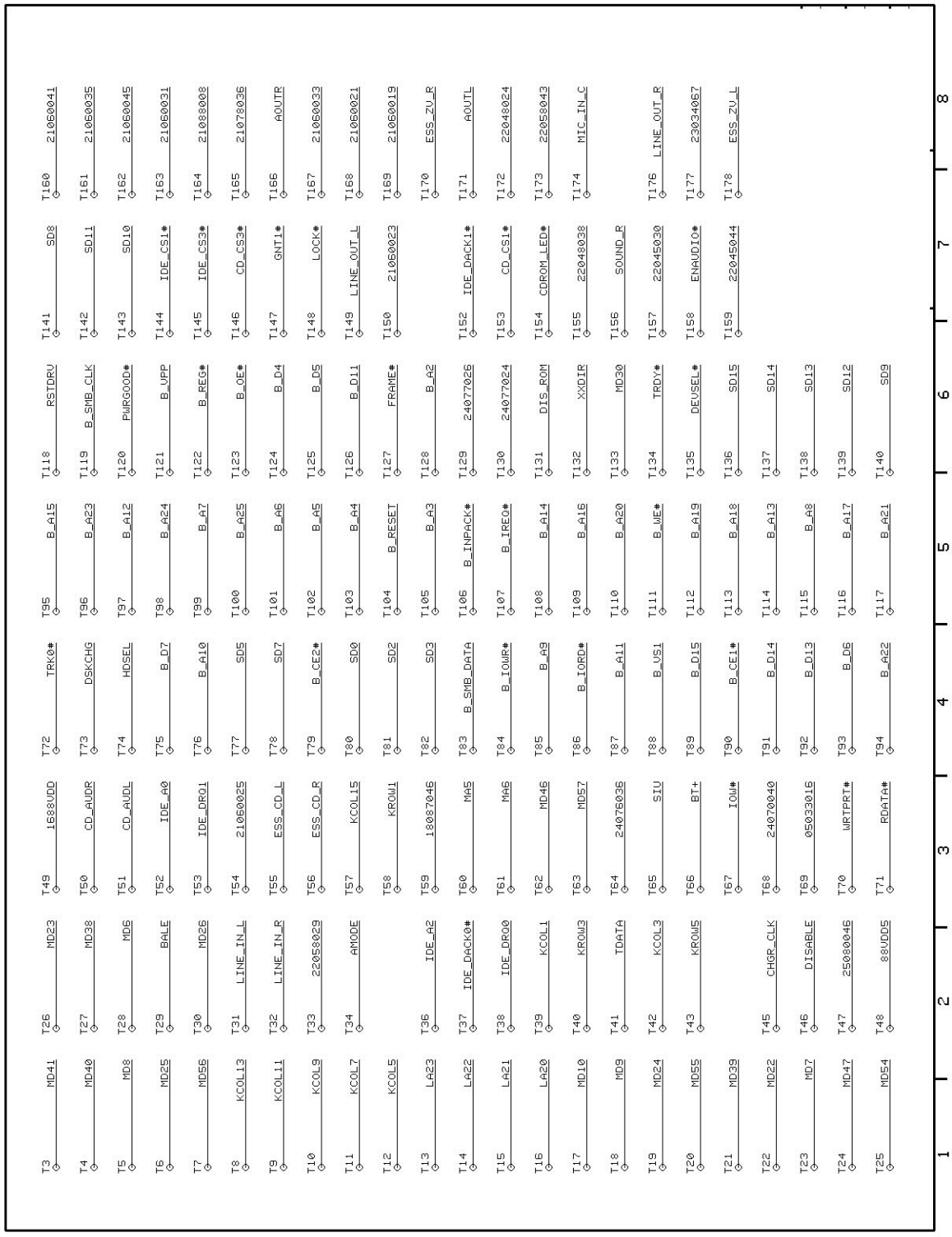


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 27 of 32)

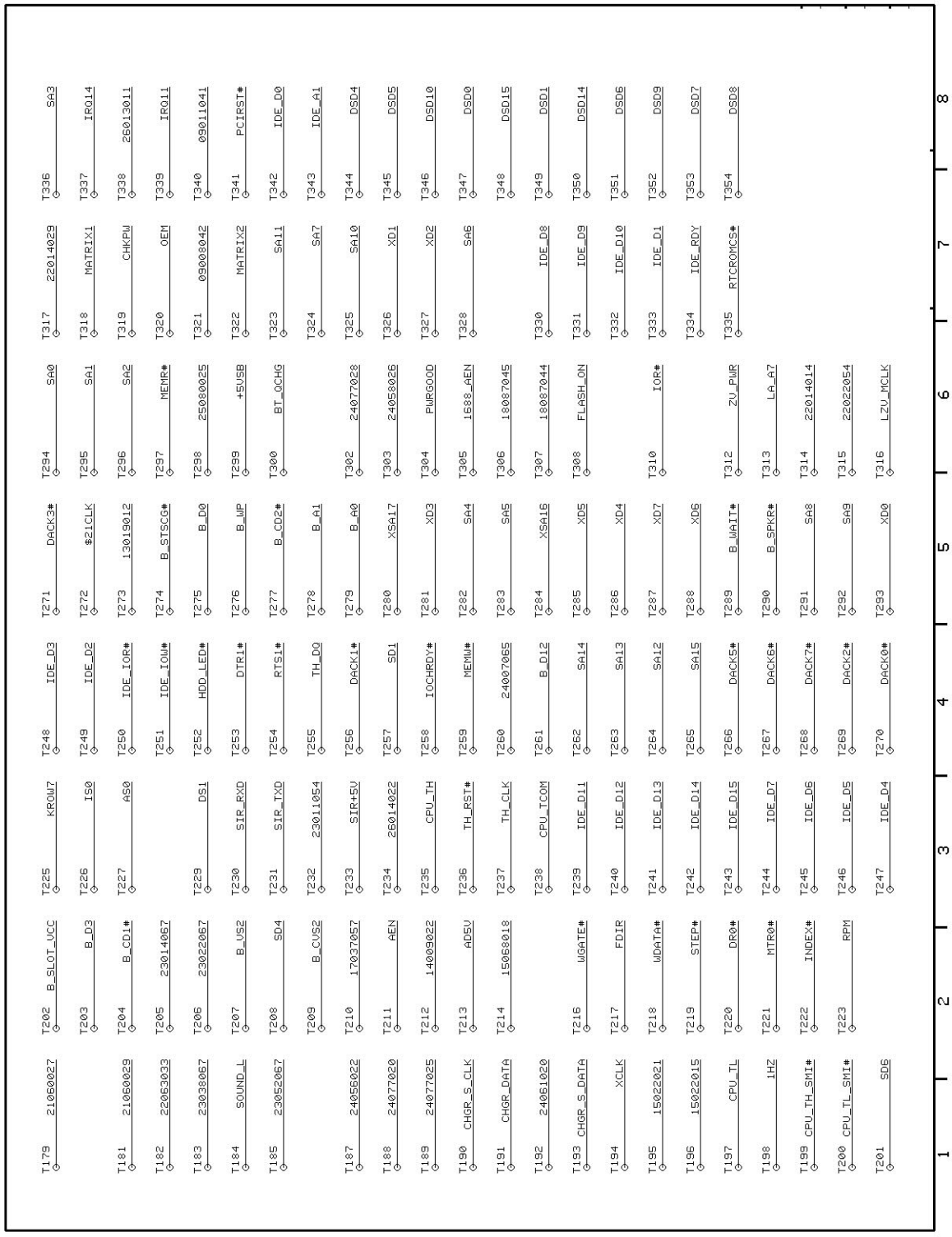


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 28 of 32)

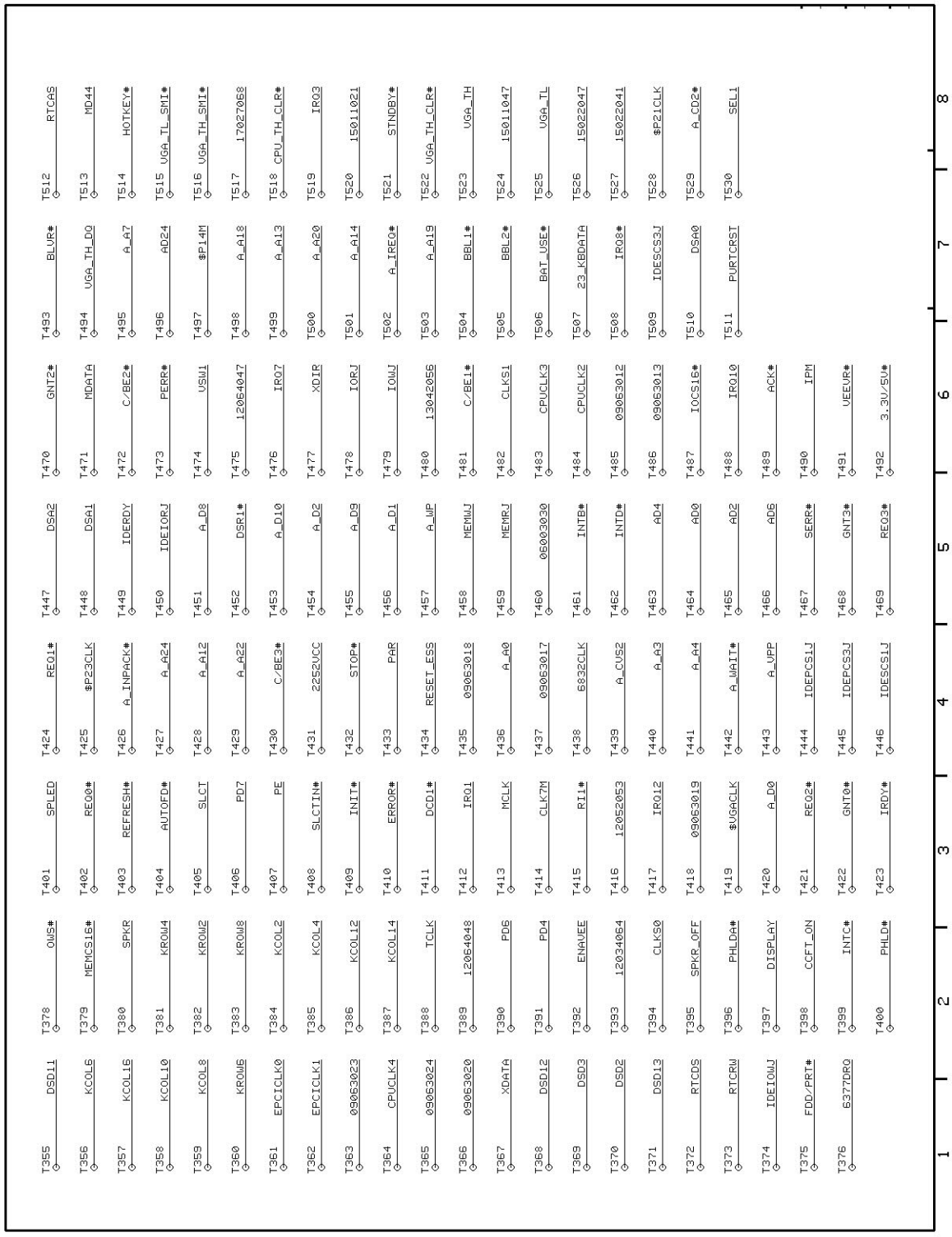


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 29 of 32)

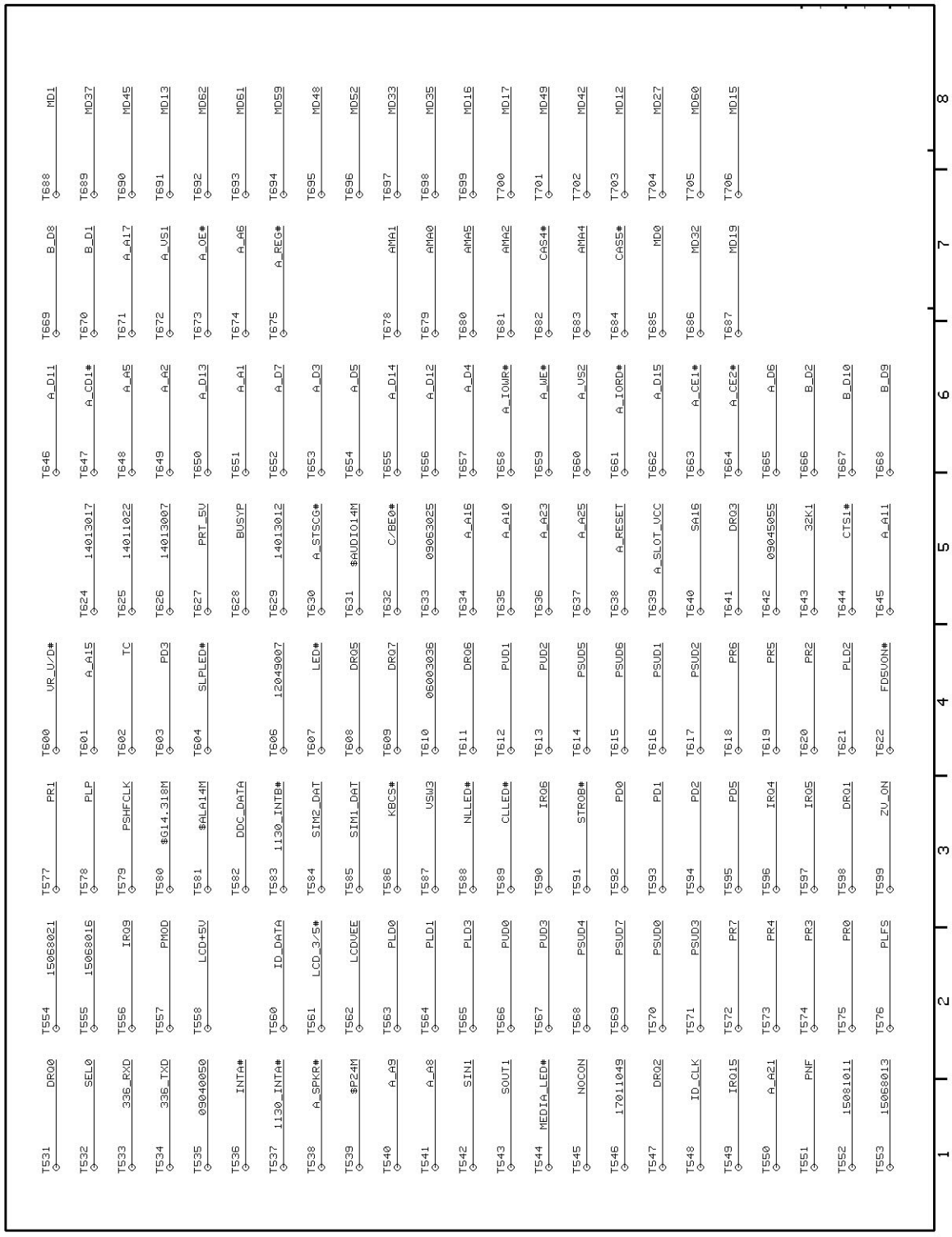


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 30 of 32)

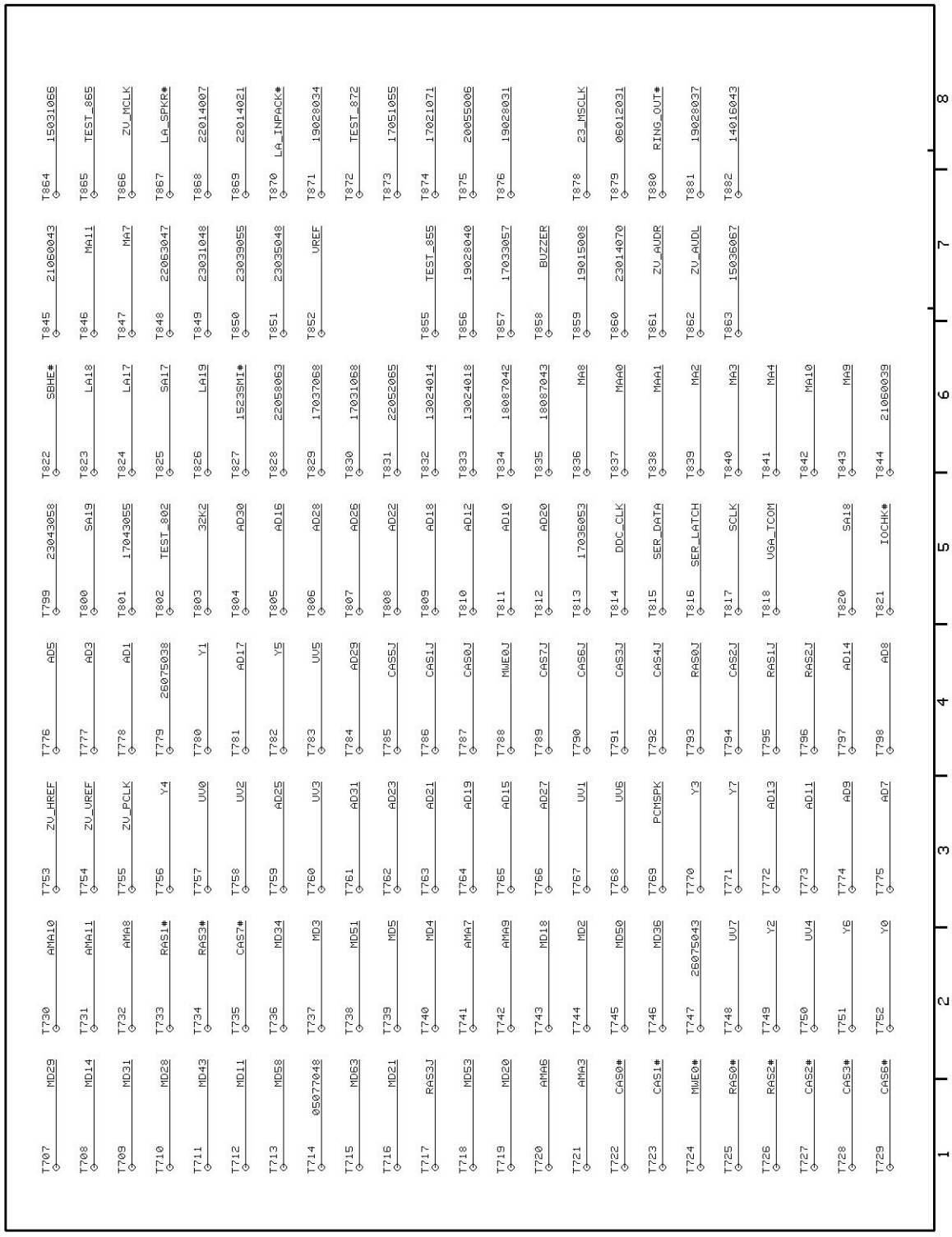


Figure A-4 Motherboard PWB Logic Diagrams (Sheet 31 of 32)



Figure A-4 Motherboard PWB Logic Diagrams (Sheet 32 of 32)

B
Model 65x Maintenance Data

B.1 Introduction

This section contains model-dependent maintenance data for the Extensa Model 65x Series Notebook Computers. For information common to all members of the Extensa 60x and 65x Series, refer to Sections 1 through 6 of this manual.

B.2 Model 65x Features Summary

The Extensa 65x Series Notebook Computers comes standard with either a 11.3-inch or 12.1-inch Super VGA Display, 1.3 GB or larger Hard Drive and is powered by a 133 MHz Pentium processor. Refer to Section 1 for a more detailed description of Extensa 65x Series features.

B.3 Field-Replaceable Units (FRUs)

Note: For FRU removal/replacement procedures, refer to Section 6 of this manual.

As shown in Figure B-1, all members of the Extensa 65x Series Notebook Computers contain two major assemblies:

- System Base Assembly
- Cover-Display Assembly

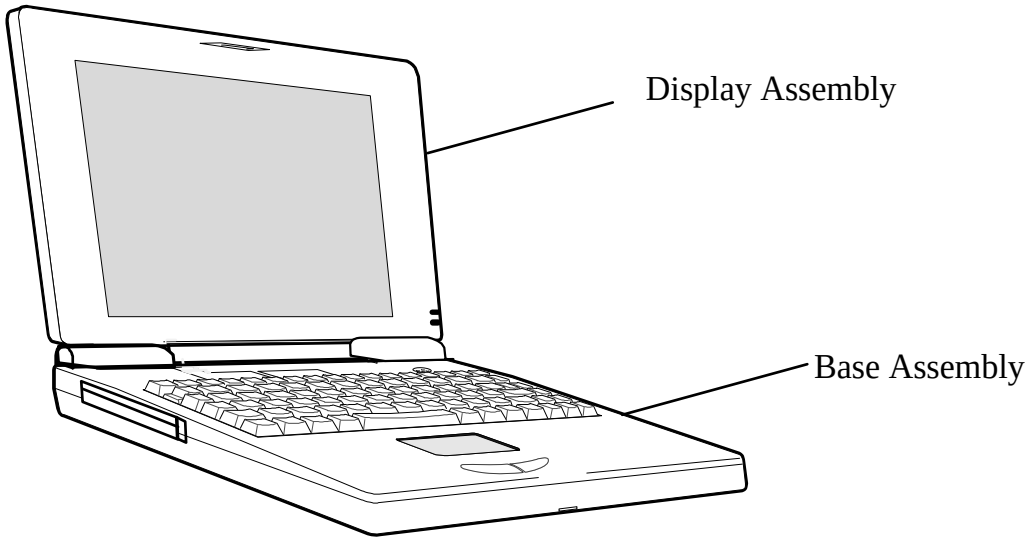


Figure B-1 Extensa 65x Series Assemblies

B.3.1 Cover-Display Assembly

The Cover-Display Assembly shown in Figure B-2, contains the LCD screen, DC-AC Inverter Board Logic, DC-DC Inverter Board Logic, bezel LCD cover and various other components as listed in Table B-1.

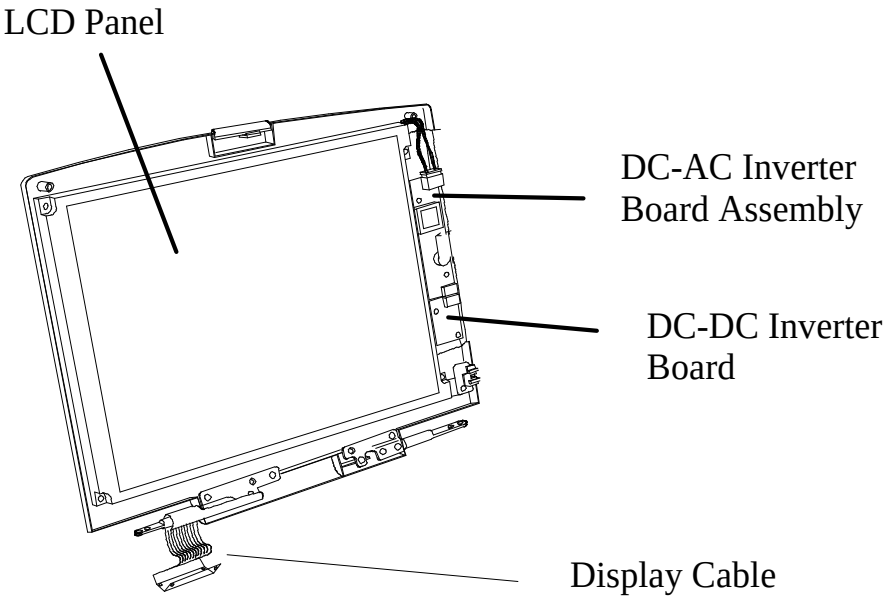


Figure B-2 Display FRUs

Table B-1 Top Cover Assembly Field-Replaceable Units (FRUs)

FRU Description	Assembly/ Disassembly Paragraph	TI Part No.
LCD Panel, 11.3", TFT	6.5.24	9813488-0001
LCD Panel, 12.1", DSTN	6.5.24	9813483-0001
Display Back Cover, 12.1"	6.5.19	9813480-0001
Display Bezel, 11.3"	6.5.22	9813482-0001
Display Bezel, 12.1"	6.5.22	9813547-0001
LCD Round Bumper	Ref	9813550-0001
TFT DC-DC Inverter PWB Assembly	6.5.23	9813493-0001
Inverter Board PWB Assembly, Ext. 500/505/ 510/515	6.5.23	9811361-0001
ASTN/DSTN DC-DC Inverter PWB Assembly	6.5.23	9813531-0001

Table B-1 Top Cover Assembly Field-Replaceable Units (FRUs)

FRU Description	Assembly/ Disassembly Paragraph	TI Part No.
Display Cable Assembly, 12.1" Display	6.5.9	9813548-0001
Display Cable Assembly, 11.3" Display	6.5.9	9813476-0001
Display Bezel, 11.3"	6.5.22	9813482-0001
Display Bezel, 12.1"	6.5.22	9813547-0001
LCD Screw Cover Right	Ref	9813551-0001
LCD Screw Cover Left	Ref	9813552-0001
Left Hinge, ASTN 10.4"	Ref	9813520-0001
Right Hinge, DSTN, 12.1"	Ref	9813521-0001

B.3.2 System Base Assembly

As shown in Figure B-3, the System Base Assembly houses a variety of field-replaceable subassemblies and components. The various assemblies and reference paragraph numbers containing removal/replacement procedures are listed in Table B-2.

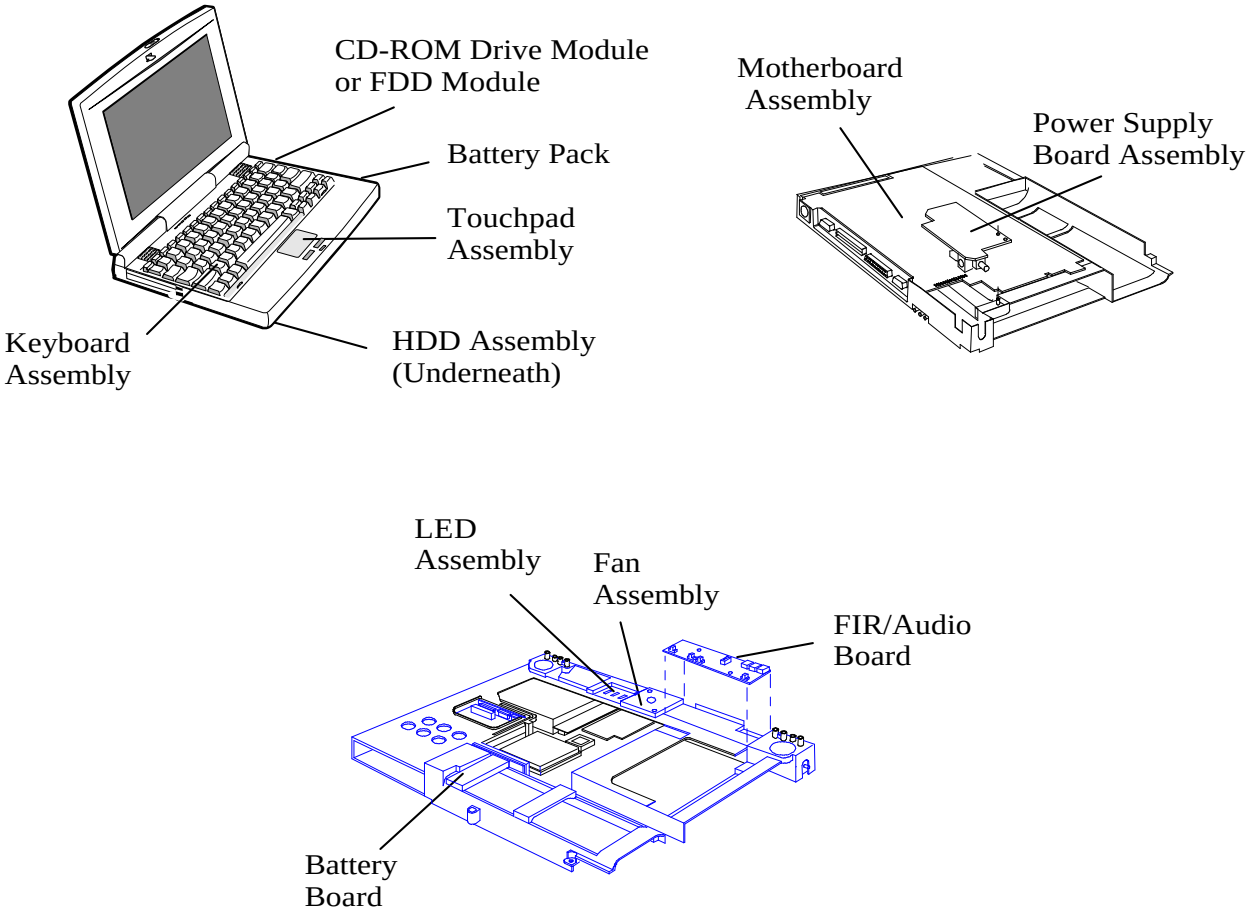


Figure B-3 Base Assembly FRUs

Table B-2 Base Assembly Field-Replaceable Units (FRUs)

Base Assembly FRU Description	Assembly/ Disassembly Paragraph	TI Part No.
PWB Assemblies		
Motherboard Logic PWB Assembly	6.5.17	9813490-0001
FIR/Audio PWB Assembly	6.5.18	9813491-0001
LED PWB Assembly	6.5.12	9813492-0001
Power Supply PWB Assembly	6.5.16	9813534-0001
Battery Connector PWB W/Cable	Ref	9813529-0001
KeyBoard Logic Transfer PWB Assembly	Ref	9813532-0001
Touchpad Assembly	6.5.21	9813516-0001
Button Board Logic w/Cable Assembly	Ref	9813501-0001
KeyBoard Logic Assemblies		
KeyBoard Logic Assembly (U.S.)	6.5.4	9805758-0001
KeyBoard Logic Assembly (UK)	6.5.4	9805758-0002
KeyBoard Logic Assembly (German)	6.5.4	9805758-0003
KeyBoard Logic Assembly (French)	6.5.4	9805758-0004
KeyBoard Logic Assembly (Spanish)	6.5.4	9805758-0005
KeyBoard Logic Assembly (Swiss/German)	6.5.4	9805758-0006
KeyBoard Logic Assembly (Italian)	6.5.4	9805758-0007
KeyBoard Logic Assembly (Portuguese)	6.5.4	9805758-0008
KeyBoard Logic Assembly (Sweden)	6.5.4	9805758-0010
KeyBoard Logic Assembly (Danish)	6.5.4	9805758-0012
KeyBoard Logic Assembly (Norwegian)	6.5.4	9805758-0013
KeyBoard Logic Assembly (Finnish)	6.5.4	9805758-0014
KeyBoard Logic Assembly (Belgian)	6.5.4	9805758-0015
KeyBoard Logic Assembly (Chinese)	6.5.4	9805758-0019
KeyBoard Logic Assembly (Korean)	6.5.4	9805758-0020
KeyBoard Logic Assembly (Japanese)	6.5.4	9805758-0021

Table B-2 Base Assembly Field-Replaceable Units (FRUs)

Base Assembly FRU Description	Assembly/ Disassembly Paragraph	TI Part No.
Cables		
CD-ROM Cable	6.5.8	9813523-0001
Peripherals		
FDD Assy, 1.44 MB	6.5.8	9813484-0001
HDD, 1.44 GB	6.5.3	9813536-0001
CD-ROM Drive, 8X	6.5.8	9813543-0001
Covers, Doors, Buttons		
Top Cover Assembly	6.5.11	9813481-0001
Memory Expansion Cover	6.5.5	9813510-0001
Left Hinge Cover	Ref	9813508-0001
Right Hinge Cover	Ref	9813509-0001
Hinge Cable Cover	Ref	9813507-0001
HDD Cover	6.5.4	9813479-0001
Battery Door, 600 Series	6.5.1	9813576-0001
Misc		
Base Assembly, 65x	6.5.10	9813477-0001
Battery, Duracell, Ni-MH, SMB, (10.8V, 2800 mah)	6.5.1	9813495-0001
AC Power Adapter, 45W, ADP-45HB	Ref	9813497-0001
Fan with connector cable	6.5.11	9813538-0001
Inside Frame Assembly	6.5.15	9813487-0001
Heat Sink Assembly, 65x	6.5.7	9813475-0001
CPU IC (P54CSLM-133 MHz, 3.1V	6.5.8	9813530-0001
Mouse Buttons	6.5.21	9813527-0001
PCMCIA Connector Module	6.5.20	9813549-0001
Right Speaker with cable	Ref	9813494-0001

Table B-2 Base Assembly Field-Replaceable Units (FRUs)

Base Assembly FRU Description	Assembly/ Disassembly Paragraph	TI Part No.
Left Speaker with cable	Ref	9813535-0001
Cover-closed switch	Ref	9813537-0001
Cover, FIR/Audio Board	6.5.18	9813504-0001
Microphone W/Cable	Ref	9813489-0001

B.4 65x Logic Diagrams

The remainder of this section contains logic diagrams for the Extensa Model 65x Series. Figure B-4 (36 sheets) contains the logic diagrams for the main board; FigureB-5 contains the logic diagrams for the VGA Board.

PAGE	DESCRIPTION
P1	BLOCK DIAGRAM
	CPU
P2	CPU (P54CSLM120M,133MHz)
P3	CPU (Power Pins) & THERMAL SENSOR
	CHIP SET (ALADDIN III)
P4	M1521 (CPU-PCI bridge,Memory,Cache and Buffer CTRL)
P5	M1521 (cont.)
P6	M1523 (PCI-to-ISA Bridge) & DACK# DeCODER
	CLOCK GENERATOR
P7	CY2252 & 32K OSCILLATOR
	MEMORY
P8	L2 CACHE (256KB synchronous pipeline burst SRAM)
P9	TAG MEMORY, EDO DRAM
P10	EDO DRAM (BANK 0 => 16M on BOARD) & DRAM DAMPING
P11	DIMM I (BANK 1,2)
P12	DIMM II (BANK 3,4)
	PCI INTERFACE
P13	VGA CONTROLLER (C&T 65550)
P14	C&T 65550 (cont.)
P15	EDO VDRAM (2M)
P16	LCD & CRT CONN
P17	PCMCIA CONTROLLER (PCI1130)
P18	PCMCIA CONN & PCMCIA POWER S.W.
P19	FEATURE B.D. & ZV PORT & PCMCIA PULL-UP
P20	HDD INTERFACE
P21	CD_ROM/FDD CONN & Q.S.
	ISA INTERFACE
P22	AUDIO CHIP (ESS ES1878S)
P23	BIOS (PLCC 28F020) & RTC (B0328SES)
P24	KBC (Mitsubishi M38813), LED B.D.
P25	K.B. MODULE & PS2 CONN & AUDIO/FIR MODULE & BUZZER
P26	SUPER I/O (NS87338)
P27	PRINTER PORT
P28	SERIAL PORT & DOCKING PORT
P29	GOLDEN FINGER & ISA PULL-UP
	POWER
P30	POWER (AMBIT) -> CHARGER,DC/DC & SMART BATTERY
P31	PMU CHIP (M6377)
P32	STATE MACHINE (M6375C)
P33	WAKEUP CIRCUIT & POWER MOS
P34	UNUSED PARTS & SPARE PARTS
P35	SPARE PAGE - DIODE & TRANSISTOR PHYSICAL SHAPE
P36	DECOUPLING CAPACITORS (EVEN DISTRIBUTED)

Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 1 of 36)

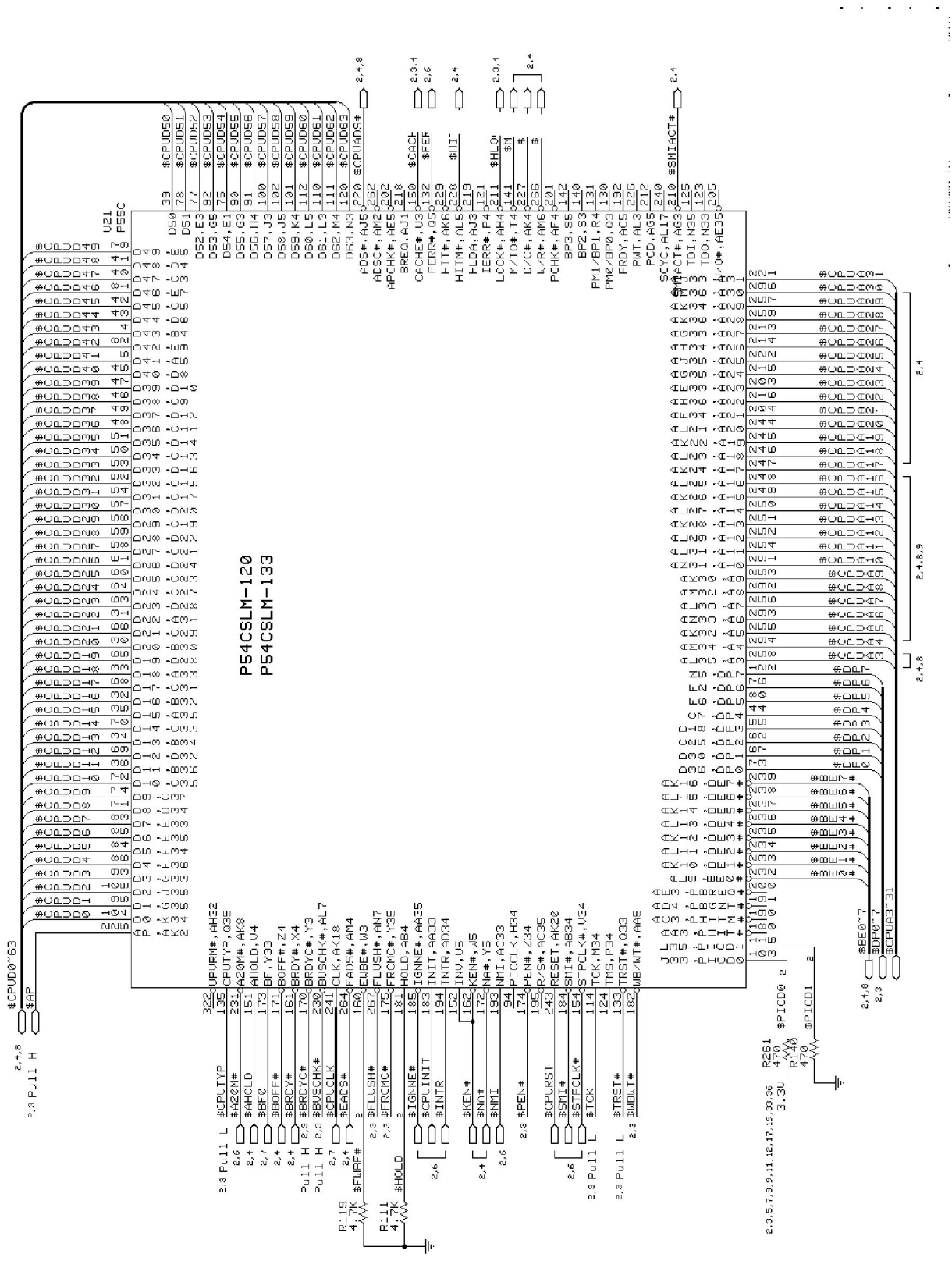


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 2 of 36)

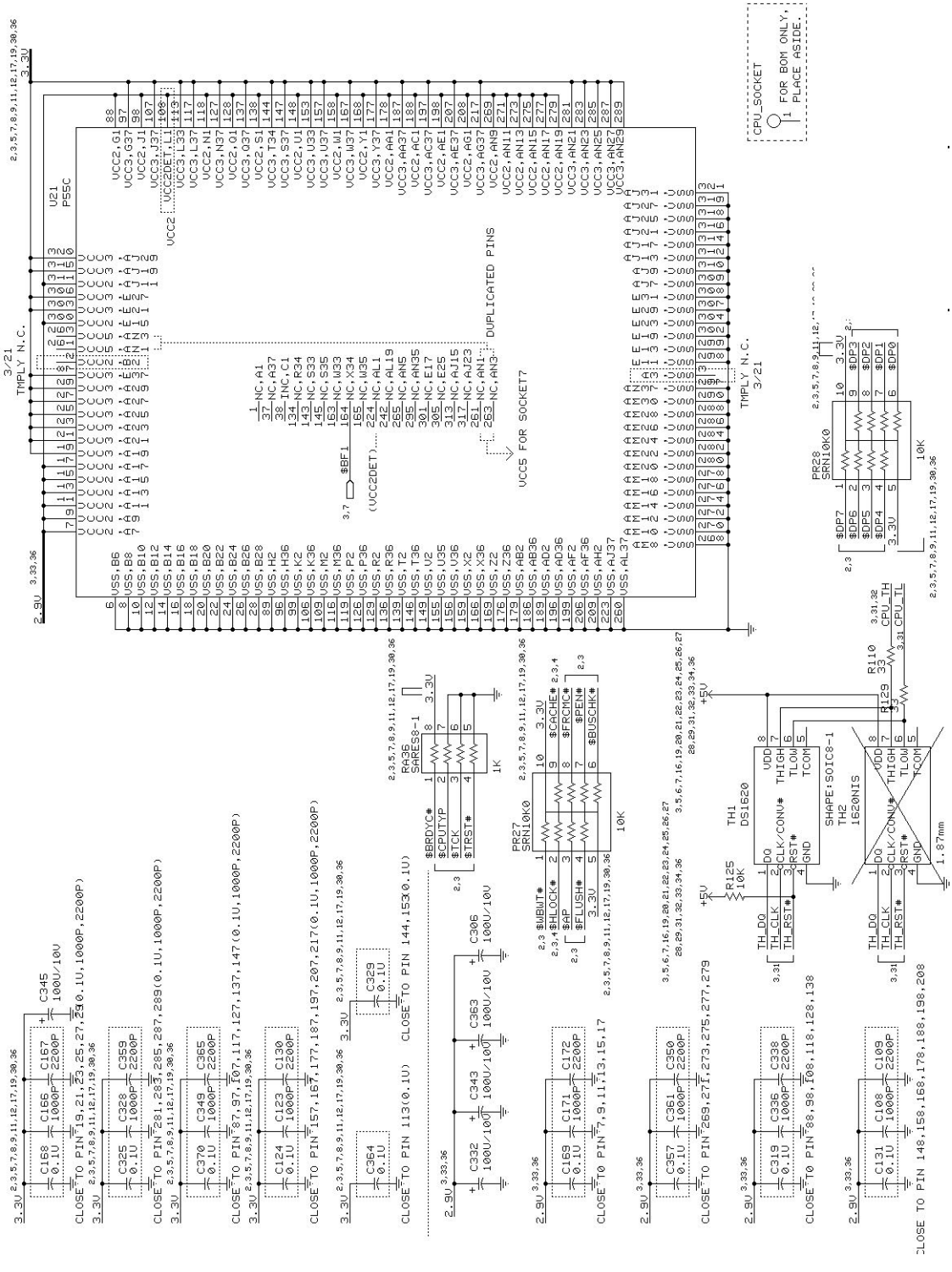


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 3 of 36)

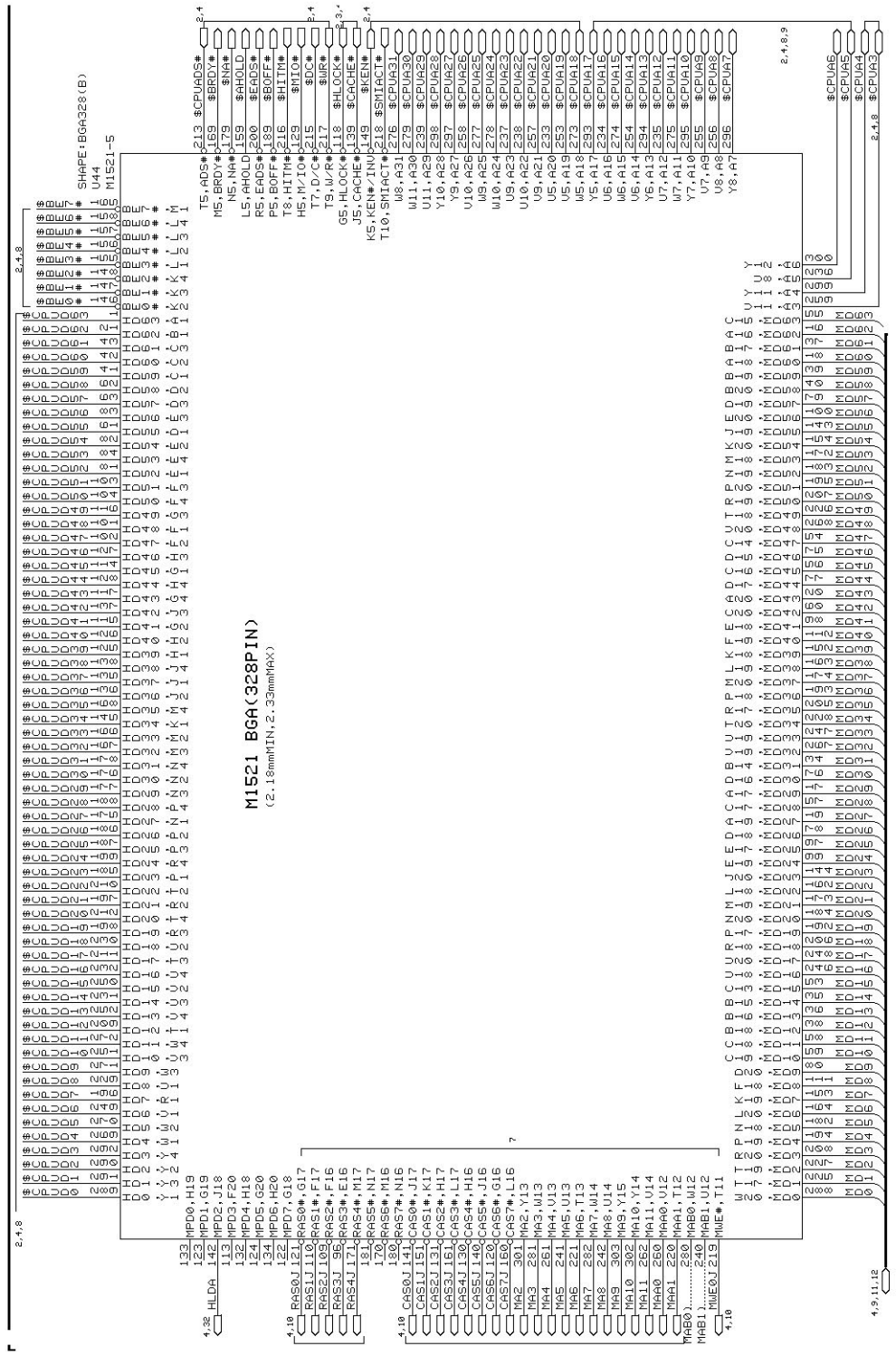


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 4 of 36)

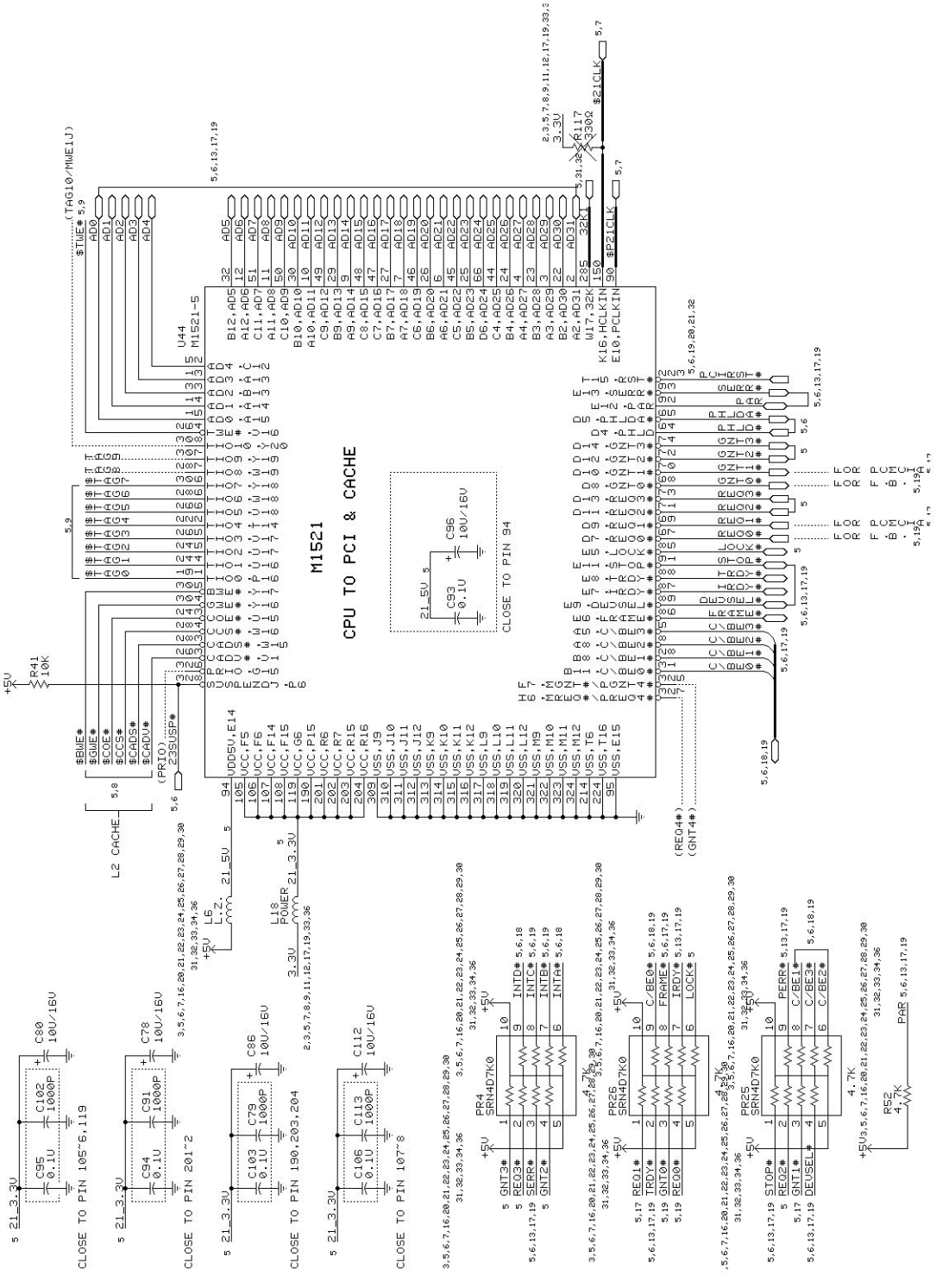


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 5 of 36)

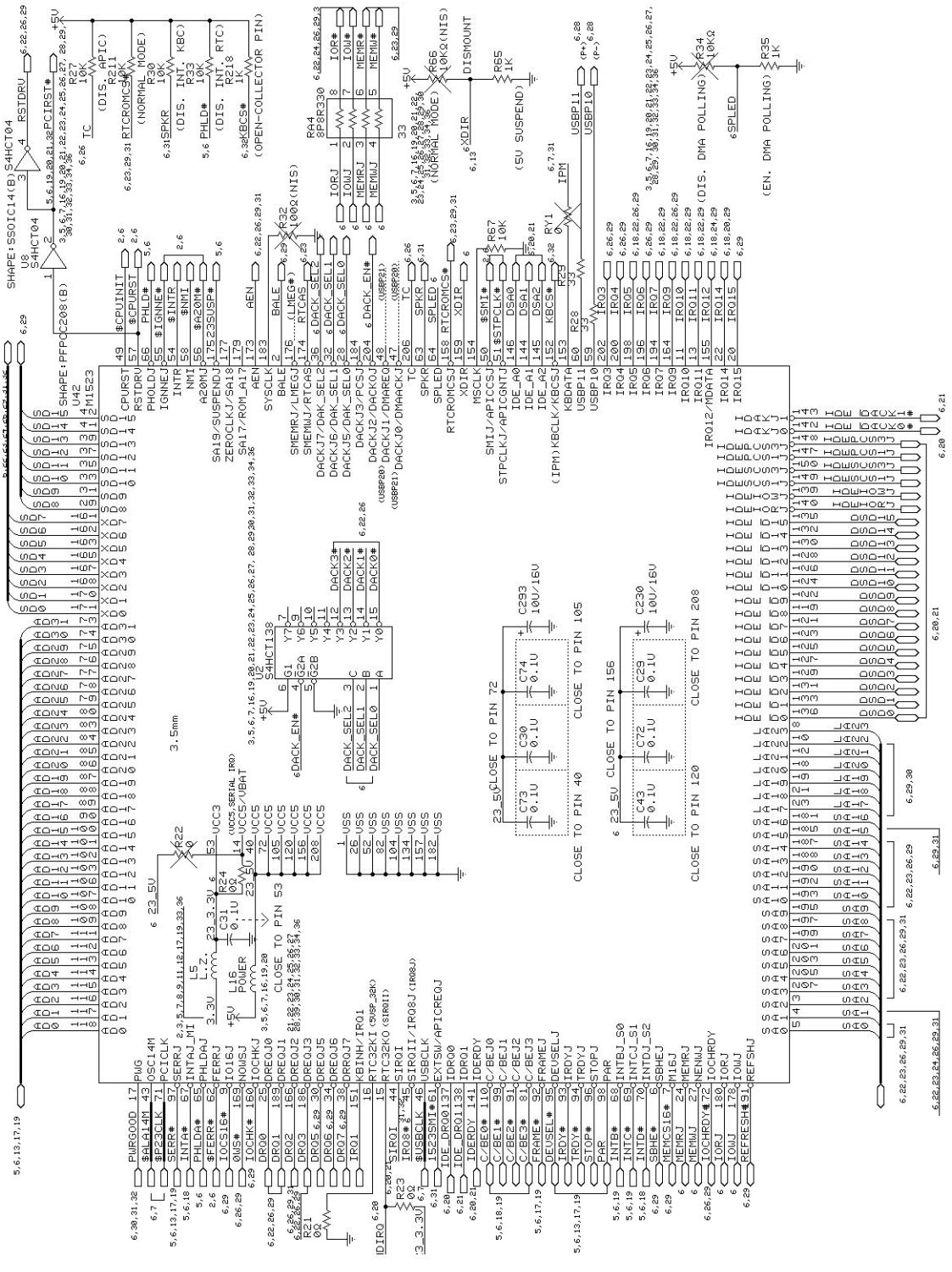


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 6 of 36)

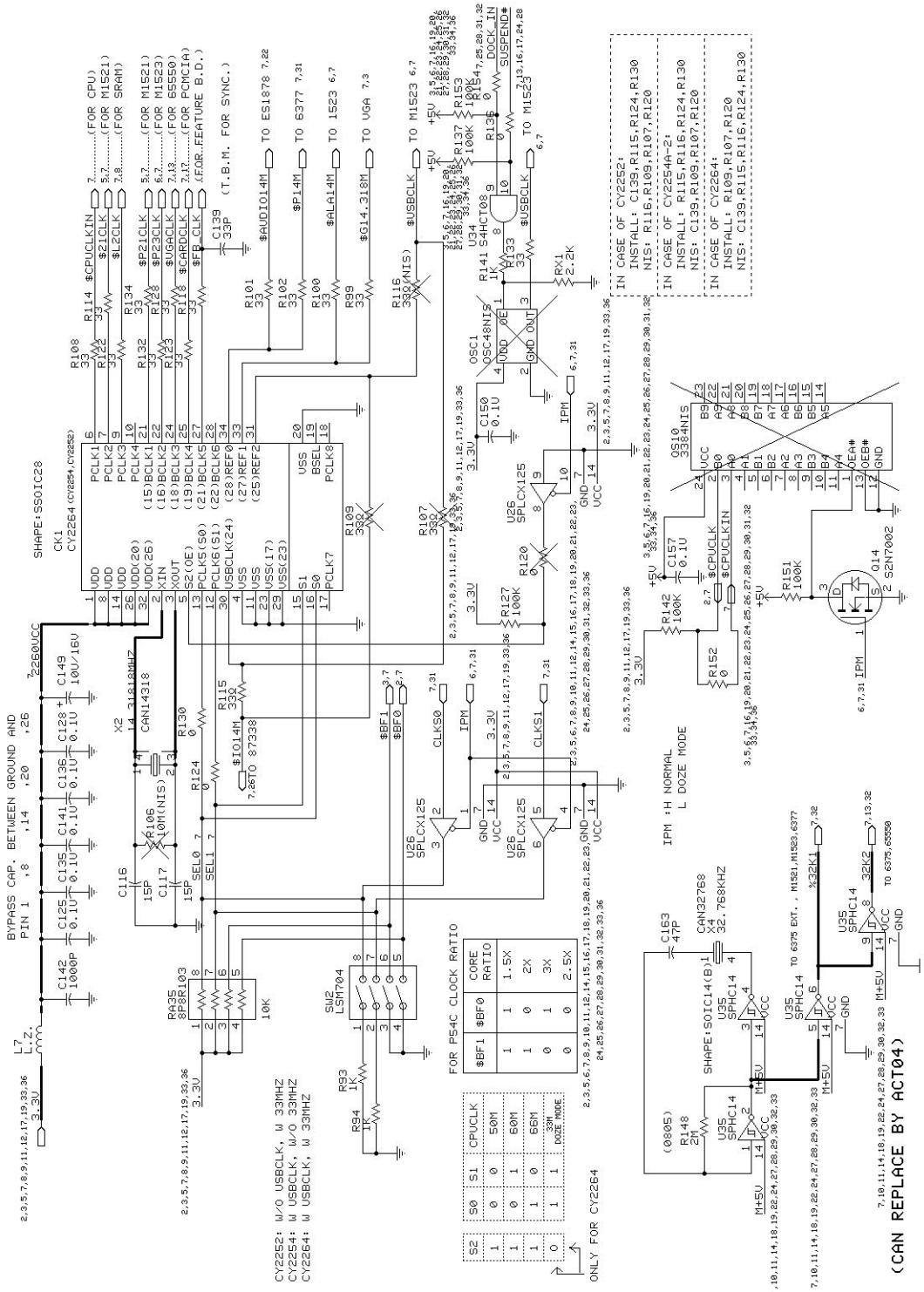


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 7 of 36)

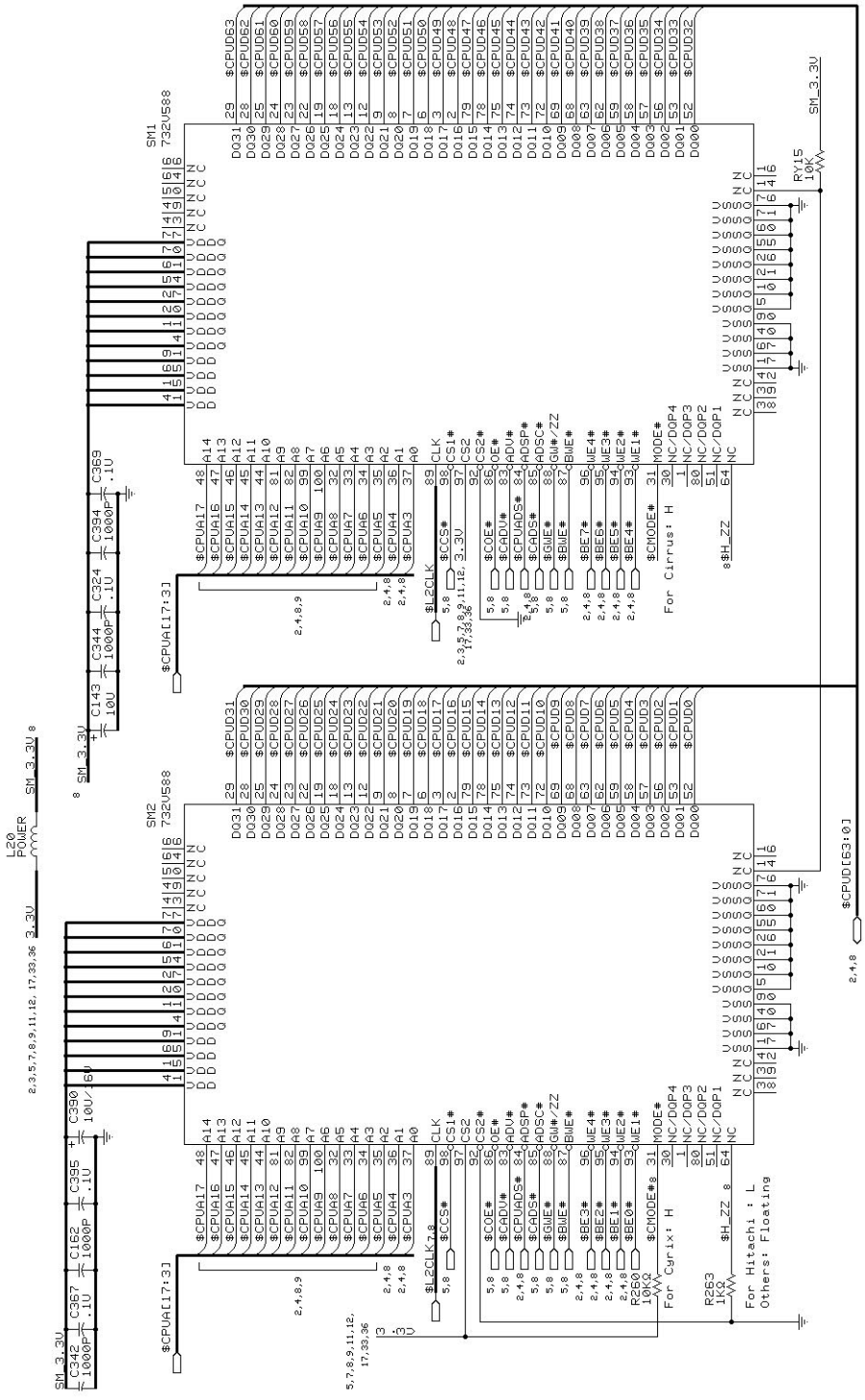


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 8 of 36)

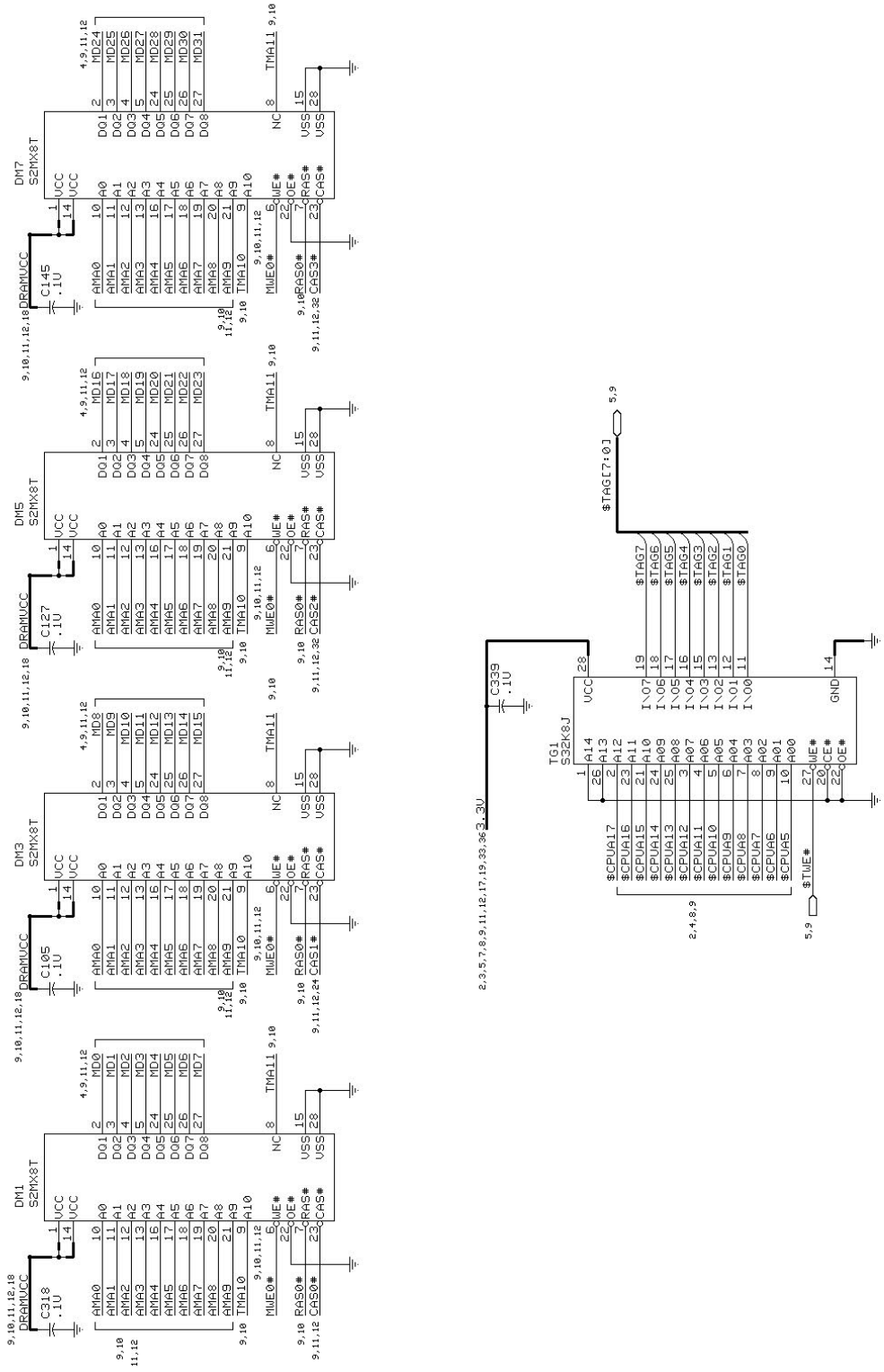


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 9 of 36)

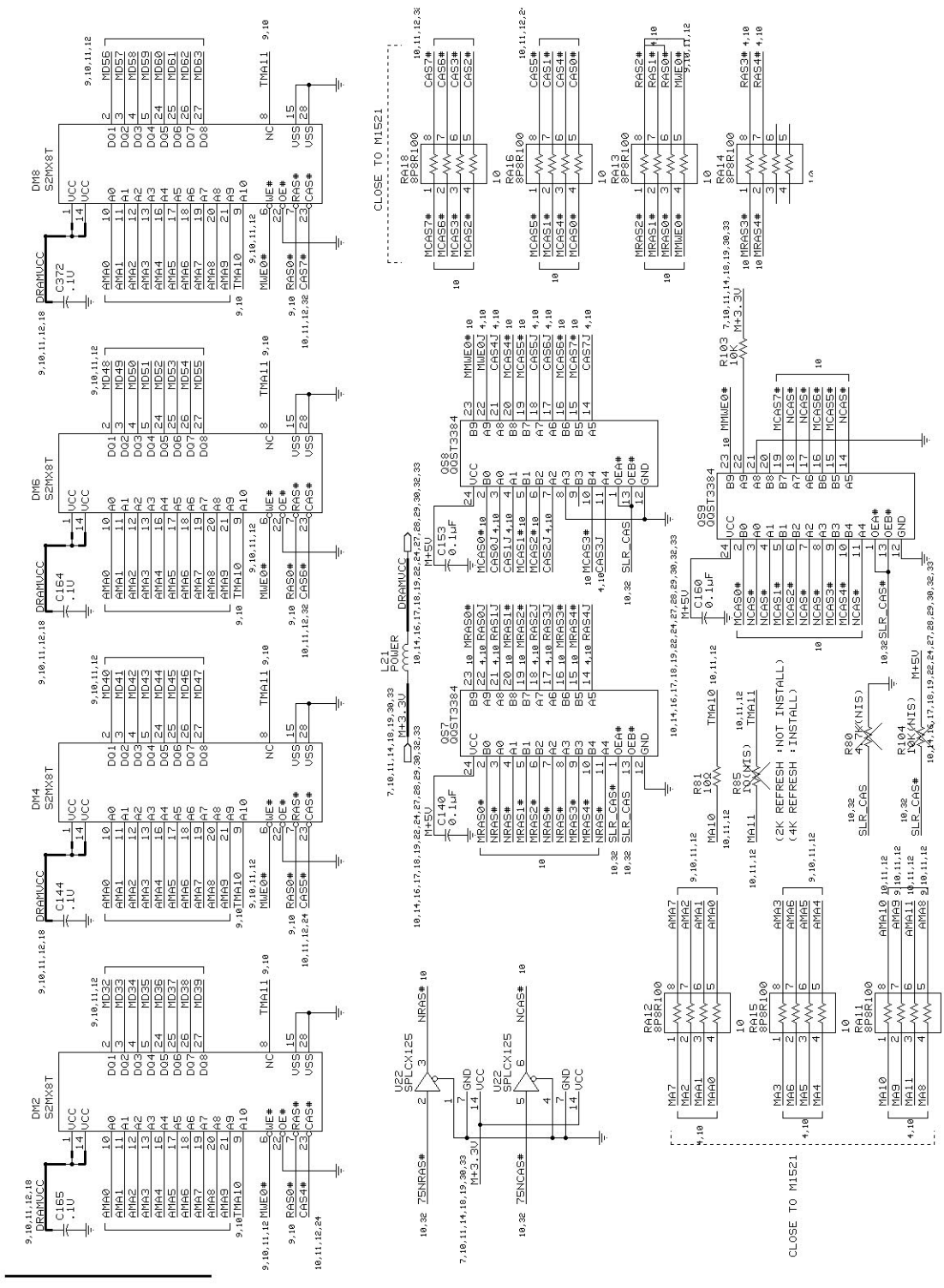


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 10 of 36)

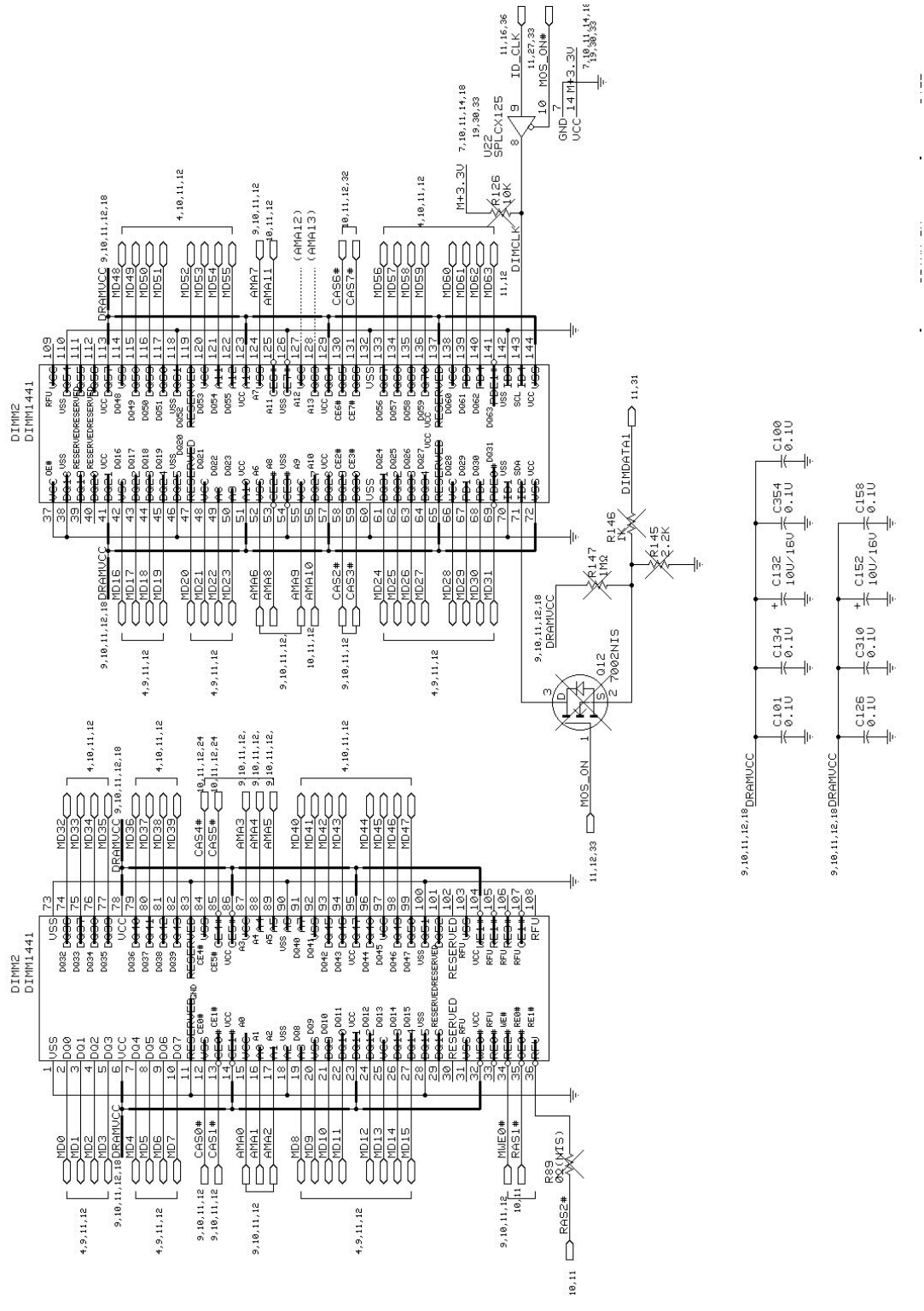


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 11 of 36)

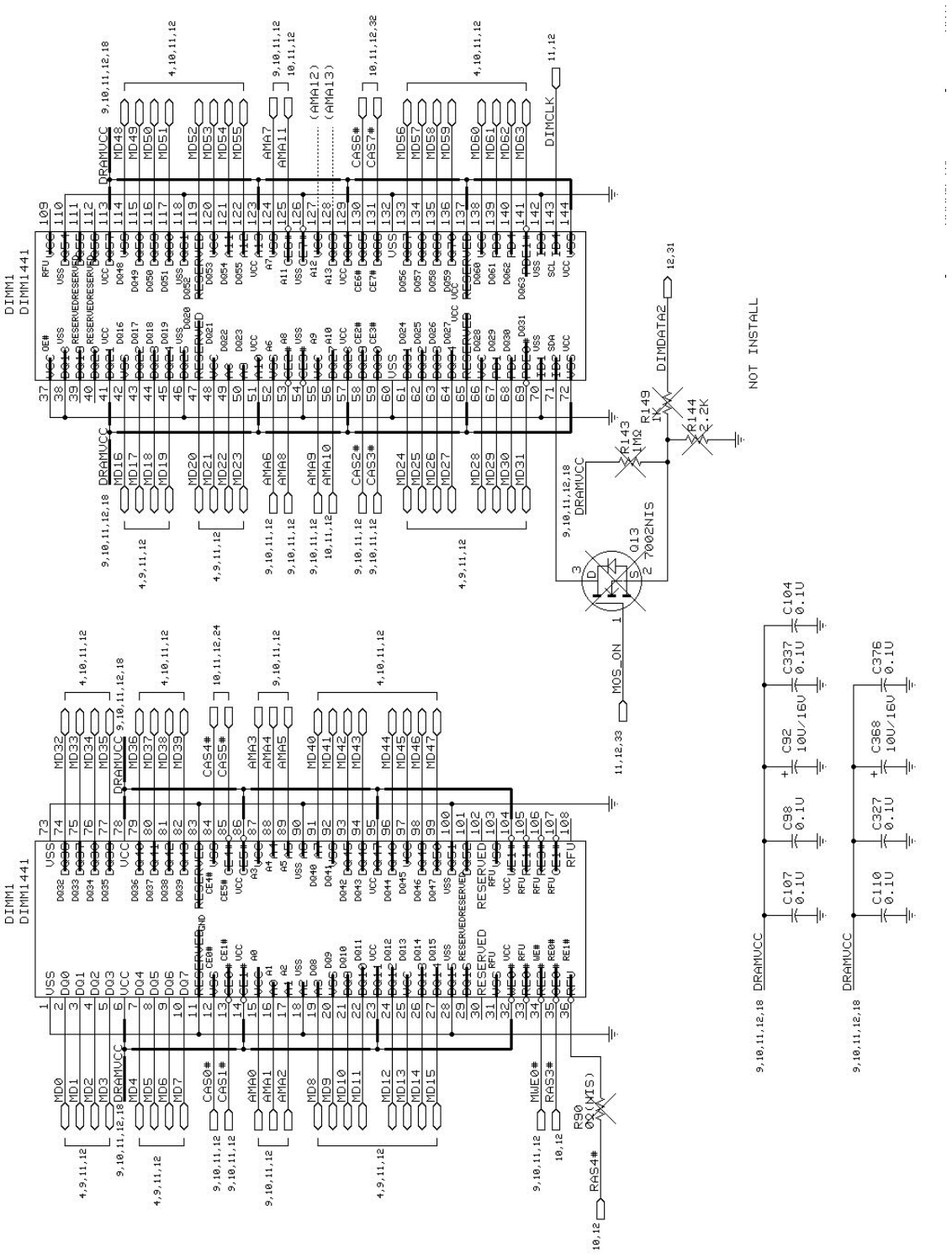


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 12 of 36)

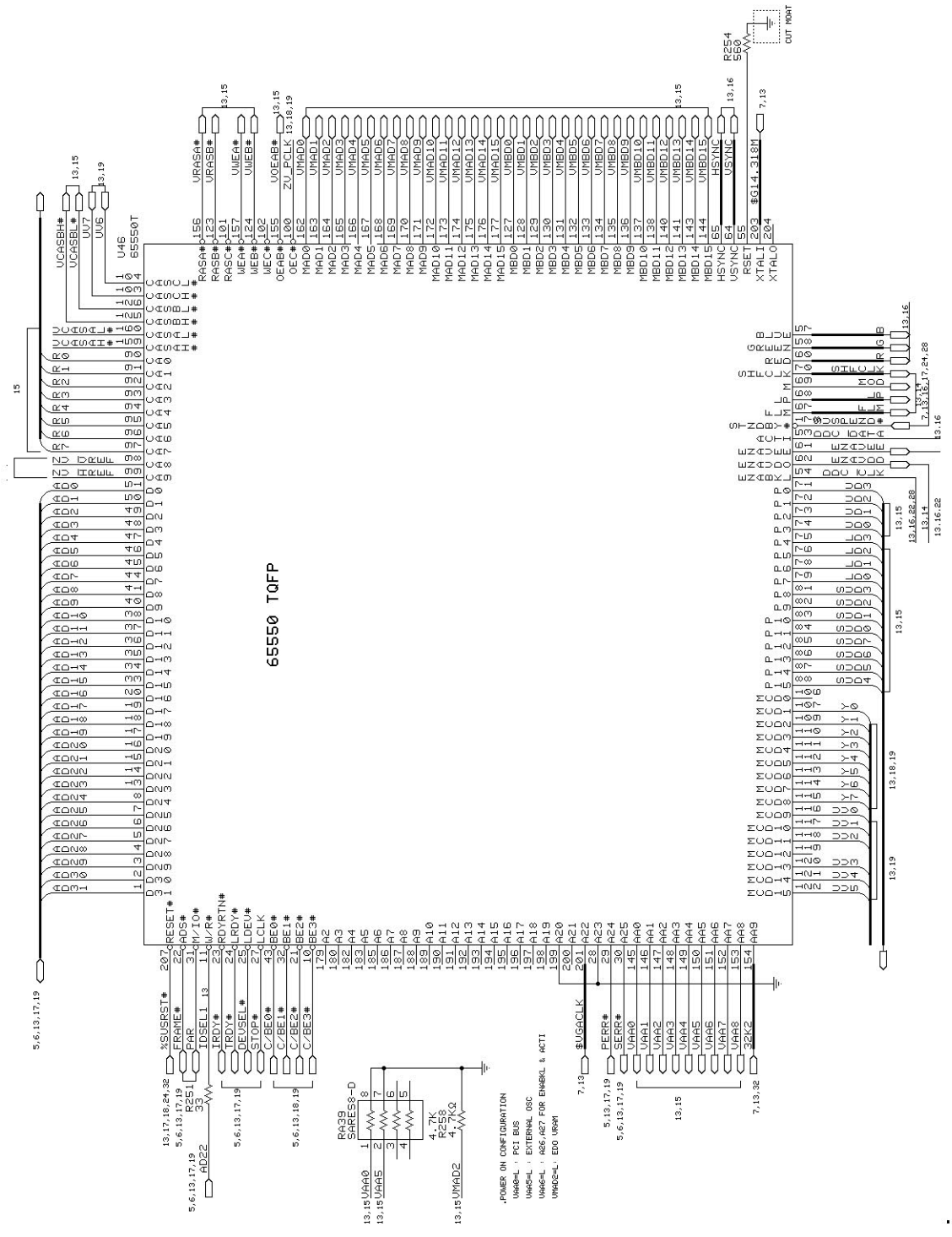


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 13 of 36)

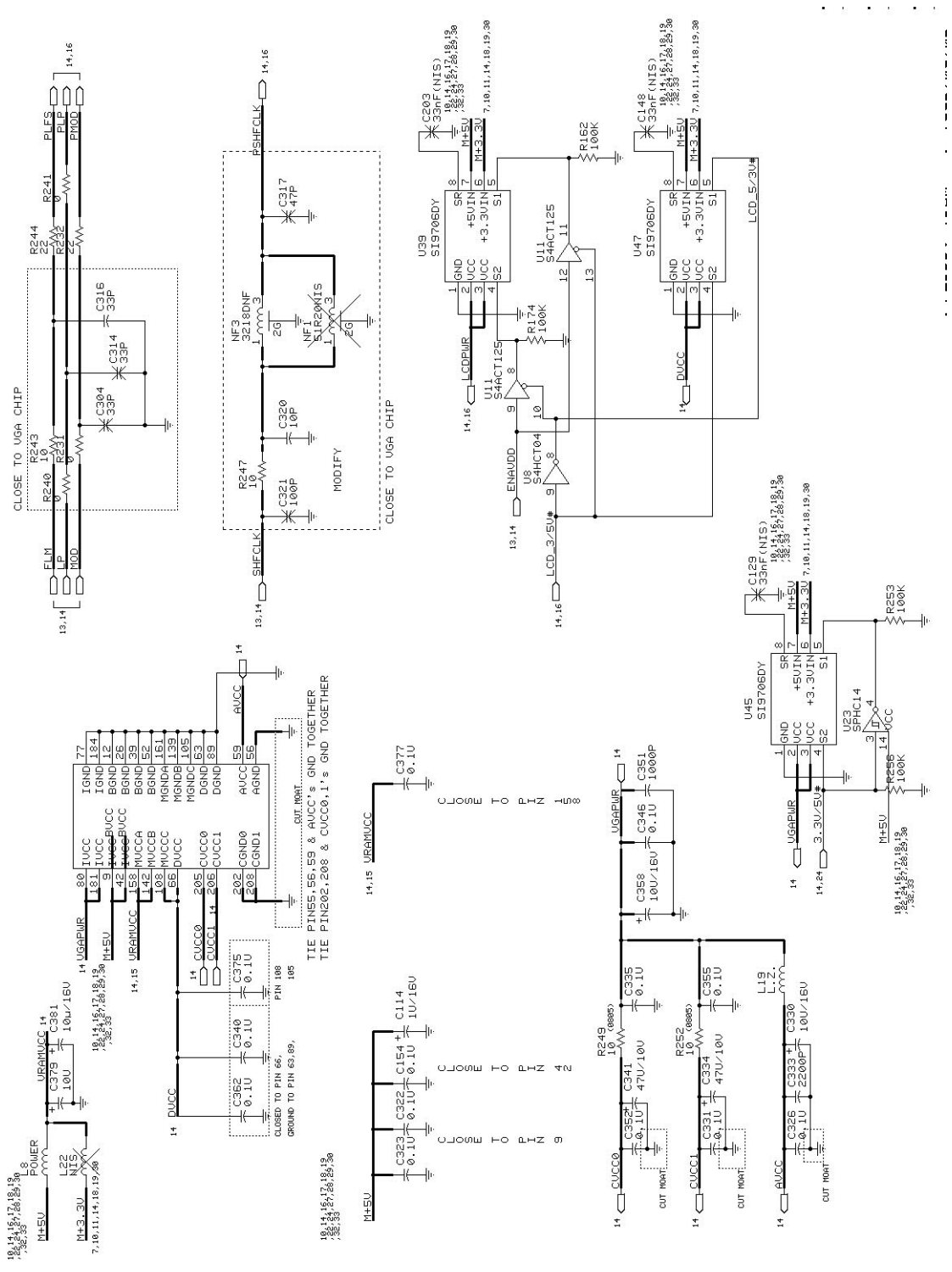


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 14 of 36)

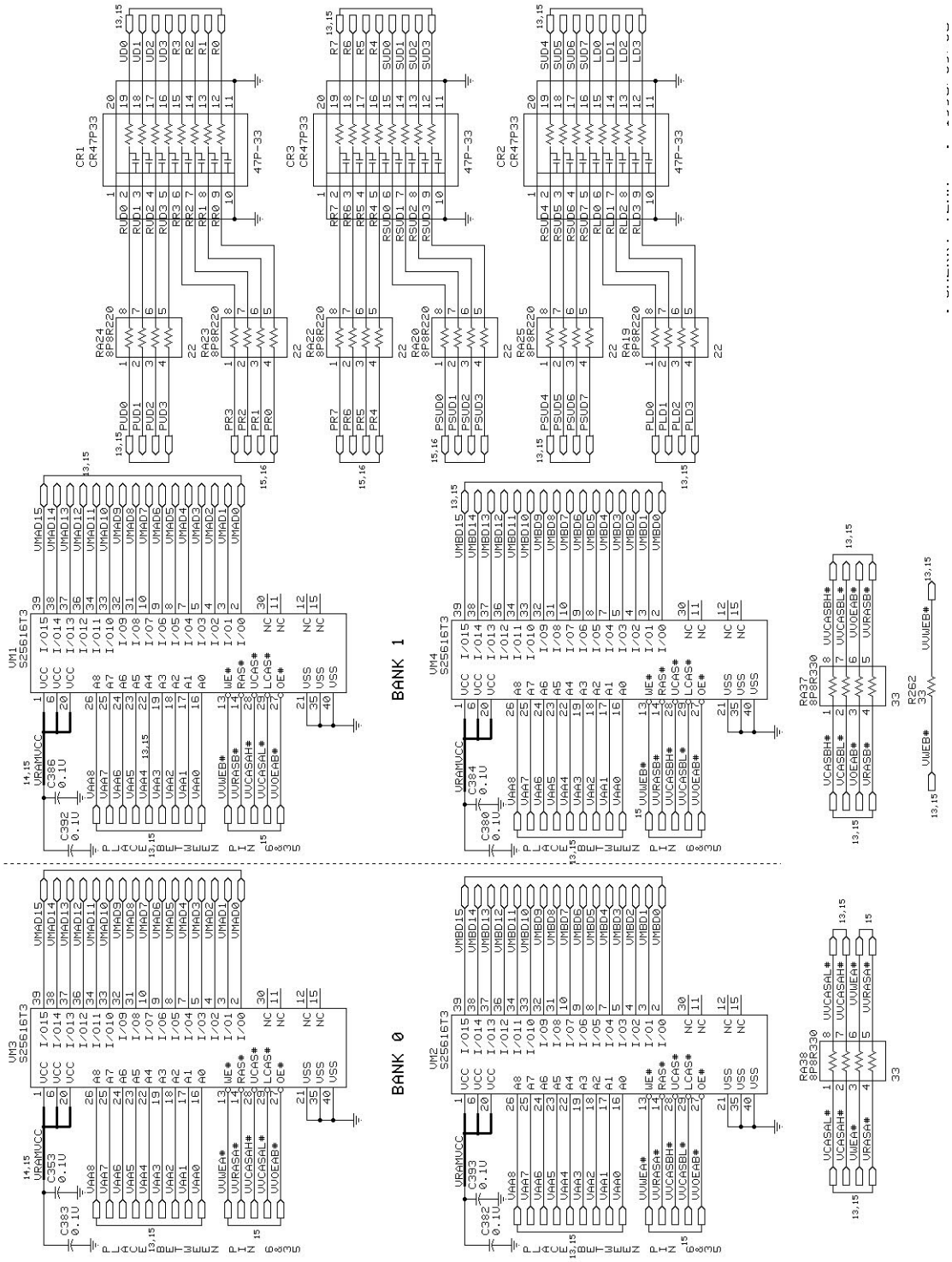


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 15 of 36)

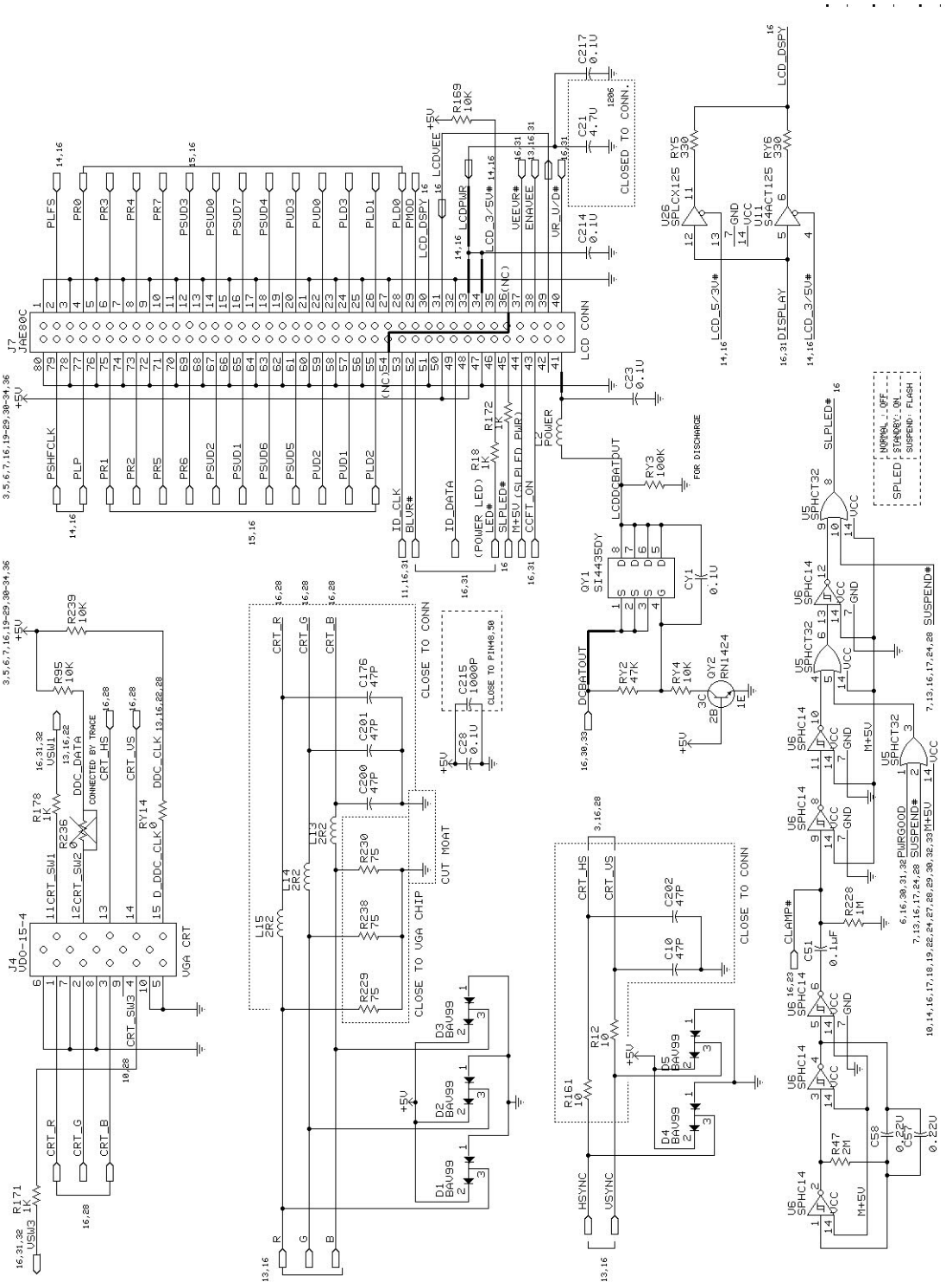


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 16 of 36)

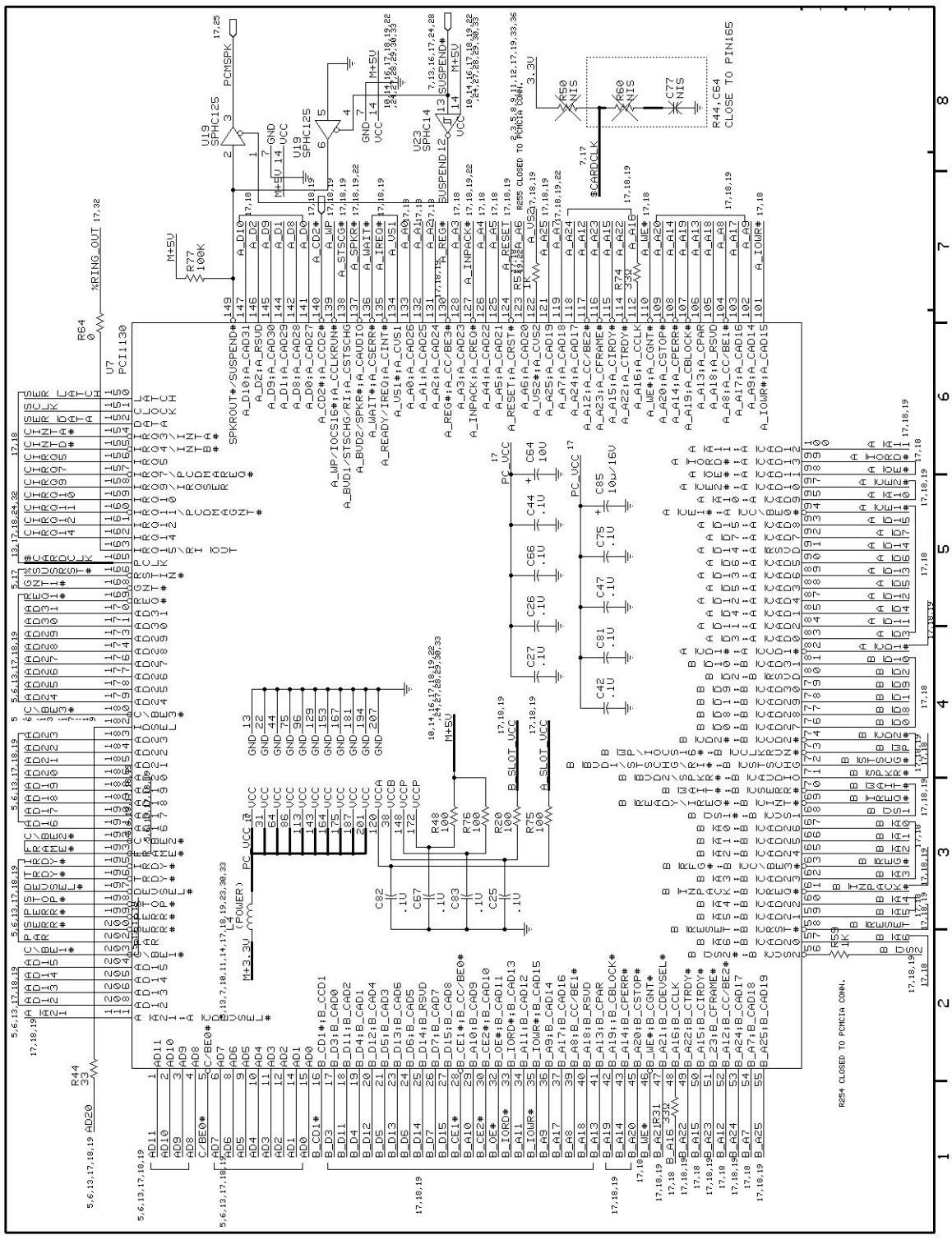


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 17 of 36)

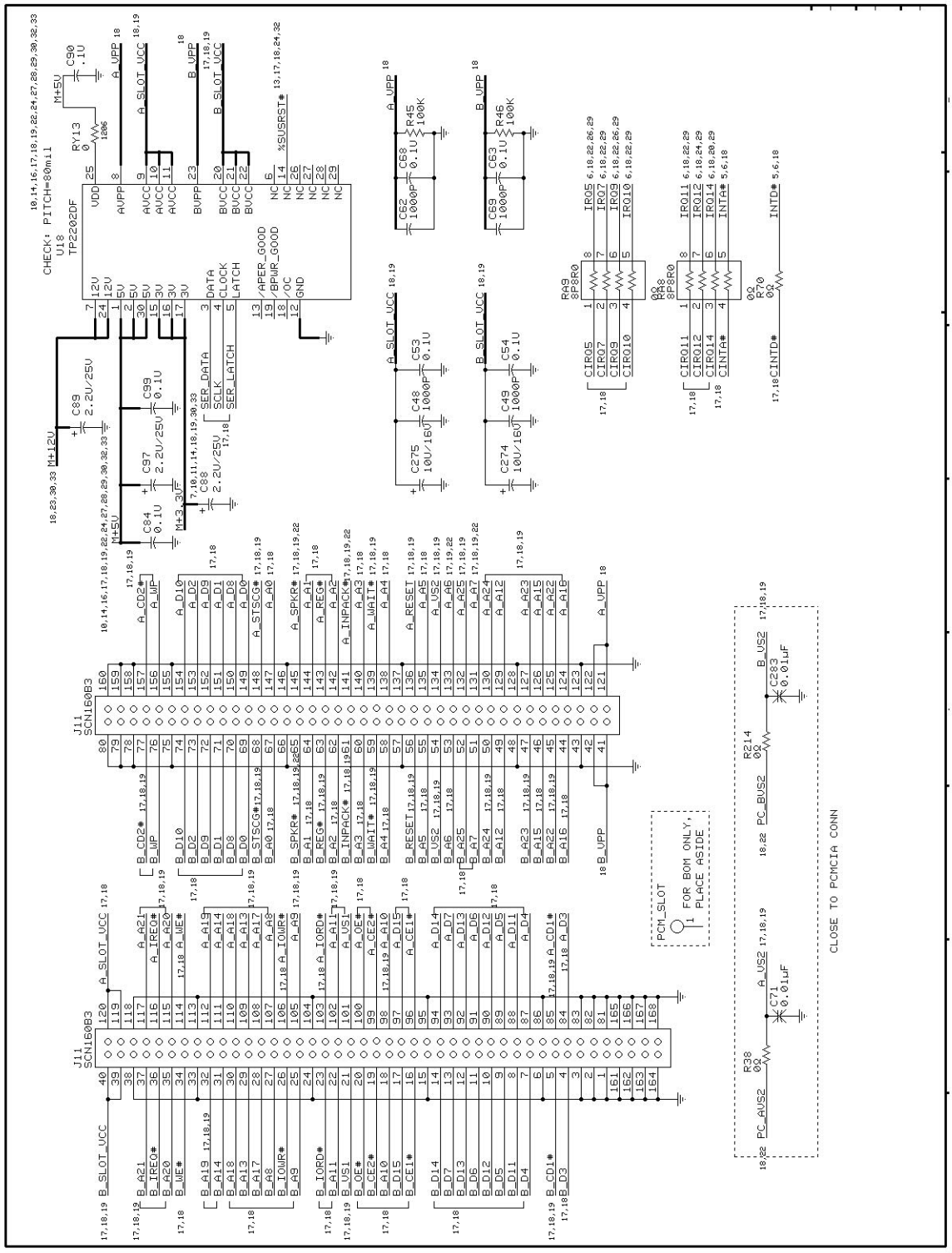


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 18 of 36)

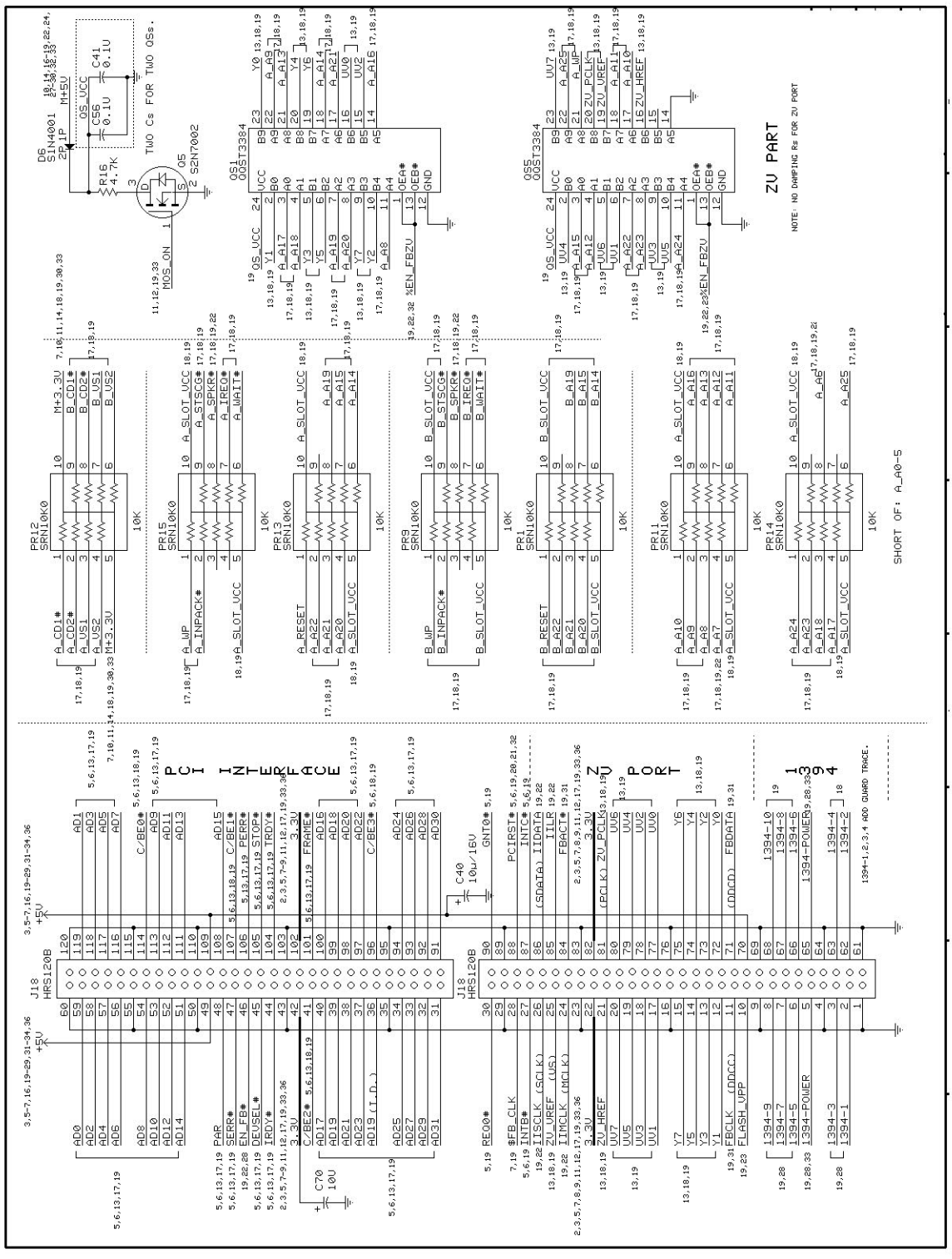


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 19 of 36)

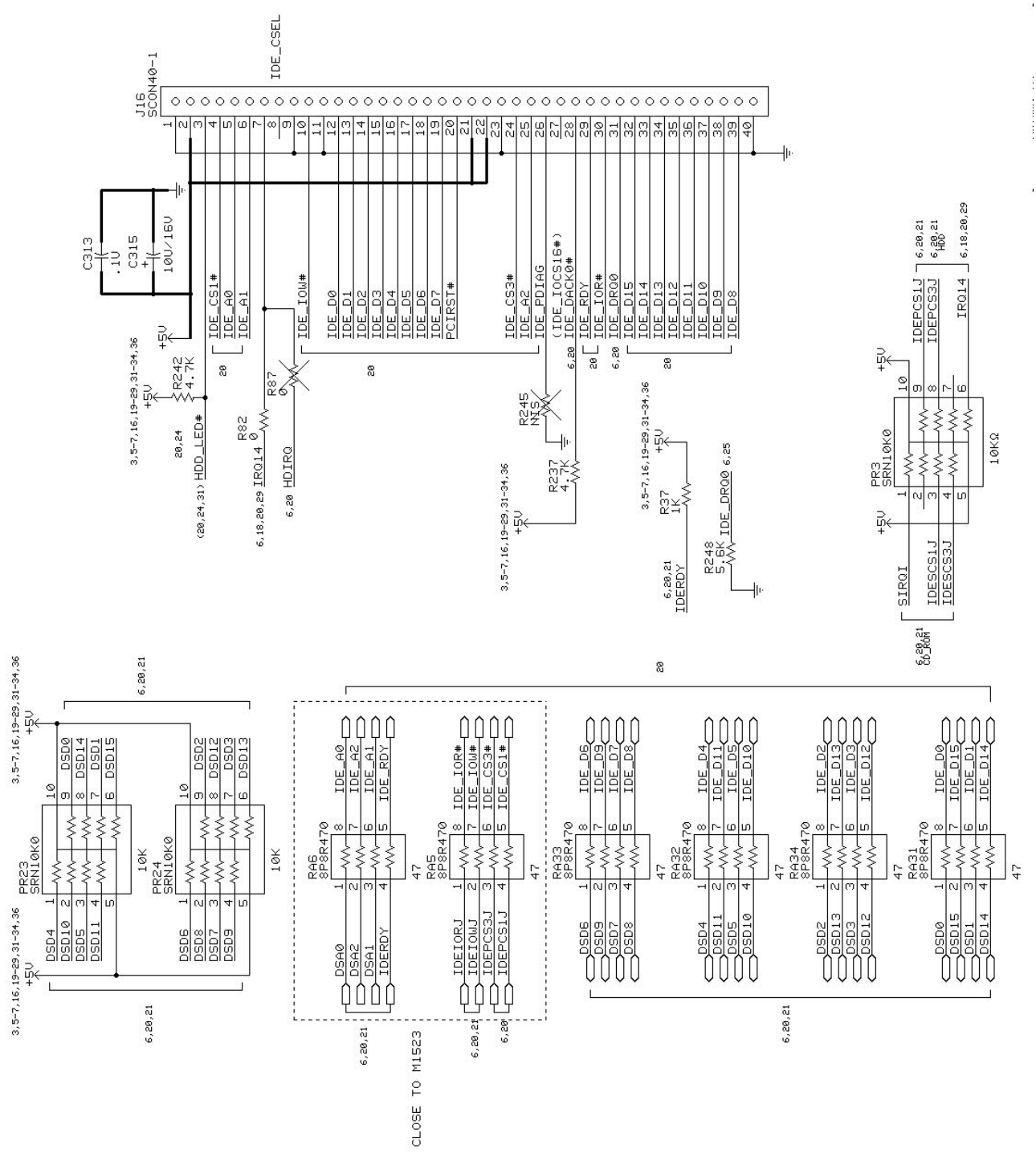


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 20 of 36)

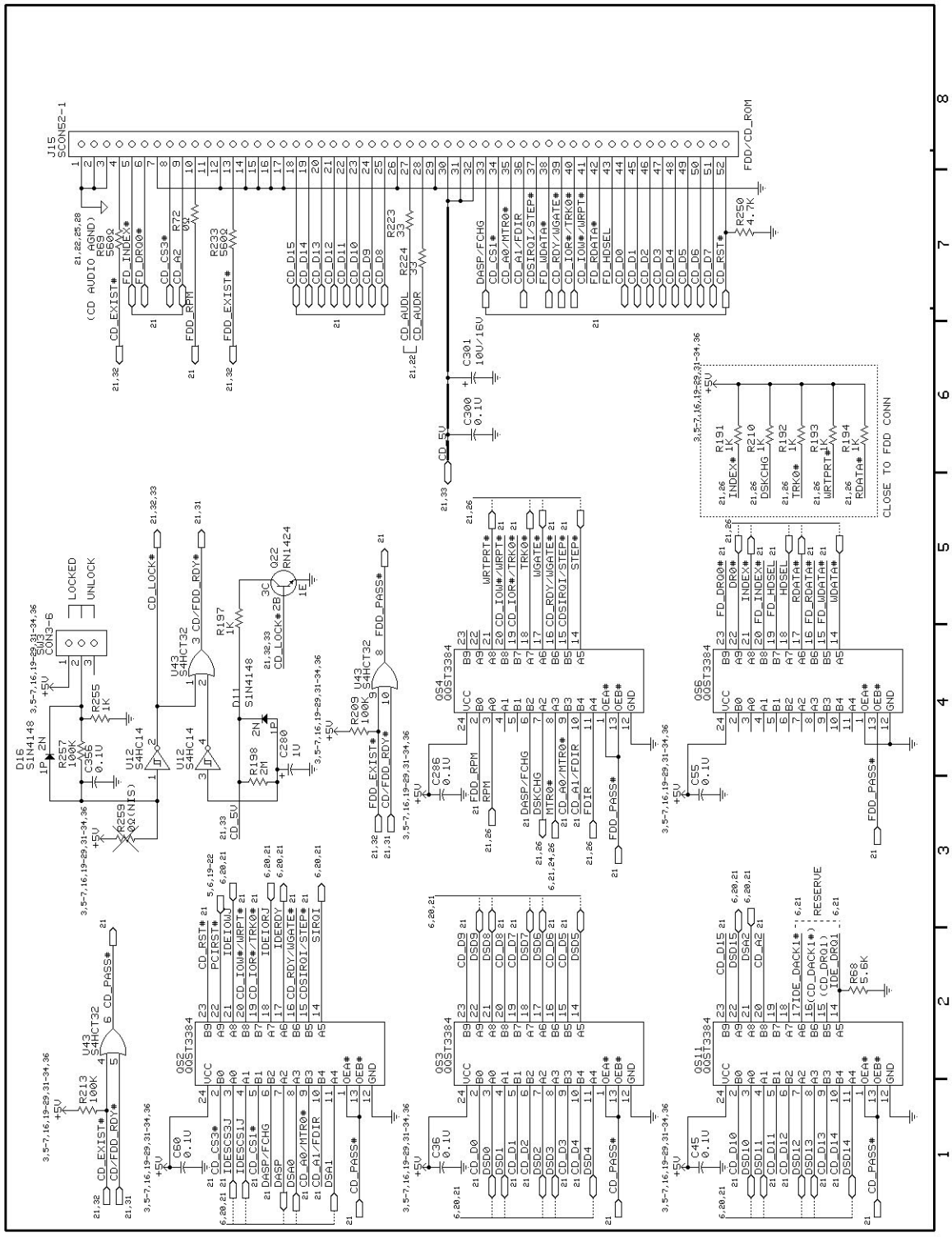


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 21 of 36)

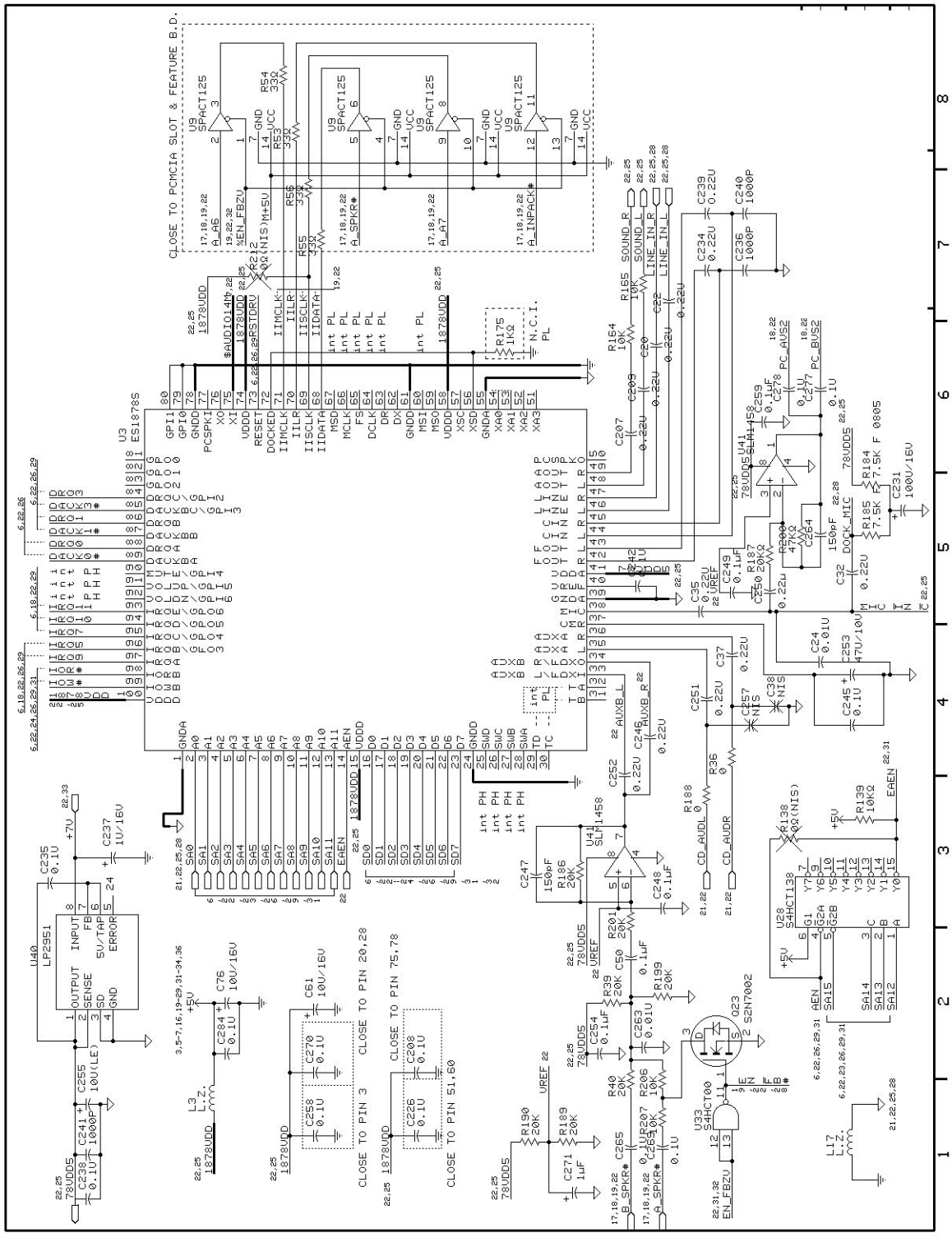


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 22 of 36)

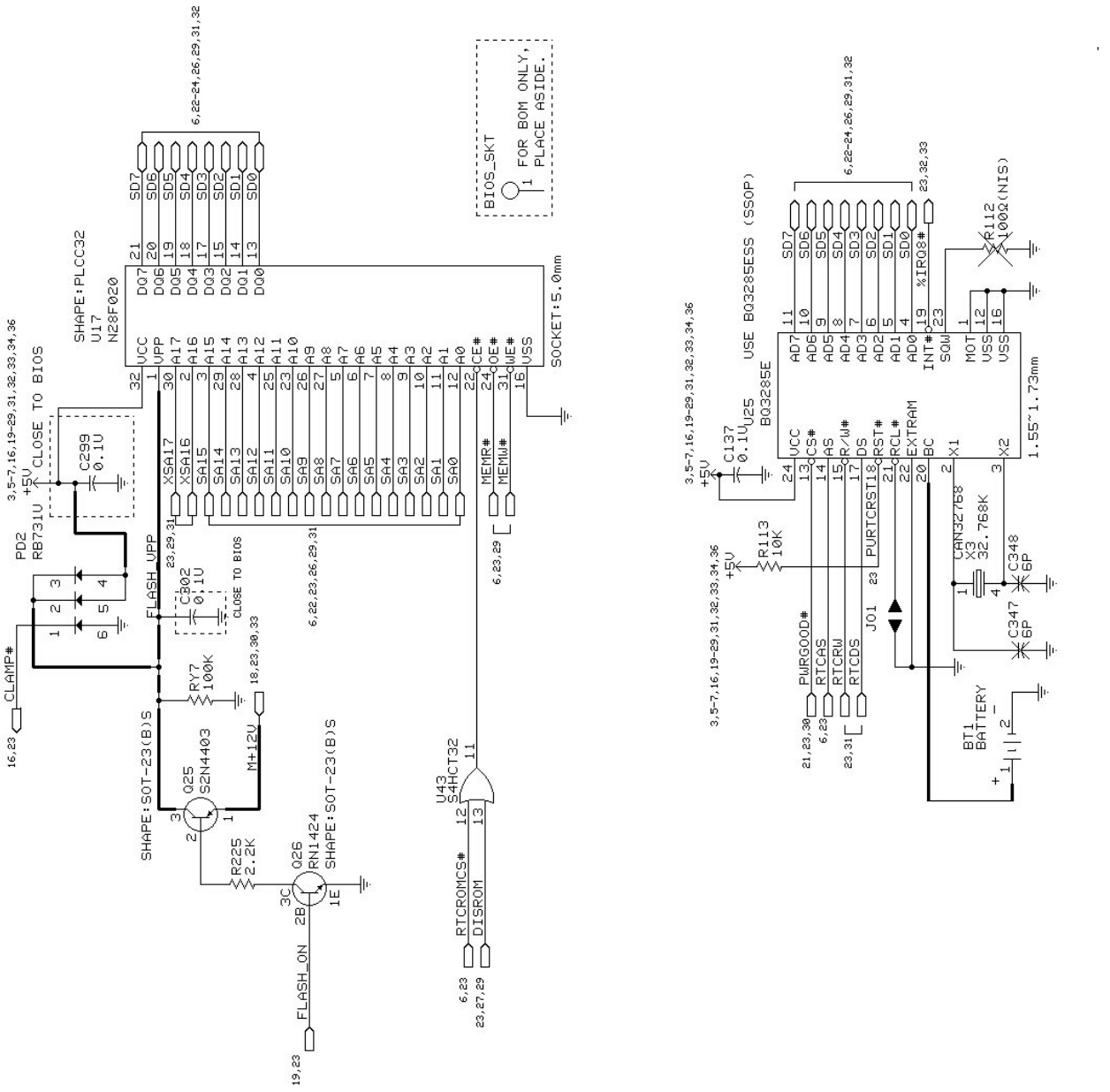


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 23 of 36)

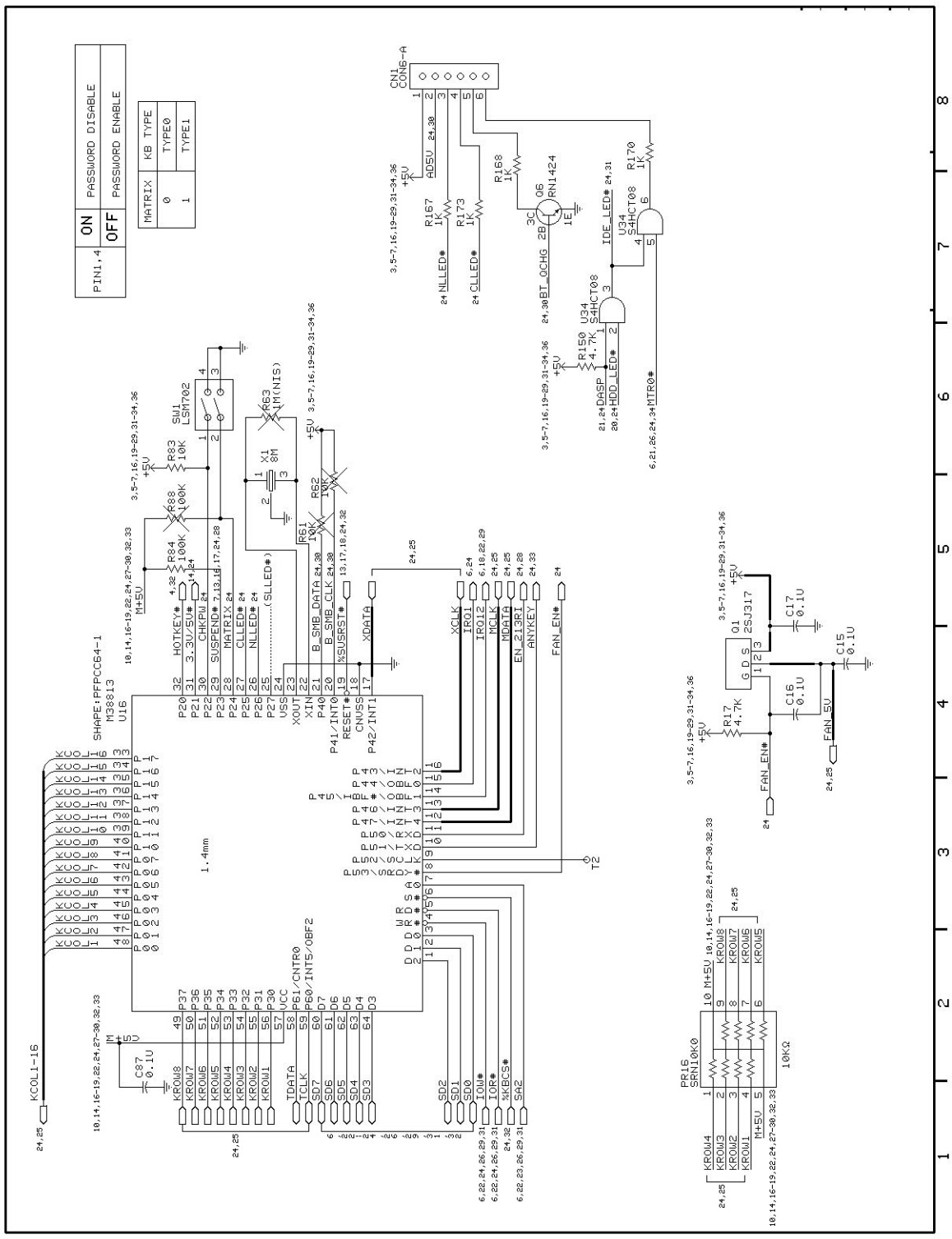


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 24 of 36)

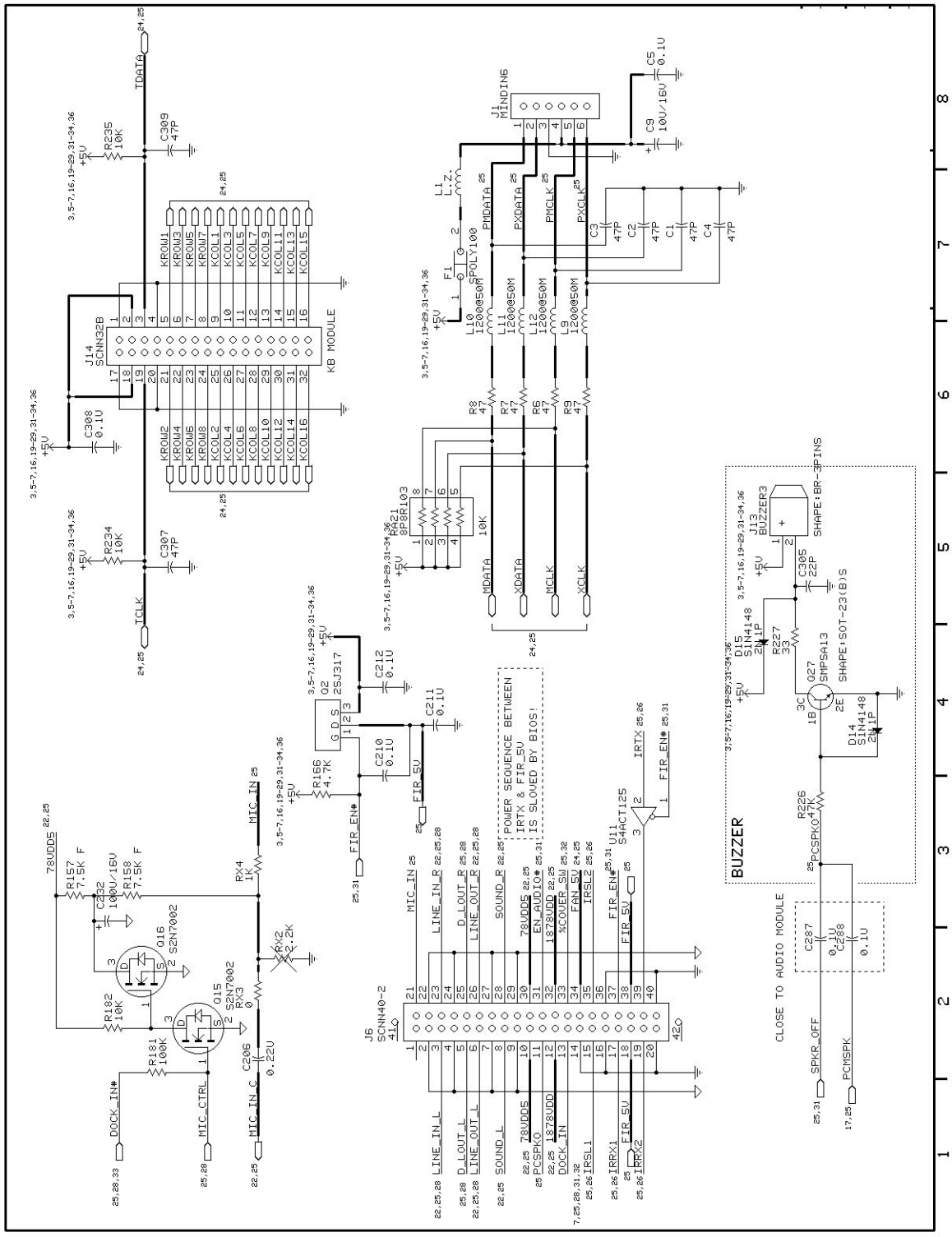


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 25 of 36)

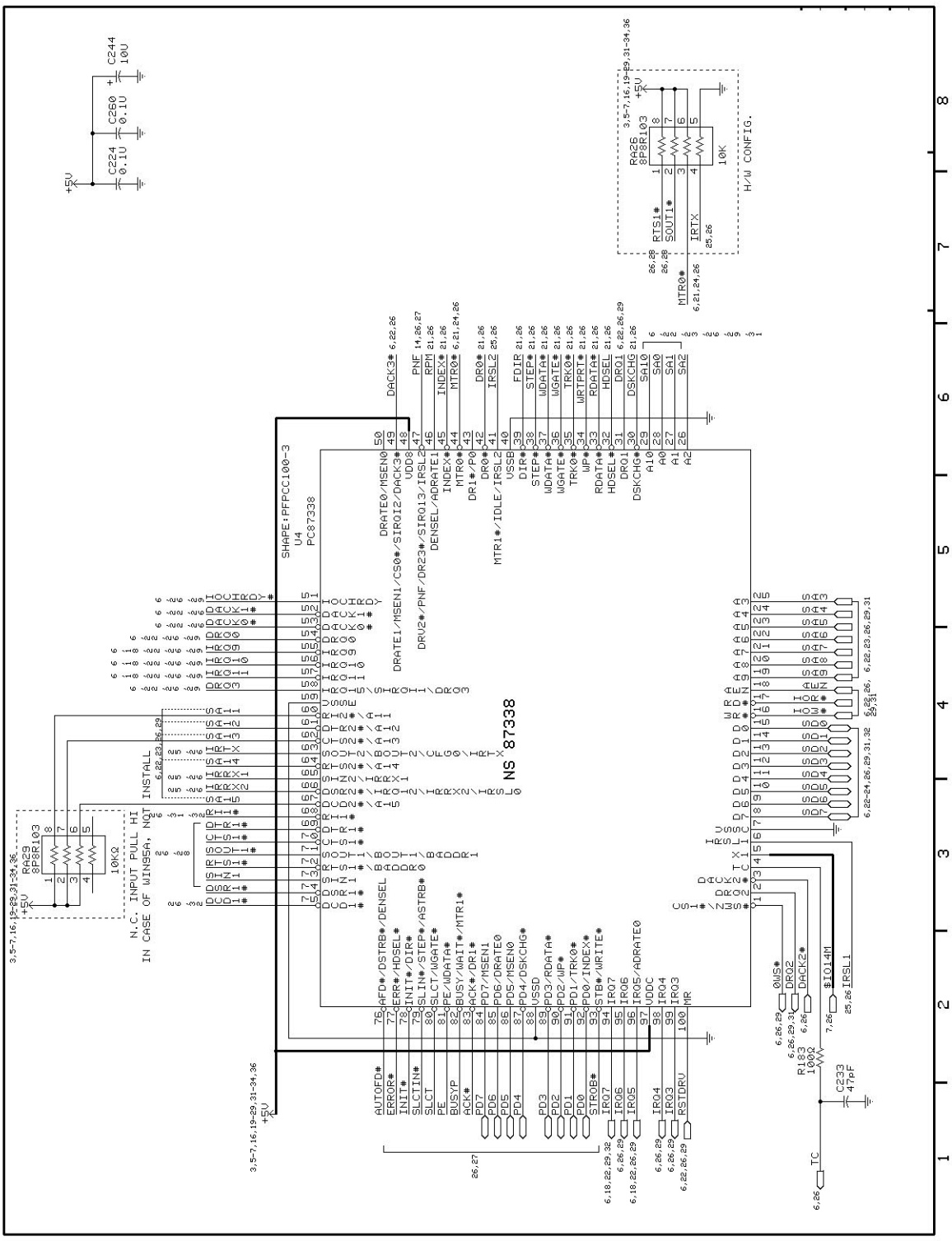


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 26 of 36)

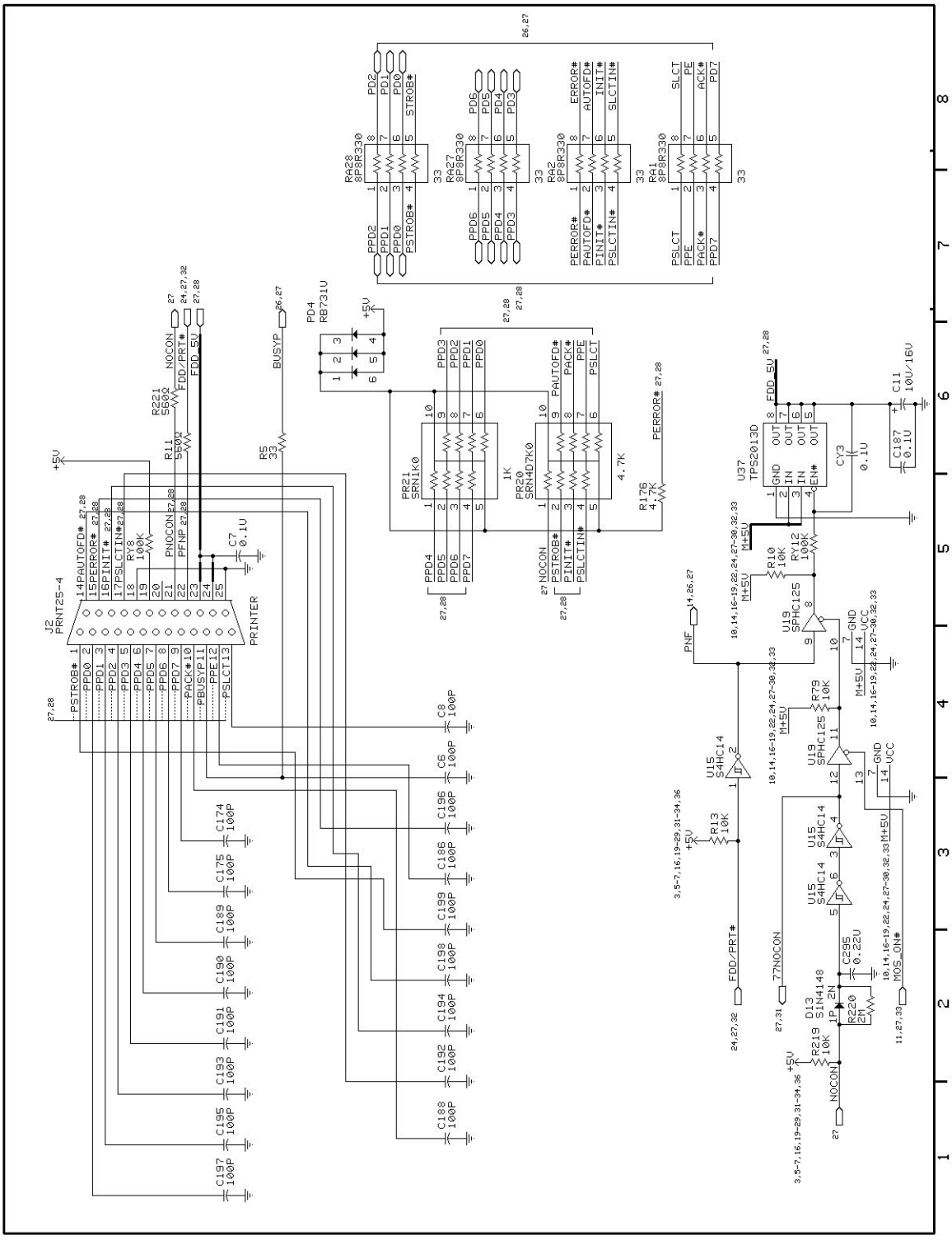


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 27 of 36)

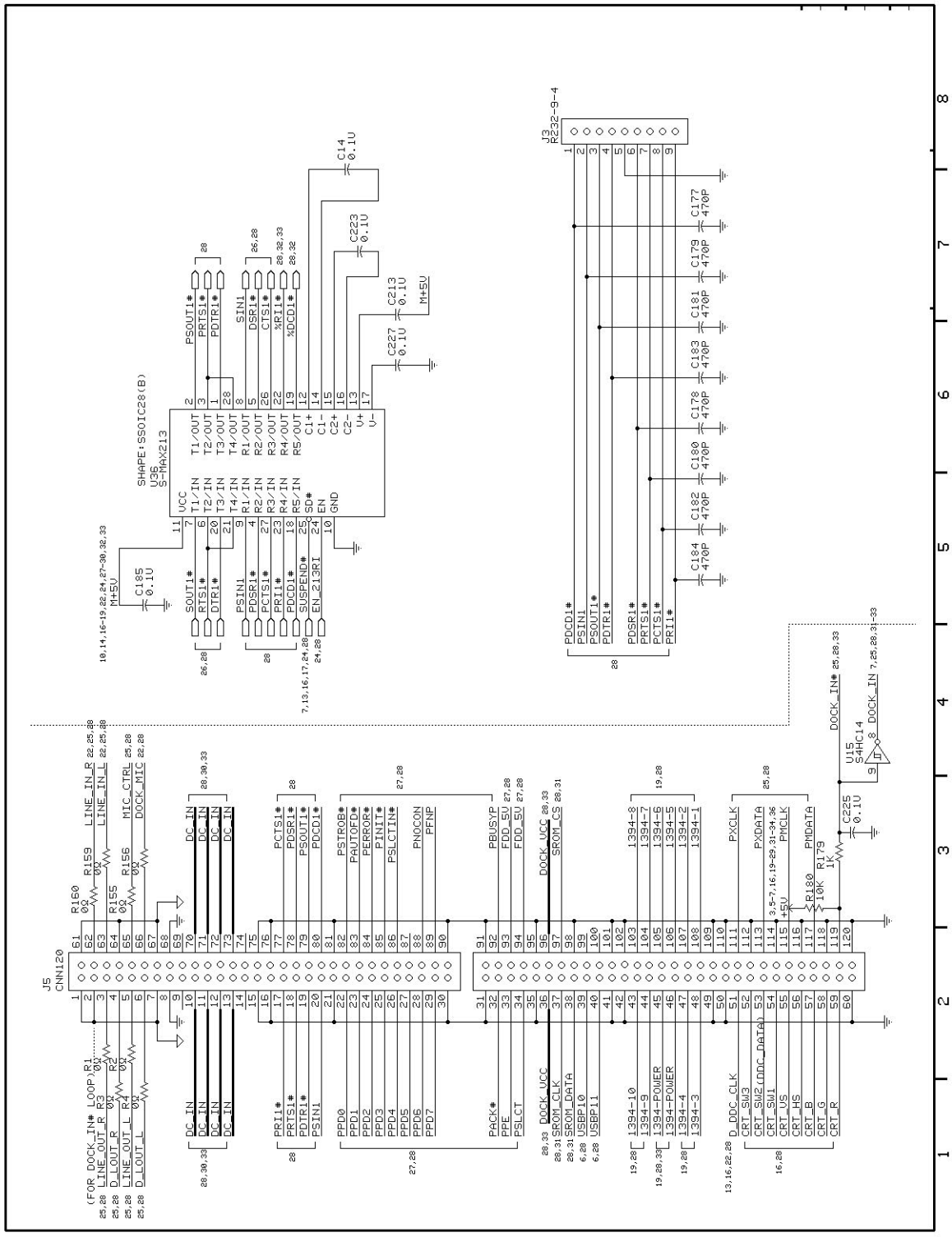


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 28 of 36)

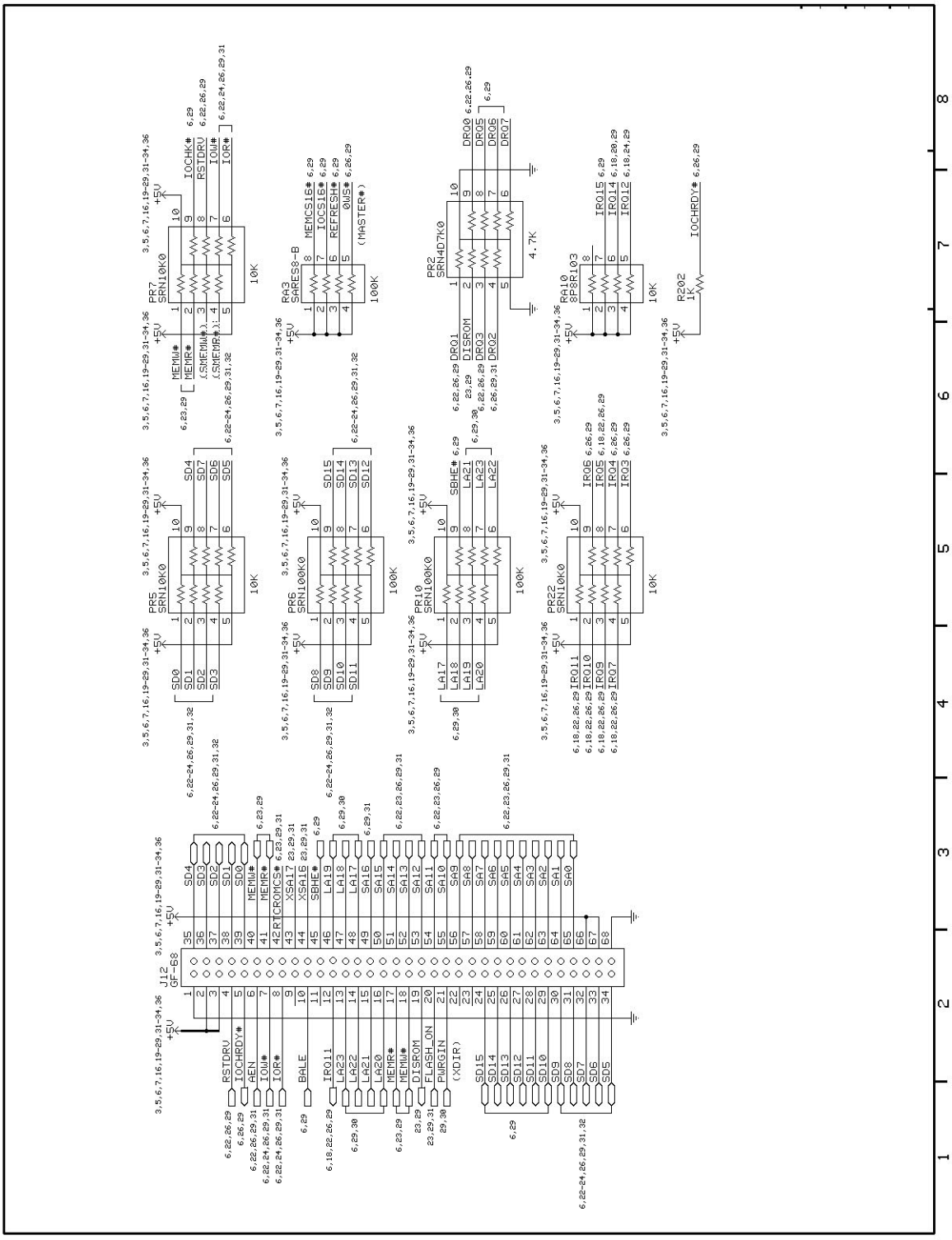


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 29 of 36)

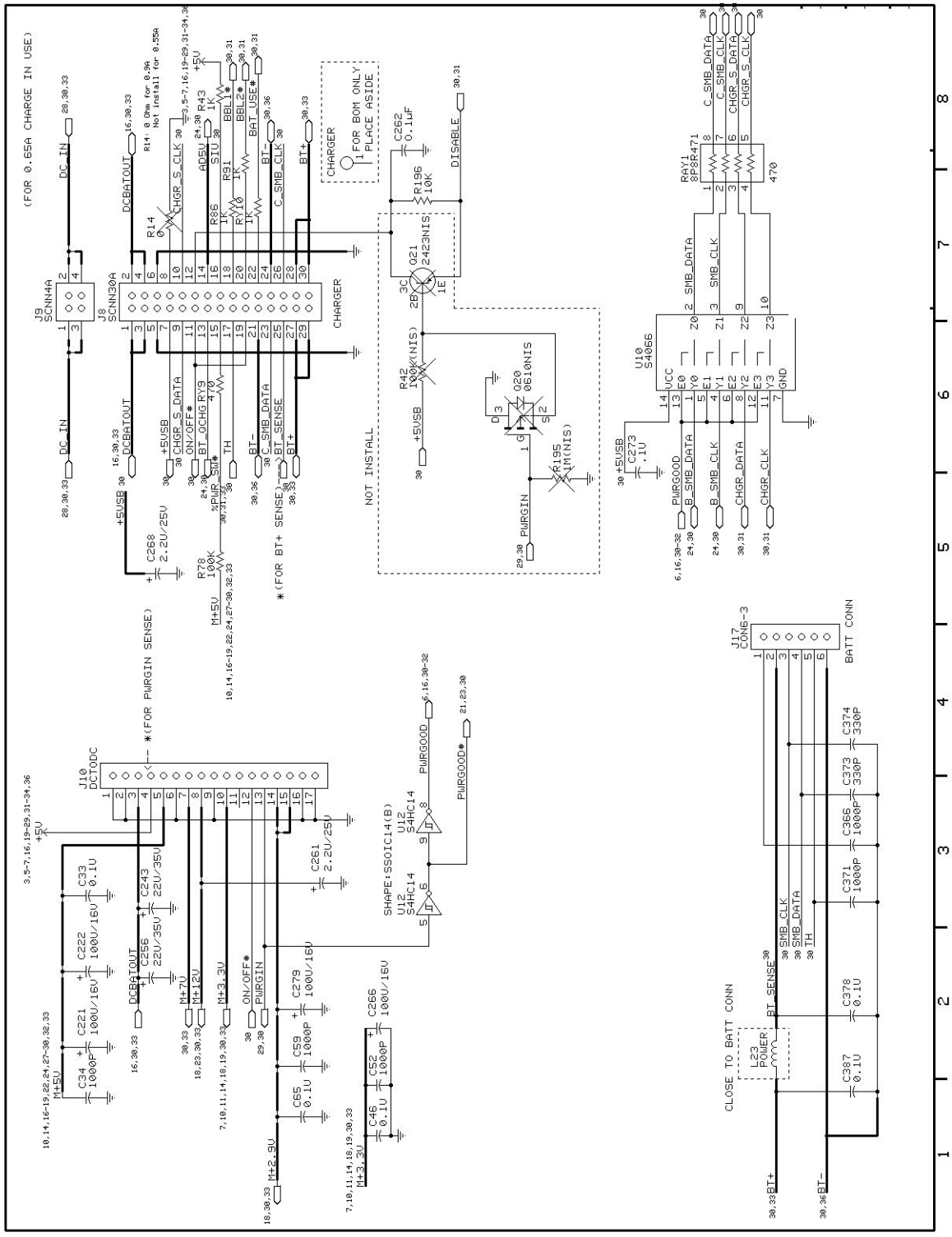


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 30 of 36)

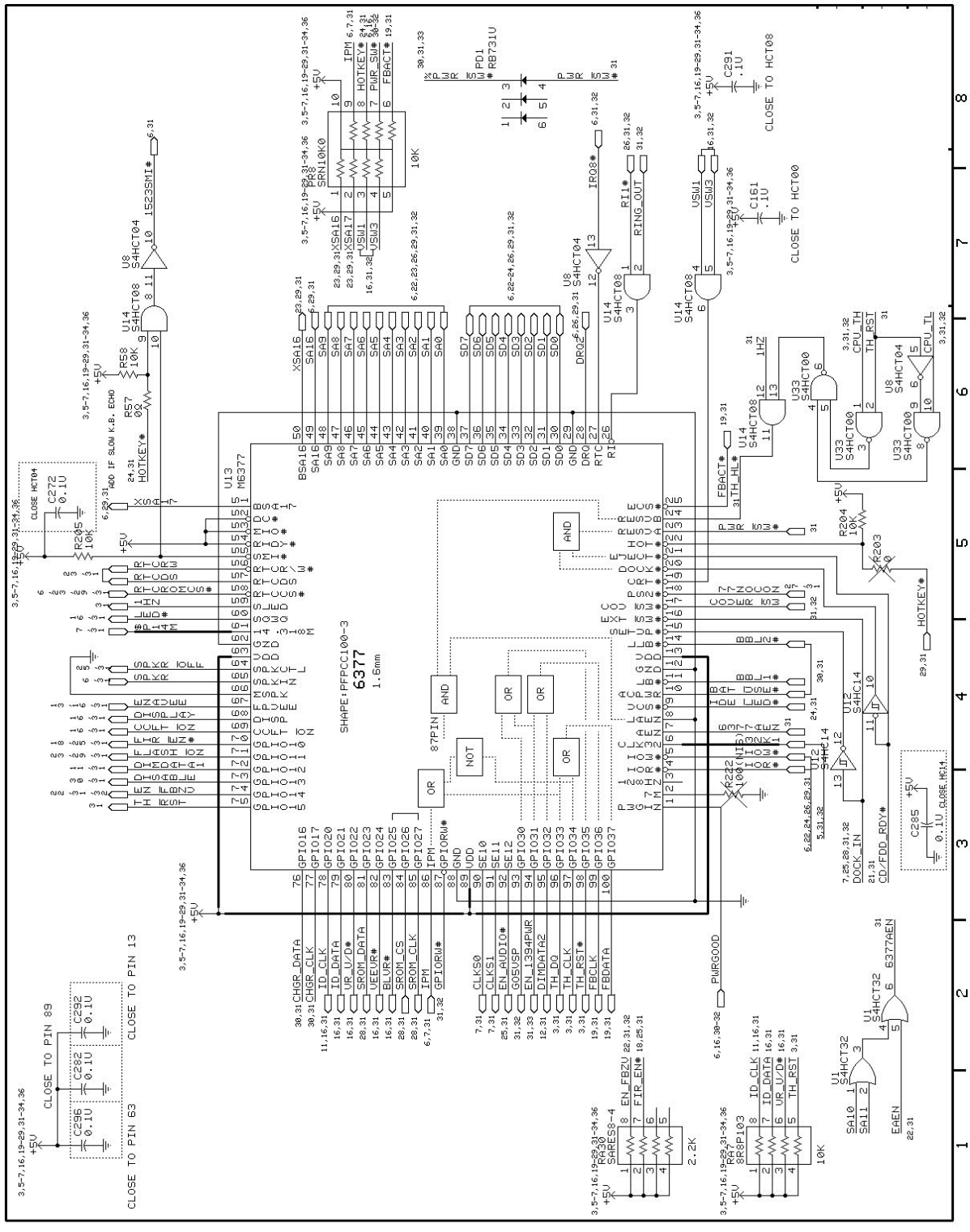


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 31 of 36)

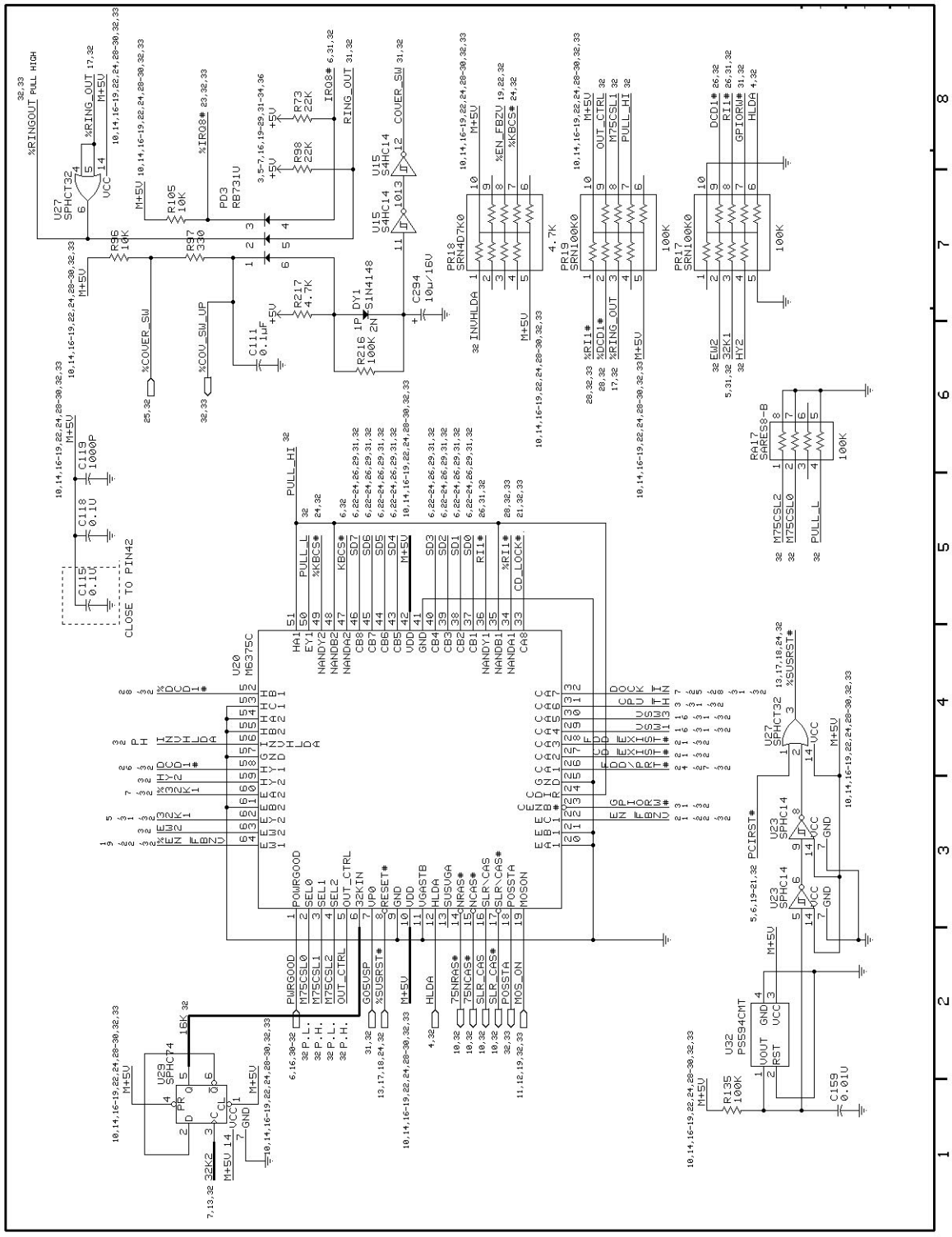


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 32 of 36)

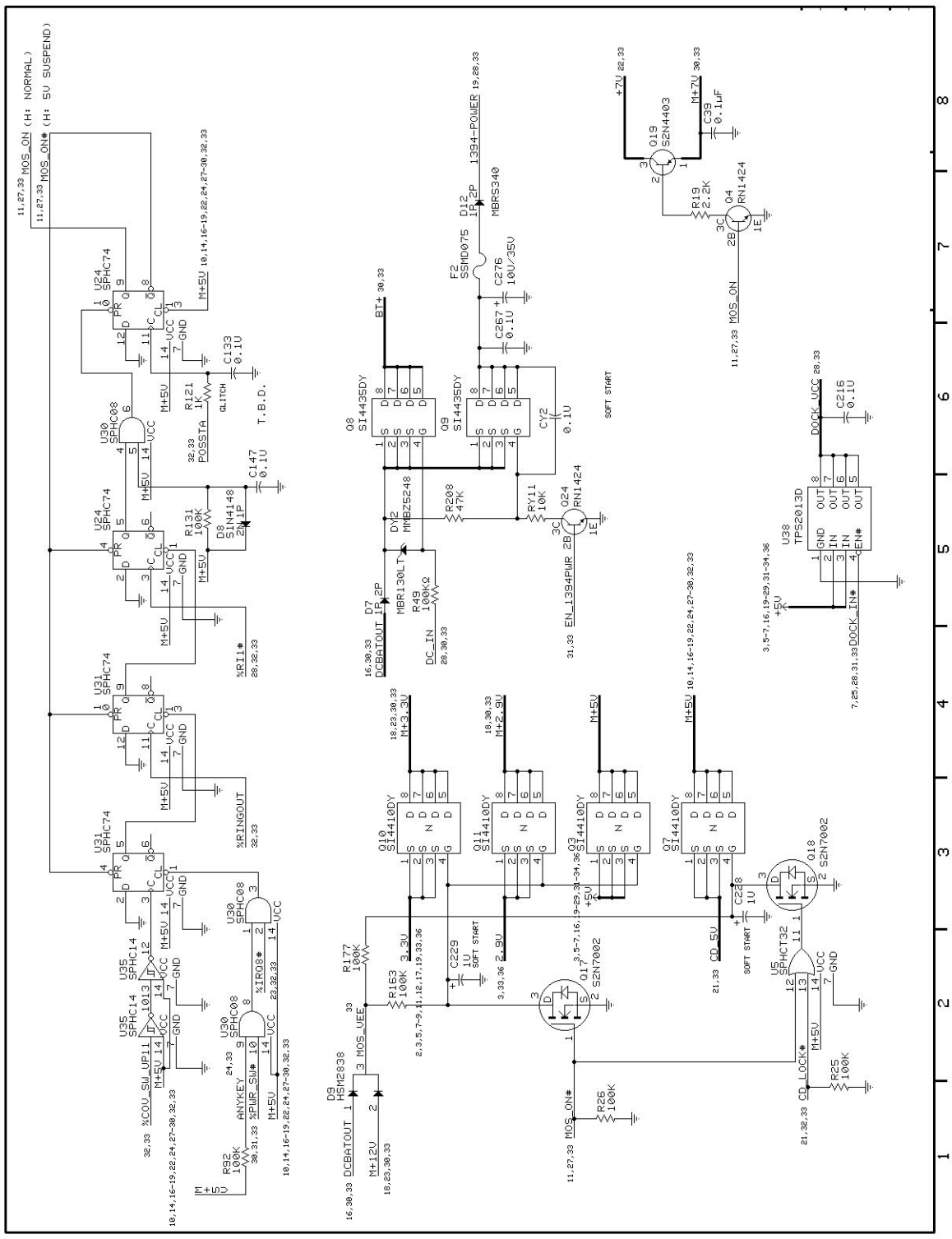


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 33 of 36)

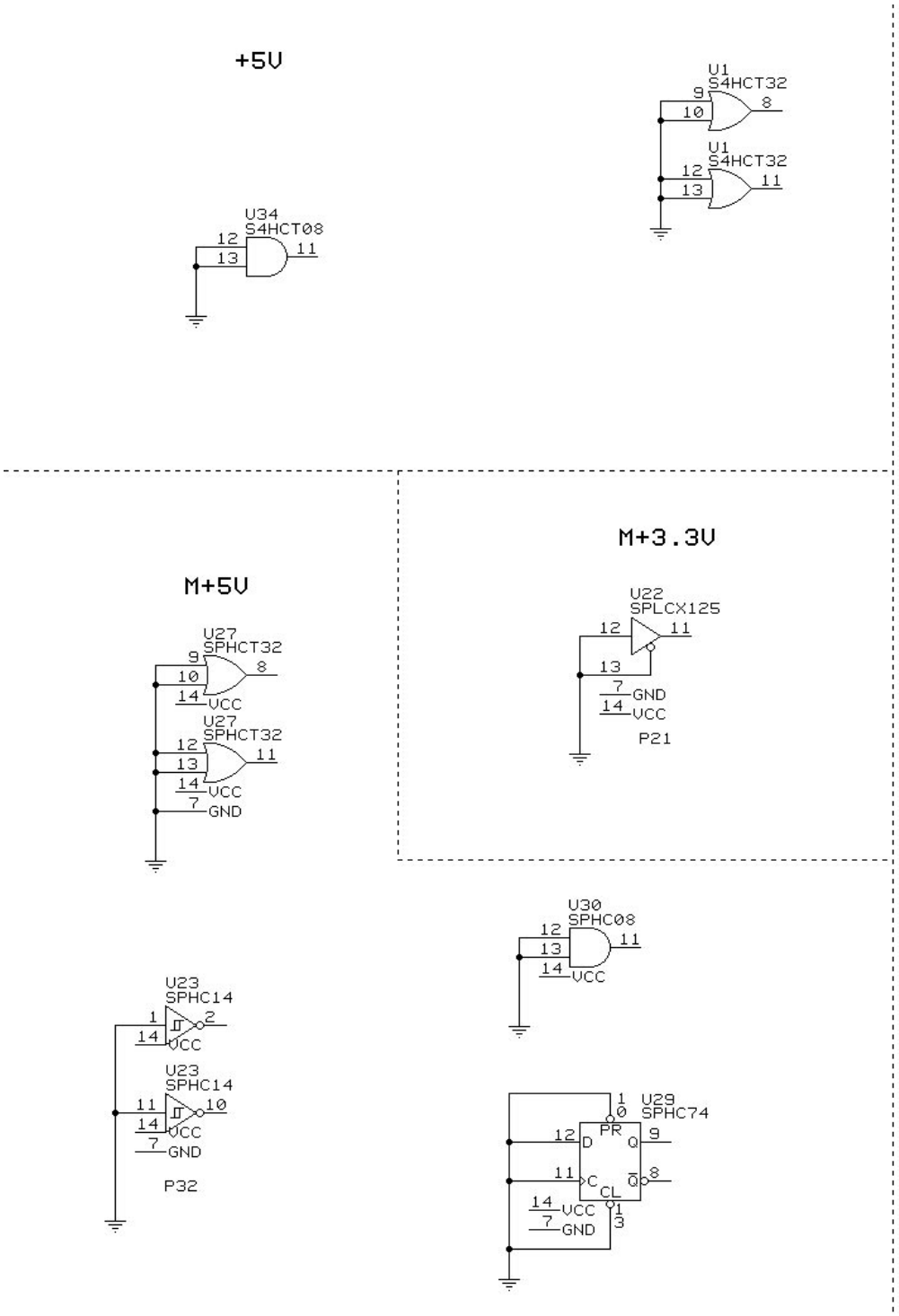


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 34 of 36)

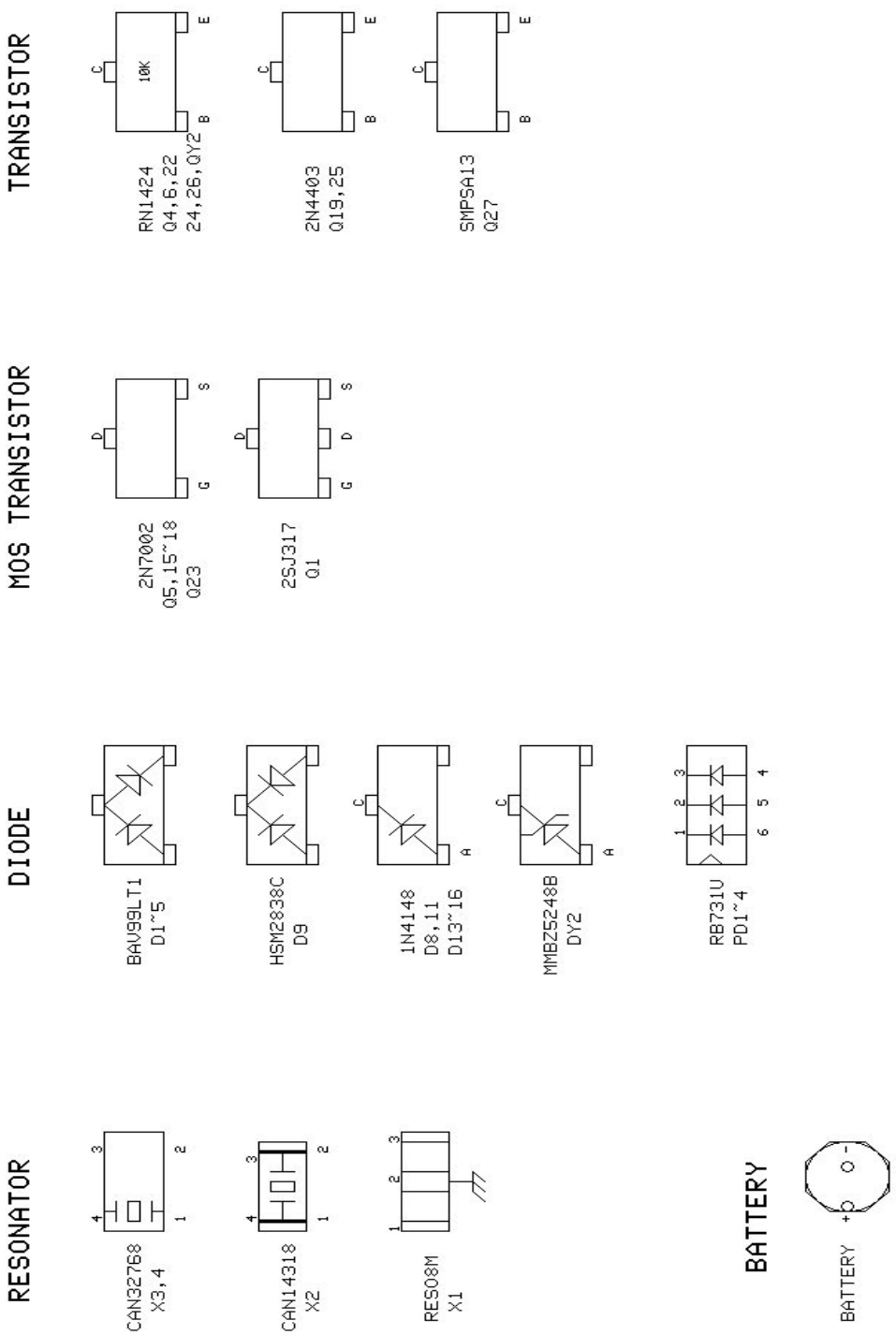


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 35 of 36)

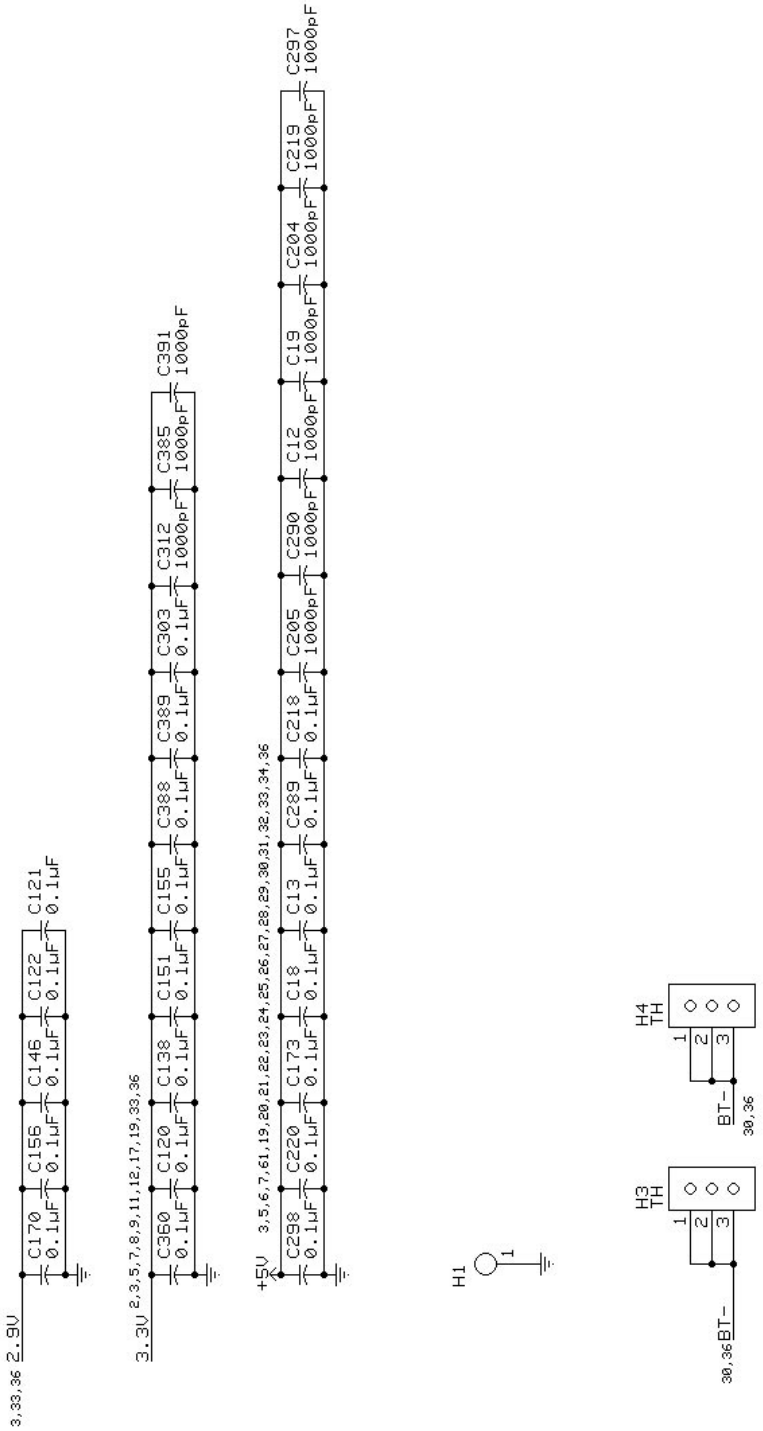


Figure B-4 Extensa 65x Series Main Board Logic Diagrams (Sheet 36 of 36)

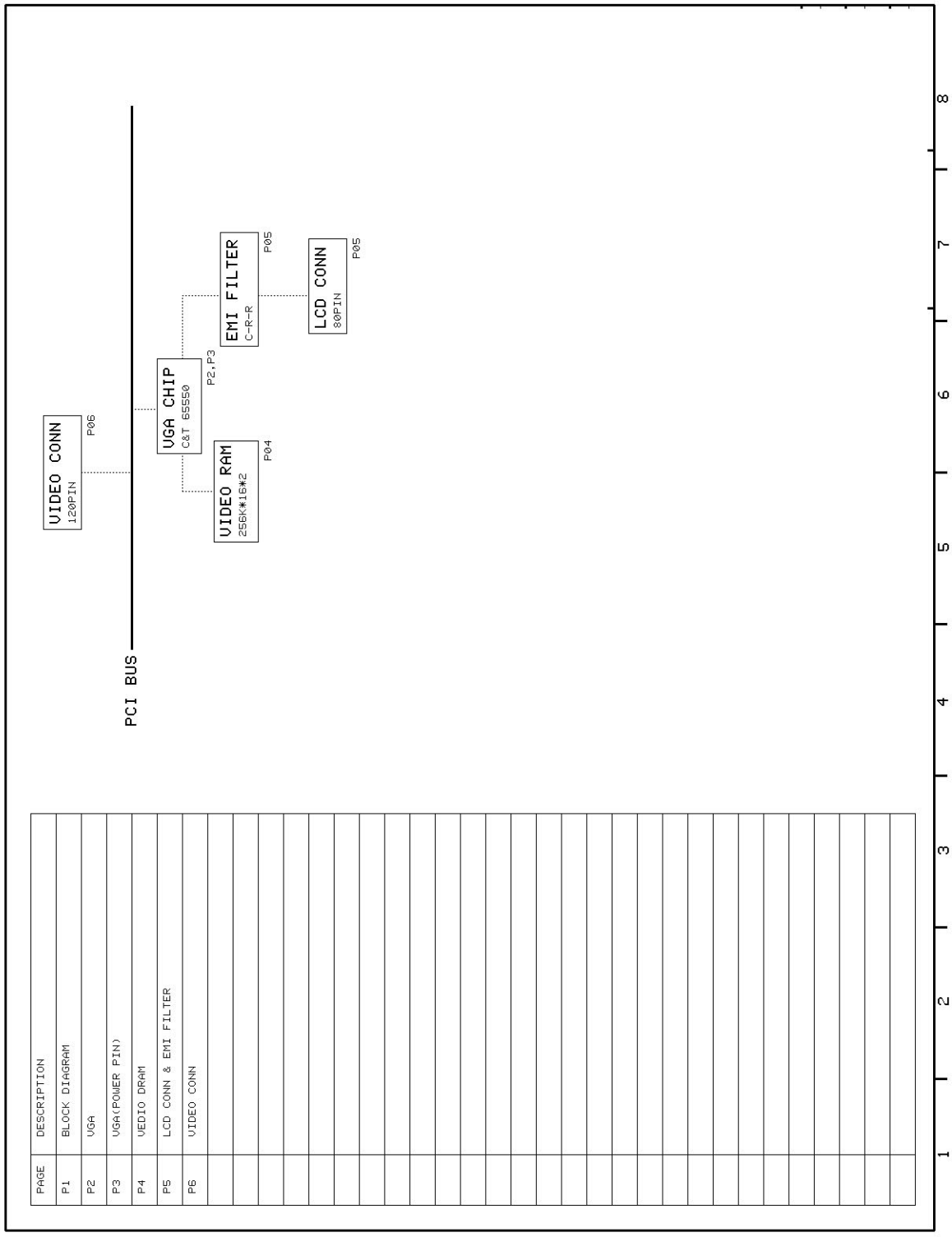


Figure B-5 Extensa 65x Series VGA Board Logic Diagrams (Sheet 1 of 6)

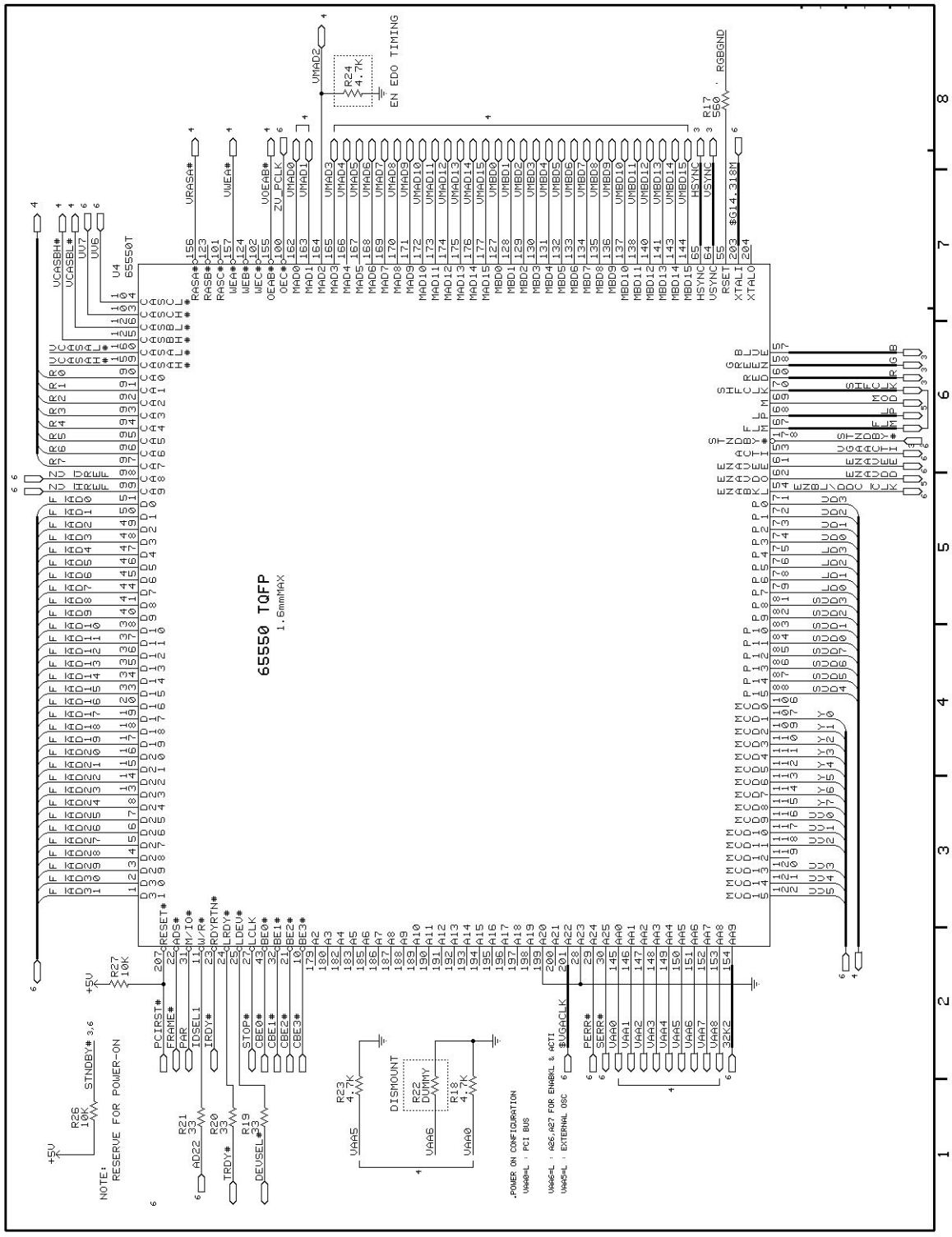


Figure B-5 Extensa 65x Series VGA Board Logic Diagrams (Sheet 2 of 6)

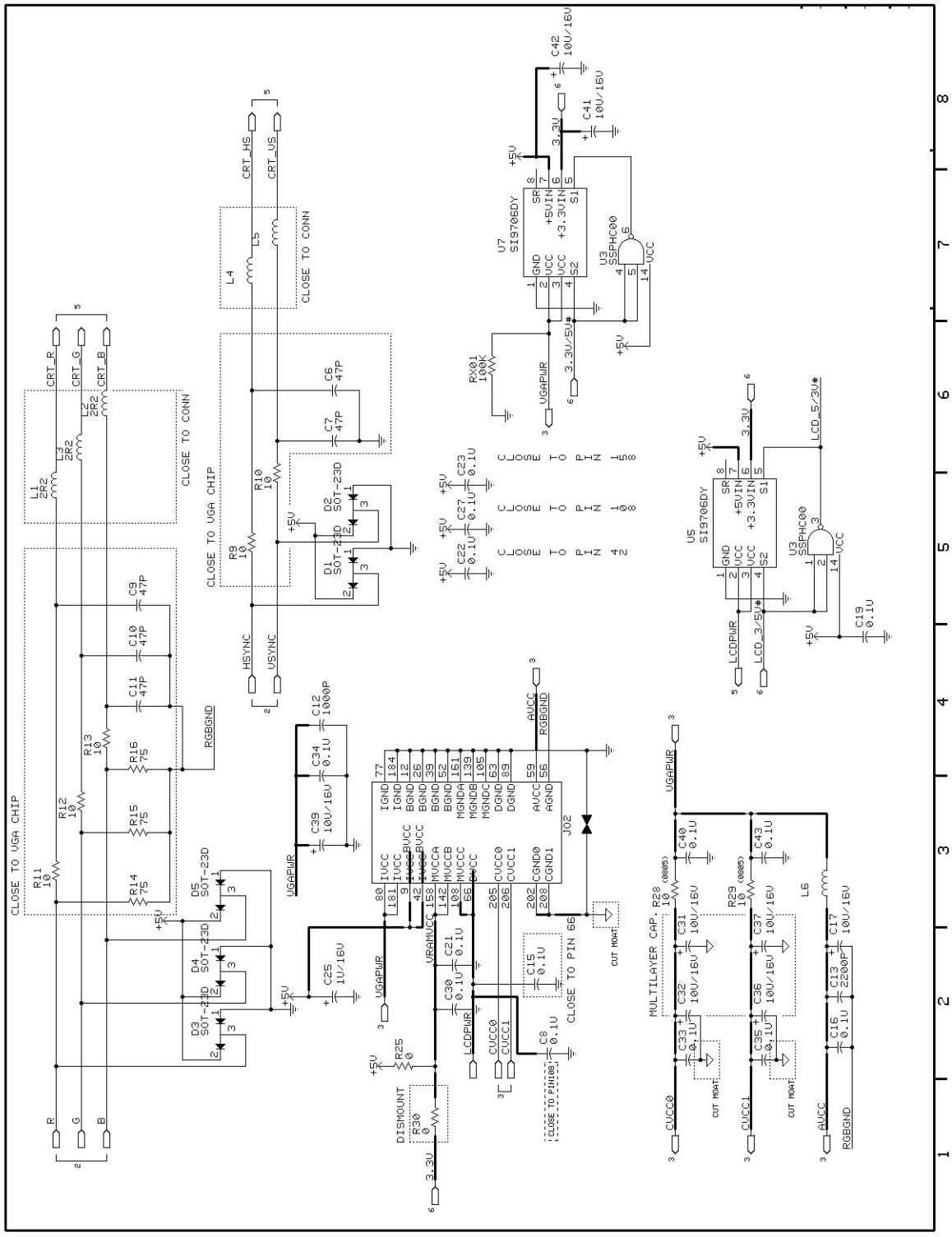


Figure B-5 Extensa 65x Series VGA Board Logic Diagrams (Sheet 3 of 6)

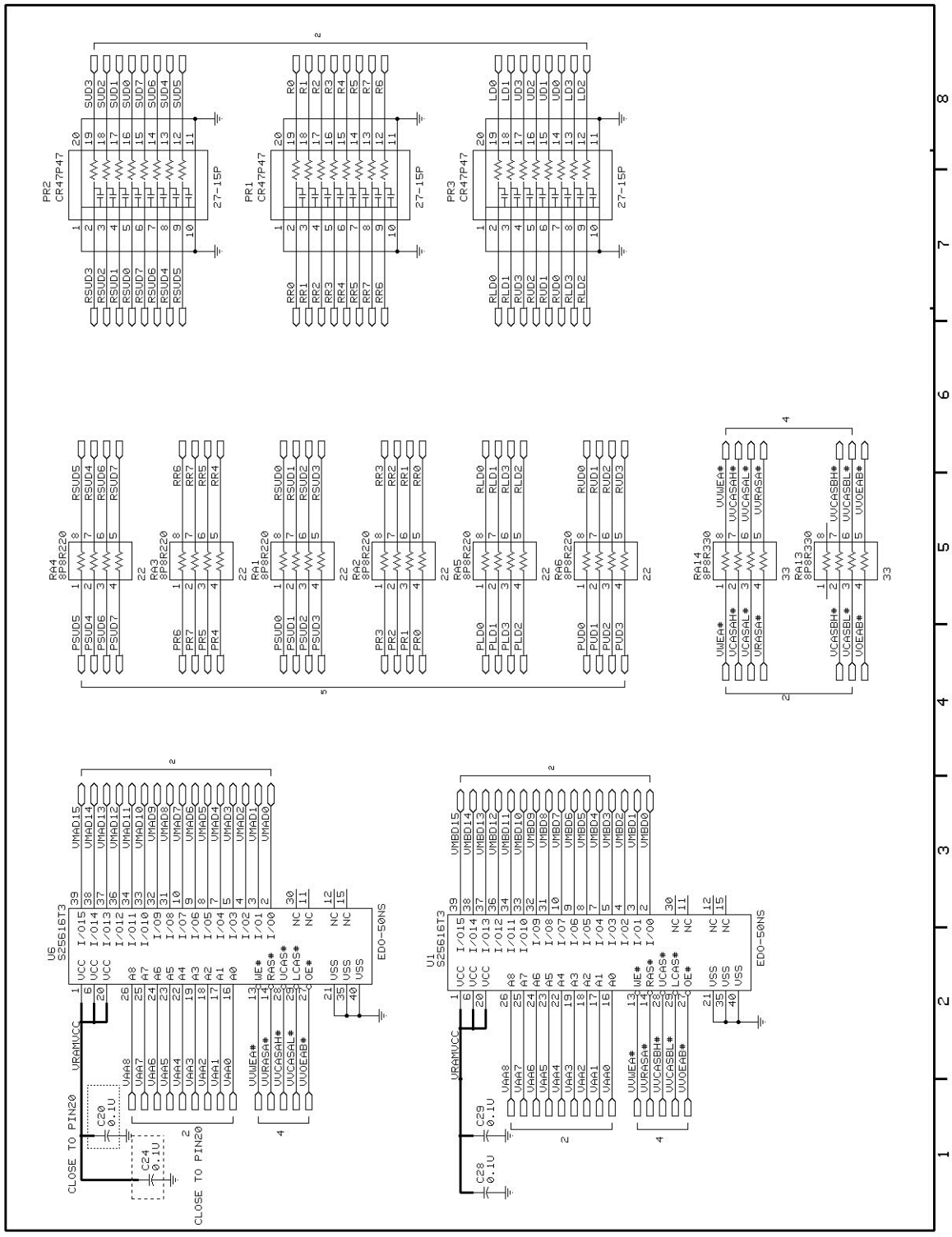


Figure B-5 Extensa 65x Series VGA Board Logic Diagrams (Sheet 4 of 6)

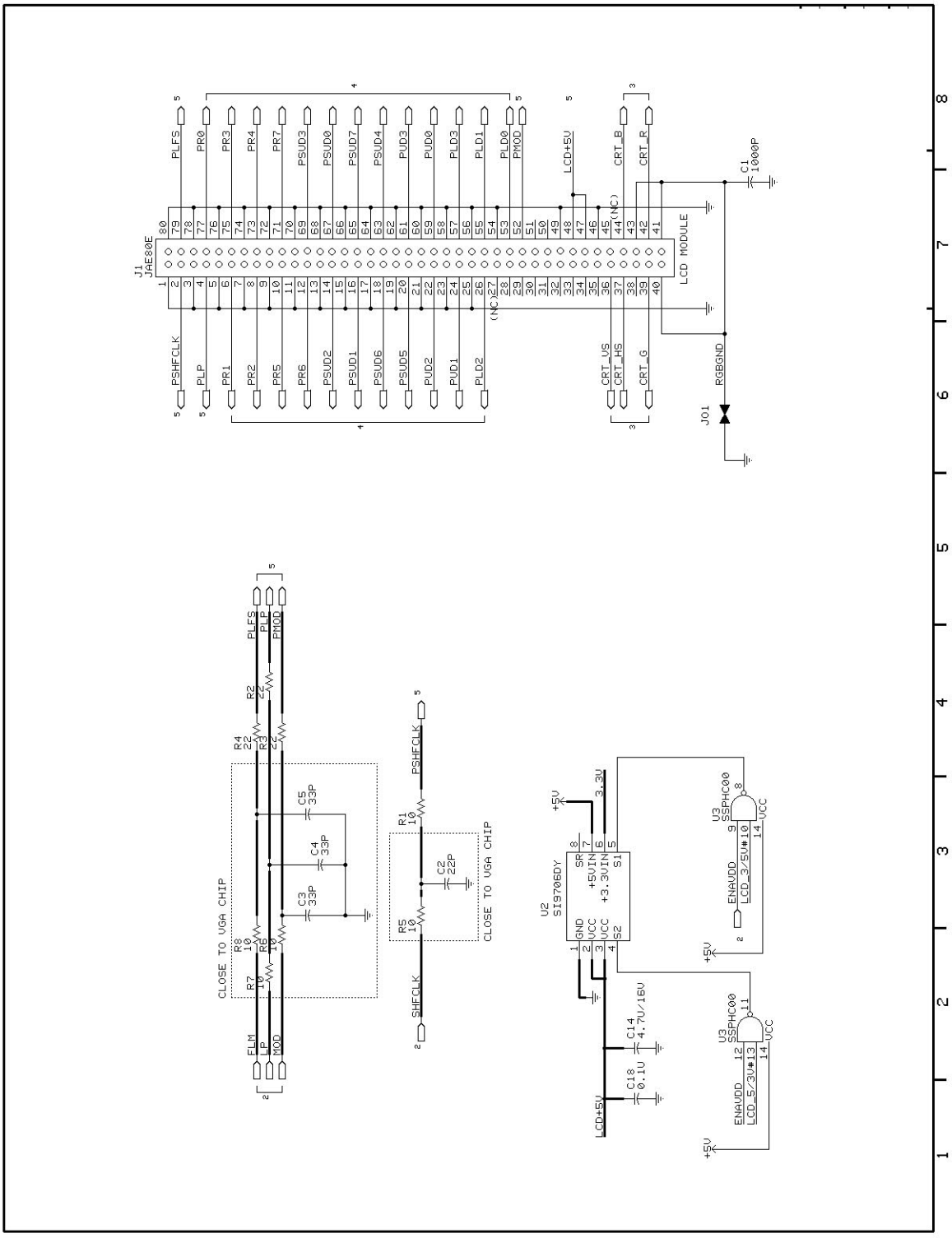


Figure B-5 Extensa 65x Series VGA Board Logic Diagrams (Sheet 5 of 6)

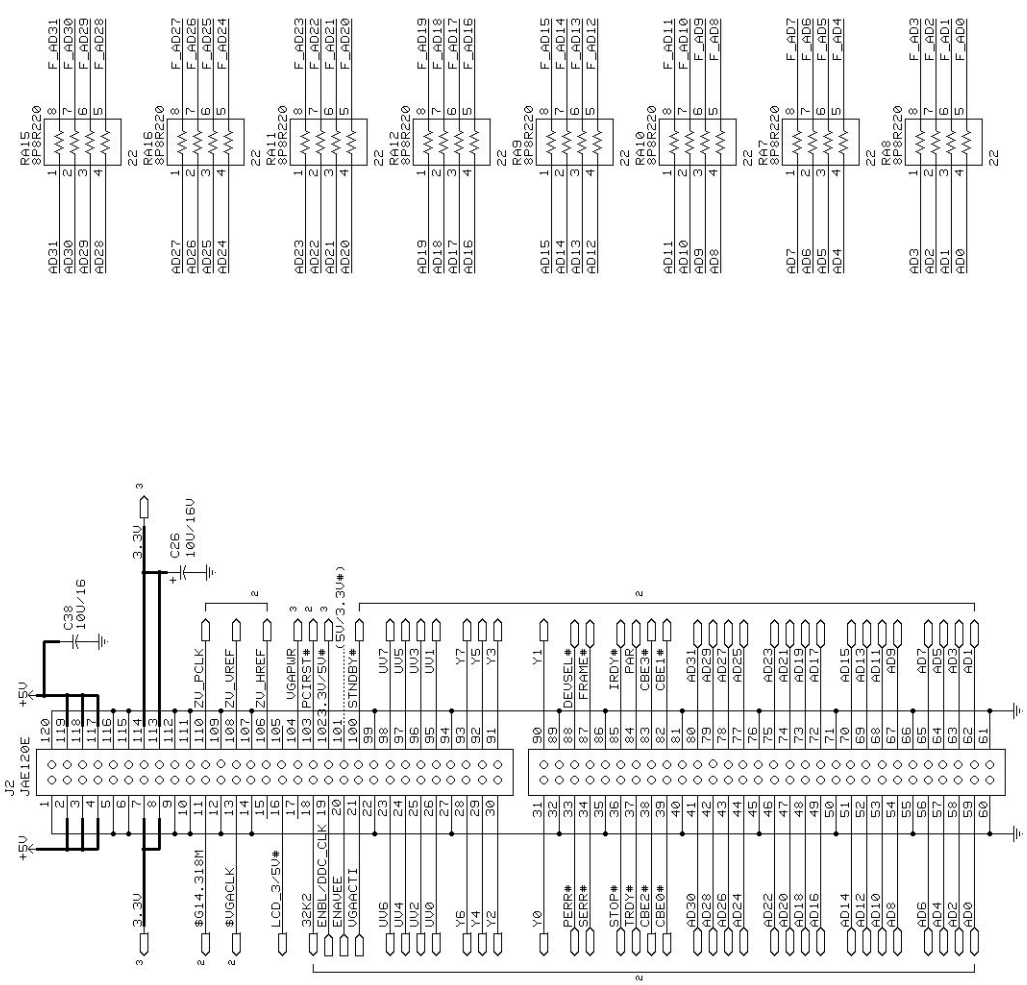
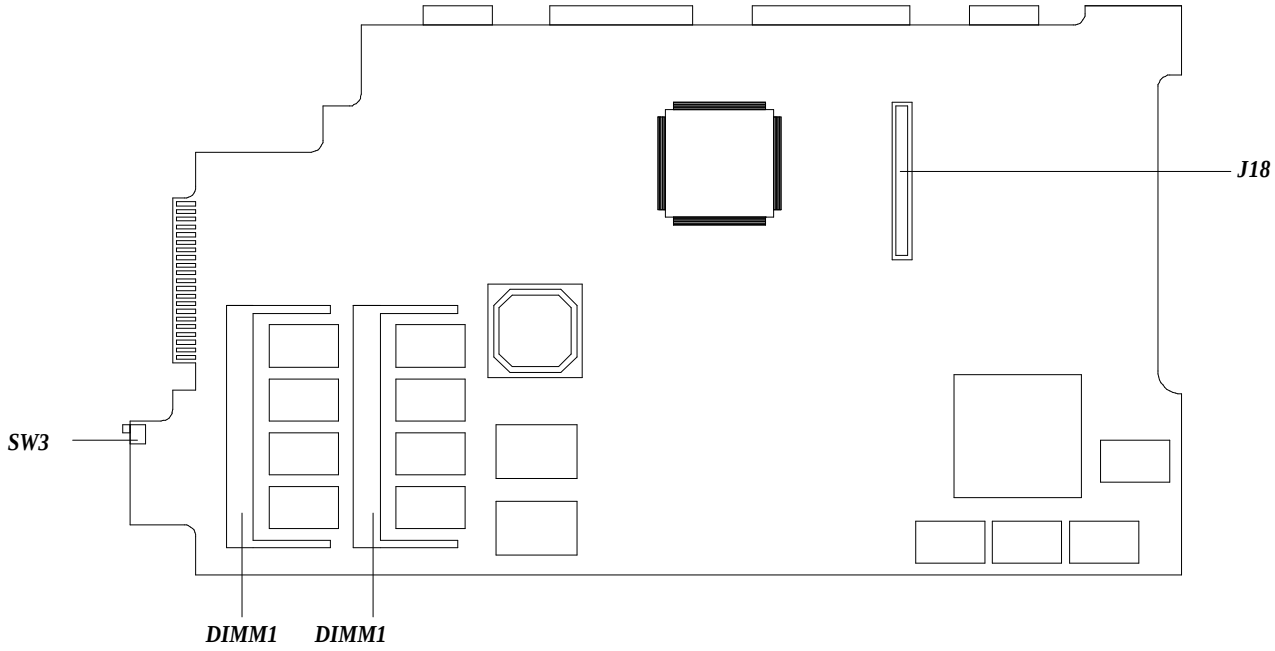


Figure B-5 Extensa 65x Series VGA Board Logic Diagrams (Sheet 6 of 6)

B.5 Jumper Options

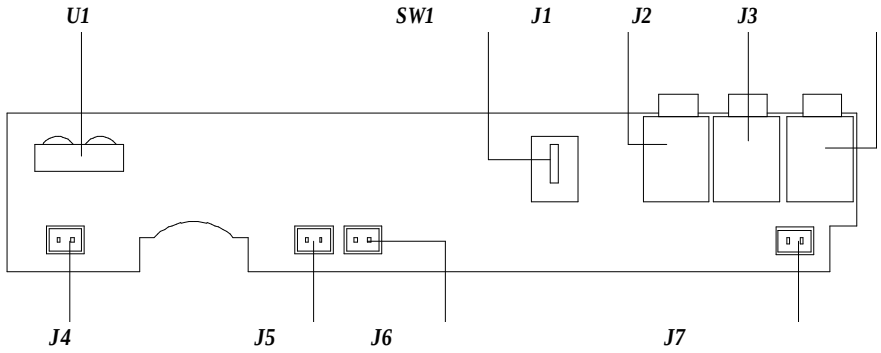
The remainder of this appendix describes the jumper configuration options for the 65x Series boards.



J18 *Feature board connector*
DIMM2 *DIMM slot 2*
DIMM1 *DIMM slot 1*
SW3 *CD-ROM/FDD Lock/unlock switch*

Figure 1-16 Main Board Jumpers and Connectors (Bottom Side)

Figure B-7 Features Board Jumper Options



U1	*FIR*	*J4*	*Left speaker connector*
SW1	*LCD Cover Switch*	*J5*	*Internal microphone connector*
J1	*Mic-in connector*	*J6*	*Fan connector*
J2	*Line-in connector*	*J7*	*Right speaker connector*
J3	*Line-out c*		

(Top Side)

Figure B-8 FIR/Audio Board Jumper Options

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