

## 1.1 Features

The T1950, T1950CS and T1950CT units consist of the following features.

Processor Processor Type BIOS RAM	Intel SL-Enhanced 486DX2/40Mhz. (P24S chip) DX2: (3.3v w/8KB internal cache) <i>Co-processor embedded.</i> 128KB flash EPROM (150ns) 4MB Expandable to 20MB (80ns)
Display  Ext. Display	T1950: Fluorescent Sidelit Monochrome LCD T1950CS: Dynamic-STN Dual Scan Color LCD T1950CT: TFT Active Matrix Color LCD T1950 & T1950CS: VGA 640 x 480 (16 colors of 4096) T1950CT: 800 x 600/256 colors;1024 x 768/256 colors (using Toshiba supplied drivers)
FDD HDD	3 1/2" 1.44MB T1950 & T1950CS: 120MB/200MB T1950CT: 200MB/320MB
Optional Peripherals	101-key Keyboard (PS/2)
Ports	1 - 14.5mm PCMCIA Type III (2.0) 1 9-PIN Serial (16450 UART) 1 Parallel/FDD: BI-DIR 1 15-PIN RGB 1 Mouse Quick Port (DCBM) 1 PS/2 Mouse Port ( <i>not usable if DCBM connected</i> )
Keyboard	1 101-key Keyboard Port (PS/2) 82-Keys, 3mm Travel
Battery Battery Life Recharge Time	NIMH (12V 2400mAH) PART# PA2420UXRA 2-3 HRS. 1.4-2.3 HRS (Computer off only)
AC Adapter	<u>T1950 &amp; T1950CS</u> : Input: 100-240VAC , Input Frequency: 50-60Hz, Input Power: .5A - .28A (50/60Hz) Output Voltage: 18 VDC, 1.1A <u>T1950CT</u> : Input: 100-240VAC, Input Frequency: 50-60Hz, Input Power: .7A - .4A (50/60Hz) Output Voltage: 18 VDC, 1.7 A
Bundled Software	Toshiba DOS 6.0; Windows 3.1; MaxTime; Ultrafont.
Dimensions	T1950: 11.7"W x 8.4"D x 2.0"H, 6.4 lbs. T1950CS & T1950CT: 11.7"W x 8.4"D x 2.1"H, 7 lbs.

The T1950 Series Personal Computer is shown in Figure 1-1, and its system configuration is shown in Figure 1-2.

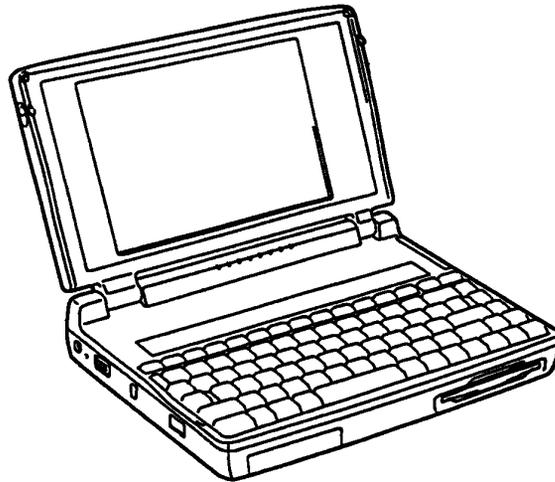


Figure 1-1 T1950 Series Personal Computer

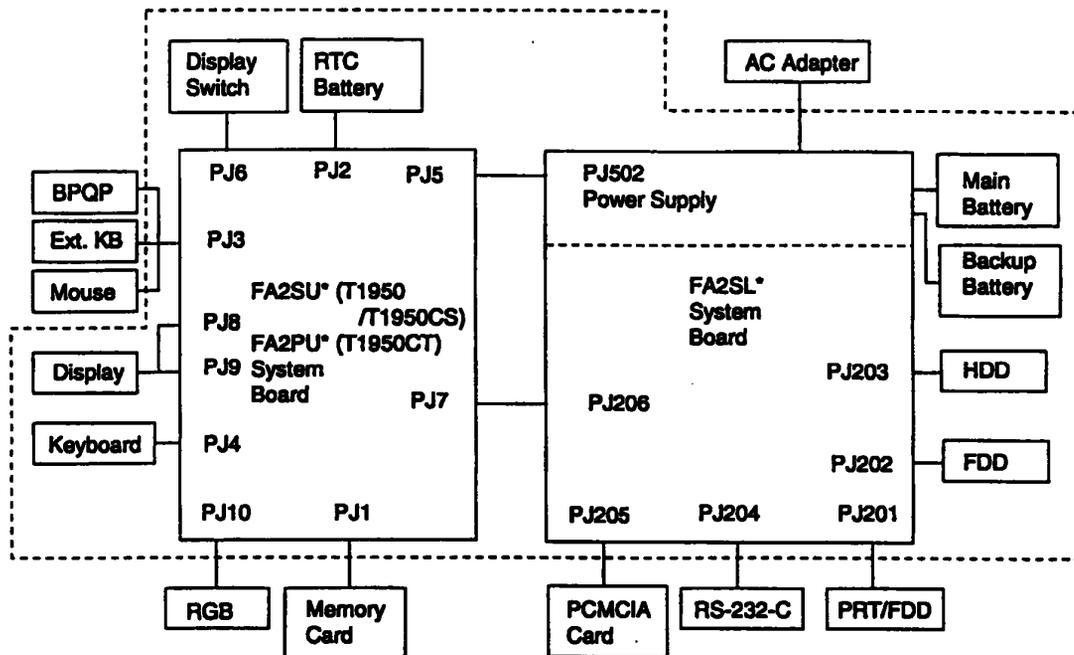


Figure 1-2 T1950 Series System Unit Configuration

## 1.2 System Unit Block Diagram

Figure 1-3 is a block diagram of the T1950 Series system unit.

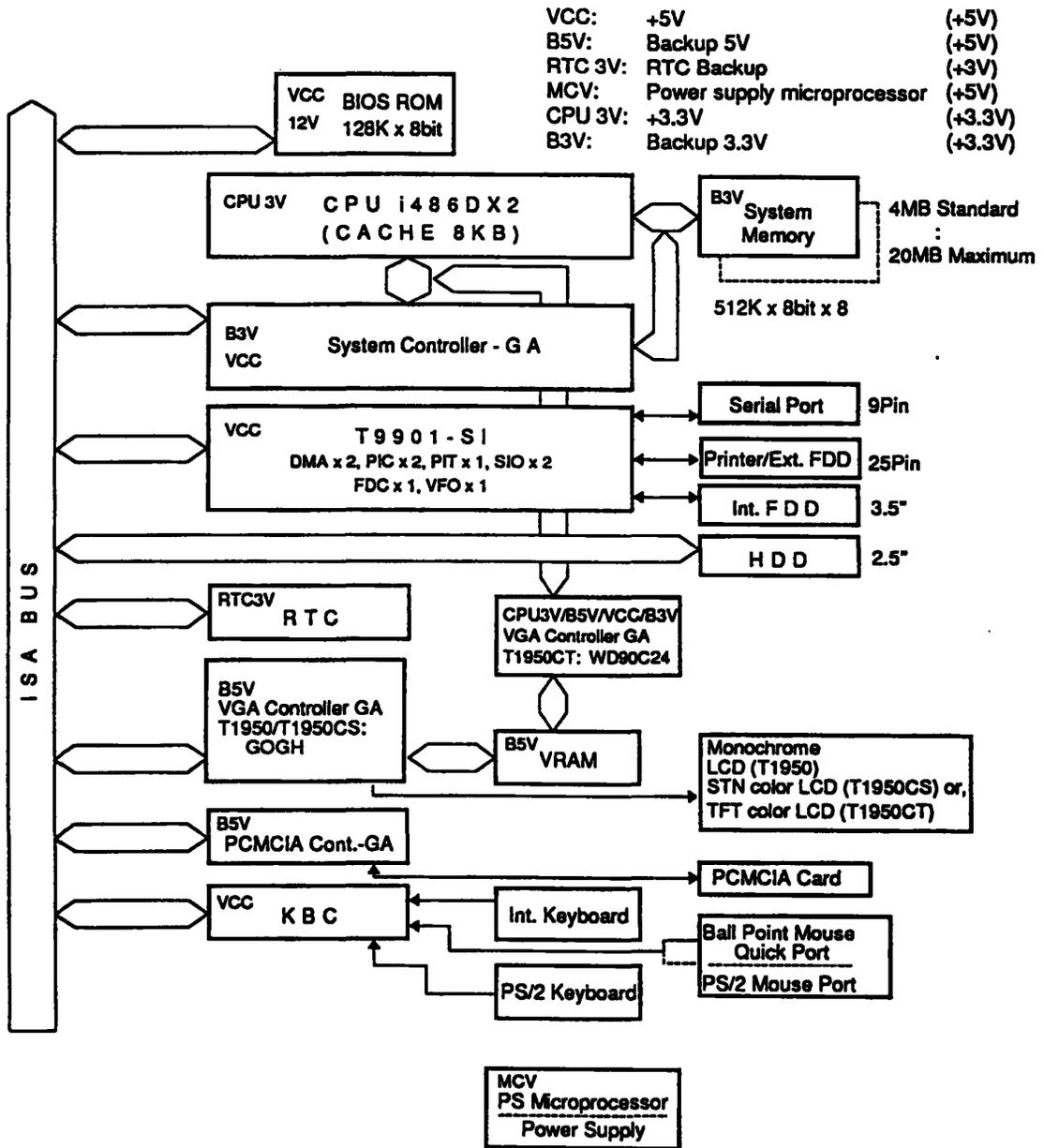


Figure 1-3 T1950 Series System Board Block Diagram

The T1950 Series system board is composed of the following major components:

- An i486DX2-40 CPU
- Super Integration (SI) T9901, which stores the following components:
  - Two Direct Memory Access Controllers (DMAC): 82C37
  - Two Programmable Interrupt Controllers (PIC): 82C59
  - One Programmable Interval Timer (PIT): 82C54
  - One Floppy Disk Controller (FDC): TC8565
  - One Serial Input/Output Controller (SIO): TC8570
  - One Variable Frequency Oscillator (VFO): TC8568
  - One I/O Controller
  - One Printer Port Controller
  - One Speaker Controller

- A Real Time Clock (RTC)

One T9934 chip is used. The T9934 has 128 of bytes memory. Fourteen bytes of memory are used for the calendar and clock. The remaining 114 bytes are used for the system configuration data.

OSC (X3) generates 32.768 KHz for RTC.

- A Keyboard Controller (KBC)

One M37452M4 chip is used.

This KBC includes the keyboard scan controller and keyboard interface controller. The KBC controls the internal keyboard, external keyboard port, PS/2 mouse port, and Ball Point Quick Port.

- The following memories:

Standard RAM: 4 MB  
Cache memory: 8 KB (inside CPU)  
BIOS ROM: 128 KB (96 KB are used)  
This ROM contains Initial Reliability Test (IRT), Basic Input/Output System (BIOS), and video BIOS.  
Video RAM: 256 KB  
Optional memory cards expand memory to a maximum of 20 MB.

- VGA display controller

T1950/T1950CS (GOGH): This controller controls internal and external VGA compatible display.

T1950CT (WD90C24): This controller controls internal VGA display and external SVGA compatible display.

- ❑ Clock Generator receives 14.31818 MHz (X2) and generates the following frequencies:

- 20 MHz for the CPU (CPU operates at 40MHz.)
- 14.7456 MHz for the COM
- 24 MHz for the FDC and VFO
- 16 MHz is used for GA
- 14.31818 MHz is used for T9901 (SI)

- ❑ Gate Array

#### System Controller Gate Array

This gate array has the following functions:

- CPU Controller
- Memory Controller
  - DRAM Controller
  - Compatible Bus Interface Controller
- SMI Controller
- VL Bus Controller
- Bus Controller
  - Compatible Bus Interface Controller
  - Compatible Access Controller
  - DMAC Controller
  - I/O Controller
- Address Latch Controller
  - 32-Bit to 16-Bit Controller
  - Address Latch
  - DMA Address Generator
  - Refresh Address Generator
- I/O Register
  - Compatible I/O Port
  - Saving the data of the Register (in resume) Controller
  - Toshiba Special Register
- 40 MHz/20 MHz Controller
- Data Bus Change Controller
- Data Latch

#### PCMCIA Controller Gate Array

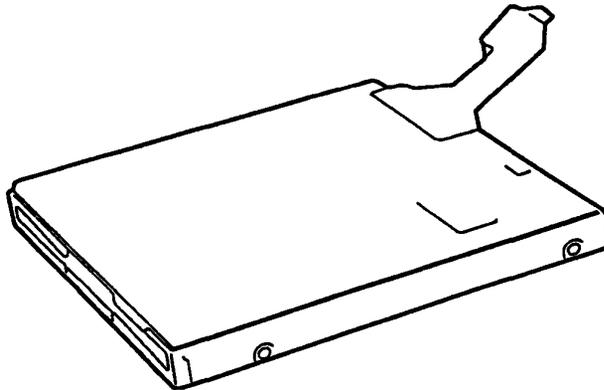
This gate array has the following functions:

- Memory Card Controller
  - PCMCIA IC Card Controller
  - Toshiba Modem Card Controller

### 1.3 3.5-inch Floppy Disk Drive

The T1950 Series 3.5-inch Floppy Disk Drive (FDD) is a thin, high-performance reliable drive that supports 720-KB (formatted) 2DD and 1.44-MB (formatted) 2HD 3.5-inch floppy disks.

The T1950 Series FDD is shown in Figure 1-4, and specifications are listed in Table 1-1.



*Figure 1-4 3.5-inch FDD*

*Table 1-1 3.5-inch FDD Specifications*

Item	2-MB mode	1-MB mode
Storage capacity (KB)		
Unformatted	2,000	1,000
Formatted	1,311	737
Number of heads	2	2
Number of cylinders	80	80
Access time (ms)		
Track to track	3	3
Average	181	181
Head settling time	15	15
Recording track density (tpi)	135	135
Data transfer rate (Kbps)	500	250
Rotation speed (rpm)	300	300
Recording method	Modified Frequency Modulation (MFM)	

## 1.4 2.5-inch Hard Disk Drive

The Hard Disk Drive (HDD) is a random access non-volatile storage device. It has a non-removable 2.5-inch magnetic disk and mini-winchester type magnetic heads.

The T1950/T1950CS supports a 120 or 200 MB HDD. The T1950CT supports a 200 or 320 MB HDD.

A T1950 Series HDD is shown in Figure 1-5, and specifications are listed in Table 1-2.

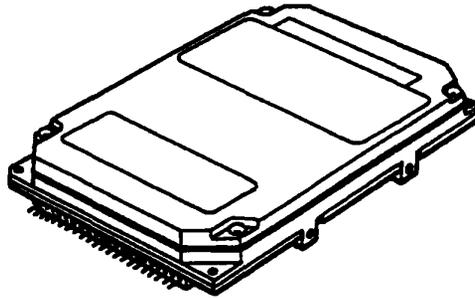


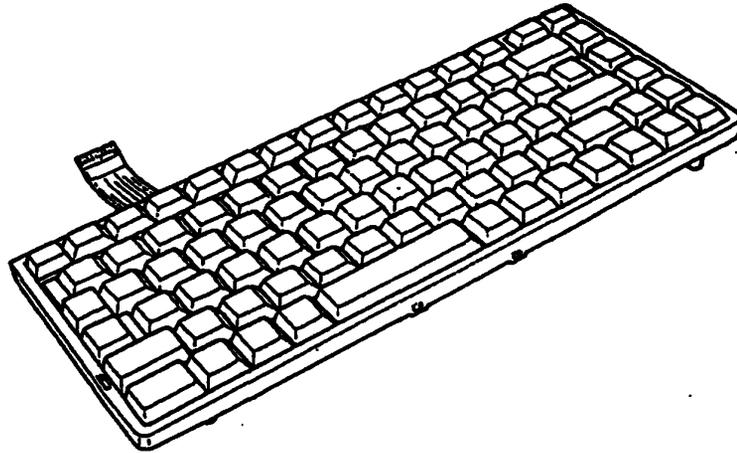
Figure 1-5 2.5-inch HDD

Table 1-2 2.5-inch HDD Specifications

	120 MB		200 MB	320 MB
	(CP2124)	(MK2124FC)	(MK2224FC)	(MK2326FC)
Storage capacity (MB) Formatted	121.6	130.1	213.0	340.0
Number of disks	2	2	2	3
Data heads	4	4	4	6
Data surfaces	4	4	4	6
Tracks per surface	1,123	1,155	1,560	1,830
Sectors per track	53 (+1)	55 (+1)	—	—
Bytes per sector	512	512	512	512
Access time (ms)				
Track to track	3	5	3	3
Average	16	17	12	12
Maximum	30	36	25	25
Rotation speed (rpm)	3,743	3,200	4,000	4,200
Data transfer rate (bps) To/from media	18 M	15.3 M	18.9 to 31.6 M	18.7 to 29.6 M
Interleave	1:1	1:1	1:1	1:1
Recording method	2-7 RLL	1-7 RLL	1-7 RLL	1-7 RLL

## 1.5 Keyboard

The 82-(USA) or 84-(European) keyboard is mounted on the T1950 Series system unit, and is connected to the keyboard controller on the system board through a 19-pin flat cable. The keyboard is shown in Figure 1-6.



*Figure 1-6 Keyboard*

## 1.6 Monochrome LCD (T1950)

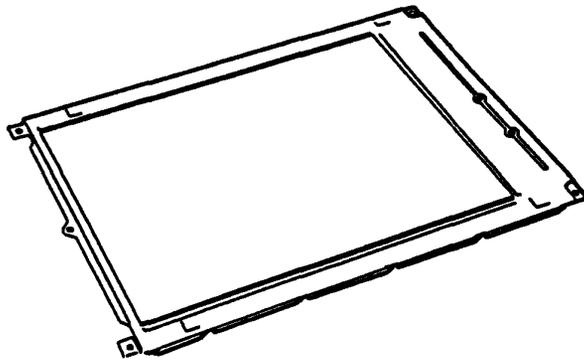
The monochrome Liquid Crystal Display (LCD) is composed of an LCD module, a Fluorescent Lamp (FL), and an FL inverter board.

### 1.6.1 Monochrome LCD Module

The T1950 monochrome LCD supports 640x480 pixels with a Video controller and 64 levels of gray. The video controller includes the functions of the Video Graphics Array (VGA).

The LCD receives vertical and horizontal synchronizing signals, 8-bit data signals (4-bit upper block data signal and 4-bit lower block data signal), and shift clock for data transmission. All signals are CMOS-level compatible.

The sidelit LCD is shown in Figure 1-7, and its specifications are listed in Table 1-3.



*Figure 1-7 Monochrome LCD*

*Table 1-3 Monochrome LCD Specifications*

Item		Specifications
Number of Dots	(dots)	640 x 480
Dot pitch	(mm)	0.30 (W) x 0.30 (H)
Display area	(mm)	198 (W) x 150 (H)
Contrast		17:1 (typically)
FL current	(mA)	5.0
FL frequency	(KHz)	42

## 1.6.2 Monochrome Fluorescent Lamp (FL) Inverter Board

The FL inverter board supplies the high frequency current needed to illuminate the FL. The specifications for the FL inverter board are listed in Table 1-4.

*Table 1-4 Monochrome FL Inverter Board Specifications*

Item		Specifications
Input	Voltage (VDC)	5
	Power (W)	2.2
Output	Voltage (VAC)	950
	Current (mA)	4.2
	Frequency (KHz)	38.5

## 1.7 STN Color LCD (T1950CS)

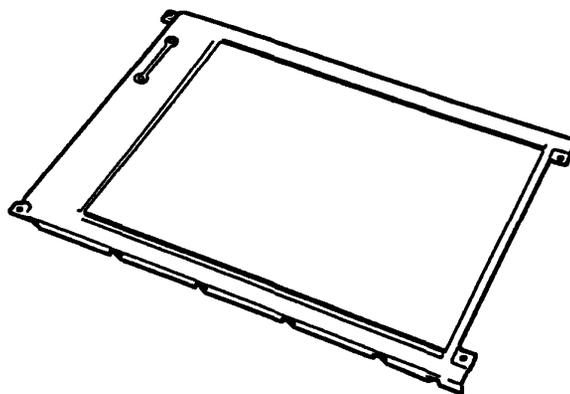
The STN Color Liquid Crystal Display (LCD) contains an LCD module, a Fluorescent Lamp (FL), and an FL inverter board.

### 1.7.1 STN Color LCD Module

The T1950CS STN color LCD is backlit and supports 640x480 pixels with a Video controller. This video controller includes the functions of Video Graphics Array (VGA).

The T1950CS's LCD receives vertical and horizontal synchronizing signals, 16-bit data signal (8-bit upper block data signal and 8-bit lower block data signal) and shift clock for data transmission. All signals are CMOS-level compatible.

The STN LCD is shown in Figure 1-8, and specifications for the LCD are listed in Table 1-5.



*Figure 1-8 STN Color LCD*

*Table 1-5 STN Color LCD Specifications*

Item	Specifications
Number of Dots (dots)	640x480
Dot pitch (mm)	0.3 (W)x0.3 (H)
Display area (mm)	195 (W)x147 (H)
Contrast	18:1 (Typically)
FL current (mA)	5.0
FL frequency (KHz)	47

## 1.7.2 STN Color Fluorescent Lamp (FL) Inverter Board

The FL inverter board supplies high frequency current to light the LCD's Fluorescent Lamp. The specifications for the FL inverter are listed in Table 1-6.

*Table 1-6 STN Color FL Inverter Board Specifications*

Item		Specifications
Input	Voltage (VDC)	5
	Power (W)	6
Output	Voltage (VAC)	1,000
	Current (mA)	5.0 x 2
	Frequency (KHz)	42

## 1.8 TFT Color LCD (T1950CT)

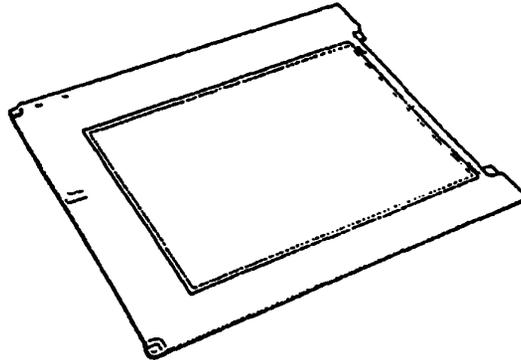
The TFT Color Liquid Crystal Display (LCD) contains an LCD module, a Fluorescent Lamp (FL), and an FL inverter board.

### 1.8.1 TFT Color LCD Module

The T1950CT TFT color LCD supports 640x480 pixels with an internal display controller and 512 colors for graphics and characters. This controller includes the functions of Video Graphics Array (VGA) and Super VGA (SVGA) for external display.

The T1950CT's LCD receives 9-bit data signals, data enable signals, and shift clock for data transmission. All signals are CMOS-level compatible.

The TFT LCD is shown in Figure 1-9, and specifications are listed in Table 1-7.



*Figure 1-9 TFT Color LCD*

*Table 1-7 TFT Color LCD Specifications*

<b>Item</b>	<b>Specifications</b>
Number of dots (dots)	640x480
Dot pitch (mm)	0.27 (W)x0.27 (H)
Display area (mm)	171 (W)x130 (H)
Contrast	60:1 (minimum)
FL current (mA)	5.0
FL frequency (KHz)	47

## 1.8.2 TFT Color Fluorescent Lamp (FL) Inverter Board

The FL inverter board supplies high frequency current to light the LCD's Fluorescent Lamp. The specifications for the FL inverter are listed in Table 1-8.

*Table 1-8 FL Inverter Board Specifications*

Item			Specifications
Input	Voltage	(VDC)	5
	Power	(W)	3
Output	Voltage	(VAC)	1,100
	Current	(mA)	5.0
	Frequency	(KHz)	47

## 1.9 Power Supply

The power supply uses a microprocessor to monitor and regulate the voltages used within the T1950 Series computers. The power supply contains the following functions:

1. Determines if the AC adapter or battery is connected to the computer.
2. Detects DC output and circuit malfunctions.
3. Controls the LED indicator and speaker.
4. Turns the battery charging system on and off and detects a fully charged battery.
5. Determines if the power can be turned on and off.
6. Provides more accurate detection of a low battery.
7. Calculates the remaining battery capacity.

The power supply output rating is specified in Table 1-9.

*Table 1-9 Power Supply Output Rating*

Use for	Name	DC voltage (V)	Regulation tolerance (%)	Maximum current (mA)	Ripple (mV)
System logic, FDD, HDD, Display	VCC	+5	±5	3,500	100
RS-232C, Flash ROM	12V	+12	±5	120	240
RAM, CPU	B3V	+3.3	±5	755	66
RS-232C	M12V	-7 to -12.6	-	10	-

## 1.10 Batteries

The T1950 Series has three types of batteries:

- Main battery pack
- Backup battery
- Real Time Clock (RTC) battery

Specifications for these batteries are listed in Table 1-10.

*Table 1-10 Battery Specifications*

Battery name	Material	Output voltage	Capacity
Main battery	Nickel Metal Hydride	12 V	2,400 mAh
Backup battery	Nickel Metal Hydride	1.2 V	1,100 mAh
RTC battery	Lithium-Vanadium	3.0 V	50 mAh

### 1.10.1 Battery Indicator

The battery indicator is located on the top cover, and shows the status of the removable battery pack, power supply and AC adapter.

The status of each can be determined by color:

- Orange     The battery is being charged. (AC adapter is attached.)
- Green     The battery is fully charged. (AC adapter is attached.)
- No light   The AC adapter is disconnected from the computer or the AC adapter is connected, but it cannot charge the battery for one of the following reasons:
  - The battery is extremely hot. Allow the computer and the battery to reach room temperature before attempting to charge the battery.
  - The battery is almost fully discharged. The battery will not begin charging immediately in this state, it will begin charging a few minutes after the AC adapter is connected.
  - The AC adapter is not receiving power.

### 1.10.2 Main Battery

The removable main battery pack is the computer's main power source when the AC adapter is not attached. The main battery recharges the backup battery when the system's power is on. The backup and main battery maintain the state of the computer when you enable AutoResume, and they maintain the information in Hard RAM.

### 1.10.2.1 Battery Charging Control

Battery charging is controlled by a microprocessor that is mounted on the power supply. The microprocessor controls whether the charge is on or off and detects a full charge when the AC adapter and battery are attached to the computer. The system charges the battery using quick charge or trickle charge.

When the AC adapter is attached, there are two types of charge: quick charge when the system is powered off, and trickle charge when the system is powered on. Table 1-11 shows the charging time period of the main battery.

*Table 1-11 Time Required for Battery Charges*

	Charging time
Quick charge (power off)	About 2.3 hours (T1950) About 1.4 hours (T1950CS/T1950CT)
Trickle charge (power on)	About 48 hours

#### ❑ Quick Battery Charge

If one of the following occurs, the battery quick-charge process stops.

1. The battery becomes fully charged
2. The AC adapter or battery is removed.
3. The battery or AC adapter output voltage is abnormal.
4. The charge current is abnormal.

#### ❑ Trickle Battery Charge

When the main battery is fully charged and the AC adapter is attached, the power supply microprocessor automatically changes quick charge to trickle charge.

### 1.10.3 Backup Battery

The backup battery maintains data for AutoResume. The power source used to back-up the AutoResume data is determined according to the following priority:

AC adapter > Main battery > Backup battery

The backup battery is charged by the main battery or AC adapter when the system is powered on. Table 1-12 shows the charging time and data preservation period of the backup battery.

*Table 1-12 Backup Battery Charging/Data Preservation Time*

		<b>Time</b>
<b>Charging Time</b>	<b>Power On</b>	<b>16 H</b>
	<b>Power Off (with AC Adapter)</b>	<b>60 H</b>
	<b>Power Off (Without AC Adapter)</b>	<b>Doesn't charge</b>
<b>Data preservation period (full charge)</b>		<b>8 H</b>

#### **1.10.4 RTC Battery**

The RTC battery provides power to keep the current date, time and other setup information in memory while the computer is turned off. Table 1-13 shows the charging time and data preservation period of the RTC battery.

*Table 1-13 RTC Battery Charging/Data Preservation Time*

		<b>Time</b>
<b>Charging Time</b>	<b>Power On</b>	<b>48 H</b>
	<b>Power Off</b>	<b>Doesn't charge</b>
<b>Data preservation period (full charge)</b>		<b>1 month</b>