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# ZT 8905

## Single Board Pentium™ Computer

**An advanced STD 32® computer with support for multiprocessing and CompactPCI™ expansion.**

The ZT 8905 is a single board Pentium-based computer that offers outstanding performance in a very small form factor. The Pentium processor (choice of 75, 100, 133, 166 MHz), the 32-bit STD 32® backplane, and PCI expansion capability give the ZT 8905 features formerly found only on larger format solutions.

Onboard PCI expansion based on the CompactPCI specification provides support for high-speed peripherals such as Super VGA. This PCI capability and an optional IDE interface allow the ZT 8905 to operate as a complete embedded PC.

PC software-compatibility provides access to the programs and tools available for the desktop computer market, and Ziatech enhances this platform with a set of tools for embedded applications.

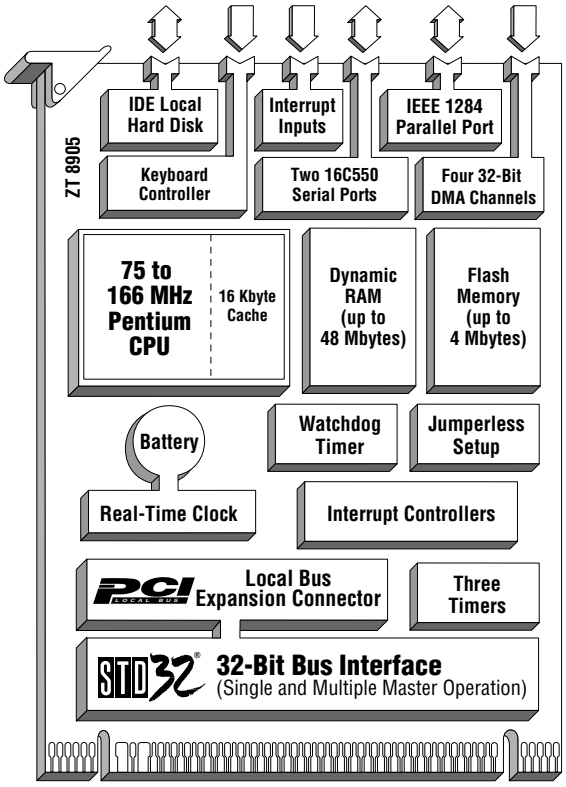
The ZT 8905 contains a large RAM capacity via expandable DRAM modules, and provides on-board flash memory for embedded programs. Its high-speed STD 32 Bus interface provides access to STD 32 and STD peripherals and I/O cards.

The STD 32 interface also supports multiple processors in the same system, allowing the ZT 8905 to operate in Ziatech's multiprocessing STD 32 STAR SYSTEM™.

- STD 32 multiprocessing-capable
- PC/AT software-compatible
- MS-DOS in flash
- 75, 100, 133, or 166 MHz Pentium
- CompactPCI local bus expansion
- CompactPCI video option
- Eight to 48 Mbytes DRAM in low profile modules
- Two to four Mbytes flash
- Integrated IDE drive option
- IEEE 1284 parallel port (Centronics, ECP, EPP)
- PC/AT keyboard controller
- Two RS-232 serial ports (16550)
- Four DMA channels (8237)
- Real-time clock, with battery backup
- Watchdog timer
- Push-button reset
- Software-programmable LED
- Jumperless system setup
- Dynamic 8-, 16- and 32-bit bus sizing
- 32-bit high-speed STD 32 Bus interface
- 3.3V technology

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***ZT 8905 Function Block Diagram***

## Functional Considerations

### STD 32 Bus Interface

The ZT 8905 Single Board Pentium Computer is designed for the STD 32 Bus architecture. Dynamic detection of backplane peripheral capabilities allows the ZT 8905 to support high-speed 8-, 16- and 32-bit Extended Architecture (EA) boards as well as slower 8- and 16-bit Standard Architecture (SA) boards. SA capability ensures compatibility with existing 8-bit STD-80 I/O boards.

### Multiprocessing Operation

The ZT 8905 can be configured for multiprocessing in an STD 32 STAR SYSTEM. Up to seven STD 32 processors can share resources in one STD 32 backplane, with common memory and I/O peripherals. The onboard PCI capability of the ZT 8905 allows fast local I/O such as VGA to run independently of the STD 32 backplane. (See the STD 32 STAR SYSTEM data sheet in the Multiprocessing section of Ziatech's Technical Data Book for detailed information.)

### Intel Pentium™ Processors

The ZT 8905 takes advantage of the latest Intel processor technology to offer unmatched computing power for the industrial OEM. The ZT 8905 supports 75 MHz through 166 MHz Pentium processors. Additional pins on the processor socket have been implemented to support future upgrade processors.

### 3.3V Technology

The ZT 8905 makes use of 3.3V technology to minimize the amount of system power required for high-performance computing. The Pentium processor and DRAM subsystem operate from 3.3V power, which is provided by an onboard high-efficiency DC-to-DC converter.

### Cooling Requirements

An integrated heat sink and fan is provided to cool the Pentium processor. Contact Ziatech for maximum operating temperatures for different speed Pentium CPUs.

### Dynamic RAM Locations

The ZT 8905 includes two 72-pin DRAM socket locations that can accommodate up to 48 Mbytes of local memory. Each DRAM module pair contains up to 16 Mbytes of stackable DRAM. Additional memory can be accessed via the onboard PCI bus or through the STD 32 backplane.

### Flash Memory BIOS/Disk

Up to four Mbytes of flash memory can be loaded on the ZT 8905. The flash memory contains the system BIOS as well as solid state disk capabilities. Making use of the latest in flash technology, the ZT 8905 provides true 5V-only operation for all flash accesses.

### Cache Memory

The Pentium processor contains 16 Kbytes of internal Level 1 (L1) cache memory. An additional socket on the ZT 8905 provides support for a 256 Kbyte Level 2 (L2) cache module. An estimated 15% performance increase can be expected with L2 cache. Please contact Ziatech for pricing and availability.

### I/O Addressing

I/O is supported via onboard peripherals, PCI expansion, and/or backplane peripheral boards. High-speed STD 32 boards and older 8-bit STD boards are supported with 16-bit addressing. The STD bus signal IOEXP is also driven dynamically to allow older 8-bit addressed peripherals from being redundantly mapped in the I/O space.

### CompactPCI Expansion Interface

The Peripheral Component Interconnect (PCI) protocol is provided as local bus expansion for the ZT 8905. This is designed to comply with the CompactPCI open specification for small form factor and mezzanine cards. The ZT 8905 supports local bus VGA and will support additional PCI peripherals as they become available. PCI local bus operation provides dramatically faster video performance than video boards operating at ISA bus speeds.

### Jumperless Setup

The setup for onboard interrupt routing, DMA routing and other features is configurable under software control. This feature dynamically reconfigures resources as needed.

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**Serial I/O**

Two 16C550-compatible UARTS are provided on the ZT 8905. Configured as COM1 and COM2, these RS-232 serial channels provide complete PC/AT-compatibility, including modem control signals, handshaking, interrupt support, and data rates up to 115K baud. The onboard serial line drivers require only 5V power supply operation, using charge pump technology to create RS-232-compatible signals. The two serial channel interfaces are provided through the multi-I/O connector.

**IEEE 1284 Parallel Port**

The ZT 8905 includes an IEEE 1284-compliant parallel port. This is a Centronics-compatible printer port with Enhanced Parallel Port (EPP) and Extended Capabilities Port (ECP). The enhancements and extensions allow the use of high-speed, non-printing devices on the parallel port with or without DMA. Bidirectional control is available via software. The parallel port interface is provided through the multi-I/O connector.

**Interrupts**

A fully PC/AT-compatible interrupt subsystem supports a total of 15 discrete interrupt inputs for the ZT 8905. Interrupt sources include a mixture of onboard, STD Bus, frontplane, and PCI peripherals. The PCI interface supports shareable interrupt levels.

**PC/AT-Compatible Timers**

Three independent, 16-bit timers (8254 architecture) are available. An interrupt can be generated on end-of-count events.

**Direct Memory Access**

Direct Memory Access (DMA) channels are provided by an onboard 32-bit controller that is a superset of the 8237 PC/AT-compatible controller. Each channel is programmable for 8- or 16-bit operation, and supports fast (TYPE F) compatible transfers. DMA through backplane control signals is supported by the ZT 8905. One channel is available through the BUSRQ*/BUSAK* handshake. Three additional channels are available through the frontplane interface.

**Hard Disk Interface**

The ZT 8905 supports a local IDE hard disk interface as an option. This interface is independent of backplane-based hard disk interfaces, allowing the ZT 8905 to boot from a local operating system. In multiprocessing applications, this feature can be used to allow each CPU to boot different operating systems, and also frees-up the STD 32 Bus for other I/O.

**Floppy Interface**

A floppy disk interface is also available on the rear of the board. This is designed for higher volume applications where a single board solution without a card cage is required. For all other applications, a ZT 8954 Low Profile Floppy Disk Controller provides a more modular solution.

**Watchdog Timer**

An onboard watchdog timer is provided for system integrity. When enabled, the watchdog must be strobed within 500 ms to avoid a system reset.

**Real-Time Clock**

The real-time clock is compatible with the industry standard Dallas Semiconductor DS1287 architecture. Features include 12- or 24-hour timekeeping, leap year adjustment, rollover status, time comparison and periodic interrupt generation. Data retention for system setup functions is provided by an onboard battery.

**Keyboard Interface**

The keyboard interface can be configured for either onboard or offboard operation, dependent upon the system requirements. The onboard keyboard controller is fully PC/AT-compatible, and is provided through the multi-I/O connector.

**Software**

The ZT 8905 comes standard with Ziatech's industrial BIOS and MS-DOS in flash EPROM. The BIOS can boot from the operating system residing in local flash memory, from a local flash drive, from a floppy or hard disk, or from another computer via a network. The flexibility of the BIOS allows the ZT 8905 to operate like a PC in a broad range of configurations, including a minimal feature set without any other peripherals. A setup program built into the BIOS allows for configuration of other peripherals, the boot source, diagnostics and other system parameters.

In the multiprocessing STAR SYSTEM, the STAR BIOS also manages interprocessor communication and access to shared peripherals.

Development toolkits are strongly recommended for the initial purchase. These toolkits contain utilities and tools that speed the development process and help with technical support. Toolkits are available for single or multiple processor DOS-based systems, and single or multiple processor QNX-based systems. Some of these tools are applicable to other operating systems. Contact Ziatech for more details.

## Specifications

- Electrically and mechanically compatible with STD 32 Specification, version 1.3
- Electrically compatible with PCI Specification, version 2.1

**Electrical**

| *Power Req.* | *Min.* | *Typ.* | *Max.* |
|---|---|---|---|
| Supply Voltage, $V_{CC}$ | 4.75V | 5.00V | 5.25V |
| Supply Current, $V_{CC}$=5.0V ***(75 MHz)*** | – | 1.8A | 2.6A |
| Supply Current, $V_{CC}$=5.0V ***(100 MHz)*** | – | 2.1A | 2.9A |
| Supply Current, $V_{CC}$=5.0V ***(133 MHz)*** | – | 2.3A | 3.1A |
| Supply Current, $V_{CC}$=5.0V ***(166 MHz)*** | – | 2.6A | 3.5A |

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**Mechanical**

- Measures 4.5" (11.4cm) x 6.5" (16.5cm)
- Requires two STD 32 slots
- Maximum component height:
  Top surface: 1" (2.5cm) with forced-air cooling heat sink; two STD slots
  Bottom surface: 0.047" (1.2mm)
- Weight: 7.5 oz. (212.6g)
- Connectors
  P1: 136-pin, edge finger STD 32 interface connector
  J1: Optional L2 cache expansion
  J3: 125-pin, 2mm style, local bus PCI interface
  J4: 16-pin, 2mm header, VGA transition connector
  J5: 100-pin, 0.50" (12.7mm) latching connector, multi-I/O interface supporting 2 COM ports, parallel port, VGA interface, keyboard, and frontplane interrupts/DMA
  J7: 44-pin, 2mm header, optional IDE hard disk interface

| *Environmental* | |
|---|---|
| Operating Temperature | 0° to 55° Celsius |
| Storage Temperature | -40° to +85° Celsius |
| Non-Condensing Relative Humidity | less than 95% at 40° Celsius |

**STD 32 Compliance Levels**

See the STD 32 brochure in the appendix of the Technical Data Book for more details regarding STD 32 Compliance Level descriptions.

- Permanent Master: EA32, EA16, EA8, SA16, SA8-I,MX,NOWS
- Temporary Master: EA32, EA16, EA8, SA16, SA8-I,MX,NOWS

**Reliability**

MTBF: 11 years
MTTR: five minutes (based on board replacement)

## Ordering Information

ZT 8905 Single Board Pentium Computer
ZT M8905 ZT 8905 manual

***Must choose one option from each category:***

**CPU options**

C1 75 MHz Pentium
C3 100 MHz Pentium
C4 133 MHz Pentium
C5 166 MHz Pentium

**RAM options**

R1 8 Mbytes low profile DRAM
R2 16 Mbytes DRAM
R3 32 Mbytes DRAM
R4 48 Mbytes DRAM

**Flash memory options**

P1 2 Mbytes flash
P2 4 Mbytes flash

**Software options**

S1 MS-DOS and Ziatech's Industrial BIOS installed in flash memory
S2 MS-DOS and Ziatech's STAR BIOS installed in flash memory for multiprocessing systems
S3 STAR QNX boot loader installed in flash (temporary masters only)

***Select from the following options as needed:***

**Cache memory option**

E1 256 Kbytes L2 cache (call Ziatech)

**IDE options**

D1 Includes IDE interface and 340 Mbyte drive (requires one extra slot)

**Video options**

V1 CompactPCI-based local bus Super VGA adapter (zPM10). Contact Ziatech for additional PCI peripheral support.

**STAR SYSTEM options**

M1 Permanent master (requires option S2)
M2 Temporary master (requires option S2 or S3)

**Development Toolkits (for first purchase)**

ZT 94036 STD DOS Development Toolkit. Includes host development disk containing VSC, PROMPREP, FLASH.EXE and other utilities; STD Device Driver Package (STD DDP) for support of STD 32 I/O peripherals. Diagnostic card, full MS-DOS, and ZT 90202 cable.

**Accessories**

Cables *(see Data Book cable section for details):*

ZT 90205 11" (25.4cm) 100-pin transition connector to the following:
Two 9-pin male D-shell COM interfaces
One 25-pin female D-shell parallel port interface
One 15-pin female D-shell VGA interface
One 5-pin female DIN keyboard interface
One 10-pin frontplane male header interrupt
One 10-pin frontplane male header DMA

ZT 95188 Boot ROM with BIOS and MS-DOS for reinstalling ZT 8905 on-board firmware

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