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ZT 8902
Single Board 486 Computer

A compact, cost-effective STD 32® computer with 486 CPU performance options for single or multiple processor control applications.

The ZT 8902 is a highly integrated 486-based computer on a single STD 32® board. It combines high-performance with industrial reliability and small size. The board can operate as a single CPU or as a permanent or temporary master in multiprocessing environments such as Ziatech's STD 32 STAR SYSTEM™.

The ZT 8902 is available with processor options ranging from the low-cost 25 MHz 486 SX to the 100 MHz DX4. It supports up to 4 Mbytes of flash memory, up to 16 Mbytes of DRAM, two serial ports, a printer port, 24 points of industrial digital I/O and additional counter/timers. The board's STD 32 bus transfers provide high bus bandwidth and compatibility with existing STD I/O cards. An optional plug-in adapter board adds high-speed, 32-bit "local bus" Super VGA video to the ZT 8902 without taking up an extra slot. This gives the ZT 8902 high -resolution graphics capability and high-speed video performance, and frees the backplane from handling video data.

The ZT 8902 is AT-compatible, and with Ziatech's Industrial BIOS, supports Microsoft MS-DOS, Windows™, and WindowsNT™. It will also run UNIX, VxWorks, QNX, and other operating systems.

The ZT 89LT02 contains the same features, but combines low power and low temperature operation (-40° to +70° C) for harsh environments.

- STD 32- and STD-compatible
- Occupies a single backplane slot
- Optional 32-bit local bus video support
- Multiprocessing STAR SYSTEM-compatible
- 25 MHz SX to 100 MHz DX4 operation
- 4, 8, or 16 Mbytes of DRAM
- 1, 2, or 4 Mbytes of flash memory
- Standard AT peripherals include DMA controllers, interrupt controllers, counter/timers, and real-time clock/CMOS RAM
- Additional counter/timers (8254)
- 24-point digital I/O interface
- Centronics printer port
- Two RS-232 serial ports (16450)
- Watchdog timer
- Push-button reset
- AC/DC power-fail detection
- Compatible with Microsoft MS-DOS, Microsoft Windows™, WindowsNT™, VxWorks, UNIX, and QNX
- STD DOS and STAR BIOS options
- Standard 4.5" x 6.5" board format
- Speaker interface
- +5V-only operation (flash memory programming may require ±12V)
- ZT 89LT02 option provides for -40° to +70°C operation

Note: LT (low temperature) denotes CMOS, TTL backplane-compatible, and extended temperature operation of -40° to +70° C. (Users should make adjustments for temperature rise in enclosures.)

ZIATECH CORPORATION

Functional Considerations

STD Bus Interface

The ZT 8902 supports both STD and STD 32 backplane architectures. In an STD backplane, all data transfers between the ZT 8902 and the bus are reduced to 8 bits. In an STD 32 backplane, dynamic bus sizing signals determine the width of the data transfer between the ZT 8902 and the bus.

Multiprocessing Operation

The ZT 8902 supports multiprocessing operation for sharing STD Bus memory and I/O resources with additional ZT 8902 single board computers, or other STD 32 masters. The STD 32 multiprocessing architecture includes a single permanent master and up to six temporary masters. The ZT 8902 is easily configured for either permanent or temporary master operation. When operating as a permanent master, the ZT 89CT39 Slot X Arbiter Card is needed to arbitrate the STD 32 Bus resource requests from temporary masters.

486 SX to DX4 Processors

The ZT 8902 supports the 486 SX, 486 DX, 486 DX2, and 486 DX4 processors. The processors are distinguished by their operating speeds and the floating-point functions available on all but the 486 SX. **Figure 2** illustrates the relative performance of these processors. The DX4 processor operates at 3.3 volts for lower power and heat dissipation. The ZT 8902 incorporates an on-board DC to DC connector to supply 3.3 volts for the processor.

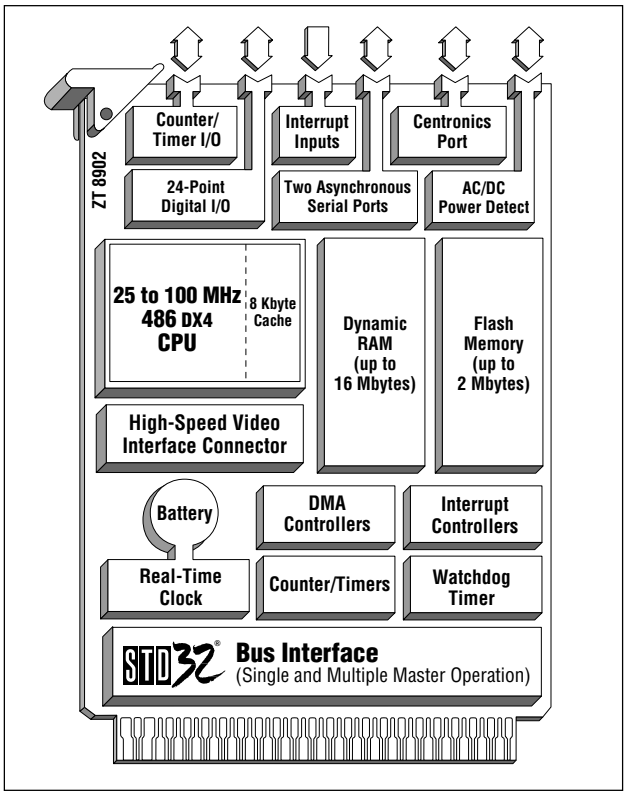


Figure 1. The ZT 8902 functional block diagram

Memory and I/O Addressing

The ZT 8902 includes two 64-pin SIMM sockets that support up to 16 Mbytes of DRAM. The ZT 8902 also includes flash memory soldered directly on the board, and many I/O peripherals required for industrial control applications. The STD I/O expansion signal (IOEXP) is supported to limit the addressing redundancy of I/O boards that decode fewer than 16 bits of address. Data transfers are dynamically adjusted to support standard architecture (SA) memory boards with an 8-bit or 16-bit data path.

Local Bus Video

Video is supported with a separate STD video expansion board or with a small adapter board that plugs directly onto the ZT 8902. Ziatech's STD 32 video expansion boards include the ZT 8982 Super VGA/ Flat Panel and Keyboard Interface and the ZT 8842 VGA/Flat Panel and Keyboard Interface.

Ziatech's zVID2 Local Bus Super VGA/Flat Panel Video Adapter adds local bus Super VGA and Flat Panel video capability to the ZT 8902. The plug-in zVID2 adapter operates at the CPU speed (25 or 33 MHz) and utilizes a full 32-bit data bus width. This increases video performance up to 10 times over boards that operate at the ISA bus speed (8 MHz) and use a 16-bit data width. The ZT 8902 with the zVID2 adapter installed provides 486 processing and high-performance Super VGA video in a single STD 32 backplane slot.

Serial I/O

There are two on-board PC-compatible serial ports. The serial ports are implemented with a +5V-only charge pump technology to eliminate the need for a ±12V supply. Both serial ports include a complete set of handshaking and modem control signals, maskable interrupt generation, and data transfer rates up to 115.2K baud.

The serial ports are configured as DTE and are available through 10-pin frontplane connectors.

Optional cables interface the frontplane connectors to 9-pin D-shell connectors. A null-modem option is also available to convert the DTE configuration to DCE. Adapter boards that provide RS-485 operation are available from Ziatech.

Printer Interface

The ZT 8902's parallel printer port can be connected to a Centronics-compatible printer. The printer interface is available through a 20-pin frontplane connector. An optional cable is available to interface the frontplane connector to a Centronics printer.

Parallel I/O

The ZT 8902 has three 8-bit parallel I/O ports for a total of 24 parallel I/O lines. Each line is programmable as an input or an output with readback. The outputs sink 12mA and do not glitch during power-up or power-down. The 24 lines are available through a

50-pin frontplane connector. Optional cables interface the frontplane connector to an 8-, 16-, or 24-position I/O module mounting rack, such as Ziatech's ZT 2226 24-Channel I/O Mounting Rack or those offered by Opto 22.

Interrupts

The ZT 8902 includes two interrupt controllers providing a total of 15 interrupt inputs. The interrupt controller supports level-triggered and edge-triggered inputs, fixed and rotating priorities, individual masking, and programmable logic to reduce noise sensitivity. Interrupt sources include counter/timers, serial I/O, real-time clock, keyboard, printer, and multiple master communications. There are also five STD 32 Bus and five frontplane interrupt sources.

Counter/Timers

Six counter/timers are included on the ZT 8902. There are six programmable operating modes: interrupt on count, frequency divider, square wave generator, software-triggered, hardware-triggered, and one-shot. Three of the counter/timers are dedicated to supporting local devices. Three additional counter/timers are available through a 10-pin frontplane connector.

Watchdog Timer

The watchdog timer optionally monitors system operation. Failure to strobe the watchdog timer within a fixed time period results in a system reset.

Real-Time Clock

The real-time clock performs timekeeping functions and includes 66 bytes of battery-backed CMOS RAM. Timekeeping features include an alarm function, a maskable periodic interrupt, and a 100-year calendar.

Keyboard Controller

The ZT 8902 includes a PC/AT keyboard controller that operates when the zVID2 local bus video adapter is installed. The keyboard connector is located on the zVID2 adapter.

AC Power-Fail Protection

With the addition of an AC transformer, the ZT 8902 monitors AC power to permit an orderly shutdown during a power failure. When AC power falls below an acceptable operating range, a non-maskable interrupt is generated to notify the CPU of the impending power failure. When the application software receives this notification, it saves critical data before the CPU is reset.

Low Power/Extended Temperature

The ZT 89LT02 is designed and tested for -40° to +70° Celsius operation in harsh environments. The companion zVID2 is also available in an LT (low temperature) version. These products are designed for use in conjunction with Ziatech's other LT and CT products for mobile and outdoor applications.

Software

The ZT 8902 is supported by Ziatech's STD DOS and STAR BIOS. STD DOS is the MS-DOS operating system residing in flash memory on the ZT 8902. Applications can be developed much faster using the STD DOS built-in disk and video services. STD DOS is also supported by many development tools such as editors, compilers, assemblers, and debuggers. Under STD DOS, the flash memory is recognized as a read/write disk, and is supported by Microsoft's Flash File 2.0 (FF2).

STAR BIOS permits STD DOS to operate concurrently on more than one ZT 8902 in a single STD 32 backplane. This allows all the processors in a system to share resources across the backplane. See the STD 32 STAR SYSTEM™ data sheet for more information. Other operating systems may be embedded in flash using Ziatech's OSFLASH utility.

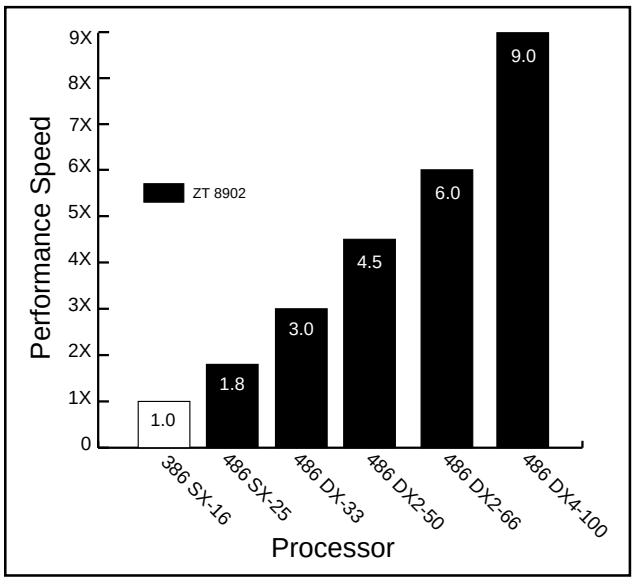


Figure 2. The ZT 8902's performance relative to that of a 16 MHz 386 SX

Specifications

- Compatible with the STD 32 and STD-80 Bus specifications

Electrical

*Power Output **	*Min.*	*Typ.*	*Max.*
Supply Voltage, V_{CC}	4.75V	5.00V	5.25V
Supply Current, V_{CC} = 5.0V			
486 SX-25	–	0.9A	1.5A
486 SX-33	–		
486 DX-33	–	1.2A	2.0A
486 DX2-50	–	1.3A	2.2A
486 DX2-66	–	1.5A	2.5A
486 DX4-100	–	1.4A	2.3A
Aux Voltage, V_{aux+}	11.4V	12.0V	12.6V
Aux Current, V_{aux+} = 12.0V	–	0.010A	0.030A

** Four Mbytes of DRAM and one Mbyte of flash memory*

Mechanical

- Measures 4.5" (11.4cm) x 6.5" (16.5cm)
- Height (from top surface): 0.5" (1.27cm)
  (from bottom surface): 0.07" (0.18cm)

- Weight: 7 oz. (198.4g)
- Connectors

P1:	136-pin STD 32 Bus card edge connector on 0.0625" (0.16cm) spacing
J1:	2-pin latching AC input
J2:	20-pin Centronics
J3:	10-pin latching interrupt controller
J4:	100-pin local bus video
J5:	50-pin parallel I/O
J6:	10-pin latching counter/timer
J7:	10-pin latching COM2 serial I/O
J8:	10-pin latching COM1 serial I/O
J9:	2-pin latching speaker
J10:	10-pin DMA

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: SA16, SA8-I, MB, SDM A8, SDMA16, SDMABP
- Temporary Master: SA16, SA8-{MD}, I, SDM A8, SDMA16, SDMABP
- Memory Slave: SA16

Note: SA8 is equivalent to STD-80 Series Rev. 2.3 (5 and 8 MHz)

Environmental	
Operating Temperature **(ZT 8902)**	0° to 65° Celsius
Operating Temperature **(ZT 89LT02)**	-40° to +70° Celsius
Storage Temperature	-40° to +85° Celsius
Non-Condensing Relative Humidity	less than 95% at 40° Celsius

Reliability

- MTBF: 21 years
- MTTR: five minutes (based on board replacement)

Ordering Information

Example: A ZT 8902 Single Board 486 Computer with a 25 MHz 486 SX CPU, 4 Mbytes of RAM installed, 1 Mbyte flash installed, and MS-DOS and Ziatech's industrial BIOS installed in flash memory, is ordered as a ZT 8902-C1P1R1S1.

ZT 8902	Single Board 486 Computer
ZT 89LT02	Single Board 486 Computer, low temperature
ZT M8902	Single Board 486 Computer manual

Must choose one option from each category:

CPU choices

C1	25 MHz 486 SX, installed
C2	33 MHz 486 DX, installed
C3	50 MHz 486 DX2, installed
C4	66 MHz 486 DX2, installed
C5	33 MHz 486 SX, installed
C6	33 MHz 486 DX, installed (indus. temp.)
C7	100 MHz DX4, installed

Flash EPROM choices

P1	1 Mbytes flash, installed
P2	2 Mbytes flash, installed
P3	4 Mbytes flash, installed

RAM choices

R1	4 Mbytes DRAM, installed
R2	8 Mbytes DRAM, installed
R3	16 Mbytes DRAM, installed (two slots)

Software choices

S1	Microsoft MS-DOS 5.0 and Ziatech's industrial BIOS installed in flash memory
S2	Microsoft MS-DOS 5.0 and Ziatech's STAR BIOS (multiprocessing) installed in flash memory

Select from the following options as needed:

Video options

V2	zVID2 Local Bus Super VGA and Flat Panel Video Adapter, installed

Development Toolkit (for first purchase):

ZT 94015	STD DOS Development Toolkit; Includes host development disk containing VSC, PROMPREP, FLASH and other utilities, and Ziatech's Device Driver Package (STD DDP) with support for STD 32 I/O cards and peripherals, ZT 7502/00 BIOS diagnostic card, full Microsoft MS-DOS, a serial cable, and a printer cable.
Note:	*See the STD 32 STAR SYSTEM data sheet for STAR Development options.*

Accessories

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

ZT 90071	24VAC wall transformer, 2-pin female
ZT 90072	10' (3m), 50-pin both ends
ZT 90136	3.3' (1m), 10-pin to 9-pin male D-shell
ZT 90157	3' (91cm), 20-pin to 25-pin female D-shell
ZT 90166	10" (25.4cm) video/keyboard, zVID2 to panel mount connector
ZT 90167	10" (25.4cm) video/keyboard, zVID2 to desktop-style connector
ZT 90168	10" (25.4cm) multi-video/keyboard, connects seven zVID2 adapters to desktop-style connector

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