



# Z8S180000ZEM

## Z8S180™ EMULATOR

### HARDWARE FEATURES

- Supported Packages

Packages	Emulation
68-Pin PLCC	Z8S180

- Effective Learning Tool for Students of Z80® and Z180™ Architectures

- Simple Emulator Environment for Z8S180-Based Design and Development

- Development Platform for Specific Application Trial Implementation

- Stand-Alone Unit Configuration Option

### GENERAL DESCRIPTION

The Z8S180 Emulator (Z8S180000ZEM) provides the hardware, software, and documentation necessary to evaluate, design, and begin development using the Z8S180 Microprocessor Unit (MPU).

The purpose of the Z8S180 Emulator is to provide a learning environment for students of the Z80 and Z180 architectures and also to provide a cost-effective emulator for Z8S180-design related activities.

The kit includes a monitor program (in EPROM) that can be used with a dumb terminal and a software program (TZ.EXE) that provides terminal emulation facilities for a PC. The

monitor program provides useful capabilities including downloading and running programs with or without breakpoints, displaying and filling memory locations, comparing contents of memory and reading/writing from the I/O ports. A board schematic is also included.

The Z8S180 emulator is engineered to provide the best balance between reasonable cost and useful features to shorten development time for products using the Z8S180. The Z8S180 emulator, based on the Z8S180 MPU, provides an excellent environment for hardware and software development.

### SPECIFICATIONS

#### Operating Conditions

Operating Temperature: 20°C, ±10°C  
Operating Humidity: 10-90% RH (Non-Condensing)  
Oscillator Frequency: 18.432 MHz

#### Power Requirements

Supply Voltage: +5 VDC ± 5%  
Supply Current: Less than 1A

#### Dimensions

Width: 4.2 in.  
Length: 4.2 in.

#### Serial Interface

RS-232C (EIA 232)  
(Data Rates: 1,200 to 57,600 Bits/sec.)

#### Minimum Hardware Requirements

Dumb Terminal and Power Supply (or)  
386-Based Machine at 20 MHz and Power Supply  
VGA Video Adapter  
4 MB RAM  
Hard Disk Drive (1 MB Free Space)  
High-Density (HD) Floppy Disk Drive (3.5-Inch)

#### Minimum Software Requirements

MS-DOS V5.0

## KIT CONTENTS

### Z8S180000ZEM Emulator

#### Main Board Assembly Includes:

- Z8S180™ MPU
- 18.432 MHz Crystal
- 8K x 8 Static RAM
- 8K x 8 EPROM - 2764  
(contains Debug Monitor Program)
- Altera FPGA (controls Emulation and ROM and RAM Decoding)
- RS-232C Line Drivers and Receivers
- Test Points Surrounding the Z8S180 Location  
(for all MPU signals)
- Reset and NMI Buttons

### Cables/Pods

- 68-Pin PLCC Emulation Adapter

### Software (IBM PC Platform)

- Z8S180 Main Diskette
- ZASM-Cross Assembler/MOBJ-Object Utility Diskette

### Documentation

- Z8S180 Emulator User's Manual
- Z180™ Family Databook
- Z180 User's Manual
- ASM800, Z800 Cross Assembler User's Guide
- Zilog Universal Object File Utilities User's Guide
- Z80® Microprocessor Family User's Manual
- Registration Card

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## PRECAUTIONS

### Target Design

#### /MREQ

In order for the Z8S180 emulator to emulate the processor in a target board, the target board must enable its memories only when the /MREQ signal is low. The target board may include /MREQ in a /CS signal, or in /OE and /WE signals, of its memories.

The Z8S180 emulator avoids conflicts with target resources during cycles that access its ROM or RAM by blocking the /MREQ signal to the target board.

#### Clocking

A crystal or oscillator on the target board is not used by the Z8S180 emulator. In order to use a different clock rate than the standard 18.432 MHz, the following steps must be taken:

1. A different crystal, of the desired frequency, must be plugged into the crystal socket on the Z8S180 emulator.
2. The symbol "clockHz" in the Debug Monitor source (included with the emulator) must be changed to the new value.
3. The MAKE.BAT file, assembler, and object utilities included with the emulator must be used to assemble the source and create a hex file.
4. A corresponding new EPROM must be programmed and installed in the U2 socket.

**Note:** Steps 2–4 can be avoided if the new frequency is a simple multiple or divisor of the old. Just start the TZ program at whatever serial rate the new crystal plus the old EPROM result in. (Refer to Chapter 3, "Using the Debug Monitor.")

### Execution

While running a program in User Mode, execution of an instruction starting at any of the following addresses makes the emulator enter Monitor Mode:

Address	Significance
00000	Reset, illegal instruction trap, RST 0, or jumping to a Null pointer.
00020	RST 20 instruction, used to provide services to user program.
00028	RST 28 instruction, used for breakpoints.
00066	Non-Maskable Interrupt.

## PRECAUTIONS (Continued)

User programs can easily work around the first problem by including a NOP at 00000, and starting execution under the Debug Monitor at 00001.

There are five other RST instructions that applications can use.

For user programs intended for eventual stand-alone use, that is, for operation without the Debug Monitor, debugging of the user's NMI routine must wait for final system integration, when the emulator is no longer plugged into the target board.

## Last 256 Bytes of Emulator RAM Protected

The Z8S180 Emulator includes 8 KB of RAM that you can locate at various 8 KB address boundaries, or optionally eliminate from the user memory map. When you do include this RAM, its last 256 bytes are protected/hidden from access by your software and by monitor commands to protect the monitor's internal states, variables, and tables.

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