# 12 MHz Zero-wait 80286 Turbo Mini Mainboard

< Hardware Reference >

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# 80286
# Turbo Mini Mainboard

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## TABLE OF CONTENTS

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## WHAT WE POSSESSIVE THAT OTHERS WITHOUT !

. *5 CHIPS SET FULL CMOS PROCESS LOW POWER CONSUMPTION*

. *ONLY 18 NON-MEMORY COMPONENTS, 38 TOTAL COMPONENTS*

. *LANDMARK PERFORMS RATE AT 15.4 (12 MHZ 0 WAIT-STATE)*

. *ZERO WAIT STATE READ OPERATIONS*

. *ONE WAIT STATE WRITE OPERATIONS*

. *20 mA, 150pF DRAM DRIVE CAPABILITY*

. *FOUR LAYER IMPLEMENTATION FOR LOW NOISE OPERATION*

# I. GENERAL SPECIFICATION

- *AMD 80286 10MHz or 12 MHz CPU*
- *6/8/12/16 MHz speed hardware selectable*
- *RAM access time 0-wait and 1-wait selectable*
- *Up to 4 mega byte memory on board*
- *16 mega byte expandable memory in the protect virtual address mode*
- *2 sockets for AMI, PHOENIX or AWARD BIOS, fully compatible with IBM BIOS*
- *8 I/O expansion slots*
- *Socket for 80287 math processor*
- *CMOS clock and calendar circuit with rechargeable battery support*
- *24-bit addressing and 16-bit data path capabilities*
- *16-level interrupts*
- *7-channel DMA (Direct Memory Access)*
- *3-programmable timers*

## II. MAIN BOARD JUMPER SELECTION

### CONNECTORS AND JUMPERS

The system board has the following connectors and jumpers

| JUMPER NUMBER | FUNCTION |
|---|---|
| P1 | Power supply connector |
| J1 | Keyboard connector |
| J2 | Speaker connector |
| J3 | Keylock / power LED |
| JP1 | Monitor selection |
| JP2 | One / zero-wait selection |
| JP3 | RAM size selection |
| JP4 | RAM size selection |
| JP5 | RAM size selection |
| JP7 | Hardware reset |
| JP8 | External battery connector |
| JP9 | Eprom size selection |
| TURBO CONTROL | Select CPU clock speed between 6MHz and 12 Mhz |

J1

P1

JP1

JP7

JP8

JP2

TURBO

JP3

JP4

JP5

JP9

J3

J2

102

100    103    101

RAM BANK 0

L  H

80286

RAM BANK 1

104
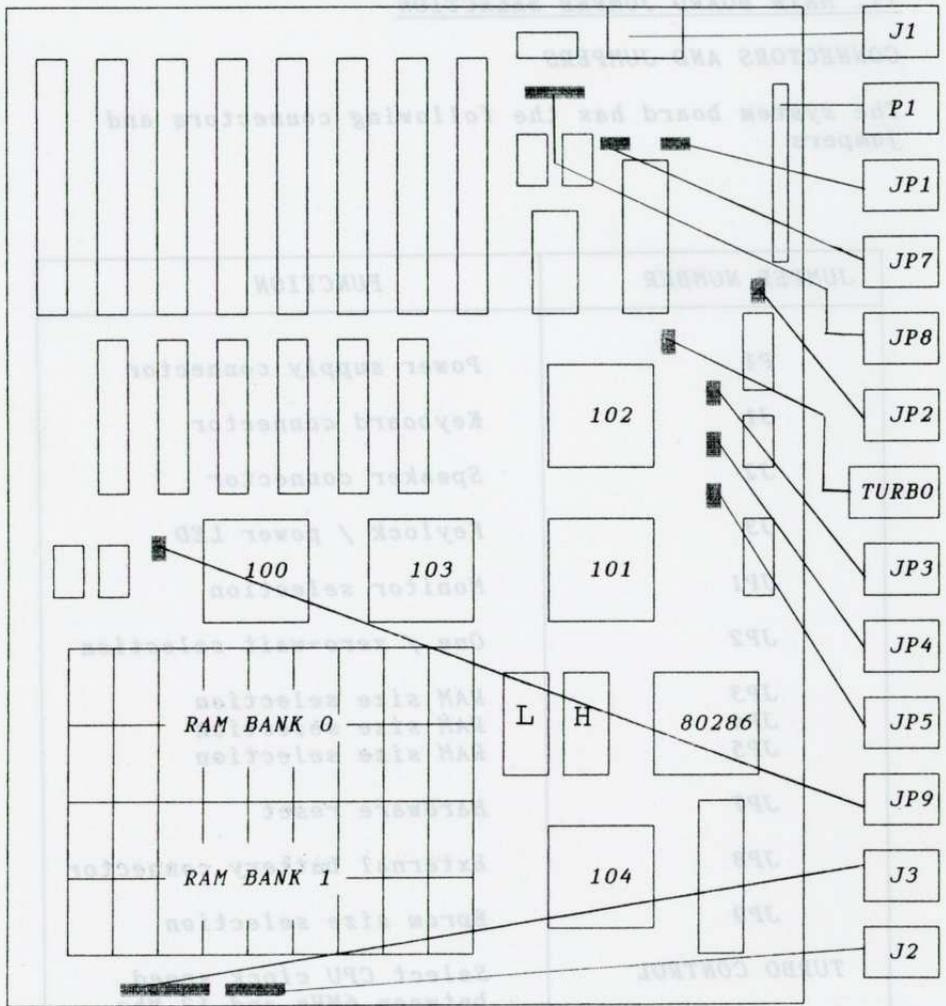
## P1 : POWER SUPPLY CONNECTOR

Jumper P1 is used to connect to the power supply
cable. The pin assignments are as follows :

| PIN | ASSIGNMENT | WIRE COLOR |
|-----|------------|------------|
| 1   | Power good | Orange     |
| 2   | + 5V       | Red        |
| 3   | + 12V      | Yellow     |
| 4   | - 12V      | Blue       |
| 5   | GND        | Black      |
| 6   | GND        | Black      |
| 7   | GND        | BLack      |
| 8   | GND        | Black      |
| 9   | - 5V       | White      |
| 10  | + 5V       | Red        |
| 11  | + 5V       | Red        |
| 12  | + 5V       | Red        |

## J1 : KEYBOARD CONNECTOR

The keyboard connector is a 5-pin, 90-degree printed
circuit board (PCB) mounting, DIN connector. The
assignments are as follows :

| PIN | ASSIGNMENT     |
|-----|----------------|
| 1   | Keyboard clock |
| 2   | Keyboard date  |
| 3   | Not used       |
| 4   | GND            |
| 5   | +5Vdc          |

## J2 : SPEAKER CONNECTOR

*Its pin assignment as follows :*

| PIN | ASSIGNMENT |
|-----|------------|
| 1 | Data out |
| 2 | Not used |
| 3 | GND |
| 4 | +5Vdc |

## J3 : KEYLOCK / POWER LED

*The power LED and Keylock connector is a 5 pin berg strip. Its assignments are as follows :*

| PIN | ASSIGNMENT |
|-----|------------|
| 1 | Power LED |
| 2 | Not used |
| 3 | GND |
| 4 | Keyboard inhibit |
| 5 | GND |

## JP1 : MONITOR SELECTION

*Jumper JP1 is used to select a monochrome or a color graphic primary display adapter.*
*Jumper setting : To select the color primary adapter, place a jumper cap over JP1. To select the monochrome primary adapter, remove the jumper cap from JP1.*

## JP2 : ONE / ZERO-WAIT SELECTION

*Jumper JP2 is used to select 0-wait state in read operation, place a jumper cap over JP2. To select 1-wait state, remove the jumper cap from JP2.*

## JP3, JP4, JP5 : RAM SIZE SELECTION

*Jumpers are used together to allow you to select the amount of RAM on board. See the table below for the connecting position. Jumpers settings:*

| JP3 | JP4 | JP5 | BASE MEMORY | EXPANSION | MEMORY TYPE |
|-----|-----|-----|-------------|-----------|-------------|
| ON | ON | OFF | 640K | 3456K | BANK 0, 18 X 1M<br>BANK 1, 18 X 1M |
| OFF | OFF | ON | 640K | 1408K | BANK 0, 18 X 1M |
| ON | OFF | ON | 640K | 384K | BANK 0, 18 X 256K<br>BANK 1, 18 X 256K |
| OFF | ON | ON | 640K | 0K | BANK 0, 18 X 256K<br>BANK 1, 18 X 64K |
| ON | ON | ON | 512K | 0K | BANK 0, 18 X 256K |

### JP7 : HARDWARE RESET

### JP8 : EXTERNAL BATTERY CONNECTOR

The connector is for connecting four size "AA" batteries instead of the blue rechargeable battery. Its pin assignments are as follows :

| PIN | ASSIGNMENT |
|-----|------------|
| 1 | 6 Vdc |
| 2 | Not used |
| 3 | GND |
| 4 | GND |

### JP9 : EPROM SIZE SELECTION

Jumper JP9 is used to select ROM size of either 27256 or 27128 chip. To select the 27256 chip, place a jumper cap over JP9. To select the 27128 chip, remove the jumper cap from JP9.

### TURBO CONTROL

To select turbo mode (6MHz clock speed), place a jumper cap over turbo control jumper pin 2 and pin 3. To select normal mode (12MHz clock speed), leave all the pins open.

## III. CONFIGURATION

### 1. SYSTEM SETUP PROGRAM

A system setup program is included in the ROM BIOS of
your mainboard. The setup program is used to record the
configuration of your system. Use DEL key to enter this
setup program while the BIOS self-test has just
finished the memory test. When you have get inside the
setup program, just answer each question to tell the
machine what kind of devices you have got in your
system. To config a harddisk system, you have to enter
a right harddisk type to the setup program, find a
right one from the following table.

| TYPE | CYLN | HEADS | W-PCOMP | L-ZON | CAPACITY |
|------|------|-------|---------|-------|----------|
| 1 | 306 | 4 | 120 | 305 | 10 MB |
| 2 | 615 | 4 | 300 | 615 | 20 MB |
| 3 | 615 | 6 | 300 | 615 | 30 MB |
| 4 | 940 | 8 | 512 | 940 | 64 MB |
| 5 | 940 | 6 | 512 | 940 | 48 MB |
| 6 | 615 | 4 | FFFF | 615 | 20 MB |
| 7 | 462 | 8 | 256 | 511 | 31 MB |
| 8 | 733 | 5 | FFFF | 733 | 31 MB |
| 9 | 900 | 15 | FFFF | 901 | 115 MB |
| 10 | 820 | 3 | FFFF | 820 | 21 MB |
| 11 | 855 | 5 | FFFF | 855 | 36 MB |
| 12 | 855 | 7 | FFFF | 855 | 51 MB |
| 13 | 306 | 8 | 128 | 319 | 21 MB |
| 14 | 733 | 7 | FFFF | 733 | 44 MB |
| 15 | --- | - | ---- | --- | ----- |
| 16 | 612 | 4 | 0000 | 663 | 21 MB |
| 17 | 977 | 5 | 300 | 977 | 42 MB |
| 18 | 977 | 7 | FFFF | 977 | 58 MB |
| 19 | 1024 | 7 | 512 | 1023 | 61 MB |
| 20 | 733 | 5 | 300 | 732 | 31 MB |
| 21 | 733 | 7 | 300 | 732 | 42 MB |
| 22 | 733 | 5 | 300 | 733 | 31 MB |
| 23 | 306 | 4 | 0000 | 336 | 10 MB |
| 24 | 925 | 7 | 0000 | 925 | 56 MB |
| 25 | 925 | 9 | FFFF | 925 | 72 MB |
| 26 | 754 | 7 | 754 | 754 | 46 MB |
| 27 | 754 | 11 | FFFF | 754 | 72 MB |
| 28 | 699 | 7 | 256 | 699 | 42 MB |
| 29 | 823 | 10 | FFFF | 823 | 71 MB |
| 30 | 918 | 7 | 918 | 918 | 55 MB |

| TYPE | CYLN | HEADS | W-PCOMP | L-ZONE | CAPACITY |
|------|------|-------|---------|--------|----------|
| 31 | 1024 | 11 | FFFF | 1024 | 98 MB |
| 32 | 1024 | 15 | FFFF | 1024 | 133 MB |
| 33 | 1024 | 5 | 1024 | 1024 | 44 MB |
| 34 | 612 | 2 | 128 | 612 | 10 MB |
| 35 | 1024 | 9 | FFFF | 1024 | 80 MB |
| 36 | 1024 | 8 | 512 | 1024 | 71 MB |
| 37 | 615 | 8 | 128 | 615 | 42 MB |
| 38 | 987 | 3 | 987 | 987 | 25 MB |
| 39 | 987 | 7 | 987 | 987 | 60 MB |
| 40 | 820 | 6 | 820 | 820 | 42 MB |
| 41 | 977 | 5 | 977 | 977 | 42 MB |
| 42 | 981 | 5 | 981 | 981 | 42 MB |
| 43 | 830 | 7 | 512 | 830 | 50 MB |
| 44 | 830 | 10 | FFFF | 830 | 72 MB |
| 45 | 917 | 15 | FFFF | 918 | 115 MB |

## IV. SYSTEM MEMORY MAP

| ADDRESS RANGE | START-END | NAME | FUNCTION |
|---|---|---|---|
| 000000-03FFFF | 000K-256K | BANK0 | SYSTEM MEMORY(256K) |
| 040000-07FFFF | 256K-512K | BANK1 | SYSTEM MEMORY(256K) |
| 080000-09FFFF | 512K-640K | BANK2 | SYSTEM MEMORY(128K) |
| 0AFFFF-0BFFFF | 640K-768K | VIDEO | DISPLAY CARD BUFFER (128K) |
| 0C0000-0DFFFF | 768K-896K | I/O ROM | EXPANSION ROM(128K) |
| 0E0000-0EFFFF | 896K-960K | ROM | SYSTEM USAGE(64K) |
| 0F0000-0FFFFF | 960K-1024K | ROM | BIOS(64K) |
| 100000-11FFFF | 1024K-1152K | BANK2 | SYSTEM MEMORY(128K) |
| 120000-15FFFF | 1152K-1408K | BANK3 | SYSTEM MEMORY(128K) |
| 160000-FDFFFF | 1408K-16146K | RAM | EXPANSION RAM (14870K) |
| FE0000-FEFFFF | 16146K-16210K | ROM | SYSTEM USAGE(64K) |
| FF0000-FFFFFF | 16210K-16274K | ROM | BIOS(64K) |

## V. I/O CHANNELS

The I/O channel supports
. I/O address space hex 100 to 3FF
. 24-bit memory addresses (16MB)
. Refresh of system memory from channel microprocessors
. Selection of data accesses (either 8 bit or 16 bit)
. Interrupt
. DMA channels
. I/O wait-state generation
. Open-bus structure (allowing multiple microprocessors
  to share the system's resources, including memory)

### I/O ADDRESS MAP

| HEX RANGE | DEVICES | USAGE |
|-----------|---------|-------|
| 000-01F | DMA CONTROLLER 1 | SYSTEM |
| 020-03F | INTERRUPT CONTROLLER 1 | SYSTEM |
| 040-05F | TIMER | SYSTEM |
| 060-06F | 8042 (KEYBOARD) | SYSTEM |
| 070-07F | REAL TIME CLOCK, NMI MASK | SYSTEM |
| 080-09F | DMA PAGE REGISTER | SYSTEM |
| 0A0-0BF | INTERRUPT CONTROLLER 2 | SYSTEM |
| 0C0-0DF | DMA CONTROLLER 2 | SYSTEM |
| 0F0 | CLEAR MATH COPROCESSOR BUSY | SYSTEM |
| 0F1 | RESET MATH COPROCESSOR | SYSTEM |
| 0F8-0FF | MATH COPROCESSOR | SYSTEM |
| 1F0-1F8 | FIXED DISK | I/O |
| 200-207 | GAME I/O | I/O |
| 278-27F | PARALLED PRINTER PORT 2 | I/O |
| 2F8-2FF | SERIAL PORT 2 | I/O |
| 300-31F | PROTOTYPE CARD | I/O |
| 360-36F | RESERVED | I/O |
| 378-37F | PARALLED PRINTER PORT 1 | I/O |
| 380-38F | SDLC, BISYNCHRONUS 2 | I/O |
| 3A0-3AF | BISYNCHRONUS 1 | I/O |
| 3B0-3BF | MONOCHROME DISPLAY AND PRINTER CARD | I/O |
| 3C0-3CF | RESERVED | I/O |
| 3D0-3DF | COLOR / GRAPHICS MONITOR CARD | I/O |
| 3F0-3F7 | FLOPPY DISKETTE CONTROLLER | I/O |
| 3F8-3FF | SERIAL PORT 1 | I/O |

## VI. REAL TIME CLOCK AND NONVOLATILE RAM

The real time clock MC146818 and its 64 bytes of RAM
information are backed up by a battery, the internal
clock circuitry uses 14 bytes while the rest is
allocated to system configuration.

| ADDRESS | DESCRIPTION |
|---------|-------------|
| 00 | Seconds |
| 01 | Second alarm |
| 02 | Minutes |
| 03 | Minute alarm |
| 04 | Hours |
| 05 | Hour alarm |
| 06 | Day of week |
| 07 | Date of month |
| 08 | Month |
| 09 | Year |
| 0A | Status register A |
| 0B | Status register B |
| 0C | Status register C |
| 0D | Status register D |
| 0E | Diagnostic status byte |
| 0F | Shutdown |
| 10 | Diskette drive type byte - driver A and B |
| 11 | Reserved |
| 12 | Fixed disk type byte - driver C and D |
| 13 | Reserved |
| 14 | Equipment byte |
| 15 | Low base memory |
| 16 | High base memory |
| 17 | Low expansion memory |
| 18 | High expansion memory |
| 19-2D | Reserved |
| 2E-2F | 2 byte CMOS checksum |
| 30 | Low expansion memory byte |
| 31 | High expansion memory byte |
| 32 | Data century byte |
| 33 | Information flags (set during power on) |
| 34-3F | Reserved |

## VII. FEATURES OF THE VLSI CHIP SET

### VL82C100
. Fully compatible with IBM PC/AT-type designs.
. Replaces 19 logic devices.
. Supports 12 MHz processor clock.
. Seven DMA channels.
. 14 external interrupt request.
. Three timer/counter channels.
. Designed in CMOS for low power consumption.

### VL82C101
. Fully compatible with IBM PC/AT-type designs.
. Replaces 36 integrated circuits on the PC/AT-type
  board.
. Supports 12 MHz processor clock.
. Sink 20 mA on slot driver outputs.
. Designed in CMOS for low power consumption.

### VL82C102
. Fully compatible with IBM PC/AT-type designs.
. Completely performs memory control function in
  IBM PC/AT-compatible systems.
. Replaces 20 integrated circuits on PC/AT-type
  motherboard.
. Support 12 MHz processor clock.
. Designed in CMOS for low power consumption.

### VL82C103
. Fully compatible with IBM PC/AT-type designs.
. Completely performs address buffer function in
  IBM PC/AT-compatible systems.
. Replaces several buffers, lathes and other logic
  devices.
. Supports 12 MHz processor clock.
. Designed in CMOS for low power consumption.

### VL82C104
. Fully compatible with IBM PC/AT-type designs.
. Completely performs data buffer function in
  IBM PC/AT-compatible systems.
. Replaces several buffers, latches and other logic
  devices.
. Supports 12 MHz processor clock.
. Designed in CMOS for low power consumption.