

PEI-301

***'386 RAM Board
32-bit Memory Expansion Card
User Manual***

PEI-301

**'386 RAM Board
32-bit Memory Expansion Card
User Manual**



Edition 1.04

© 1990 Datatech Enterprises Co., Ltd.

The PEI-301 RAM Board, this manual and all illustrations in it are copyrighted with all rights reserved. Under the copyright laws the PEI-301 RAM Board, this manual and the illustrations may not be copied without the written consent of Datatech Enterprises Co., Ltd.

Checklist

Your PEI-301 RAM Board package should contain the following:

- One PEI-301 '386 RAM Board card.
- One user manual.

The following does not apply to any country where such provisions are inconsistent with local law:

Datatech makes no warranties with respect to this documentation either express or implied and provides it "as is". This includes but is not limited to any implied warranties of merchantability and fitness for a particular purpose. The information in this document is subject to change without notice. **Datatech** assumes no responsibility for any errors that may appear in this document.

The typeface used in the text of this manual is 12 point Helvetica® and is used under licence from the Allied Corporation, the owner of the typeface.

Contents

<i>Introduction</i>	1
<i>Card layout</i>	2
<i>Board setup</i>	3-10
Memory blocks.....	3
DRAM chip speed.....	5
DIP switch	6
Starting addresses.....	7
Setting starting addresses.....	9
<i>Installation</i>	11-12
<i>Technical information</i>	13-17
32-bit memory expansion bus.....	13
32-bit memory expansion bus signals.....	14
32-bit memory expansion bus pinouts	17

Introduction

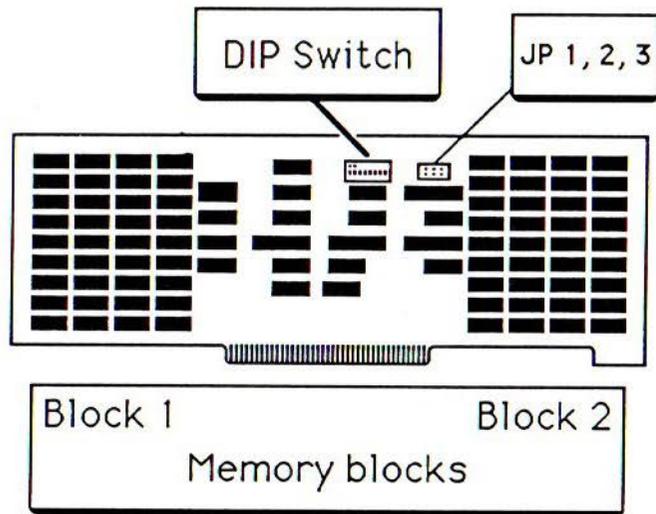
The '386 RAM Board is a flexible memory solution for the Datatech© FastET16 or FastET20 32-bit mainboard which is based on Intel® Corporation's 80386 microprocessor. Up to two '386 RAM Boards can be installed in the 32-bit expansion bus slots designed for this purpose. This allows for the configuration of extended memory of anywhere from one to sixteen megabytes.

This '386 RAM Board makes use of a mixture of 256K-bit RAM and 1M-bit RAM which allows for 1, 2, 5 or 8MB of memory on each card to provide maximum options for the end user.

With so many potential combinations, configuration becomes a major consideration. The '386 RAM Board has been designed with maximum ease of use in mind, with all configuration settings made using one simple DIP switch system.

Card layout

The figure below will familiarize you with the layout of the '386 RAM Board.



Card layout

Board setup

Memory blocks

The '386 RAM Board memory is divided into two 'blocks' of four banks each. Each block must be completely filled with chips with at least Block 1 full for the board to function. Both blocks of the first board **must be** full if a second board is to be used. You can therefore have one board with either one or two blocks full, or two boards with either three or four blocks full.

As mentioned, two types of RAM chips are used on the board either separately or together. For 1MB blocks 256Kbit DRAM chips are used. For 4MB blocks, 1Mbit chips are used. Since these chips each have sixteen and eighteen pins respectively, they are not interchangeable.

By setting the JP1, JP2 and JP3, the '386 RAM Board will be set up with a minimum of 1MB and a maximum of 8MB memory. The figures on the next page show the possible memory configurations and the settings of JP1, JP2 and JP3.

Memory Blocks

<u>Block 1</u>	<u>Block 2</u>
1MB	1MB 1, or 2MB
1MB	4MB 1, or 5MB
4MB	4MB 4, or 8MB

1MB: 256Kbit chips 4MB: 1Mbit chips

Possible memory configurations

Memory Blocks		Jumper Settings		
Block 1	Block 2	JP1	JP2	JP3
1 MB	Not used			
4 MB	Not used			

Memory Blocks		Jumper Settings		
<u>Block 1</u>	<u>Block 2</u>	JP1	JP2	JP3
4MB	4MB			
1MB	4MB			
1MB	1MB			

Jumper settings

DRAM chip speed

The FastET16 mainboard has a clock speed of 16MHz. This 16MHz version requires the use of 100 nanosecond DRAM chips on the '386 RAM Board.

Both types of DRAM mentioned previously (256K-bit and 1M-bit) are available in this speed so you can take full advantage of the '386 RAM Board's variety of possible configurations. You can refer to the chart below for a synopsis of this information.

Mainboard clock speed

16MHz

'386 RAM Board:

100ns DRAM
256K-bit or 1M-bit chips

DRAM specifications

NOTE: This PEI-301 ('386 RAM Board) can also be used on the FastET20 mainboard.

DIP switch

A DIP switch on the '386 RAM Board is used to set the starting address of the board memory. This allows the mainboard to integrate the '386 RAM Board's memory with its own onboard memory. The system is simple and convenient. You should check to see that the settings are correct before installing the board or when adding memory.

Switches 1-7 of the DIP switch are used in combination to define the starting address. Switch 8 is used to enable/disable the '386 RAM Board. The figure below shows their arrangement. In this manual the graphic representations of the DIP switch only show the individual switch positions when they are set to **ON**. Blank switches represent an off setting.



Switch	1	2	3	4	5	6	7	8
Func.	128KB	256KB	512KB	1MB	2MB	4MB	8MB	ON - DISABLE RAM BD. OFF - ENABLE RAM BD.

DIP Switch switch assignments

To activate the setting for any of the switches as shown in the figure on the previous page, the switch is turned to the **ON** position. A switch in the **OFF** position has no influence on the setting.

Starting addresses

The starting address for each RAM Board that you use must be correct for the board to function properly. Starting addresses are based on the total amount of RAM already configured in the system. Unless other non-32-bit memory has already been configured, the first RAM Board in the system can only have a starting address of either 1.384MB or 4.384MB. These depend on the size of the mainboard's memory subsystem which on the FastET16 can be either one or four megabytes, depending on whether 1Mbit or 256Kbit memory is used.

For a second RAM Board, the settings again depend on the total amount of RAM already installed in the system. This includes the RAM on the first RAM Board, the mainboard memory subsystem and any 16-bit RAM you may have installed using another type of memory card (and have already set the starting address for). There are, therefore, a variety of possible settings which depend on the specific configuration of your system. The figure on the next page represents the settings required where only the mainboard and '386 RAM Board RAM size are taken into account. Since 16-bit memory is much slower and will impair the effective function of a 32-bit 80386 system, it is recommended that you either configure 16-bit memory to start after 32-bit memory or to refrain from using it in the system at all.

If the mainboard memory is 1MB and the first board has a total of 2MB, the setting for the second board is 3.384MB. If the first board total is 5MB, the setting is 6.384MB and if the first board total memory is 8MB, the setting is 9.384MB.

If the mainboard has 4MB installed and the first board has a total of 2MB, the setting for the second board is 6.384MB. If the first board total is 5MB, the setting is 9.384MB and if the first board total memory is 8MB, the setting is 12.384MB. Refer to the figure below for a synopsis of these settings.

First Board

Mainboard RAM	Board starting address
1MB	1.384MB
4MB	4.384MB

Second Board

Mainboard RAM	First board RAM	Starting address
1MB	2MB	3.384MB
	5MB	6.384MB
	8MB	9.384MB
4MB	2MB	6.384MB
	5MB	9.384MB
	8MB	12.384MB

Starting addresses

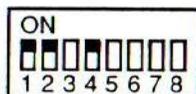
To calculate any other starting addresses for, for instance, 16-bit memory cards, you should add up the total amount of RAM in the system **already** set and then add 0.384MB to that figure to get the starting address. The same process applies for any additional memory cards.

Setting starting addresses

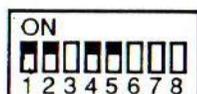
Use the DIP switch to set the starting address of your '386 RAM Board(s). Use the figure on the previous page to define what the starting address should be. Switches 1 and 2 should be set to **ON** for all of the settings listed in order to set the 0.384MB part of each setting. Whole megabytes are set using one or a combination of switches (Refer to diagram on page 6 for switch values). In theory, any address up to 16MB can be set but only the settings listed are currently applicable to the '386 RAM Board. Refer to the following figure to make the address settings. Once the settings are made the board is ready to be installed.

Switch	1	2	3	4	5	6	7	8
Func.	128KB	256KB	512KB	1MB	2MB	4MB	8MB	ON - DISABLE RAM BD. OFF - ENABLE RAM BD.

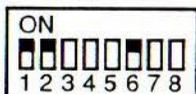
1.384MB



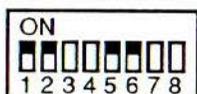
3.384MB



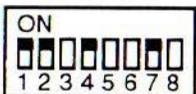
4.384MB



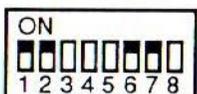
6.384MB



9.384MB



12.384MB



DIP switch settings

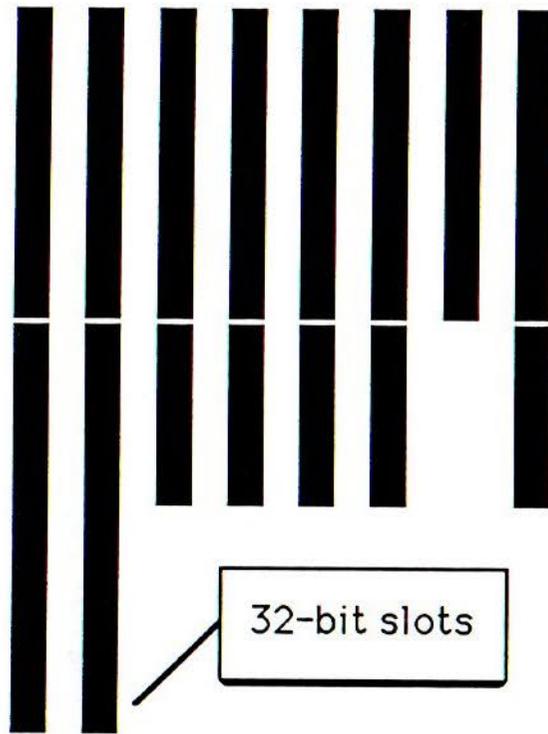
Installation

Ensure that the power supply to the system is turned off and unplugged. Refer to the user manual of your computer to open it up.

Before you install the '386 RAM Board in your system, make sure the computer is unplugged and then remove any static electric charge from your body by placing one hand on the power supply box inside your system unit.

There are two 32-bit expansion slots at the left side of the mainboard as you look at the system unit from the front. Either one can be used to install a RAM Board and no special order is required.

Pick up the '386 RAM Board by its non-conductive edges. It's best to avoid touching the connector contacts or any components with your hands as this could damage the board. Insert the 'golden fingers' into one of the two 32-bit expansion slots. Be sure to insert the board fully. The fit is tight and you should avoid torquing the board if possible. The figure on the next page shows the location of the 32-bit expansion slots.



32-bit slots

Expansion slots

Finishing up

If you have another RAM Board to install, put it in now following the same steps. When your new board(s) have been installed, if you have nothing else that needs doing while the system unit is open, follow the procedure outlined in your system manual for closing the unit and re-connecting peripherals.

Technical information

The FastET 16[©] mainboard uses a 16MHZ 32-bit DRAM subsystem and 32-bit memory expansion bus for maximum bandwidth to the memory subsystem. This architecture is critical to the FastET 16's performance, given the high bandwidth requirements and 32-bit optimization of the instruction prefetch of the 80386.

The '386 RAM Board installs in this 32-bit expansion bus.

32-bit memory expansion bus

The 32-bit memory expansion bus optimizes the memory subsystem to take advantage of the 32-bit architecture of the 80386. Without the size and speed of the memory expansion bus, the 80386 would be limited to a performance equivalent to that of 80286 products. This bus is not intended to be a general-purpose, industry standard 32-bit bus. It is simply a mechanism to optimize the performance of the FastET 16[©] memory subsystem for the 80386 architecture.

32-bit memory expansion bus signals

•D0, D1, D2, D3, D4, D5, D6, D7

These bidirectional signals should be driven during 32-bit memory access when qualified by the BE0 signal going active.

•D8, D9, D10, D11, D12, D13, D14, D15

These bidirectional signals should be driven during 32-bit memory access when qualified by the BE1 signal going active.

•D16, D17, D18, D19, D20, D21, D22, D23

These bidirectional signals should be driven during 32-bit memory access when qualified by the BE2 signal going active.

•D24, D25, D26, D27, D28, D29, D30, D31

These bidirectional signals should be driven during 32-bit memory access when qualified by the BE3 signal going active.

A2–A31

These output signals address memory devices on the 32-bit memory bus.

BE0

This output signal (active high) indicates when the 32-bit memory board should operate on the D0 through D7.

BE1

This output signal (active high) indicates when the 32-bit memory board should operate on the D8 through D15.

BE2

This output signal (active high) indicates when the 32-bit memory board should operate on the D16 through D33.

BE3

This output signal (active high) indicates when the 32-bit memory board should operate on the D24 through D31.

PIN0

This output signal is a parity bit generated by D0 through D7.

PIN1

This output signal is a parity bit generated by D8 through D15.

PIN2

This output signal is a parity bit generated by D16 through D23.

PIN3

This output signal is a parity bit generated by D24 through D31.

POUT0

This input signal is a parity bit for parity checking of D0 through D7 on a 32-bit memory board.

POUT1

This input signal is a parity bit for parity checking of D8 through D15 on a 32-bit memory board.

POUT2

This input signal is a parity bit for parity checking of D16 through D23 on a 32-bit memory board.

POUT3

This input signal is a parity bit for parity checking of D24 through D31 on a 32-bit memory board.

BDSEL-

This input signal (active low) indicates that the 32-bit memory board is being selected.

HLDA

This output signal, when inactive (low), indicates that the CPU has control of the bus. When active, some other bus master has control of the bus.

REFRESH-

This output signal indicates a refresh cycle.

MEMCMD

This output signal is a memory command signal.

BAMEMW-

This output signal (active low) instructs the memory devices to store the data present on the data bus.

The pinouts for the eighty-six pin I/O channels of the 32-bit memory expansion bus are as shown below:

