NOTE: This Technical Note has been retired. Please see the Technical Notes page for current documentation.

Technical Note HW525
PDS Expansion Interface Q&As

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This Technical Note contains a collection of archived Q&As relating to a specific topic--questions sent the Developer Support Center (DSC) along with answers from the DSC engineers. Current Q&A's can be found on the Macintosh Technical Q&A's web site.

[Oct 01 1990]

How Macintosh IIci PDS responds to burst write attempt

Date written: 10/9/92

Last reviewed: 11/2/92

How will the Macintosh IIci PDS respond to an attempt to burst write (/CBREQ and /W and /AS all asserted)? Will it respond with /CBACK? Will it do the burst correctly?

A burst will occur in the designed RAM address range 0-$4000 0000. It's probably implemented this way because trying to burst outside that range might confuse other system components and produce unpredictable results.

Macintosh Portable 68000 Direct Slot connector documentation fix

Date written: 6/26/92

Last reviewed: 11/1/92

The Macintosh Portable 68000 Direct Slot connector on pages 280 and 325 of the 2nd edition of *Designing Cards and Drivers* doesn't match what I see in my Macintosh Portable. Is the notch on the wrong side of the connector in the diagrams?

You're correct, the notches should be on the opposite side of the connector, not as shown in the 2nd edition. The "Macintosh SE 68000 Direct Slot connector pinout" figure has been fixed for the 3rd edition (page 284). However, the notches on the Direct Slot expansion connector in the "Expansion connector location on Macintosh Portable main logic board" figure in the 3rd edition (page 393) are still shown incorrectly.

Macintosh Quadra Processor Direct Slot performance

Date Written: 11/26/91

Last reviewed: 6/14/93

Do you have performance specs on the Macintosh Quadra's 040 Processor Direct Slot (PDS)? If it's a direct connection to the 040's processor bus, the maximum data transfer rate should depend on the speed of the RAM. Do you have a maximum

transfer rate to RAM? Are there any known bugs in the Quadra's PDS?

The maximum data transfer rate of the Quadra PDS depends on your mixture of reads and writes. The theoretical maximum is:

26 MB/sec for reads
36 MB/sec for writes

This maximum would be reached if all bus transfers were to/from DRAM, were bursts, and there was no arbitration for alternate bus masters going on.

We measured the bus activity when the bus was saturated, with data and instruction caches turned off. Since the caches were turned off, there were no burst transfers, and 93 percent of the accesses were reads. The observed bus throughput was 16 MB/sec. Why is this so much below 26 to 36 MB/sec? Because nonburst reads are 6-clock cycles and nonburst writes are 5 clock cycles. Also ROM accesses are slower than DRAM, as Apple uses 150 nS ROM, compared to 80 nS DRAM. Typically half the instruction read accesses are to the ROM.

There are no known problems with the Quadra PDS.

Macintosh Classic II expansion connector pinouts

Date Written: 12/11/91

Last reviewed: 8/1/92

Where can I find documentation on the Macintosh Classic II expansion connector pinouts?

The schematics and specifications for the Classic II are documented in the "Macintosh Classic II, Macintosh PowerBook Family, and Macintosh Quadra Family Developers Notes." You can order this document from APDA for approximately $25. The order number is #RO143LL/A. You can contact APDA at:

Apple Computer, Inc.
20525 Mariani Avenue, Mail Stop 33-G
Cupertino, CA 95014
(800) 282-2732
AppleLink: APDA

A notable difference between the Classic and previous compact Macintosh models is the new FPU/ROM connector, which replaces the earlier Processor Direct Slot. Full details about this connector are available in the Developer Notes.

Dynamic bus sizing on the Macintosh IIfx PDS

Date Written: 4/22/91

Last reviewed: 8/1/92

Referring to pages 312-313 of the second edition of *Designing Cards and Drivers for the Macintosh Family,* it seems the Macintosh IIfx handles PDS Pseudo NuBus differently between read and write cycles, and therefore does not support true 68030-style dynamic bus sizing. Could you please explain?

To clarify *Designing Cards and Drivers,* the paragraph with the wording about "cycles incoming to the Macintosh IIfx memory" on page 313 really refers to MASTER cycles incoming to the Macintosh IIfx memory. The memory controller will respond to masters reading IIfx memory with STERM (and only STERM) as a 32-bit port.

PDS slaves can use either DSACK or STERM--it's your choice. DSACK is passed directly to the processor in this case. So the right thing should happen because the Macintosh IIfx circuitry is not altering your DSACK signals.

While there are buffers on the Macintosh IIfx connected to the PDS, they are only bidirectional buffers that flip one way or the other, depending on whether a read or write is happening. There is no byte-swapping.

The only differences between a Macintosh SE/30 card and the Macintosh IIfx are that the IIfx uses slot E and the PDS is a 20 MHz rather than a 16 MHz slot.

The only way to get on D0-D15 would be if a 16-bit cycle was made on a 32-bit port. Again, the Macintosh IIfx PDS doesn't do anything funny with regard to slave accesses.

Don't exceed Macintosh LC expansion card size specifications

Date Written: 3/8/91

Last reviewed: 6/14/93

The Macintosh LC class machines expansion card specifications are clear, but I'm wondering why a larger expansion card cannot be developed. It seems that a card with an "L" shape could be used to increase the size of the board. There don't seem to be any restrictive components other than a large electrolytic capacitor which could be avoided. Are the restrictions due to heat or power considerations? What would Apple think about a card that was larger than the specifications if it was within the power budget?

Making a larger or oddly-shaped expansion board for the Macintosh LC class machines is not a viable alternative. Besides physical size limitations, blocking ventilation and air flow patterns, increasing the heat dissipation, and exceeding the power budget all become more acute because the Macintosh LC is designed with even less tolerance for "bending the rules" than any model before. Also, in designing upgrades to any Macintosh model, our engineers know not to violate the documented expansion space reserved for you. Likewise, your staying out of areas not defined for your use will eliminate conflicts with Apple's upgrades.

The guidelines were set up to protect you and your product from an expensive exercise in incompatibility. Apple very much wants to see your product be a success in the marketplace.

Macintosh Portable 68000 Direct Slot connector documentation f

Date Written: 6/26/92

Last reviewed: 10/11/92

The Macintosh Portable 68000 Direct Slot connector on pages 280 and 325 of the 2nd edition of *Designing Cards and Drivers* doesn't match what I see in my Macintosh Portable. Is the notch on the wrong side of the connector in the diagrams?

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