sun
microsystems

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Memo from:	Robert Snively
Date:	August 17, 1989
Subject:	Comments on 16 bit single connector SCSI proposal

After having reviewed X3T9.2/89-094R1, which describes a single 68 pin connector carrying a 16 bit data path, I have one serious concern and a number of less significant suggestions.

My serious concern relates to the suggested pin assignments for the W cable and their relationship to the presently defined pin assignments for the A cable and B cable.

The present A cable is designed to operate correctly even for weakly polarized unshielded connectors based on the 50-pin header. As such, it is tolerant of being plugged in backwards. It is also tolerant of being accidentally plugged into systems having the wrong type of transceivers, differential or single-ended. The B cable has similarly been constructed with such tolerance in mind, even though there is no B cable connector defined which will allow plugging the connectors in backwards.

In the case of the W cable, a slightly different set of goals is desirable. The W cable allows the coexistence of 8 bit and 16 bit SCSI Devices in the same system. Up to 8 8-bit devices in combination with up to 16 16-bit devices in any combination totaling less than 16 is allowed. Since the devices can be combined in such a flexible manner, it is very desirable to make the W cable implementation sufficiently compatible with the A cable implementation so that A cable devices can be daisy-chained with W cable devices using either flat ribbon cables that have been divided or using very simple conversion printed

circuit boards. To achieve this goal, it is very desirable that the first 50 pins of the 68-pin W cable exactly match the A cable pin assignments. Since the connectors approved for the 68-pin implementation are not symmetrical, no errors in polarization of properly assembled cable components can occur. The possible improper assembly of a cable is not sufficient justification for mandating a symmetrical W cable.

Since such a pin-out is desirable for the W cable and since the W and B cables have the same connector type, it is desirable to have the B cables changed so that grounds, differential detection circuitry, and termination power signals are aligned. This would prevent possible circuit damage if a W cable connector and a B cable connector were inadvertently plugged together. This cannot be considered a major risk, because the B cables and W cables are mutually exclusive, but if it is felt to be important, the B cable should be modified to match up with the corrected W cable pin out.

In summary, I recommend that the first 50 pins of the W cable match the A cable pin out. It is desirable but not necessary that the B cable be modified to match with the W cable on all connector locations that can cause circuit damage.

I have the following suggestions and comments about the proposed 16-bit single cable SCSI implementation.

1)   Page 1, Termination Issue 1:

Reducing the termination impedance, while potentially desirable, increases the drive current required by the single-ended driver circuits significantly. This violates the desired compatibility with SCSI-2 devices.

2)   Page 1, Termination Issue 2:

This removes compatibility with SCSI-2 and places a hardship on many chip vendors. Their chips must already sink 44 milliamps during the steady state and up to 80 milliamps at the instant of switching. If incompatibility with SCSI-2 is acceptable (and this remains a SCSI-3 project), significant modifications and improvements are possible in the system, including the respecification of Term Power, cabling, the terminator circuit, and the transmitted and received voltage and current levels.

3)   Page 1, Termination Issue 3:

The cable length cannot be increased for single-ended circuitry unless the electronic interface is modified as suggested in 1 and 2, both incompatible with SCSI-2.

4)   Page 2, Section 4.1, First paragraph

The first sentence should be restructured to clarify the daisy–chaining possibilities.

5)   Page 2, Section 4.1, Third paragraph

The cable lengths should not be any longer unless SCSI–2 compatibility is abandoned. For the differential case, timings become the limiting factor in the vicinity of 100 feet. For the single–ended case, transceiver limitations limit the maximum distance and loading.

6) . Page 2, Section 4.2, First paragraph

The use of cables with an unbalanced characteristic impedance in excess of 90 ohms creates an excessively bulky cable.

7)   Page 3, Section 4.2, First paragraph
Page 4, Section 4.2.3, Fourth paragraph
Page 15, Section 4.4.1, W cable implementation
Page 16, Section 4.4.1.1, W cable implementation
Page 16, Section 4.4.1.2, W cable implementation
Page 17, Section 4.4.2.1, W cable implementation

The same values should be used as are specified for SCSI–2 unless compatibility is abandoned.

8)   Page 32, Section 5.1.5.3, item (3) last paragraph
The first sentence should read "the information transfer procedures defined in 5.1.5.1 and 5.1.5.2 for the A cable (the REQ, ACK, and DB(7–0,P) signals) and the W cable (the REQ, ACK, DB(15–8,P,P1) signals shall also apply......."

9)   Pages 38,39 Section 8.2, Table 8–1
Pages 40 and 41, Section 8.2.11, introductory paragraphs
Page 43, Section 8.2.12, introductory paragraphs

It should be clearly specified that the RESERVE(10) and RELEASE(10) commands are mandatory only if the W cable is implemented and may be rejected by machines not implementing the W cable. To allow this to be predicted, a bit identifying the SCSI device as implementing the W cable should be provided in byte 3 or byte 7 of the INQUIRY Data field.