

Comments accompanying Gene Milligan's SPI-3 Rev 10 Letter Ballot 10/28/99

From an overall standpoint SPI-3 is in good shape and will be ready for forwarding when the letter ballot resolution is complete. The following comments are in order of occurrence in the draft. The labels are an artifact of the software used for the review.

Notes from spi3r10.pdf

Page 16

Note 1; Label: Gene Milligan; Date: 10/15/99 2:38:49 PM

1) When does the revision history get deleted?

Page 21

Note 1; Label: Gene Milligan; Date: 10/15/99 2:43:04 PM

2) Do we still like the name of T10 as shown on page 21? Note in these comments all page numbers are pdf page numbers.

Page 22

Note 1; Label: Gene Milligan; Date: 10/15/99 2:46:45 PM

3) I think the Introduction is where the Clauses should be listed. Not the foreword.

Page 23

Note 1; Label: Gene Milligan; Date: 10/15/99 2:52:40 PM

4) In the scope "Properly conforming" should be changed to "Conforming" since implementations are either conforming or they are not conforming. The standard does not define what is proper. It only defines what is conformant.

Note 2; Label: Gene Milligan; Date: 10/15/99 2:56:44 PM

5) <<Distributed arbitration (i.e., bus-contention logic) is built into the architecture of SCSI.>> I think this should be changed to "Distributed arbitration (i.e., bus-contention logic) is built into the architecture of SPI." Or of this standard.

Page 25

Note 1; Label: Gene Milligan; Date: 10/15/99 3:18:49 PM

6) There are no normative requirements in SPI-3 referencing SCSI-2. Why is it a normative reference?

Page 26

Note 1; Label: Gene Milligan; Date: 10/19/99 5:04:34 PM

7) Why is VHDCI called out both as an approved reference and as an other reference?

Note 2; Label: Gene Milligan; Date: 10/27/99 6:42:55 PM

8) The definition of asynchronous transfer also fits synchronous transfers. There should be a distinction such as "with an offset of zero"

Page 27

Note 1; Label: Gene Milligan; Date: 10/27/99 6:43:10 PM

9) The contingent allegiance definition should be changed from "One of the conditions" to "An optional condition".

Page 28

Note 1; Label: Gene Milligan; Date: 10/25/99 5:06:28 PM

10) With the step forward to "a SCSI" why "an SPI L_Q".

Note 2; Label: Gene Milligan; Date: 10/27/99 6:43:31 PM

11) In 3.1.39 the underlines are missing for I_T nexus and I_T_L nexus.

Page 31

Note 1; Label: Gene Milligan; Date: 10/27/99 6:43:45 PM

12) <<A task causes the nexus to be generated.>> or is it vice versa?

Page 32

Note 1; Label: Gene Milligan; Date: 10/25/99 5:10:15 PM

13) In 3.3.2 change <<shall be reported as error.>> to "shall be reported as an error." Adding the "an" to this phrase is a global change.

Page 33

Note 1; Label: Gene Milligan; Date: 10/26/99 11:19:55 AM

14) I prefer "reserved: A keyword indicating reserved bits, bytes, words, fields, and code values that are set aside for future standardization. Their use and interpretation may be specified by future extensions to this or other standards. A reserved bit, byte, word, or field shall be set to zero, or in accordance with a future extension to this standard. The recipient shall not check reserved bits, bytes, words, or fields. Receipt of reserved code values in defined fields shall be reported as an error."

Note 2; Label: Gene Milligan; Date: 10/25/99 5:11:20 PM

15) Since the construction of lists, thankfully does not follow the ANSI style guide, the convention for ordered lists, non-ordered lists, and mixed lists should be added.

Note 3; Label: Gene Milligan; Date: 10/26/99 11:20:11 AM

16) In 3.5 the separators would be clearer if they were taller.

17) The use of <<input-1a and input-1b>> is not explained as the stated convention causes the reader to expect "input-1 and input-2".

Page 35

Note 1; Label: Gene Milligan; Date: 10/25/99 5:11:46 PM

18) In 4 change <<This standard defines the cables, connectors, signals, transceivers, and protocol used to interconnect SCSI devices ...>> to "This standard defines the cables, connectors, signals, transceivers, and protocol used to interconnect parallel SCSI devices ..."

19) Consider eliminating hanging paragraphs.

Note 2; Label: Gene Milligan; Date: 10/26/99 11:20:22 AM

20) Table 1 is a little misleading. It infers there are two types of LVD transceivers for (ST) and (DT).

Actually the LVD transceivers can be used for both ST and DT. Probably ST and DT should be eliminated from the Transceiver column and added to the Async and Fast-80 columns.

Note 3; Label: Gene Milligan; Date: 10/25/99 10:22:38 AM

21) Stub connections in 4.2 should have a forward reference to figure 4.

Page 37

Note 1; Label: Gene Milligan; Date: 10/25/99 5:13:13 PM

22) <<SCSI bus connectors shall be defined by their function and by their physical placement.>> should be changed to "SCSI bus connectors are defined by their function and by their physical placement." since as presently stated it is a requirement for the editor not for the implimenter.

Note 2; Label: Gene Milligan; Date: 10/25/99 5:13:22 PM

23) <<d) connectors physically part of enclosures are enclosure connectors, and>> is not clear to me since all the other connectors mentioned, if in an enclosure, are part of an enclosure (the inside parts). Was this item intended to specify the connectors entering and exiting the enclosure?

Page 38

Note 1; Label: Gene Milligan; Date: 10/25/99 5:14:12 PM

24) Under Figure 4 <<If an intermediate interconnection is added to connect the SCSI device to the bus path this additional interconnect (including its connectors) and both SCSI devices contribute to the stub and bus loading. In system implementations that use an intermediate interconnect the parameters specified in this standard at the SCSI device connector shall apply at the stub connection.>> is confusing. "both SCSI devices" should be referring to a single SCSI device.

Page 39

Note 1; Label: Gene Milligan; Date: 10/25/99 5:14:19 PM

25) In 4.4 two terms are used for the same thing:

<<Bus termination circuitry bus loading>>

<<Bus termination loading>>

Pick one.

Note 2; Label: Gene Milligan; Date: 10/25/99 5:14:48 PM

26) In 4.6 I think <<the width of the data path on the bus;>> should be "the width of the data path of the bus;"

Note 3; Label: Gene Milligan; Date: 10/25/99 5:14:58 PM

27) In 4.7 since the ST technique is used in all phases except DT data phases <<When ST DATA phases are used data is only latched on the asserting edge of the REQ(ACK) signal.>> should be changed to "Data shall only be latched on the asserting edge of the REQ(ACK) signal except in DT DATA phases." and change <<When DT DATA phases are used, data is latched on both the asserting edge and the negating edge of the REQ(ACK) signal.>> to "When DT DATA phases are used, data shall be latched on both the asserting edge and the negating edge of the REQ(ACK) signal."

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Note 1; Label: Gene Milligan; Date: 10/25/99 5:17:58 PM

28) In 4.8 last line <<before each interval iuCRC is transmitted.>> should be "before each iuCRC interval, iuCRC is transmitted." for consistency.

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Note 1; Label: Gene Milligan; Date: 10/25/99 5:25:07 PM

29) Under figure 9 change <<The SCSI parallel interface service interface consists of the following interactions:>> to "The SCSI parallel interface four step confirmed service protocol consists of the following interactions:"

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Note 1; Label: Gene Milligan; Date: 10/25/99 5:26:23 PM

30) Under figure 10 change <<The SCSI parallel interface service interface consists of the following interactions:>> to "The SCSI parallel interface two step confirmed service protocol consists of the following interactions:"

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Note 1; Label: Gene Milligan; Date: 10/25/99 5:30:24 PM

31) Consider using IEC specifications rather than EIA.

Note 2; Label: Gene Milligan; Date: 10/25/99 5:33:31 PM

32) In 5.1 change <<c) Contact resistance is measured in accordance with item a) above (this is an optional step);>> to "c) Measure contact resistance in accordance with item a) above (this is an optional step);"

Should <<a)>> be "(a)"?

Page 46

Note 1; Label: Gene Milligan; Date: 10/25/99 5:43:22 PM

33) In 5.2.4 change <<see the SCA-2 E I A specification EIA-700A0AE.>> to "see the SCA-2 EIA standard EIA-700A0AE." The change from specification to standard is global.

Note 2; Label: Gene Milligan; Date: 10/25/99 5:45:14 PM

34) Why are we seeing SFF-8451?

Page 59

Note 1; Label: Gene Milligan; Date: 10/25/99 6:02:28 PM

35) The drafting standard used for figures 11-13, 17-19, and 21-22 should be added to the normative references (preferably the international version).

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Note 1; Label: Gene Milligan; Date: 10/25/99 6:20:09 PM

36) In the notes of the tables in 5.4 shouldn't <<2 The minus sign next to a signal indicates active low.>> be "2 The minus sign next to a signal indicates asserted low."?

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Note 1; Label: Gene Milligan; Date: 10/25/99 6:17:40 PM

37) In table 5 <<3 The pins identified as being short and long only applies to the host connector and not the connector on the SCSI device.>> should be "3 The pins identified as being short and long only applies to the mating cable stub connector (i.e., backpanel connector and not the connector on the SCSI device."

Page 68

Note 1; Label: Gene Milligan; Date: 10/25/99 6:31:58 PM

38) As commented previously <<The interconnect shall ensure that worst case transmitted signals result in received signals that meet the requirements contained in clause 7.>> should be "The interconnect shall meet the specified characteristics to ensure that compliant worst case transmitted signals result in received signals that meet the requirements in clause 7."

Note 2; Label: Gene Milligan; Date: 10/25/99 6:37:17 PM

39) 6.2 states <<b) In the P cable, if there are more than three conductor pairs in the cable core, conductor pairs #47-48 (ACK) and #57-58 (REQ) shall not be adjacent to each other;>> In a round cable with four pairs in the core is this possible? It is clearly possible if it is a twisted flat. But in a round cable it seems like all four could be adjacent to the other three.

Note 3; Label: Gene Milligan; Date: 10/25/99 6:41:35 PM

40) <<f) Each cable conductor pair shall consist of the signal return and its associated signal.>> should be "f) Each cable conductor pair shall consist of the signal return and its associated signal for single ended applications or signal plus and its associated signal minus for differential applications.

Note 4; Label: Gene Milligan; Date: 10/25/99 6:43:46 PM

41) <<(clocks in the center, data around the periphery)>> should be (REQ and ACK in the center, data around the periphery)"

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Note 1; Label: Gene Milligan; Date: 10/25/99 6:52:10 PM

42) Clause 6.2 stated that all interconnects are required to meet <<a) transmission line impedance (see 6.3);
b) propagation delay (see 6.3);
c) cumulative length (see 6.6 and 6.7); and
d) signal attenuation (see 6.3).>>

Clause 6.3.1 seems to state that only uniform media is required to meet the requirements of 6.3. <<The requirements in this clause apply to uniform cable media.>> The two subclauses are in conflict.

Page 70

Note 1; Label: Gene Milligan; Date: 10/26/99 11:21:33 AM

43) What does note 3 of Table 9 mean? <<3 The conductor size recommendations assume voltage drops only due to the cables (i.e., does not include voltage drops due to connectors, ground effects. etc.)>>. That the recommended wire sizes are invalid since there are no applications without connectors.

Note 2; Label: Gene Milligan; Date: 10/25/99 7:02:40 PM

44) Table 10 should include units (i.e., Ohms). In note 3 shouldn't ohms be capitalized in respect to old man Ohm or the symbol in homage to the Greeks? If so, it is global.

Page 71

Note 1; Label: Gene Milligan; Date: 10/26/99 11:21:44 AM

45) <<variation of 30 ohms over the frequency range 1 MHz to 1 GHz on a 30 meter cable.>> Does that mean there is no requirement for a compliant cable (i.e., =< 25 meters)? Should this be

"variation of 30 ohms over the frequency range 1 MHz to 1 GHz on a 30 meter cable media sample."?

Note 2; Label: Gene Milligan; Date: 10/26/99 11:29:39 AM

46) The first paragraph in 6.3.7 repeats the requirements of 6.3.6.

The or choice for total delay for a cable instead of per foot is tolerable. But this choice for differential delay is onerous. Allowing the choice of the total differential delay for 25 meter point to point cables for shorter cable multi-drop applications unnecessarily squeezes the budget for 12 meter applications by 1 ns. If the "or" requirement is to be maintained it should be divided into three values (i.e., 6, 12, and 25 meters) or four values (i.e., 3, 6, 12, and 25 meters).

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Note 1; Label: Gene Milligan; Date: 10/26/99 11:32:38 AM

47) In 6.3.10 what does <<measured at a time position not associated with the test fixture>> mean? Since the test fixturing is for the purpose of measuring crosstalk the maximum crosstalk will be associated with the test fixture.

Note 2; Label: Gene Milligan; Date: 10/26/99 11:33:56 AM

48) In note 5 change <<at 1963 mV peak-to-peak p aggressor signal amplitude>> to "at 1 963 mV peak-to-peak aggressor signal amplitude"

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Note 1; Label: Gene Milligan; Date: 10/26/99 11:44:03 AM

49) In table 13 why is there both note 1 and note 3? Note 1 includes the concept of note 3. In table 13 and in table 14 add to the remaining note or both notes "If the maximum cable requirements are exceeded, SCSI devices shall not be required to conform to the electrical and timing requirements of this standard.

Page 76

Note 1; Label: Gene Milligan; Date: 10/26/99 11:48:04 AM

50) In 7.1 soften <<If a mode change occurs the SCSI bus is not operational until all SCSI devices and terminators have changed modes.>> to "If a mode change occurs the SCSI bus is not operational until all multi-mode SCSI devices and all terminators have changed modes and all other SCSI devices have released the SCSI bus."

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Note 1; Label: Gene Milligan; Date: 10/26/99 12:04:07 PM

51) Regarding 7.2.1 <<Terminators employing a 220 ohm resistor to 5 volts and a 330 ohm resistor to ground shall not be used.>> we knew what we meant, but shouldn't this be "Terminators employing a resistor divider network between 5 volts and ground as the termination shall not be used."

Note 2; Label: Gene Milligan; Date: 10/26/99 12:39:15 PM

52) In table 18 change the note <<SE steady state output voltage characteristics specified by maximum transfer rate shall apply even if a slower transfer rate is negotiated.>> to "SE steady state output voltage characteristics specified by maximum transfer rate shall apply according to the driver type." Better yet, delete the note.

Note 3; Label: Gene Milligan; Date: 10/26/99 12:42:31 PM

53) Change <<The output characteristics (signal negated) for active-negation drivers shall be constrained to operate in the non-shaded areas of figure 26 for fast-20 SCSI devices and are recommended for all others.>> to "The output characteristics (signal negated) for active-negation drivers shall be constrained to operate in the non-shaded areas of figure 26 for SE SCSI devices that support fast-20 and are recommended for all other SE SCSI devices."

Page 81

Note 1; Label: Gene Milligan; Date: 10/26/99 12:57:36 PM

54) In 7.2.3 the table does not use subscripts and the text does. Since the text takes precedence change the table to use subscripts.

Page 82

Note 1; Label: Gene Milligan; Date: 10/26/99 1:03:38 PM

55) Wherever the note <<SE input and output voltage characteristics specified by the maximum transfer rate shall apply even if a slower transfer rate is negotiated.>> is valid should be changed to "SE input and output voltage characteristics specified by the maximum transfer rate supported shall apply even if a slower transfer rate is negotiated." (e.g., Table 20).

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Note 1; Label: Gene Milligan; Date: 10/26/99 1:19:48 PM

56) Below figure 29 remove the redundancy from <<Figure 30 and table 21 show the allowed ranges for I diff and V diff in figure 29. The requirements that relate to differential impedance are specified in figure 30 and table 21. Table 21 specifies the allowed ranges for I diff and V diff in figure 29.>> I think this is done by deleting the third sentence. The second sentence should be deleted in favor of the same sentence below Figure 31. Should it however be figure 31 and should figure 30 be mentioned in each of these cases?

Page 85

Note 1; Label: Gene Milligan; Date: 10/26/99 1:24:28 PM

57) Below Table 21 delta V does not need to be identified as being in figure 31 twice in the same paragraph.

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Note 1; Label: Gene Milligan; Date: 10/26/99 1:28:37 PM

58) In table 22 the Value column should be labeled parameter and the LVD column should be labeled Value.

Page 94

Note 1; Label: Gene Milligan; Date: 10/26/99 2:05:08 PM

59) Regarding <<NOTE 11 - The DIFFSENS voltage filter time delay allows time for the DIFFSENS pin to connect after the initial power connection (in the case of insertion of a SCSI device into an active system), or allows time for the power distribution system to settle.>> there is no concept of DIFFSENS disconnecting. "connect" should be changed to "settle".

Note 2; Label: Gene Milligan; Date: 10/26/99 2:11:15 PM

60) Change <<A SCSI device shall change to the new signal driver or receiver mode based on the DIFFSENS voltage level within 400ms of the last DIFFSENS voltage change regardless of the DIFFSENS voltage filter time.>> to "A multimode SCSI device shall change to the new signal driver or receiver mode based on the DIFFSENS voltage level within 400ms of the last DIFFSENS voltage change regardless of the DIFFSENS voltage filter time. Devices not capable of the new mode shall release the SCSI bus and remain in the high impedance state after the DIFFSENS voltage filter time."

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Note 1; Label: Gene Milligan; Date: 10/26/99 2:26:16 PM

61) Wherever <<DIFFSENS voltage filter time>> is first used in a subclauses a forward reference to the specified time should be given to prevent designers from concluding this is a vendor specific time.

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Note 1; Label: Gene Milligan; Date: 10/26/99 2:32:18 PM

62) Why is <<NOTE 13 - The +SIGNAL line and -SIGNAL line capacitance should be balanced on disabled terminators.>> not also in the LVD terminator clause.

Note 2; Label: Gene Milligan; Date: 10/26/99 2:43:14 PM

63) Change <<Multimode termination is not recommended for HVD environments unless the common mode voltages in the environment are controlled to safe levels for SE and LVD SCSI devices (see table 16 and table 17).>> to "Multimode termination is not recommended for environments with common mode voltages exceeding the safe levels for SE and LVD SCSI devices (see table 16 and table 17)." Make this same wording change to 7.4.2.

Note 3; Label: Gene Milligan; Date: 10/26/99 2:41:19 PM

64) Delete <<NOTE 14 - When using only the SCA-2 connector (see 5.2.4) the SE, LVD, and HVD connector contact numbers allow switching between all three modes. In this case the terminator may switch to HVD mode if so indicated by the DIFFSENS line.>> or change it to "NOTE 14 - When using only the SCA-2 connector (see 5.2.4) the SE, LVD, and HVD connector contact numbers allow switching between all three modes. In this case the terminator may switch to HVD mode if so indicated by the DIFFSENS line and the SCSI devices should be replaced with HVD SCSI devices."

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Note 1; Label: Gene Milligan; Date: 10/26/99 2:57:46 PM

65) I think <<NOTE 16 - The disabled ground driver capacitance should match the capacitance of the disabled assertion and negation drivers.>> is wrong. The note should be deleted or changed to "NOTE 16 - The disabled ground driver capacitance is a factor in meeting the capacitance requirements of table 23."

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Note 1; Label: Gene Milligan; Date: 10/26/99 3:06:53 PM

66) It should be well known that repeating requirements as is done rather frequently in SPI-3 (probably also in SPI-2) leads to the danger of conflicting requirements. An example of this is in 7.5 <<Direct connection between the TERMPWR source and the individual terminators without using the TERMPWR line is also allowed.>> This is in direct conflict with an earlier clause that allowed additional power sources but required the terminator to also use the TERMPWR line as a source.

Note 2; Label: Gene Milligan; Date: 10/26/99 4:50:04 PM

67) Regarding <<The TERMPWR lines may be used for distribution of power for purposes other than for SCSI bus termination as long as the voltage delivered to the SCSI bus terminators remains adequate to supply the requirements of the terminators under all conditions of SCSI bus operation and under all conditions of other loading.>> This should be deleted or a current limit added. I will open the bidding at 0 amps.

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Note 1; Label: Gene Milligan; Date: 10/26/99 4:52:39 PM

68) In clause 8.1 change <<The maximum number of SCSI devices is determined by the width of the data path implemented.>> to "The maximum number of SCSI devices is determined by the width of the data path implemented and restrictions in clause 7."

Note 2; Label: Gene Milligan; Date: 10/26/99 4:56:35 PM

69) Above table 28 expand <<Table 28 shows the relationship between SCSI Addresses, SCSI IDs, and arbitration priority. In table 28 a hyphen ("-") represents a logical zero bit.>> to "Table 28 shows the relationship between SCSI Addresses, SCSI IDs, and arbitration priority. In table 28 a hyphen ("-") represents a logical zero bit resulting from the data bus bit being released."

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Note 1; Label: Gene Milligan; Date: 10/26/99 5:03:58 PM

70) Change <<P_CRCA (PARITY/CRC AVAILABLE) (ST DATA phase, COMMAND phase, MESSAGE phase, or STATUS phase). A signal sourced by the SCSI device driving the data bus during these phases. This signal is associated with the DB(7-0) signals and is used to detect the presence of an odd number of bit errors within the byte. The parity bit is driven such that the number of logical ones in the byte plus the P_CRCA bit is odd.>> to "P_CRCA (PARITY/CRC AVAILABLE) (ST DATA phase, COMMAND phase, MESSAGE phase, or STATUS phase). A signal sourced by the SCSI device driving the data bus during these phases. This signal is associated with the DB(7-0) signals and is used to detect the presence of an odd number of bit errors within the byte. The P_CRCA bit is driven such that the number of logical ones in the byte plus the P_CRCA bit is odd."

Note 2; Label: Gene Milligan; Date: 10/26/99 5:47:52 PM

71) Change <<P1 (ST DATA phase). A signal sourced by the SCSI device driving the data bus during ST DATA phases. This signal is associated with the DB(15-8) signals and is used to detect the presence of an odd number of bit errors within the byte. The parity bit is driven such that the number of logical ones in the byte plus the parity bit is odd.>> to "P1 (ST DATA phase). A signal sourced by the SCSI device driving the data bus during ST DATA phases. This signal is associated with the DB(15-8) signals and is used to detect the presence of an odd number of bit errors within the byte. The P1 bit is driven such that the number of logical ones in the byte plus the P1 bit is odd."

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Note 1; Label: Gene Milligan; Date: 10/26/99 6:35:17 PM

72) In 9.2.16 change <<(See SCSI Primary Commands-2 Standard).>> to "(See SCSI Primary Commands-2 standard)." or "(See SCSI Primary Commands-2)." or "(See SPC-2). This is a global change. (The first choice is the way SAM-2 is handled.

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Note 1; Label: Gene Milligan; Date: 10/26/99 6:49:02 PM

73) Expand <<9.2.25 Receive REQ (ACK) period tolerance The minimum tolerance that a SCSI device shall allow to be subtracted from the REQ (ACK) period.>> to "9.2.25 Receive REQ (ACK) period tolerance The minimum tolerance that a SCSI device shall allow to be subtracted from the REQ (ACK) period. The tolerance comprises the Transmit REQ (ACK) tolerance plus a measurement error due to noise."

Note 2; Label: Gene Milligan; Date: 10/26/99 6:49:09 PM

74) Change <<9.2.27 Receive REQ negation period with P_CRCA transitioning The minimum time required at a SCSI device receiving an REQ signal>> to "9.2.27 Receive REQ negation period with P_CRCA transitioning The minimum time required at a SCSI device receiving a REQ signal"

Note 3; Label: Gene Milligan; Date: 10/26/99 6:53:33 PM

75) In 9.2.28 change <<since data is only qualified the assertion edge of the REQ (ACK) signal.>> to "since data is only qualified on the assertion edge of the REQ (ACK) signal."

The proposal, that was accepted for DT added the definition of REQ (ACK) period. It included the measurement concept of using a regular signal (without offsets) to measure the time to avoid ISI. That concept seems to have disappeared and should be restored.

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Note 1; Label: Gene Milligan; Date: 10/26/99 7:54:50 PM

76) Under figure 47 what does <<This sets up an environment where the short REQ or ACK pulses may not have adequate timing margin unless the definitions in figure 46 and figure 47 are used in the measurement of timing parameters.>> mean? The definitions will not increase the timing margin of real signals. They will either have margin or they will not.

Note 2; Label: Gene Milligan; Date: 10/26/99 8:01:20 PM

77) Regarding << Measurement of driver timing parameters shall be performed using the circuit and test conditions defined in A.2.5 applied to the SCSI device connector. Receiver timing parameters are defined by the waveforms existing at the connector of the receiving SCSI device.>> Isn't the second sentence completely redundant to the first.

78) What does <<The receiver timing parameters include the effects of data pattern. The receiver data pattern is therefore not defined.>> mean?

Page 121

Note 1; Label: Gene Milligan; Date: 10/26/99 8:18:28 PM

79) in 10.2 change <<QAS is optional and, when enabled, requires the detection of a QAS REQUEST message (see 16.2.10) before starting.>> to "QAS is optional and, when enabled, requires the initiation and detection of a QAS REQUEST message (see 16.2.10) to start."

Note 2; Label: Gene Milligan; Date: 10/26/99 8:27:20 PM

80) <<however the SCSI device shall not arbitrate (i.e. assert the BSY signal and its SCSI ID) if more than a bus set delay has passed since the BUS FREE phase was last observed.>> This sounds like a deadly embrace. It should probably be changed to (comma for sure) "however the SCSI device shall not arbitrate (i.e., assert the BSY signal and its SCSI ID) if more than a bus set delay has passed since the BUS FREE phase was last observed and the SCSI bus is not BUS FREE."

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Note 1; Label: Gene Milligan; Date: 10/26/99 8:38:04 PM

81) Regarding <<10.2.2 QAS protocol QAS allows a target that has information unit transfers enabled and QAS enabled that is currently connected to an initiator that has information unit transfers enabled and QAS enabled to transfer control of the bus to another SCSI device that has information unit transfers enabled and QAS enabled without an intervening BUS FREE phase.>> What is the outcome if information unit transfers are not enabled?

Note 2; Label: Gene Milligan; Date: 10/26/99 8:42:02 PM

82) Regarding <<An initiator that supports QAS shall negotiate the use of the QAS phase with each target that has indicated support of QAS any time the data transfer agreement is in an indeterminate state,>> What is a data transfer indeterminate state?

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Note 1; Label: Gene Milligan; Date: 10/26/99 8:51:01 PM

83) The QAS list construction violates what I judged to be the conventions used in SCSI for ordered lists. But this will be dependent upon the response to the earlier comment. If this list is not in violation, then others are.

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Note 1; Label: Gene Milligan; Date: 10/26/99 9:02:40 PM

84) Regarding <<10.3.1.1.2 Information unit transfers enabled
If information unit transfers are enabled for the connecting initiator the target shall proceed to a MESSAGE OUT phase.>> Enabled by what?

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Note 1; Label: Gene Milligan; Date: 10/26/99 9:12:28 PM

85) In 10.3.1.2.1 change <<In this case, the initiator shall create an attention condition and on the corresponding MESSAGE OUT phase and shall issue an ABORT TASK message.>> to "In this case, the initiator shall create an attention condition and on the corresponding MESSAGE OUT phase shall issue an ABORT TASK message."

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Note 1; Label: Gene Milligan; Date: 10/26/99 9:19:25 PM

86) Regarding <<The winning SCSI device shall also set the DATA BUS to a value that is the logical OR of its SCSI ID bit and the initiator's SCSI ID bit and the appropriate parity bit(s) (i.e., DB(P_CRC), and/or DB(P1)).>> several places, I can not think of an instance where it could be "and DB(P1)" but can think of cases where it would be "or" or "neither".

Note 2; Label: Gene Milligan; Date: 10/26/99 9:23:14 PM

87) Change <<The initiator shall not respond to a physical reconnection if bad parity is detected (see 11.1). Also, if more than or less two SCSI ID bits are on the DATA BUS, the initiator shall not respond to a physical reconnection.>> to "The initiator shall not respond to a physical reconnection if bad parity is detected (see 11.1). Also, if more than or less than two SCSI ID bits are on the DATA BUS, the initiator shall not respond to a physical reconnection."

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Note 1; Label: Gene Milligan; Date: 10/26/99 9:37:01 PM

88) In 10.5 change <<The actual content of the information is beyond the scope of this section.>> to "The actual content of the information is beyond the scope of this subclause."

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Note 1; Label: Gene Milligan; Date: 10/26/99 9:58:13 PM

89) In 10.5.2.2.1.1 <<1) Shall after detecting a REQ transition;>> shall what? Everything that follows also has a shall.

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Note 1; Label: Gene Milligan; Date: 10/27/99 10:23:32 AM

90) Change <<10.5.2.2.1.2 DT DATA OUT phase information unit transfer exception condition handling

The target shall only respond to a iuCRC error after all the data in an information unit has been received.>> to "10.5.2.2.1.2 DT DATA OUT phase information unit transfer exception condition handling

The target shall only respond to an iuCRC error after all the data in an information unit has been received."

Also change <<If the target is receiving a SPI L_Q information unit and the target detects a iuCRC error (i.e., the nexus identification fails) the target shall cause an unexpected bus free by generating a BUS FREE phase (see 10.1.1).>> to "If the target is receiving a SPI L_Q information unit and the target detects an iuCRC error (i.e., the nexus identification fails) the target shall cause an unexpected bus free by generating a BUS FREE phase (see 10.1.1)."

Note 2; Label: Gene Milligan; Date: 10/27/99 10:36:47 AM

91) Regarding <<10.5.2.2.2 Data Group data field transfer>> and wherever this style of describing data transfer is used, I question if using a minimum of transmit setup and transmit hold time is a good way to describe the mechanism. If a designer actually transferred with this timing zero SCSI device skew would be required. The transfer time should be targeted at the ideal setup time (half of the ideal bit time). Perhaps this could be described as half of the negotiated bit period or half of the transfer period.

Page 135

Note 1; Label: Gene Milligan; Date: 10/27/99 10:49:44 AM

92) I think in <<10.5.2.3 Wide data transfer>> parity should be described for DB(7-0) not just DB(15-8).

Page 137

Note 1; Label: Gene Milligan; Date: 10/27/99 11:00:11 AM

93) Regarding 10.9.2 what does qualifies mean in <<A QAS-capable initiator qualifies the assertion of ACK for a minimum 50ns period to ensures the data valid time.>>?

Note 2; Label: Gene Milligan; Date: 10/27/99 11:01:19 AM

94) Change <<it shall indicate that it does not wish to retry by changing>> to "it shall indicate that it will not retry by changing".

Page 138

Note 1; Label: Gene Milligan; Date: 10/27/99 11:05:43 AM

95) Change <<10.9.2.1 MESSAGE OUT phase exception condition handling

If the target detects one or more parity error(s) on the message byte(s) received, it may indicate its desire to retry the message(s) by>> to "10.9.2.1 MESSAGE OUT phase exception condition handling

If the target detects one or more parity error(s) on the message byte(s) received, it may request a retry of the message(s) by".

Page 141

Note 1; Label: Gene Milligan; Date: 10/27/99 11:16:17 AM

96) In 11.2.4 change <<For a 32-byte transfer of an incrementing pattern from 00h to 1Fh: 7E8Ah, 9126h.>> to "For a 32-byte transfer of an incrementing pattern from 00h to 1Fh the CRC transferred across the SCSI bus is: 7E8Ah, 9126h."

Page 142

Note 1; Label: Gene Milligan; Date: 10/27/99 11:18:37 AM

97) In 12.1 change <<the ATN signal at least two system deskew delays before asserting the targets ID in the bus.>> to "the ATN signal at least two system deskew delays before asserting the targets ID on the bus."

Page 143

Note 1; Label: Gene Milligan; Date: 10/27/99 11:25:39 AM

98) Clarify <<The initiator should only create an attention condition during a RESELECTION phase to transmit an ABORT TASK SET, ABORT TASK, TARGET RESET, CLEAR TASK SET, DISCONNECT, LOGICAL UNIT RESET, or NO OPERATION message.>> by changing it to "During a RESELECTION phase the initiator should only create an attention condition to transmit an ABORT TASK SET, ABORT TASK, TARGET RESET, CLEAR TASK SET, DISCONNECT, LOGICAL UNIT RESET, or NO OPERATION message."

Note 2; Label: Gene Milligan; Date: 10/27/99 11:30:16 AM

99) In 12.2 delete immediately.

Note 3; Label: Gene Milligan; Date: 10/27/99 11:29:15 AM

100) Change <<The initiator may negate the ATN signal at any time except it shall not negate the ATN signal while the ACK signal is asserted during a MESSAGE OUT phase.>> to "Unless otherwise specified, the initiator may negate the ATN signal at any time, that does not violate the specified setup and hold times, except it shall not negate the ATN signal while the ACK signal is asserted during a MESSAGE OUT phase."

I think there are several other places where it is otherwise specified - conflicting(?).

Page 144

Note 1; Label: Gene Milligan; Date: 10/27/99 11:36:36 AM

101) I think <<Any SCSI device that detects a transceiver mode change shall:>> should be changed to "Any SCSI device that detects a reset event shall:"

and;

<<In addition any target that detects a transceiver mode change shall switch to a BUS FREE phase.>> should be changed to "In addition any target that detects a reset event shall switch to a BUS FREE phase."

Page 149

Note 1; Label: Gene Milligan; Date: 10/27/99 11:53:07 AM

102) In the next to last paragraph of 14 replace <<'>> with " two places.

Page 156

Note 1; Label: Gene Milligan; Date: 10/27/99 12:04:39 PM

103) Below table 38 add an explanation of why <<The write data bit (WRDATA) and read data bit (RDDATA) shall be ignored.>> are not reserved.

Page 161

Note 1; Label: Gene Milligan; Date: 10/27/99 12:20:22 PM

104) Below table 43 change <<The PACKETIZED FAILURES LIST LENGTH field shall only contain a length of 4.>> to "The PACKETIZED FAILURES LIST LENGTH field shall contain a length of 4."

Page 164

Note 1; Label: Gene Milligan; Date: 10/27/99 12:44:46 PM

105) Clause 16.1.1 discusses messages with information units disabled but not enabled. A reference should be give to the specification of messages with information units enabled.

Page 173

Note 1; Label: Gene Milligan; Date: 10/27/99 12:54:33 PM

106) In table 55 the space ahead of ns is missing in all cases. Check globally. For 09h change <<12.5>> to "12,5". In note 6 change<< 1020>> to "1 020"

Note 2; Label: Gene Milligan; Date: 10/27/99 12:58:44 PM

107) What is the meaning of both SCSI devices in <<The transfer width that is established applies to all logical units on both SCSI devices.>>?

Page 174

Note 1; Label: Gene Milligan; Date: 10/27/99 1:01:51 PM

108) Change <<The responding SCSI device uses the protocol options bits to indicate the protocol options requested by the originating SCSI device the responding SCSI device has enabled.>> to "The responding SCSI device uses the protocol options bits to indicate the protocol options, requested by the originating SCSI device, that the responding SCSI device has enabled."

Note 2; Label: Gene Milligan; Date: 10/27/99 1:11:00 PM

109) Change <<(i.e., data group transfers shall be enabled)>> to "(e.g., data group transfers shall be enabled)" since ST may be the result of the negotiation.

Also change <<information unit transfers are supported when received from the responding>> to "information unit transfers are enabled when received from the responding"

Note 3; Label: Gene Milligan; Date: 10/27/99 1:18:53 PM

110) My prior change request depends upon this comment. If the originating SCSI device sends a DT enable request bit (DT_REQ) of zero indicates that DT DATA phases are to be disabled to another SCSI device that supports DT DATA phases should the receiving device respond with a (DT_REQ of one indication that DT DATA phases are supported or a (DT_REQ of zero indicating that DT DATA phases are disabled? I prefer the latter. But the text indicates the former. This question applies to each of the bits.

Note 4; Label: Gene Milligan; Date: 10/27/99 1:43:04 PM

111) Change <<A PARALLEL PROTOCOL REQUEST message exchange shall be initiated by a SCSI device whenever a previously arranged parallel protocol agreement may have become invalid.>> to "A PARALLEL PROTOCOL REQUEST message exchange shall be initiated by an initiator whenever a previously arranged parallel protocol agreement may have become invalid." The present wording is equivalent to the objectionable SDTR requirement that most targets are required to violate.

Page 175

Note 1; Label: Gene Milligan; Date: 10/27/99 1:46:37 PM

112) Regarding <<If the responding SCSI device is able to receive data successfully with these values (or smaller periods or larger REQ/ACK offsets or both), it returns the same values in its PARALLEL PROTOCOL REQUEST message.>> This is the way I prefer it but it is presently in conflict with the stated requirements.

Page 176

Note 1; Label: Gene Milligan; Date: 10/27/99 1:55:41 PM

113) Regarding table 57 what impact, if any, does asynchronous have on DT transfers. The protocol description of asynchronous transfers has a different timing requirement than DT and different than ST.

Is it likely that devices that do not support DT will support PPR? I doubt the message reject option is needed since for the case given the message probably will be rejected by the recipient.

Message reject from the respondent is elsewhere forbidden. But I presume table 57 is referring to a respondent that does not support the message.

Page 177

Note 1; Label: Gene Milligan; Date: 10/27/99 2:03:10 PM

114) Per prior comment change <<16.2.9.1 Target initiated PARALLEL PROTOCOL REQUEST negotiation

If the target recognizes that PARALLEL PROTOCOL REQUEST negotiation is required, it sends a PARALLEL PROTOCOL REQUEST message to the initiator.>> to "16.2.9.1 Target initiated PARALLEL PROTOCOL REQUEST negotiation

If the target recognizes that PARALLEL PROTOCOL REQUEST negotiation is required, it may send a PARALLEL PROTOCOL REQUEST message to the initiator." Or alternatively limit the initiation to initiators and delete this subclause.

Page 178

Note 1; Label: Gene Milligan; Date: 10/27/99 2:06:56 PM

115) Just before 16.2.10 in <<both SCSI devices shall use the go to eight-bit/asynchronous data transfer mode>> delete "go to".

Note 2; Label: Gene Milligan; Date: 10/27/99 2:11:16 PM

116) In 16.2.11 change <<When information unit transfers are enabled there is an implied restore pointers. For more information on this see 14 and 14.2.3.>> to "When information unit transfers are enabled there are implied restore pointers as specified in 14 and 14.2.3." But 14 includes 14.2.3 so why not just refer to 14? Could there be a hanging paragraph?

Page 179

Note 1; Label: Gene Milligan; Date: 10/27/99 2:13:16 PM

117) Apply earlier comment on the format of numbers to table 59.

Page 180

Note 1; Label: Gene Milligan; Date: 10/27/99 2:17:40 PM

118) Where is the agreed to backoff between PPR and SDTR if a non-standard expander spoils the negotiation? Well actually it is in an informative annex. Should it be in the body of the standard?

Page 194

Note 1; Label: Gene Milligan; Date: 10/27/99 2:27:49 PM

119) In 18.1.1 change <<1024>> to "1 024".

Page 202

Note 1; Label: Gene Milligan; Date: 10/27/99 2:34:48 PM

120) Table A.1 references Annex G. It seems inappropriate for LVD requirements to reference a single ended annex especially since it was stated in T10 meetings the annex was to be replaced by new material developed for SPI-3.

Page 203

Note 1; Label: Gene Milligan; Date: 10/27/99 2:43:27 PM

121) Regarding <<A.2.1 Differential output voltage, V S

This subclause does not specify requirements for drivers with source impedances less than 1000 ohms.>> are drivers with source impedance less than (change above error) 1 000 (change above error) Ohms (requested global change) non-standard without requirements or is SPI-3 incomplete pending the requirements?

<<Figure A.2 shall only apply to drivers with source impedances greater than 1000 ohms.>> Why is Figure A.2 singled out? Per the above Table A.2 and Figure A.1 also do not apply.

Page 207

Note 1; Label: Gene Milligan; Date: 10/27/99 2:47:25 PM

122) Why does A.2.4 use "its common" when apparently referring to ground?

Page 208

Note 1; Label: Gene Milligan; Date: 10/27/99 2:50:18 PM

123) In A.2.5 change <<The slew rates specified above are requirements>> to "The rise and fall times specified above are requirements"

Page 214

Note 1; Label: Gene Milligan; Date: 10/27/99 3:17:17 PM

124) At the moment B.1 requires that a higher priority device that has not won arbitration ever must wait for lower priority devices, that have previously lost arbitration, to win arbitration before arbitrating for the first time. Why?

125) Change the numbers in annex B to match the convention for decimal numbers.

Note 2; Label: Gene Milligan; Date: 10/27/99 3:19:52 PM

126) Note 38 contradicts the normative requirement above it. Change one or the other to agree.

Page 215

Note 1; Label: Gene Milligan; Date: 10/27/99 3:23:08 PM

127) Note 39 repeats text presented earlier in Annex B. Delete it. Consider reorganizing the annex to remove the temptation to repeat text.

Note 2; Label: Gene Milligan; Date: 10/27/99 3:26:19 PM

128) Regarding (4B) <<except when the winning device is an initiator and does not select another device after winning arbitration.>> Why would an initiator do that?

Page 216

Note 1; Label: Gene Milligan; Date: 10/27/99 3:36:57 PM

129) In B.4 change <<This would require a second register in which a bit is enabled for each lower priority SCSI device to which a higher priority SCSI device shall be fair.>> to "An example method would be to have a second register with a bit enabled for each lower priority SCSI device that a higher priority SCSI device will be fair to. Multiple initiators should have a means to be cooperative. The means for cooperation is beyond the scope of this standard.

Page 217

Note 1; Label: Gene Milligan; Date: 10/27/99 3:38:58 PM

130) Why include <<NOTE 45 - The details of the actual SCSI device supply requirements need to be studied for each SCSI device and enclosure combination.>>?

Page 218

Note 1; Label: Gene Milligan; Date: 10/27/99 3:45:27 PM

131) Regarding C.1.2 <<Three charge signals, one for each of the power supply voltages, provide controlled precharging of the disk SCSI device's internal circuits to avoid excessive surge currents during hot plugging.>> SCA connectors are not limited to disk drives. Delete disk.

Note 2; Label: Gene Milligan; Date: 10/27/99 3:49:30 PM

132) Regarding <<NOTE 46 - Industry practice presently requires that SCSI devices interconnected for synchronization be the same or equivalent models.>> Actually industry practice is that spindle synchronization is obsolete. Consider obsoleting this clause.

Page 219

Note 1; Label: Gene Milligan; Date: 10/27/99 3:51:51 PM

133) What should be in the first row of the Output voltage column of table C.3?

Page 221

Note 1; Label: Gene Milligan; Date: 10/27/99 3:55:31 PM

134) Correct the note in table C.6 to use SPI-3 terminology in lieu of 16 bit option.

Page 222

Note 1; Label: Gene Milligan; Date: 10/27/99 3:58:33 PM

135) In C.1.7.3 change <<The following SCSI device behaviors are defined when a SCSI device detects to open level of MATED 1:>> to "The following SCSI device behaviors are defined when a SCSI device detects the open level of MATED 1:"

Page 231

Note 1; Label: Gene Milligan; Date: 10/27/99 4:14:48 PM

136) Regarding E.2.1.3 what is <<mp>>?

Page 236

Note 1; Label: Gene Milligan; Date: 10/27/99 4:29:28 PM

137) Regarding E.2.3.3 what is an <<S11 measurement>> and where is it defined? Same question later regarding S12.

Page 237

Note 1; Label: Gene Milligan; Date: 10/27/99 4:32:25 PM

138) Regarding E.3.1.1 add a space in <<0,5cm>> one place.

Page 239

Note 1; Label: Gene Milligan; Date: 10/27/99 4:35:37 PM

139) Regarding E.3.3 what does <<Selection of this test method is on underway.>> mean? Either delete the clause or correct the clause and add the standard statement for contacting T10 to get the needed information.

Page 242

Note 1; Label: Gene Milligan; Date: 10/27/99 4:41:54 PM

140) In E.7.1 I think input and output are not used in the same sense as in the rest of the standard where input would be found at the receiving SCSI device and the output at the transmitting SCSI device. I think a definition should be added.

Note 2; Label: Gene Milligan; Date: 10/27/99 4:43:56 PM

141) Figure E.7 contradicts the statement introducing it.

Page 243

Note 1; Label: Gene Milligan; Date: 10/27/99 4:46:55 PM

142) On page 243 of 292 (pdf) there is a term used in the formula that is not explained near the equation.

Note 2; Label: Gene Milligan; Date: 10/27/99 4:48:31 PM

143) Annex E has musts that should be changed to shall. Suggest a global search.

Page 244

Note 1; Label: Gene Milligan; Date: 10/27/99 4:53:12 PM

144) E.7.1.2 uses minus db for attenuation although the annex explains this should not be done. (But see comment 146.)

Also the numbers need to conform to the conventions.

Page 247

Note 1; Label: Gene Milligan; Date: 10/27/99 4:58:59 PM

145) E.7.1.3 needs the escape clause "or equivalent" several places.

Page 249

Note 1; Label: Gene Milligan; Date: 10/27/99 5:02:51 PM

146) In E.7.1.5 change <<The instrument automatically accounts for the attenuation found in the calibration scan.>> to "The instrument should automatically account for the attenuation found in the calibration scan."

Judging by this clause the earlier minus db may have been an approximate db but it is hard to tell.

Page 251

Note 1; Label: Gene Milligan; Date: 10/27/99 5:12:58 PM

147) Regarding E.8 <<This test is limited to a the single applied pulse method.>> choose between "a" and "the".

<<The sum of the noise from the aggressor pairs on the victim pair IS the cross talk.>> Define the acronym or make it lower case.

<<This requirement may appear contrary to logic that says the maximum disturbance occurs with the maximum signal swing and that occurs with a peak to peak measurement.>> Delete "and".

Page 252

Note 1; Label: Gene Milligan; Date: 10/27/99 5:16:10 PM

148) In E.8.2 what is <<SMI1>>?

Page 259

Note 1; Label: Gene Milligan; Date: 10/27/99 5:22:04 PM

149) During the SPI-3 review meetings I asked if we were going to review Annex G. The T10 Vice-Chairman responded that we did not need to review it since Annex G would be replaced by the annexes being developed by the cable working group. I agreed with that conclusion. Delete Annex G. Alternatively upgrade it to be Transmission line considerations for data transfer rates up to fast-80.

Page 265

Note 1; Label: Gene Milligan; Date: 10/27/99 5:29:15 PM

150) Regarding J1.1 <<permittivity.>> should be added to the glossary. Or alternatively replace it with dielectric constant.

Page 269

Note 1; Label: Gene Milligan; Date: 10/27/99 5:33:12 PM

151) Regarding J.1.6 what is <<odd mode>>?

Page 271

Note 1; Label: Gene Milligan; Date: 10/27/99 5:37:59 PM

152) Under figure J.8 change <<Controlled impedance boards in which all the impedance's match within>> to "Controlled impedance boards with the impedances matching within".

Page 273

Note 1; Label: Gene Milligan; Date: 10/27/99 5:44:04 PM

153) Annex J also needs to have the numbers with a space before the units in some places.

Note 2; Label: Gene Milligan; Date: 10/27/99 5:45:26 PM

154) On page 273 of 292 (pdf) delete <<your>>

Page 276

Note 1; Label: Gene Milligan; Date: 10/27/99 5:53:54 PM

155) On page 276 of 292 check to see if Tpd or T'pd should be used. Also delete <<, remeber that>>.

Page 277

Note 1; Label: Gene Milligan; Date: 10/27/99 5:58:20 PM

156) On page 277 of 292 (pdf) change <<The signals magnitude>> to "The signal's magnitude".

Page 284

Note 1; Label: Gene Milligan; Date: 10/27/99 6:16:11 PM

157) Regarding Table M.1 change <<2 For calculation purposes these signals are zero. However, these virtual signals could be used for other functions in a future standard.>> to "2 For calculation purposes these signals are zero. However, these virtual signals may be used for other functions in a future standard."

Page 286

Note 1; Label: Gene Milligan; Date: 10/27/99 6:30:05 PM

158) In M.3.2 change <<possible times when a SCSI device could try to enable protection code>> to "potential times when a SCSI device may try to enable protection code". Make the change from possible to potential and could to may global.

159) Regarding global searches there presently are:

2 musts all in Annex E

32 desires or desired that can be replaced with a deletion, required, needs, or needed.

24 immediates or immediately that can be replaced usually by a deletion and perhaps in some cases by a next wording.

17 cans or cannots that may be replaced by a deletion with a change to the form of the following word or by a may.

160) Regarding table A.5, does the 3,6 volts conflict with the requirements in clause 7? See for example Table 17 and the 3,01 V limit.