To: X3T9.2 -- Connectors X3T9.2/92-93 Rev 1

From: Bill Ham (DEC)

SUBJECT: SCSI-3 Connector Framework

DATE: May 18, 1992

BACKGROUND:

For various reasons we seem to be having difficulty in keeping the requirements for an effective standard and the desires of integrators, cable assembly vendors, and connector vendors pointing in the same direction. A framework that may help in refocussing us towards a common path is suggested below. This framework needs to be more thoroughly fleshed out through cooperation and participation from all affected. The value of this framework is directly related to the data that can be found to put in it. Data available to date is included.

HIGH LEVEL FRAMEWORK:

There are four points that seem to cover most of the issues:

(1) True compatibility for both connector sides in a multivendor environment

(2) Different application requirements

(3) Availability and multisourcing

(4) Real technical properties

True compatibility means that all of the requirements needed by the application are satisfied: continuity and isolation, service life, shielding, mechanical interfacing including all securing devices, cost, and simultaneous availability of both sides when needed.

Different applications have different requirements.

The breadth of compatible types available now for different styles is probably very different. This feature has major impact to total design freedom for devices, adapters, terminators, and cables

Real technical properties -- this must include both the intrinsic design style properties and the performance properties in a multi vendor environment.

With all these variables a framework appears essential to construct an effective standard.

LOWER LEVEL FRAMEWORK (for SCSI-3 connectors):

Another level of detail is given for (2), (3) and (4) above. Compatibility is the result of (2), (3) and (4).

A seven level division of the basic applications is suggested.

BASIC APPLICATIONS FEATURES (2):

(A) Mating cycles

Presently there is an agreed minimum requirement of 50 cycles. There is much discussion about needing up to 3000 cycles for certain laptop/notebook applications. Clearly these two applications are vastly different and may require different connector solutions.

(B) Shielding

Presently there are only two options: shielded or unshielded. It has long been recognized that these two require different solutions. However, if friction securing is adequate shielded and unshielded can intermate.

(C) Mounting/support mechanism

There are three main types: panel or bulkhead, free floating on a cable, or PWB.

(D) Back side connections

These include IDC, thru hole, true SMT (non-intrusive), compliant pin, straight, right angle and others.

(E) PWB assembly process compatibility

The primary issue here is the ability to withstand the higher temperatures of the SMT PWB assembly process. This is determined mainly by the materials of construction for the connector and does not imply that the connector itself is non-intrusive. Although this is not strictly an end user application feature it is still a critical feature with respect to the PWB design options. The two important options are SMT process compatible or not.

(F) Securing mechanism

Jack screws and friction seem to be the options here. The thread on the jack screws is likely to be considered a variable however by some.

(G) Physical access

This refers to blind, open, external, internal and the like.

AVAILABILITY AND MULTISOURCING (3):

A matrix of the present types is constructed below. Some data generated at the April SCSI meeting is shown. Over the next few weeks more complete data will be added as the connector vendors make it available. The data below reflects input received by May 12, 1992. It may or may not be nearly complete.

MATRIX OF PRESENTLY AVAILABLE HIGH DENSITY 68 PIN CONNECTORS
(SUPPLIERS NAME GIVEN IF PRODUCTION TOOLED , X = NOT TOOLED)

STYLE =>	TAB AND RECEPTICLE		RIBBON STYLE A MDR (NEC SPEC)		RIBBON STYLE B EDGE CARD (IBM SPEC)	
BACK END TYPE	SHIELD	UNSHIELD	SHIELD	UNSHIELD	SHIELD	UNSHIELD
THRU HOLE PWB (NOT SMC) VERTICAL	MOLEX (NOV) AMP HONDA	MOLEX (OCT) AMP HONDA	DDK 3M AMP	AMP	X	X
RT ANGLE	AMP MOLEX HONDA	AMP HONDA	AMP 3M	AMP	BURNDY MOLEX	X
THRU HOLE PWB SMT ASSY COMPAT VERTICAL	AMP	AMP	AMP	AMP	AMP	AMP
RT ANGLE	AMP	AMP	AMP 3M	AMP	AMP MOLEX	AMP
TRUE SMT PWB (NON-INTRUSIVE) VERTICAL	X	X	X	X	X	X
RT ANGLE	AMP (AUG)	X	X	X	X	X
COMPLIANT PIN (VERTICAL)	AMP	X	X	X	X	X
STRADDLE MOUNT (SMT)	X	AMP	X	X	X	X

(CONTINUED)

MATRIX OF PRESENTLY AVAILABLE HIGH DENSITY 68 PIN CONNECTORS
(SUPPLIERS NAME GIVEN IF PRODUCTION TOOLED , X = NOT TOOLED)

STYLE =>	TAB AND RECEPTICLE		RIBBON STYLE A MDR (NEC SPEC)		RIBBON STYLE B EDGE CARD (IBM SPEC)	
BACK END TYPE	SHIELD	UNSHIELD	SHIELD	UNSHIELD	SHIELD	UNSHIELD
PANEL/BULKHEAD UNSHIELD CABLE						
0.025 RIBBON	AMP HONDA	NA	3M	NA	X	NA
0.050 RIBBON	AMP HONDA	NA	DDK 3M AMP	NA	BURNDY	NA
ROUND	?	NA	?	NA	?	NA
INTERNAL CABLE (UNSHIELDED)						
0.025 RIBBON	NA	AMP HONDA	NA	3M(JUNE)	NA	AMP?
0.050 RIBBON	NA	AMP	NA	DDK	NA	X
UNSHIELD ROUND	NA	?	NA	3M	NA	?
EXTERNAL CABLE ROUND SHIELDED	AMP MOLEX HONDA	NA	AMP 3M	NA	BURNDY MOLEX AMP	NA
FLAT SHIELDED						
0.025	?	NA	?	NA	?	NA
0.050	?	NA	?	NA	?	NA

When filled out this matrix will clearly show where the industry is today in terms of style and type availability. The style with the fewest "X's offers more design flexibility.

REAL TECHNICAL PROPERTIES (4):

Following is a collection of the technical properties that appear to be the most important based on numerous discussions.

(a) Mating cycles to failure:

If the connector is infrequently mated/demated the main concern seems to be noble metal wear thru. Failure will be caused by corrosion. If the connector is frequently mated corrosion is much less of a concern. Failure here is more likely due to mechanical wear or handling damage. Failure data in both modes seems essential to objective reaction.

(b) Mechanical robustness:

There are three stress conditions that apply:

(1) Handling and plugging -- both blind and open
(2) Torque on jack screws
(3) Stress transmitted through the cable

(c) Defect detectability and repairability:

Some defects can be visually detected, others will only be operationally visible. The visual defects are generally much easier to deal with. Some defects can be repaired by the user, others require significant hardware replacement.

(d) Ability to deal with dirt

The effectiveness of the connector wipe in moving "dirt" out of the way is a key parameter.

(e) Tolerance differences between suppliers and the intrinsic ability to tolerate specific kinds of variability

(f) ESD exposure sensitivity to pins

(g) Robustness to EMI (due to high contact resistance)

A second matrix is suggested to map these technical features with the connector styles.

TECHNICAL PROPERTIES OF 68 PIN SCSI CONNECTORS

DATA SHOWN IS FROM SOURCE INDICATED -- P IS MY PRESENT IMPRESSION BASED DISCUSSIONS AT ANSI (formal and informal -- need real data)

STYLE =>	TAB AND RECEPTICLE	RIBBON STYLE A MDR	RIBBON STYLE B EDGE CARD
COMPATIBLE => SUPPLIERS (CLAIMED BY SUPPLIERS)	AMP, HONDA, FUJITSU, JAE, ALLBEST, T&B, FOXCON, BURNDY, ITT CANON ...	3M, AMP, DDK, HIROSE, HONDA, JAE ...	BURNDY, MOLEX AMP ...
TECHNICAL PROPERTY			
CORROSION LIMITED MATING CYCLES (DOUBLING OF RES IN MIXED FLOWING GAS)	250 (AMP)	?	?
WEAR LIMITED MATING CYCLES (DOUBLING OF RES DURING TEST)	?	?	?
ROBUSTNESS HANDLING/MATING	BENT PINS (P) LIKELY	BENT PINS (P) POSSIBLE	BENT PINS (P) POSSIBLE
JACK SCREW TORQUE SENSITIVITY	VERY LOW (P)	LOW (P)	MODERATE (P)
CABLE STRESS SENSITIVITY	VERY LOW (P)	LOW (P)	MODERATE (P)
DETECTABILITY OF DEFECTS	GOOD (P)	MODERATE TO POOR (P)	MODERATE TO POOR (P)
FIELD REPAIRABILITY OF DEFECTS	GOOD (P)	POOR (P)	MODERATE (P)
EFFECTIVENESS IN DIRT	GOOD (P)	MODERATE (P)	MODERATE (P)
TOLERANCE SENSITIVITY	VERY LOW (P)	VERY LOW (P)	LOW (P)
ESD SUSCEPTIBILITY	?	LOW (3M)	LOW TO MODERATE (IBM/3M DATA) CONFLICTING RESULTS
FMI SUSCEPTABILITY	?	?	?

During the May meeting additional data received will be compiled and discussed prior to the plenary vote in June.