To: Disk Attach Study Group Members  
X3T9.2 Members  

Subject: Disk Attach Project

The attachments to this memo are:

- Letter from Dal Allan to Bill Rhinehuls, X3 SPARC Chair  
- Response from Dal Allan to Clyde Camp  
- Letter from Clyde Camp to Bill Rhinehuls, X3 SPARC Chair  
- Letter from Dal Allan to IEEE

I believe the attached are self-explanatory, as they represent the latest information as of this date on the memory-model interface definition for disk drives.

There is an issue of charter and direction here which will affect all of us in one way or the other. That is why this is being put into the hands of the standards management committees within IEEE and X3.

I. Dal Allan
ENDL

August 10, 1991

Mr. William Rinehuls
ASC X1 SPARC Chair
US Department of Defense
8497 Rushing Creek Ct.
Springfield
VA 22153-2532

Dear Bill,

Enclosed is a copy of my letter to Clyde Camp, which contains my comments on the record. The latter is a fine effort, but unfortunately, re-creating a historical record of events is both extremely difficult and unlikely to be totally accurate. History has to be taken with a grain of salt, because all parties involved suffer from selective recall, and less than perfect memory.

Even though it may not seem that way given the size of my response to the record, I do not think the history is particularly relevant to the subject matter at hand.

The important issue is to do the right thing for industry, and that makes input from those who will implement interfaces the critical players here. Vendors will be responsible for designing the disks and selling them, and integrators will have to design systems around the disk drives.

I hope this investigation will solicit opinions from participants as a factor in shaping any standards activity. Companies that have attended at least three meetings include Apple, DEC, IBM, Integral Peripherals, Quantum, Seagate, and Western Digital.

As an example of the considered thoughts that participants offer, I have attached a copy of a fax received from Jim McGrath. Jim is the only participant in the technical activities who is a member of X3T9.2, PC6IA and DASG. His remarks seem to separate and clarify the issues involved here.

Yours sincerely,

I. Del Allan

cc: C. Camp
    H. Freeman
    D. Herman
    D. Shoemaker
August 10, 1991

Mr. Clyde Culp
Texas Instruments
PO Box 655474 MS230
Dallas
TX 75265

Dear Clyde,

As per your request to correct the record, following are my comments accompanied by explanations. In your cover letter:

"... a letter objecting to the proposed work was received from Mr. Allan.

I did not object to the work. I believe in the work. What I said was:

The purpose of this letter is to request that there be no formal action taken on this matter until a number of technical issues have been clarified. Until some decisions are reached, it is not clear whether this is really a new project or actually an extension of an existing standards activity.

Nothing causes more confusion than multiple standards bodies working on the same activity. My objective is to avoid this possibility.

Chronological Summary December 1990: Liaison was not attempted with TPCIA (Personal Computer Memory Card International Association) of all the organizations which should have been contacted, the most overlap was with TPCIA because a first draft of their memory-model interface specification was already published.

Item 2: I disagree with the statement "...It seems at the time that there was no serious overlap of effort although there was some assistance on the part of Mr. Allan to the work of the DASG."

Martin was told very clearly that there was a serious overlap of effort in our first phone conversation.

The points I made were:
- was already an effort under way for a memory interface for disk drives at the TPCIA,
- disk interfaces were the responsibility of XT39,
- if TPCIA turned out to be suitable for a standard, I expected that any extensions and changes to it for Winchester would be handled by XT39.

You spoke of printed records. There are some which I am sure you do not have which reference discussions regarding a memory interface for disk drives. I have attached copies of material and, following is a summary.

The first open discussion of a memory interface for disk drives occurred at the industry ad hoc held May 29-30, 1989 which pre-dated the formation of the Small Form Factor (SFF) Committee. Dave De Lauter distributed copies of an article about FOWIA and asked that the interface and the connector be part of any SFF activity.

The SFF Committee was formed in July, 1990 and the first formal meeting was held on August 27. More time was spent on the subject of a memory interface for small disk drives at this meeting. It was felt a standards effort would soon begin in this area, but there would be no formal activity in XT39 until recommendations were drawn up for XT39 to act upon.

It was agreed the charter of the SFF Committee did not include inventing new interfaces, but did include proposing that XT39.2 begin such an activity based on SFF Committee input. I was given the action item to find out where to obtain copies of the FOWIA specification.

There are some who place no credence in the industry committees which are not accredited standards making bodies. Specifications produced by these bodies often become de-facto standards which are later formalized by a standards committee.

The FOWIA specification is not being developed by a standards committee but it will be shipped in volume next year on a significant number of products. Although not presently compatible with PI212, disk vendors at the DASG have presented ideas on how to enhance FOWIA, and incorporate both FOWIA and PI212 into the same disk drive.

Item 3: I did not state that the "electrical and protocol aspects would have to be handled elsewhere;" I said they belonged to XT39. Let me quote you from the charter submitted to, and approved by, the members:

".... approving a new interface represents years of work which should be done in one of the XT39 committees."

Martin attended this SFF meeting at my invitation but said nothing about his planned DASG. I thought the subject of our previous conversation was dead. It came as a shock when a second-hand copy of Martin's e-mail invitation arrived from a client asking for an opinion on the DASG meeting.

Item 5: I did not attend the February 11 meeting and do not understand the comment that "XT39 had not been previously receptive to the idea of having the disk look like RAM memory."

I do not recall any instance in which this subject was ever raised in an XT39 committee. I do recall conversations in the SFF Committee on having a disk look like RAM memory, and it was agreed the responsibility was XT39's.
Item 1: It is somewhat misleading to say that I "...introduced the idea of working with the POMCA" on March 10.

It is more accurate to say it was re-introduced because it had first been covered when I spoke with Martin several weeks before. What I did at the DASG was reiterate my phone conversation:

- duplicate standard efforts should not exist,
- POMCA had an ongoing effort.
- the charter for disk interface standards belonged at X79.

I invited John Pelzner to attend the DASG because he knew nothing of the DASG as Martin had never contacted him. John was asked to provide some background on POMCA and what difficulties and opportunities might exist in working together. As John did not receive my voice mail until an hour before he arrived at the meeting, he was completely unprepared.

It was at this meeting that I agreed to the compromise that all political issues such as charter and project priorities would be set aside until we completed the technical issues. NOTE: When I was told in June that a decision was pending on the DASG PAR, I felt this was a political issue of charter and project responsibilities. This prompted my letter asking that a decision be delayed until all the relevant standards organizations became involved to settle the matter of charter and responsibility.

Item 11: A small correction to give credit where it is due. I did not propose the options for the DASG at the May 13 meeting, but summarized the migration ideas developed by Tom Hanan and Jim McGrath.

Item 13: The June 14 DASG meeting was unsatisfactory from my point of view.

Martin received a copy of my letter to NSCSC prior to this meeting. I took copies to serve as discussion material for the group to hear ideas for and against my content. Martin did not want the subject discussed, or my letter distributed. My letter should have been discussed and the attendees been given the opportunity to review and criticize it.

When you talk of "more heavily attended by systems oriented people" it should be made clear that the three additional attendees were employees of the host company (Apple), and no other systems manufacturers were present.

Item 15: I was surprised to read that I "had promised to attend the NSCSC meeting" because I left for Japan that week. It would have been impossible to attend, and I had no intention of doing so.

Item 19: It is no coincidence that the DASG attendance was higher than average on July 19. The SFF Committee meets in the morning and the SCSI Working Group meets the following day.

A comparison of the attendance list illustrates the dependency of DASG on X79.2 activities. Only one company representative attended just the DASG meeting. All other attendees were in Valley Forge for at least one or both of the other activities held the same week.

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<tr>
<th>SFF &amp; DASG</th>
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Item 21: I prepared the SFC for a memory interface to give X79.2 members the equivalent of a PAR to debate at the August plenary. It is the vehicle to respond to Del Shoemaker's request that X79.2 form an opinion.

In order to discuss and decide what to do, we needed an agenda item and a specific proposal. I did not have the DASG documents with me at the time as it was prepared on-line while the SCSI working group was in session.

The memory interface is but one of three project proposals that will be debated by X79.2 at the August plenary.

Item 25: The next meeting of the DASG on August 16 was not "re-arranged so that Mr. Allan could attend."

The recommendation to hold even-month DASG meetings on the Friday before X79.2 met was proposed and accepted in April, at a meeting which I did not attend. The June 14 and August 16 meeting dates were set in accordance with that decision.

There was speculation about the low attendance at June's meeting. None of the alternatives discussed (meeting earlier in the week, changing the date, etc.) were acceptable to the members present.

CONCLUSION:

I must confess to having a problem with the impression I drew from your report that it is Allan vs Freeman, and that several concessions have been made because of my attending the DASG.

I stated to you in my conversation, that my biggest issue originally was that no effort was made to check with other standards committees or industry groups before the DASG project was proposed. The SFF and POMCA activities were not a secret, they were widely publicized in industry news magazines and trade publications. Your history of events confirms that no effort was made until after Martin's November 12 submission.
Martin's first words last year accused me of not having authority to form a committee (SFF) to do work that "belonged to IEEE." We definitely started off on the wrong foot, because my reaction to this was negative. It did not improve matters that Martin dismissed the activities of SFF and FOMCA as meaningless because they are not accredited committees.

It may surprise you, but I am in agreement with what Martin hopes to achieve when he talks of futures and applications. I disagree with him on the way to achieve it. Other devices which buses must support have characteristics that are different to IDE, and must be considered. Flash-ROM is one, and there are likely to be others.

Your history deals heavily with my interactions with the DASG. I admit that I am the catalyst for your involvement, but there are more members on the DASG than Dal Allan who warrant mention in your report e.g. there is no mention of the letter that Tom Hanan wrote.

No effort has been made to poll the attitude of companies which would have to implement a memory disk interface. It seems to me that what they think should be more important than what either Martin Freeman or Dal Allan think.

Several manufacturers have attended the DASG meetings, and I would very much like to see their input to NESCOM and X79 be reflected. All those who have shown serious interest in DASG can be categorized very quickly, by counting how many meetings were attended.

I request that the opinions of individuals or companies which have attended at least three of the DASG meetings be included in your report. Dennis Pak can provide you with a more comprehensive list, but companies included in such a list are Apple, DEC, IBM, Integral Peripherals, Quantum, Seagate, and Western Digital.

In this way, the subjectivity of a "Martin & Dal" history can be balanced by objectivity. Without such input, I do not see how NESCOM or X79 will have the facts needed to make a balanced decision.

Yours sincerely,

I. Dal Allan

cc: M. Freeman
    D. Riemer
    W. Rhineslu
    D. Shoemaker
Verbatim extract from report on Small Form Factor ad hoc May 29-30

During the meeting, several different ideas on mounting and connectors had been bandied about. A letter had been received from IMDS, stating that "the suggestion of disk drives being treated like chips is in no way outlandish."

IMDS had faced a different, but similar, problem for a board standard and designed a "THAT," which was basically a 16-pin DIP.

In developing the "THAT," IMDS had "considered the problems of small size, modular size, small connectors, and mechanical fixings, all of which need to be considered by small form factor drives."

Dave De Leuter (Maxtor) had brought copies of an article which described the recent PC card standard which used a memory-style interface for RAM and ROM cards to be plugged into portable computers. The 2" x 3" card has a stranded mounted high density 68-pin connector which Dave felt was eminently suitable for a small drive.

The other likelihood was a serialized interface so that the connector could be as small as possible. This could be SCSI or some other interface that suited the drive (it might be difficult to squeeze enough logic into a 1" drive to support the controller and its buffers).

Verbatim extract from report on Small Form Factor Committee August 27

A list of what the group wanted to discuss was laid out:

- Size and dimensions
- Connectors
- Transputers
- Mounting schemes
- Interfaces
- PC MCIA

...It is expected to be a new world for interfaces as well. There are all kinds of alternatives:

- ATA
- Serial
- Transputer
- SCSI
- PC MCIA
- Proprietary

Expected to be highest volume is the ATA (Embedded AT Bus), and every device is likely to have a SCSI variation. A serial interface is likely to appear which relies on logic on the board to which the drive is mounted. There will undoubtedly be proprietary versions, but a standard activity sometime in the next couple of years is likely.

PC MCIA defines the RAM/ROM card which is likely to be an explosive market on laptops. It seemed reasonable to expect that laptop manufacturers will want drives with the same interface as memory cards.

The transputer is an IMDS patented concept which transfers chunks of data between elements by treating them as objects. It uses a TCA (Pin Grid Array) mounting system and IMDS is looking to license its use to all comers.
January 13, 1991

To: Small Form Factor Committee
Subject: New Interfaces

Some of the phone calls taken over the last few weeks have assumed that the SFF Committee is going to invent or bless at least one new interface.

My response has been that this is not the purpose of the SFF Committee, as approving a new interface represents years of work which should be done in one of the X119 committees.

To this, I have sometimes added that it is possible the SFF Committee may hear about new interfaces before X119, and that the SFF Committee may wind up being a catalyst in recommending that a new interface project be started.

I see the rule of the SFF Committee as being to define the critical factors required for the packaging and interactivity of new generation drives in constrained applications. The list of activities includes:

- physical dimensions
- connector alternatives
- connector pinouts for interface standards where the existing pinouts are not suited.

Once we reach agreement on the interface pinouts, I expect the SFF Committee to propose these pinouts to X119 to be included in a future revision of the standards.

At this time, I am not sure which organization should standardize the other contents of a Small Form Factor document. It may be X119, it may be IEEE, it may be nobody and we let it ride as a de facto. These are political issues that should not take much time until we are finished our technical job.
August 8, 1991

Mr. William Rinehals
ASC X3 SPARC Chair
US Department of Defense
8457 Rushing Creek Court
Springfield, VA 22153-2532

Dear Bill,

I am forwarding this to you (as X3 SPARC Chair) for your information and action (if appropriate). At issue is whether or not a proposed MSC program is significantly overlapping in scope with anything that X3T9 is doing.

Briefly, the MSC has proposed a standard to allow extremely small disk drives, mounted directly on circuit boards, to in effect emulate physical semiconductor memory. This is not just a simple extension of existing methods which treat disks as archival storage separate from main memory. Rather, it is to develop techniques for fully integrating disk drives into the physical or logical memory space of the system in which they are installed. The Disk Attach Study Group (DASC) has been looking at this since November, 1990.

Because this work might have conflicted with the work of X3T9.2, the DASC Chair contacted John Lohmeyer (X3T9.2 Chair) via e-mail. John stated that, although he knew of no X3 project similar to the proposed project, an industry committee known as the Small Form Factor Committee (SFFC) might be working in this area. When contacted, the SFFC's chair (Dal Allan, who is also vice-chair of X3T9.2) indicated that the SFFC was involved only in the mechanical and connector aspects.

Based on this assessment, the project was approved by the MSC and submitted to the June IEEE NESCOM for approval as P1261. Two weeks prior to NESCOM, a letter objecting to the proposed work was received from Mr. Allan. It was unclear at the time whether or not the letter represented a personal opinion of Mr. Allan's (which in fact it did), a position of the SFFC or a position of X3T9.2. Because of the short notice and uncertainty, and because Mr. Allan did not attend NESCOM to clarify his objections, NESCOM postponed action on the request for PAR until its September meeting.

I have since been assigned the task of investigating the matter further and generating a report and recommendation for that meeting. The next DASC meeting is August 16 and the next X3T9 meeting is the week of August 19. Both will be addressing the issue and may develop a recommendation of some sort. Based on these inputs plus phone interviews through August 28th, I will submit a final report and recommendation to NESCOM on the first week in September.

NESCOM will approve or disapprove the P1261 PAR submission at its September 25 meeting. Representatives from X3T9 or other affected parties are again invited to attend that meeting if they so desire. Note that the final decision on this matter does lie with the IEEE Standards Board, which usually follows NESCOM's recommendation.

The remainder of this mailing is a detailed chronological history of pertinent events as I know them, but I have no conclusions at this point.

Regards and Thanks,

Clyde R. Camp
Chair: Architecture and Microcomputer Standards Subcommittee

enc:

- Chronological Summary
- Detailed Chronological History

CC:
- Martin Freeman
  DASC Chair
  Philips Research
  4005 Miranda Ave. #175
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- Dal Allan
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  Saratoga, CA 95070

- Paul Shears
  X3T9 Chair
  Digital Equipment Corporation
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- Ben Heiman
  IEEE NESCOM Chair
  143 Dumpy Hook Rd.
  Lawrence, K1 6708-1412
[Chronological Summary]

1. November, 1990 - Disk Attach Study Group Formed by MSC
2. December, 1990 - Liaison with interested parties set up. Verification from X3T9.2 Chair that X3 had no directly related projects. Verification from SPPC Chair that SPPC was concerned only with mechanical aspects of disk attach.
3. February, 1991 - First Disk Attach committee meeting (have occurred monthly since then)
4. March, 1991 - Disk Attach PAR approved by MSC
5. April, 1991 - Disk Attach PAR submitted to NESCOM
6. May, 1991 - Strawman proposal developed by DASG
7. June, 1991 - Dal Allan sends letter to NESCOM opposing P1261
8. June, 1991 - NESCOM, lacking any further X3T9 input, postpones approval until September and appoints Dr. Borrill to look into possible overlapping scopes between X3T9 and DASG.
11. August, 1991 - NESCOM Chair reassigns authority to investigate matter from Dr. Borrill to Clyde Camp.

[Detailed Chronological History]

Note: The following is correct as far as I have been able to ascertain from printed records and direct interviews with the parties concerned. If there is anything anyone believes to be incorrectly stated or otherwise in error, please contact me immediately. Otherwise the record will be assumed correct as stated.

1. November 12, 1990
Dr. Martin Freeman proposed a project to the Microprocessor Standards Committee (MSC) which would allow extremely small disk drives, mounted directly on circuit boards, to effect emulate physical semiconductor memory. This was not just a simple extension of existing methods which treat disk as special archival storage. Rather, it was to develop techniques for fully integrating disk drives into the physical or logical memory space of the system in which they were installed.

After discussion, the Disk Attach Study Group (DASG) was authorized to further research the industry interest and related projects and to report back to the January meeting of the MSC.

2. November/December, 1990
By telephone conversations, e-mail and FAX, various discussions were held between Dr. Freeman, John Lohnmeyer (X3T9.2 Chair) and Mr. Dal Allan (Organizer of the industry Small Form Factor Committee (SFFC) and X3T9.2 vice chair) to determine exactly what the scope and purpose of X3T9.2 and SFFC entailed since they appeared to address similar topics as the DASG.

According to John Lohnmeyer, there was no X3 committee engaged in work similar to that proposed by the DASG. According published charter of the SFFC, it limited its activity to the mechanical and connector aspects of small form factor disk drives.

Since the DASG was primarily interested in high efficiency transfer mechanisms, protocols and electrical aspects as opposed to the mechanical aspects (although they certainly play a part), it seemed at the time that there was no serious overlap of effort although there was some resistence on the part of Mr. Allan to the work of the DASG.

Dr. Freeman attended the January 14 meeting of the SFFC. At that time, Mr. Allan once again stated that the SFFC was only interested in the mechanical and connector aspects and that the electrical and protocol aspects would have to be handled elsewhere.

Dr. Freeman gave a report to the MSC on the progress to date and indicated that he was going to start scheduled meetings. During the remainder of January he contacted a number of disk manufacturers soliciting support for the proposed DASG project.
The second DASG meeting was also well attended (12) but with a slightly different mix of people. There were three major decisions made:

(a) To forward the PAR developed at the meeting on the the MSC for submission to the IEEE Standards Board.
(b) To have a joint meeting with the SFPC on the 16th.
(c) To more explicitly define a charter/scope for the DASG.

7. March 11, 1991
The proposed PAR was approved by the MSC with X3T9.2 being on the coordination list.

8. March 18, 1991
The third DASG meeting (attendance 15) was in conjunction with an SFPC meeting chaired by Mr. Allan. John Reimer, from the Personal Computer Memory Card International Association (PCMCIA) also attended. PCMCIA is trying to produce standards for RAM cards. Mr. Allan reiterated his opposition to any new standards effort in this area and then introduced the idea of working with the PCMCIA.

It was pointed out that previous efforts by one of the other DASG members to interest PCMCIA in using disks-on-a-card as RAM had been unsuccessful. Mr. Reimer appeared to not be all that much interested in it personally and stated that it would have to be first approved by the PCMCIA Marketing Committee.

The remainder of the meeting was devoted to developing the charter proposal for the DASG. Mr. Allan made significant contributions to the charter. However when Dr. Freeman offered the possibility of a joint X3T9.2 and IEEE project, Mr. Allan replied to the effect that the committee should worry about the technical aspects and not worry about politics – the standards organizations would handle the politics.

In order to foster participation from the disk drive manufacturers, Dr. Freeman proposed that future DASG meetings alternate in the Bay area (for the systems expertise) and in conjunction with X3T9.2 (for the drive expertise) so that as many disk drive companies as possible are included.

9. April 19, 1991
The Disk Attach project PAR approved by the MSC was submitted to the IEEE Standards Board NESC03M meeting for its June 25 meeting. The Study Group was upgraded to Working Group status (DAWG).

10. April 24, 1991
The DAWG met again, defining potential applications and reiterating that the motivation behind a new interface is to develop a logical layer for direct connection of small form factor drives into the system memory model. While current disk drive interfaces (as evolved from existing X3T9 standards) were adequate and appropriate for the near term, a more revolutionary approach was needed for the long term. It was also felt that although the PCMCIA was the most desirable disk interface, its memory model might be suited to the DAWG needs and could be easily adapted with minor modifications. An alternative and perhaps better long term memory model might be to use the IEEE P1212 standard. Both approaches have drawbacks and advantages.

11. May 13, 1991
A strawman draft was developed by the Disk Attach Working Group addressing software protocols and mechanical interface requirements to meet long term needs. Also discussed was that PCMCIA might be changing its mind about supporting disk drives on cards but using current interface technology (ATA) and that this evolutionary approach might be more suitable for X3T9 while the DAWG addressed longer term requirements. A number of proposed options for the DAWG were presented by Mr. Allan which emphasized the PCMCIA approach, including possible modifications to it.

12. June 12, 1991
Mr. Allan wrote a letter to the NESC03M Chair in opposition to the proposed project on the grounds that it was duplicative and requested that no formal action be taken until "a number of technical issues have been clarified."

The DAWG met in the Bay area and was more heavily attended by systems oriented people who preferred the P1212 approach for reasons of scalability and flexibility. A proposal for connecting PCMCIA and ATA drives was also discussed. It was decided that Dr. Freeman and two others would attend the upcoming PCMCIA meeting in Seattle. Mr. Allan mentioned that he would be unable to attend the PCMCIA meeting because he would be in Japan for several weeks around that time.

A preliminary press release previously prepared by Dr. Freeman was modified and edited by the committee with the concurrence and help of Mr. Allan, describing the DAWG and its coordination with the SFPC.

Dr. Freeman attended the PCMCIA meeting in Seattle which had mixed results. While the PCMCIA Technical Committee was in favor of putting disk drives on PCMCIA boards, the Chair of marketing committee was adamantly opposed on the grounds that disk drives were competition to RAMs and that the PCMCIA
should not sanction disk drives. It is not known at this time what PUMCIA's final position will be.

Dr. Freeman flew to New York at his own expense to be present at NESCOM to answer any questions that may have arisen as a result of Mr. Allan's objection. Dr. Paul Borrell reported that he had spoken to Mr. Allan and that he (Mr. Allan) had promised to attend the NESCOM meeting.

Lacking input from both sides, NESCOM accepted Dr. Borrell's offer to look further into the matter and report back to the September NESCOM.

Dr. Borrell asked the DAWG Chair not to contact the X3 SPARC committee since he had already discussed matters with the X3T9 Chair by phone.

17. July 8, 1991
The MSC reviewed the situation and directed Dr. Freeman to continue with the technical development of the proposed standard as an IEEE project until such time as NESCOM made its final decision. He was also directed to continue his coordination with X3T9.2 and SFFC.

18. July 9, 1991
Dr. Borrell wrote to Del Shoemaker (X3T9 Chair) regarding the issue and asked if:

(a) The proposed IEEE standards project would normally come under the charter of the X3T9.2 committee, and
(b) if the X3T9 committee had plans to develop a standard with substantial similarities to the NESCOM proposal.

In his letter he included a copy of the PAR, DAWG presentation foils and the DAWG mailing list.

DAWG met again with membership from 24 companies representing system houses, connector manufacturers and disk drive manufacturers. Mr. Allan discussed a proposed X3T9.2 project submission for a PUMCIA connection to ATA drives; the proposal was couched as an extension to the ATA interface specification (a channel model interface).

Del Shoemaker replied to Dr. Borrell's letter deferring the decision to the X3T9.2 committee and informed Dr. Borrell that it would be discussed at the next X3T9.2 meeting on August 19.

An X3T9.2 Project Proposal was posted on an e-mail bulletin board and announced to be discussed at the August 19 X3T9.2 meeting. The proposal is virtually identical to the one submitted to NESCOM a month earlier and contains much of the philosophy from DAWG minutes and the DAWG strawman proposal.

Due to the urgency of resolving the issue in some fashion and because Dr. Borrell was on vacation and because the responsibility is ultimately the sponsor's, the NESCOM chair reassigned the job of developing a report to Clyde Camp, the MSC Chair, relieving Dr. Borrell of the responsibility and authority.

23. August 5, 1991
Clyde Camp discussed the change of responsibility and confirmed timetable of upcoming events with Del Shoemaker by phone.

24. August 9, 1991 (week of)
Mr. Camp reviewed documentation and correspondence and conducted phone interviews with most of the concerned parties. A preliminary report to NESCOM and X3 was prepared (this summary without conclusions.)

**Upcoming Events**

25. August 16, 1991
Next meeting of the DAWG. This date was rearranged so that Mr. Allan could attend.

Next meeting of the X3T9.2 committee.

27. August 26, 1991
Del Shoemaker and Martin Freeman send Clyde Camp the recommendations from the latest X3T9 and DAWG committee meetings.

28. August 30, 1991
Final report and recommendation on P1261 sent to NESCOM by Clyde Camp.

29. September 25/26, 1991
Approval/disapproval of P1261 Pink Attach Interface by NESCOM/IEEE Standards board after consideration of Camp recommendation and opposing viewpoints (if there are any.)
Dear Sir,

I understand that in the near future, there is a possibility of a project officially being started as an activity under the Disk Attach Study Group. The purpose of this letter is to request that there be no formal action taken on this matter until a number of technical issues have been clarified. Until some decisions are reached, it is not clear whether this is really a new project or actually an extension of an existing standards activity.

Nothing causes more confusion than multiple standards bodies working on the same activity. My objective is to avoid this possibility.

Background:

Magnetic disk drives are becoming so small in size that it is feasible to consider mounting them directly on a Printed Circuit Board. This possibility changes the whole environment for disc drives and a comprehensive set of new characteristics must be met by drive manufacturers.

Semiconductor manufacturers supply components which comply with standard physical sizes and pin layouts. Disk drives have traditionally been cabled into a system, and manufacturers have had the leeway to mount signal and power connectors in locations which suited their own mechanical design.

Disk drives are not passive devices, and this creates a new problem for retention in a socket. Connector designs to date have dealt with external motion, not internally generated motion. Physical attachment to the PCB will have to be done using connector sockets that are not yet designed.

To address these and other issues, an Industry ad hoc committee named the Small Form Factor (SFF) Committee, of which I am Chairman, was created to provide a forum within which these and other issues could be addressed. The SFF Committee is not a standards body, but will address the issues involved. The documented solutions will be submitted to the appropriate standards bodies for processing to become standards.

Work done to date makes it likely that submissions will be made to ASC X39.2 for recommended pinout changes and new connectors to both the SCSI-3 and ATA interface standards. Work on connector sockets which incorporate retention mechanisms is expected to be submitted to the EIA or IEC.

The scope of the SFF Committee includes recommending changes to existing disk drive interfaces, defining the physical characteristics for other interfaces, and promoting the development of suitable connectors.

Problem:

One of the identified desires that accompanies the SFF activities is for a new interface which treats disk like semiconductor random access memory.

This is the stated purpose of the project requested by Mr. Martin Freeman of Phillips Research under the Disk Attach Study Group (DASG).

The SFF Committee and the DASG are working together. The last meeting was held in Hershey on May 13, with SFF in the morning and DASG in the afternoon.

The technical program discussed at that meeting involves co-operating and working with several standards bodies:

- ASC X39.2 has the Small Computer Systems Interface (SCSI) and AT Attachment (ATA) Interface activities (ATA which embeds part of the IBM PC AT bus in a drive). Extensions to ATA and SCSI are clearly in the X39.2 charter.
- FOMIA (Personal Computer Memory Card International Association) has defined a memory interface for credit-sized cards which contain semiconductor memory. FOMIA has participation from a significant number of both hardware and software suppliers, and has agreed to consider proposals that define the attachment of disk drives using the FOMIA Interface. The present interface is limited to 68 pins for removable media, and there is a likelihood that this will be extended to 100 pins to support memory sizes beyond 64 MB, and provides more functions.
- IEEE Disk Attach Study Group has proposed developing a memory interface for disk drives.

At this time, the technical issues involved in developing a memory interface for disk drives are unclear. The plan recommended at Hershey has multiple steps:

1. Extend ATA by adopting the FOMIA physical interface as is and take it to X39.2.
2. Work on the FOMIA memory model to get Winchester support added to the removable interface, and accept the 64 MB limitation.
3. Add pins to extend the addressability and provide additional functions such as third party DMA for non-removable Winchesters with capacities far above 64 MB.

There is a fourth option, and that is to do something new and different with no compatibility to existing interfaces. This approach was discouraged by the disk drive manufacturers present because it involves a lengthy and uncertain integration cycle. The above plan allows manufacturers to migrate
from existing interfaces to a memory interface in a more gradual manner.

One of the difficulties faced in developing a suitable standard is the lack of continuity in attendance between meetings. Meetings which coincide with X179.2 are well-attended by disk drive manufacturers (which are heavily involved with SCSI and ATA). Meetings in Sunnyvale have participation from interested parties but have had poor disk drive manufacturer representation and the number of systems integrators involved has been small.

For this reason, the upcoming meeting schedules are going to try and alternate between X179.2 and P3CIA version in the even months, and in Sunnyvale during the odd months.

Request:

It is uncertain what technical solution is going to be pursued for a memory interface, but it is clear these standards organizations are involved.

More time has to be spent on this matter to establish technical direction.

Based on the past meeting, there is a strong possibility that a new memory interface for disk drives will be closely allied to the P3CIA activities.

This does not mean that there is no market for a second, and different, type of memory interface. We simply do not know how it would be different and whether it would be of value to systems integrators.

The participants in the SFF and DASS activities are interested in having as few solutions to integrating disk drives on PCHs as possible.

I request that the IEEE delay a formal project approval until the direction a memory interface for disk drives should take becomes clearer.

Hopefully, the answers to direction will become clearer as time goes on, and we can avoid overlapping the various standards activities.

Yours sincerely,

I. Dal Allan

cc: John Reiner (P3CIA Chairman)
    Del Shoemaker (X179 Chairman)
    Paul Borrelli (IEEE Standards Program)
    Martin Freeman (Disk Attach Study Group)