Notes from Interview with Pete Thomas
Regarding early Semiconductor Memory Systems

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SUMMARY

We met in Pete's office for about 90 min, and discussed his recollections of memory systems development at Fairchild Communications (Systems) Division in the early 1970s and at Intel Memory Systems Division mid 70s to early 80s. Pete has no surviving artifacts or documents or ephemera in his personal store (several household moves have purged all his old files).

The session was notable for the wealth of additional contact names Pete provided, pointers to many early memory system designers. Under separate cover I'll get the list to the SIG steering committee members to see if any of their data-bases hold current contact information for some of these people.

There were also several capture-worthy anecdotes about the design motivations, the customer applications, and the discovery of the soft error phenomenon, which afflicted DRAMs and affected DRAM system design methods ever after.

WHO DID WHAT AT FAIRCHILD AND INTEL MEMORY SYSTEM DIVISIONS?

Fairchild was the leading early maker of semiconductor memory systems, nearly all as custom implementations that used SRAM chips to replace Core memory for computer makers.

Pete was a board designer, working in the OEM Communications division, which was run by ***Gene White***. White had started the division, and was viewed as a potential successor to Les Hogan to run the whole company. According to Pete, White didn't get along well with the other potential successor, Wilf Corrigan. Corrigan eventually got the succession in 1974, and within 6 months the Memory System Division was disbanded, along with all the other system divisions, so the company could concentrate on components, not systems.

Pete went to Intel, where ***Bill Jordan*** was running the newly formed OEM System Division. The division's main purpose was to make boards that demonstrated the maximum use of Intel components, and sell them to customers who were uncomfortable working with microprocessors and semiconductor memories. Pete joined a group making OEM microcomputer and memory boards, using Intel MPUs as the controlling element. The division was organized into two parts, OEM boards (custom products for specific customers) run by ***Tom Lund***; and End User Boards (standard general purpose products to be sold to many customers, e.g. add-in boards for specific DEC PDP minicomputers) run by ***__?___ Soms***. Pete's original job was running marketing in the OEM custom group; later he took over the engineering for that group as well. Key designers included: ***Ralph Bannister, Gary Woods, Jeff Auhorn***. Later the division was reorganized to remove most of the standard End User boards into the Microcomputer OEM Systems and Development Systems division, and leave the Memory Systems division to concentrate on custom OEM boards and systems.

WHO WERE EARLY CUSTOMERS FOR SEMI MEMORY BOARDS?

At Fairchild the first computer customers were the ***ILLIAC IV*** program and ***IBM***, both of which used SRAM boards to replace core memory. Another important early customer was ***Teletype***, which used original 16b SRAMs for permission flags and later 64kb boards for data buffers in their 30 bps and 120 bps TTY machines. The data buffers saved messages, both incoming and outgoing, to enable the end customer to take advantage of cheaper night rates for transmission.

Intel's early custom memory system customers included ***Bzerba***, a German maker of industrial scales (who, Pete believes, still maintain a museum of their early products and might be persuaded to lend or donate artifacts to CHM), and ***Honeywell***.

Later Intel made "solid state discs", memory systems organized like magnetic discs and using standard disc type ECC techniques to be "self-healing". An early customer was ***GE***.

HOW SOFT ERRORS WERE DISCOVERED, AND CURED

In making one of the earliest high-capacity solid-state disc systems for GE, a large number of chips were required, more than 5,000. The system ran an overnight final QA verification test before shipping. The next morning it was found that three chips had failed. Not so bad in that large population. So the chips were replaced and the failing chips were sent back to device test for analysis, where, mysteriously, they passed the component tests OK. But the next morning the overnight final system with the new chips test had again failed, with three different chips failing. This went on for several nights. Someone on the team jokingly remarked that the project was beset by Cosmic Rays. After three months of analysis, it was discovered that indeed the package cavity was "hot", radiating its own alpha particles that could disturb random bits in the enclosed DRAM chip. The ultimate solution was to use ECC to self-heal the failing chips, a technique well-known to the disc drive community who were used to dealing with "bad spots" in the magnetic media. This became the main reliability-enhancing technique for most DRAM-based systems for years after, until more radiation-free and radiation-resistant materials became the norm.

THE END OF THE MEMORY SYSTEM BUSINESS AT INTEL

By 1980, the US semiconductor makers in general, and Intel in particular, were embroiled in a debilitating competitive situation. Intel's domestic competitor, Mostek, had developed easier-to-use microprocessor-oriented (with respect to operating voltage and system interface) DRAMs. Their Japanese competitors had developed better quality, lower manufacturing cost, higher-yielding products. Intel's several major task-force efforts to catch up with these competitors had all failed. A year earlier Pete had been appointed Strategic Business Segment manager. At their 1980 semi-annual SBS review with Senior Staff, his SBS team made the bold recommendation to kill the Memory Systems business, since they were constrained to come to market in number 2 or 3 position and with a cost disadvantage, thus counter to Intel business goals. After lively discussion with Senior Staff, the recommendation was accepted, and the Memory Systems business unit was shut down. This competitive situation and similar reasoning ultimately led to Intel's eventual exit from memory components as well.