

Another Computer Was Born
By Curt Christensen, editing by Lowell Benson

INTRODUCTION

With the death of Howie Stensel in 2007 and the previous passing of George Workman, I think that that just leaves two, Jim Button and me, who met with Don Ream one Friday afternoon in the old gilder factory at 1902 Minnehaha Ave. The sequence went like this - Red Phillips had signed a contract with the Marines to build a new 642B compatible computer using his department's shipboard packaging technology. I was assigned as program manager reporting to George Workman. Findley McLeod was tagged as the project manager reporting to Red. The contract stated the computer must be less than 20 cubic feet!

Table of Contents

INTRODUCTION..... 1
PART I, THE AN/UYK-8 DEFINED 1
PART II, THE AN/UYK-7 DEFINED 2
PART III, THE '7' PROPOSAL..... 3
PART IV, THEN WHAT? 4
 AN/UYK-8 4
 AN/UYK-7 4
CONTRIBUTORS 5
 Author 5
 Editor..... 5

PART I, THE AN/UYK-8 DEFINED

Findley had called a meeting to inform Red that there was no way that they could meet that 20 cu. Ft. requirement! Red got upset and started throwing out options, like using flat head rivets! Findley's response was: "Hell Red, even if we use displacement volume instead of swept volume we still can't make it!"

A decision was made to explore using aerospace packaging developed by Tip Miller [being used for the 1830], a concern was that it had to be air cooled and Tip had used conduction cooling to a heat exchanger which was then cooled with forced air. I had worked for Red developing this packaging technique using Muffin fans and multilayer boards for a proposed development of a 1236 computer [See associated story on the 18-bit page of the Legacy web site, <http://vipclubmn.org>.] We got shot down by Manufacturing [they asked if we had bought stock in the company that made the muffin fans] and more yelling by Marketing who stated customers would not accept the concept, i.e. would not pay a million dollars for equipment like that when they were used to seeing a room full of equipment. The distinction at that time was air cooling referred to the cold air or room air flowing directly over the components on the printed circuit cards. There were several other innovative changes like distributed power supply modules to spread the heat load and minimize shock and vibration problems.

So the debate at that time was how to get the heat off of the card, air cooled or conduction cooled! Red's position was that air cooled was best. We used the argument that by feeding the heat to an air exchanger we had met the requirement that the unit was air cooled, seems silly today that it was a serious debate decades ago.

Functionally, I had advocated adding two bit's to the memory, from 30 to 32 bits and to use one bit for the lower 15 and one bit for the upper 15 bits as parity bits. Findley and Bob Draving agreed stating that the unit could be built in about 8 cu. ft. [approximately 2' wide x 2.5' deep x 4' high.] I got the assignment to meet with the Marines and convince them to change the contract. With the appropriate internal approvals, we proceeded and requested a meeting in St Paul. We had agreed to present the subject by talking about the problem of meeting the 20 cu. ft. requirement and asked if there was any room for relief? The answer was as predicted - short and negative, very negative! We then stated that we had another proposal for them and outlined what came to be the AN/UYK-8. The initial reaction was positive and when we told them there would be no increase in funding required, nor any change in delivery date, they agreed.

PART II, THE AN/UYK-7 DEFINED

With the Marine computer concepts completed and the project staffed, management decided to form a committee to recommend future changes to be made to the 642B. I was assigned to lead the task force. It was a very diverse group of highly regarded and respected logicians and systems programmers. The group very quickly defined two options Processor A and Processor B, each with minor changes to the 30-bit Instruction Set Architecture, i.e. add some more B-boxes and so on! We sat there, as we still had a few weeks to go to complete the assignment.

The magic question was ASKED? "WHAT KIND OF A COMPUTER WOULD WE BUILD IF WE COULD BUILD ANY KIND OF COMPUTER WE WANTED TOO?"

The group came alive and the ground rules got quickly defined 8-bit bytes not 6, 32-bit words not 30, multiple processors, semi-independent I/O and so on. I acted as note taker, got things typed up, and got to exercise some editorial judgment where there were disputes. Generally, the next day the group reviewed drafts and concurred. Of course objections to any areas were dealt with. We used the technique of small specialty groups to flesh out concepts as required. There were no formal management reviews at any time. However, I am sure that as group members went back to their groups - there was some discussion, if not with their management, certainly with the fellow workers! Committee members would come back the next day with questions or bring new thoughts.

This part of our report was labeled "PROCESSOR C". Processor concepts A, B, & C were placed in Blue Vinyl three-ring binders and given to George Workman for review and to have copied if he approved. Our response came when George scheduled a staff meeting for 1:30 on a Friday in the conference room in the loft of 1902 that had at one time been the library, a conference room seldom used by us. The attendees were George Workman, Jim

Button, Howie Stensel, Curtis Christensen, and Don Ream. There were three Blue folder's on the table labeled "Processor A", "Processor B", and "PROCESSOR C". It was a very short meeting - Don Ream looked at the covers, picked up PROCESSOR C and said is this the one you recommended. George said: "Yes." Don Ream stated: "I'll take this back and have Jim Ward at DDR&E look at it." George said: "OK", that was the end of the meeting.

The following Monday I got called into George's office and he related that Don had just called and reported that Jim Ward had called him and said that PROCESSOR C was the best thing he had seen come out of the company in years. George then informed me that we had the go ahead to submit a formal proposal and I was to be the proposal manager.

Thus the decision on the AN/UYK-8 to move it from Red's shop also defined the AN/UYK-7. I have a full set of pictures of the first AN/UYK-8 marked up to indicate the AN/UYK-7.

This how the UYK-8 got built for the Marines and how UYK-7 got defined - then presented to Don Ream the first time, before we developed and submitted the formal proposal.

PART III, THE '7' PROPOSAL

The proposal activity was set up in plant 8 in Joe Stoutenburgh's office where his secretary did much of the typing. Bob Draving was the engineering manager under Arnie Hendrickson and his group generated much of the technical section. A key member of the proposal team was John Markfelder; if not for John the proposal would not have been delivered to DC on time!!

The proposal activity was not universally endorsed by all management with much concern expressed about the loss of all the code which we'd generated for the 642A/B NTDS computers. We were going through graphics to have the final proposal generated, but could not get approval for them to work overtime. We got down to the last day with all the inputs from everyone in draft form, but when we checked in with graphics we were informed that they were only about half done. We asked them to return the package, explaining that we would do a final review that night and return it in the morning. John got on the phone and started calling secretaries to find several that agreed to work that night. Joe's office was located in executive row where we setup the volunteer secretaries at various desks.

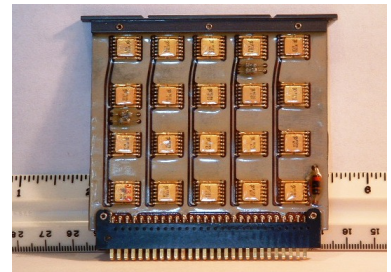
We passed out pieces of the draft to be typed. We had a bit of a false start when we realized that all typewriters were not using the same font and had to redo some of the pages. It got to be a late night, the reproduction room was closed and locked for the night. We thought for a moment we were done, but John came through - somehow he got into the repro room to make the necessary number of copies of the first half from the beautiful graphics portion and the last half from our typed sections. The proposal included one key phrase that assured the reader that the "7" would be 100% compatible with the code generated for the CP642 series provided it was reassembled or re-compiled. Now we were ready to go with only one problem left - how to get it down to DC in time. John had taken care of that using his marketing credit card. He had purchased a ticket and someone drove him to the airport in time to get on the plane and hand deliver it to DC.

PART IV, THEN WHAT?

AN/UYK-8

I have a couple of memos in my file documenting the Marines' plan for how they were going to use the "8".

Bob Oulicky was assigned as the Project Engineer. His engineering team started the AN/UYK-8 development using the PC card layout concepts from the 1830A [CP-901] including use of the 7901000 flat package integrated circuits. As shown in the photo on the right, these ICs were mounted on an aluminum layer to conduct heat to the black 'T-bar' at the top. The T-bar in turn made contact with metal to air heat exchanger.



AN/UYK-7

At some point in time in the mid-60s, we got reorganized. Arnie Hendrickson wound up on Forest Crowe's staff, Bob Draving disappeared off of the organization charts as did George Workman. I was assigned as manager of Technical Planning for the DSD on Crowe's staff. The next event came when the contract was awarded and the VP of marketing, Duane Osman, asked me to put together the business plan for the "7".

To do so, I made arrangements to use Leon Findley's Office [he had been transferred to Roseville commercial] where we met off and on for a couple of weeks. This worked really well as it kept members of the team from being called out for a "few minutes" and as a result were able to complete the plan on time and receive the required approvals so we could return to our current assignments.

At that time Ken Oehlers was put in charge of the logic design for the "7" after he had completed the CP-901 logic design. The result was a multi-processor modular design subsequently delivered into Navy systems as one bay, two bay, three bay, or four bay installations. This development became very successful product with over 1,000 bay deliveries during a 15 year production run. See the Computers, 32-bit page of <http://www.vipclubmn.org> for additional information.

{Editor's Notes:

1. Although the UYK-8 project started before the UYK-7, the nomenclature request for the UYK-7 was submitted earlier in that project's schedule. Thus the reversed chronological order of the numbers.
2. Ernie Lantto's information shows that the UYK-8 project began in June of 1967 with the first delivery in January of 1969. The UYK-7 project began in April of 1968 with first delivery in April of 1969. The air cooling heat exchanger packaging concepts from the 1830, a project which began in November 1963 with the only delivery in June 1965. The detail mechanical implementation

- designs for cards and heat exchangers came from the 1830A/CP-901 project which began in April 1966 with delivery to NAVAIR in September of 1967.
3. More information about all of the computers mentioned herein is available on the VIP Club's web site on the 30-bit and 32-bit computer pages.}
-

CONTRIBUTORS

Author

Curt Christensen graduated from North Dakota State in June of 1956 with a BSEE. He had worked as an intern the year before at Engineering Research Associates Division of Remington Rand the summer before so was ready to return to work there in July of '56. Curt worked on many projects in the defense systems part of the company until 1969 when he transferred to commercial operations, reporting to Harry Smuda as section manager of logic design for large scale systems. He retired November 1, 1991 after 33 years with the firm.

Editor

Lowell Benson worked at the company from 1960 to 1994 in a wide variety of positions. He graduated from the U of MN with a BEE in 1966. His mini-bio is on the Legacy web site, <http://vipclubmn.org/people1.aspx>.
