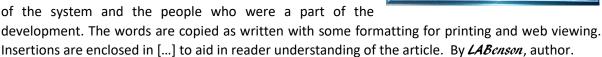**VIP CLUB**
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INTRODUCTION

Curt Christensen's estate donated many framed pictures and over a dozen boxes of papers to the VIP Club's Legacy Committee. We had published this snapshot of a framed picture in our Club's November 2016 newsletter. One of our Club members, David Durand, recognized his automobile in the picture.

A framed picture shows an Air Force mobile system from the 60s that Curt worked on from plants 1 & 2.

This Legacy Article copies the email messages 'telling the story' of the system and the people who were a part of the development. The words are copied as written with some formatting for printing and web viewing. Insertions are enclosed in […] to aid in reader understanding of the article. By *LABenson*, author.

Contents

THIS STORY

Msg. 1, 11/15 @ 2:48 PM - Lundgren

Lowell, this morning I had a call from Dave Durand in SD. It was his Corvette in that Curt Christensen pic. Dave told me the site was RADC and Rome, NY. Curt was the principal programmer, but also Paul Wood was there. Dave thought Paul would remember a lot about it. The project had to do with surveillance photo analysis. I suggest you call Paul for his input. He wouldn't know me from a hole in the ground. Dick

Msg. 2, 11/15 @ 4:07 PM - Benson

Paul: In our November newsletter, we had an article about a couple of pictures displayed at Curt Christensen's funeral service. Dick Lundgren had had a note from Dave Durand stating that it was his Corvette in one of the pictures. I've copied Dave's note and the article below my signature.

Can you add anything to this story, i.e. what was the project name, what year was it, what computer was used in the shelters? Who else may have worked on the project.

The Legacy project continues to try to ferret out stories about what we (our company

![VIP CLUB logo — Established in 1980]

employees) have done since 1946. Would appreciate your inputs.

Thanks, Lowell A. Benson; BEE 1966, U of MN - Retired, 2016 volunteering:

Article from VIP Club November 2016 newsletter.

Celebrations of Life and Careers: Rosalie Christensen will be providing our Legacy committee with boxes of artifacts, pictures, and books for the Lawshe Memorial Museum and the Charles Babbage Institute. This poster from Curt's memorial service is a microcosm of his 30-yr career with us.

A framed picture shows an Air Force mobile system from the 60s that Curt worked on from plants 1 & 2.

I thought that it was rather ironic that Curt's family chose to display framed pictures of two of the 23 shadow boxes that will be moving from Roseville to Eagan next year.

Msg. 3, 11/15 @ 4:32 PM-Lundgren

Lowell, I found my notes scribbled from the call with Dave Durand. USAF was the customer. Time frame was mid-60s. Persons named by Dave (if I heard the names correctly) were Paul Wood, Al Gresbrink, Roy Irwin, Charlie Hoffer (?), Lance Moberg, [unknown 1st] O'Dell. and Larry Lutton. Dave also mentioned project "Big Boy" where satellite photos over Russia and China were taken and then the film "canisters" (if that's the right word) were ejected from the satellite (polar orbit) upon receiving the "Drop" command. The command was given when the satellite was over Hawaii and recovery over Alaska, all drops were successfully recovered except one. Hopefully Paul Wood can make sense of this. I think there were two separate projects here, but I'm not sure. [Dick L.]

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Msg. 4, 11/15 @ 6:27 PM - Wood

Lowell, If I remember right Dave Durand was one of the hardware maintenance engineers on the Mobile Wing RECC Tech Project at Rome Air Development (RADC) Griffiss AFB in Rome, NY. There was a picture of the huts in one of the previous newsletters. The application was processing support for mobile air reconnaissance. The idea was to fly it into the field in C-124s and set it up to support air recon.

The other hardware guy was Charlie Huffer. I think Dave worked for Charlie.

The computer was an interlaced 1218. By interlaced they meant that the programs were stored into memory biased by an "interlace factor" of 2, 4, or 8. So a program was stored every other word or every fourth word or every eighth word depending on the setting of the interlace factor. The P-Register was incremented always by the interlace factor rather than the usual one.

This whole interlace factor was a security thing. If the bad guys captured the system and took a memory dump it would be very hard to reverse engineer the code from the dump because the programs were not stored sequentially.

The 1218 actually had paging, albeit implemented with software. All the pages were 1024 words (I think). The Local Control Routine (LCR), which I wrote, loaded and unloaded pages as needed. Because it was all done in software, the CMS-2 compiler had to divide up the generated code into 1028 word chunks. When there was a "jump" to an address, the compiler had to figure out if the "to address" was in the page or not. If it wasn't, it generated an entry in the "Jump Table" at the end of the page.

I remember that it was a multi pass process to generate the Jump Table. The compiler had to make an entry in the Jump Table every time it generated a jump command. When the generated code plus the Jump Table totaled 1024, then it would go through again and find the jump commands that jumped within the page and then removed that entry from the Jump Table. This always left a hole between the code and the Jump Table. The compiler would then try and fill the gap with additional code as best it could.

It was Phase III of the compiler that did this allocation. It was written by Jack Jolley who passed many years ago.

I have long forgotten the mechanism we used to effect the "page fault" to get control back to the LCR, nor how we resolved the virtual and physical addresses. For some reason, I remember that the Jump Table had two word entries. So, I imagine that one of the words was a "Return Jump" to the LCR and the second word the virtual address it needed to resolve. I think the addressing was structured to be a "page number" and an offset within the page. So, I assume the LCR loaded the page into physical memory and somehow conveyed the physical address to the hardware. I remember there was a "Local Control Table" where the LCR kept track of what pages were in memory. I seem to remember putting some code in to keep track of when a page was used and that was used to decide which page to swap out for another page.

The huts were out in a field behind a building (280?) at RADC in the deployed configuration. We should have debugged it all in the lab and then installed it, but RADC wanted to show the system off so we had to debug the system in the huts. The power source was portable jet powered generators fueled with JP-4 fuel. It was unbelievable noisy in huts when the doors

were open because of the constant whine of the generators. The sound you hated to hear was when the whine began to wind down because the generator had run out of fuel and all the equipment was about to shut down. There went your debug run, your compile, or whatever you were doing at the time. There were backup generators of course and we would have to go outside and start one up and bring it on line.

To add to the noise, Griffiss was a SAC Base and they flew B-52s that had no sound suppression for the engines. When they took off the roar was deafening.

The equipment was spread amongst the huts, because each hut had a role, but I can't remember the allocation. This meant that in debugging we had to run to another hut to get to the printer. Sometimes that meant tramping through snow to get there, sometimes in the middle of the night. It was not pleasant.

The printer was a thermal printer and required special thermal paper. When you had to print something, the smell was horrible. The paper was on a roll, so after you printed out a core dump or a compiler listing you had to sit down and manually cut the printout into 11" pages that you could work with it. The ink would rub off on your fingers.

Jack Jolley and I had the responsibility of the acceptance demonstration of the system software. Jack and I were the only two software wienies left on-site and we were working literally 24 on, 8 off, seven days a week getting ready for acceptance. Because we were in the huts we never knew whether it was night or day. My wife Nancy had flown out and we had planned a several days in NYC after the acceptance; we even had some show tickets. The night before the acceptance

testing, Jack and I were doing the final runs and, you guessed it, the 1218 crashed. It took several days to get it up and running again and Nancy and I had to cancel the whole NYC thing. She was not a happy camper!!!!

When we were on-site we stayed at the Trinkaus Manor [Trinkaus means 'drink up' in German]. Needless to say, we got to know the staff quite well. When we worked the grave yard shifts or pulled an all-nighter, the housekeepers would do our rooms first thing while we were having breakfast so we could just eat and then collapse. One of the owner's daughter married while were there and we were all invited to the wedding. One of the Trinkaus sons was ordained and Nancy and I were invited. It was wall-to-wall Trinkaus family and Nancy and I. I am sure the Manor made its revenue goals while we were working on the program. BTW, the Trinkaus was destroyed by fire in 1992.

This was the first program I worked on when I started in 1964. The project was under Clyde. Dick Olson was the, what we would now call, the Project Engineer. Under him was Jim Kim, who was in charge of the CMS-2 compiler. I worked for Jim.

There was also an operating system, but I can't remember any name for it. I think Larry Jackson and Bill Roose [Roos] worked on it. I do remember that executive calls were made through a fault interrupt which turned the red light on the chassis of the 1218. So, when the system was running the fault light was always on and the USAF didn't like that, so we unscrewed the bulb in the fault light.

What a trip down memory lane! Cheers. Paul

Msg. 5, 11/15 @ 6:34 PM - Benson

Dick: Somewhere in the recesses of my mind are a part of the story. The AF would fly a cargo plane which would fly along the canister re-

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entry track and catch the canister with a net that was hung out the rear of the cargo plane as the canister deployed a small parachute. Sort of like a baseball player catching a pop fly. Yes, the story was that there was only one missed out of a few hundred - Now if I could only remember where I had read the story and whether it was classified. The tracking of the satellite and 'catcher' I believe was out of Sunnyvale, CA. Cheers! [Lowell]

Msg. 6, 11/15 @ 6:53 PM - Benson

Paul: Great response! I think that the interlaced 1218s were noted as the 1218m on some genealogy charts. I'm going to copy Bill Roos on your answer - perhaps he can add a few words to this project.

This is another of the 'untold stories' that our engineering teams accomplished over the years, now I have to find a good place to merge it into our website anthology.

Thanks for your recollections.

Lowell A. Benson;

Msg. 7, 11/15 @ 6:59 PM - Wood

Lowell, you are right it was the 1218M.

Cheers, Paul

Msg. 8, 11/15 @ 8:51 PM - Lundgren

Jesus! What a great response and so quickly and so thorough! And all because of an old Corvette in an old pic and the coincidences of various people knowing various other people! You'll never get away with a short one paragraph "filler" for a coming newsletter. [Dick]

Msg. 9, 11/16 @ 1:12 AM - Roos

Paul, your email brought back many memories from my time working on the M1218, a one of a kind computer I believe. (I apologize in advance for any memory hiccoughs.) There was a follow-on computer called the M555

Buffer, another one of a kind computer, basically a souped-up M1218. The story I remember is that the government did not have money for another computer so they called it a Buffer. I think it had 32K memory banks for a total of 256K words versus 8K (4K?) memory banks, or 64K (32K) memory total for the M1218—I think 4K, because that was the bank size of the 1218.

One of the executive program functions (offhand, I don't remember calling the executive anything else) was the capability to write the contents of memory to a huge (physically that is) Data Products disk storage system, located in its own hut, so that it could be reloaded at a later time and continue executing from where it left off. The exec could also be saved to mag tape. My recollection is that it wrote/read 512 word chunks at a time with checksum (511 + checksum or 512 + checksum? I forget; probably the latter). There was a timing problem with the mag tape drive because the M1218 could not execute fast enough to keep the tape running smoothly. A simple loop that used a B-Box to index and add each of the 512 words to the AL register for the checksum was too slow, so I changed the loop to a sequence of 512 add instructions using direct addressing, and that was fast enough.

After I left Sperry for AiC in the fall of 1966, RADC gave AiC a small contract for me to fix a problem they were having with the "shelving" of the contents of memory; that's what we called it, and we had a lot of fun when we went to lunch or dinner talking about "aborting on the shelf". Apparently RADC had hired some other outfit to fix the problem without success, and the only reason I was involved was because I wrote the original program. The problem turned out to be a disk problem. The program was always writing to the same disk area, and that area simply wore out.

I do not have fond memories of the "jump tables." When program patches had to be made, there was often not enough memory left in the bank and, shall I say, compromises had to be made that did not enhance the program's logic. Back in St. Paul the recompilation would usually resolve any issues.

On a Sunday afternoon of the first or second winter in Rome there was a blizzard that left snow banks higher than the tall wire fences around secure areas of the base. We were stranded for 2 days, I believe, at the Trinkaus that we luckily returned to before the roads were impassible. Unfortunately, :>), the Manor restaurant bar was unofficially open to us.

Some of the people I worked with were Jolley who wrote the CCH, Centralized Card Handler, Dave Frear, Don K... I cannot recall his name, Larry Jackson, and a third maintenance engineer, Denny Yeoman. Lance Moberg was my supervisor, but I do not recall that he ever traveled to Rome. I made a trip out east in 2004 with my daughter, Barb, and we went through Rome to show her where she was born in 1968—that was when we lived in Oriskany when I was working for AiC and moved there for about two years, 1967-1969. The Trinkaus Motel and Manor was in Oriskany, not far from the little house I bought, and it was sad to see the restaurant gone. The Manor and the Motel were separate buildings, and in 2004 the Motel may have been open, but it didn't look like it.

There are many stories I could tell about the days in Rome. One of the favorite places to eat steak and drink martinis was Coalyard Charlies, and then there was the episode with some Canadian Air Force pilots, but I have to stop now. Bill [Roos]

Msg. 10, 11/16 @ 1:27 AM - Roos

Less than five minutes after sending my previous email, I suddenly recalled Don K...'s name! Don Kivi. A sure sign of old age is the great pleasure one gets when occasionally one does recall something. I also forgot to include Jim Goodland, as I'm sure I have forgotten others. Bill

Msg. 11, 11/16 @ 6:38 AM - Benson

Bill: Thanks for your feedback. I remember Jim Goodland because he started as a computer operator in the plant 1 military computer center about 1965, then became a programmer when he finished his degree. My wife and I played bridge with him and his wife a few times as we both lived in Roseville.

Cheers! [Lowell]

Msg. 12, 11/16 @ 7:24 AM - Wood

Bill, Lowell, I remember the snow storm and being snowed in at the Trinkaus Manor. When it was all over and done, the huts were totally buried. They used snowplows with blowers (the ones they used to clear the runways) to dig out the huts.

Another person that worked on the program was Dave Vatsaas (I believed he passed).

Last I knew, and that was years ago, Jim Goodland lived in Rodgers. I still see Don Kivi every now and then at Life Time Fitness in Eagan, but haven't seen him for months. I know Dave Frear, who wrote the "Source Language Librarian" and the "Data Handler" left Sperry and moved to California to work for a lumber company. Never heard from him after that.

After reading Bill's email the pages were 512 words not 1024. I had forgotten that there was one hut that had nothing in it but the disk unit.

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BTW, the white tubes in the picture that you see coming out of the huts were for the heating/air conditioning.

Another place we liked to eat was "The Savoy" in Rome because they had great filets. Vatsaas like his meat well done and they always had to butterfly that beautiful piece of meat to get it done to his liking.

To get to Rome we flew to JFK and then took Mohawk Airlines from JFK to the Rome/Utica airport. The planes were Martin 404s prop jobs. In bad weather, they would ask your weight and then distribute people around the plane to get the desired weight and balance. Later they acquired BAC-111s and the maintenance group from BAC that was training the Mohawk maintenance guys were also staying in the area. I don't think it was the Trinkaus Manor, but I can't remember. These guys would always march in the big July 4th celebration parade representing England, I suppose. They also had organized a cricket league and taught the locals how to play the game. Cheers, Paul

Msg. 13, 11/20 @ 9:07 PM - Durand

Lowell, Did Dick mention I had mailed him a booklet describing mission and equipment for RADC?

RADC people:

First EIC: Al Gresbrink from training dept.

2nd EIC: Roy Erwin also from training

3rd EIC: Charlie Huffer in from Army war room (DC)?

Programmers:

Lance Moberg wrote the assembler, was on site to demonstrate??? Remember meeting once early on.

Paul Wood: operational software

Jack Jolly: "   "

Others: Didn't remember Bill Roos and others that are mentioned. Others may have arrived after we left or were working the project back in the cities. There was a young lady on hand crutches who appeared for a short time in the winter. She had a tough time with getting into the main building, only entrance in front. Dave Vatsaas may have arrived after we left. There were others who came and went over short periods of time but [I] don't remember their names.

Maintenance personal:

Larry Lutton: Responsibility for the single disk unit assigned to each I/O console monitor, don't know how many there were (3?). This drive had a plated surface which the R/W heads rested when turned off. Reportedly the heads would be airborne within one half turn of the disk. High turnover.

Dennis Yeoman: 1240 mtu, printer, 1232 I/O console with a Kleinschmidt keyboard(?) and likely the I/O console monitors.

Dave Durand: Disk File Control Unit, DP645(?) mass storage Unit, Had dual excess,30 " (?) disks, used an air compressor to "land" the R/W heads.

Three maintenance personnel arrived at the same time, July 1964, Durand departed Oct 1966, Huffer passed on sometime after that, Larry left not long after to Training(?). Thought Yeoman was the last man standing and went to California for UNIVAC.

Air Force interface: Lt O'Dell. Later resigned and joined the staff at RADC, same job but as a civilian.

In the picture [on page 1] as I can recall(?):

1. Double shelter: m1218,1240 mtu, DFCU, Larry's "rack" of single disks-Number of them unknown and think one I/O console monitor.

2. Believe nearest shelter was for the Data Products Mass Storage Device.

3. Beyond the double shelter and left center was the shelter for 1232 I/O console, "smelly Printer", I/O console monitor(?), and something else????

4. Center page shelter was probably for photo interpretation, well-lit tables with optics and I/O console monitors.

5. Shelter to the right likely was for photo film development, prep for analysis.

2 and 3 may be reversed.

Some fact, some guessing.

There was equipment that required 60 cps power. A small box outside the double shelters converted 400cps to 60 cps. Solid state but not very reliable.

The turbine generators were rated at 20kw 400cps and portable(?), 485 lbs., came with 4 handles. The AF expected us to maintain these units and they had the facilities. Eventually we were down to one operating unit. Univac sent a lawyer from contracts who straightened things out. Not our problem and the AF took on the maintenance. Wish I could remember his name, likable and smart.

Enjoyed the replies, brought back some memories. [Dave Durand]

Msg. 14, 11/21 @ 6:13 AM - Benson

Dave: Thanks for the information, Dick will quite likely bring the booklet to our next board meeting.

I got the photo from Curt Christensen's widow Rosalie - along with a whole lot of other pictures and papers - a dozen storage boxes.

My intent is to put all of the comments into a paper - Holiday preparation will slow completion. Cheers! [Lowell]

Msg. 15, 12/8 @ 8:15 AM - Benson

Gentlemen: At yesterday's VIP Club Board meeting, Dick Lundgren asked if I'd done anything with the 'Durand' information. Please review this draft, is there anything that you'd like to add?

I'll add a mini-bio for Curt when I do the update – I think that he was the program manager for the system. Thanks, Lowell

Msg. 16, 12/8 @ 9:14 AM - Roos

Lowell, The Young Lady on crutches that Dave Durand mentioned may have been Rita E. Lukes. She was a programmer and later got her law degree and left Univac. She died July 26, 2006. Bill

Msg. 17, 12/8 @ 11:51 AM - Wood

Lowell. I don't remember Larry Lutton working on the program, but he may have come off the program before us software wienies appeared on the scene. Larry is a neighbor and I will forward this email on to him and maybe he can add some more stuff. Cheers, Paul

Msg. 18, 12/8 @ 2:13 PM - Lutton

Hi Paul & Lowell, Thanks for the update. I remember Curt while we were at plant 2; the only way he fit in the huts was to put his ear on his shoulder. I was lucky, I fit under the AC vents.

Paul, you and Roger McCumber are the only project members I've seen recently. Roger was the logic designer for the hardware mods...he put the M in M1218.

Msg. 19, 12/8 @ 4:25 PM - Benson

Roger: Your name was mentioned by Larry Lutton as a participant in the subject project. Note the email sequence below my name. Do you have anything to add to the attached paper? Happy Holidays!

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Msg. 20, 12/8 @ 9:26 PM - Lundgren

Lowell, I haven't had time to proof the article thoroughly yet, but I like your approach with a sequence of email exchanges. It exemplifies how diverse people get drawn together to reconstruct a story from our collective historical past. You could call it an example of "synergy." Remember when Sperry Rand tried to project to customers (in ads) and tell us that all our different divisions worked better together because of synergy? Actually, it demonstrates networking possibilities that we didn't even know we had. Dick

Msg. 21, 12/9 @ 9:46 PM - Durand

Lowell, I should not have mentioned "Big Boy" as that was an operation out of Vandenberg. The correct version of the "Drop" was the

command to drop the film package came from the tracking site at Kodiak Island, Alaska and Hawaii would snatch the parachute on the fly. Sorry about mentioning it. Dave

Msg. 22, 12/11 @ 9:14 PM, McCumber

Lowell Benson, it was my brother "Mac" that worked on the 1218 software and with the chip people. The 1218 was a core memory computer and the M1218 was a chip memory computer. The 1219 had an extra bit that allowed for twice the memory. All three had 18 bit words.

Msg. 21, 12/12 @ 10:15 AM - Benson

Gentlemen: Unless one of you has something more to add, I'll post this on our website before the new year begins.

CURT CHRISTENSEN

This photo was taken at a luncheon when the certificate on page 10 and plaques were awarded to UNIVAC. In the picture are: Mr ?, UNIVAC VP Vern Leas, AF ?, Curtis Christensen, and AF ? [This framed picture and the certificate will be donated to the Lawshe Memorial Museum.]

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 until1969 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. [copied from Curt's 2008 Legacy paper, http://vipclubmn.org/Articles/AnotherComputerWasBorn.pdf]

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Air Force Systems Command
Honors
Curtis A. Christenson
with the
Award for Outstanding Achievement

IN RECOGNITION OF HIS CONTRIBUTIONS TO THE DEVELOPMENT OF THE ELECTRONIC DATA PROCESSING MODULE MOBILE WING RECONNAISSANCE TECHNICAL SQUADRON

A.T. CULBERTSON
Brig Gen, USAF
Commander

B. A. SCHRIEVER
General, USAF
Commander

[I apologize for the reflections in this image as the 11"x14" certificate is too large for my scanner]

Christensen, Curtis A. - Age 86, of Mendota Heights, MN. Passed away peacefully on September 9th, 2016. Preceded in death by his first wife Patricia. Survived by wife Rosalie. Curt retired from Unisys in 1991 after a long career in designing computers. Curt was a long-time member of the VIP Club. [copied from the VIP Club's October 2016 newsletter.] Curt had served in the AF during the Korean conflict – before attending NDSU.

AUTHOR

Lowell Benson worked at the company from 1960 to1994 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.

I first met Curt in 1963 in Plant 1 when both of us reported to Leon Findley, he as a Program Manager/Project Engineer and I as a financial analyst.

Thanks to Rosalie for providing Curt's artifacts and to each person who contributed to this story.