

Project MASS

(Modern Army Supply System)



Some observations on the
early application of a
computer (IBM 650)
in processing military
materiel management data
in USAREUR

by

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During the first years of Project MASS transaction processing at the 7th Army Stock Control Center was done on Electrical Accounting Machines (EAM). In November 1957, an IBM 650 Computer was installed to provide a much needed improvement in processing capability. This marked one of the earliest applications of using a computer to process military material management data. Following is a view of the first steps Project MASS took into the "Computer Era".

Selection and training of the first IBM 650 Computer Programmers for Project MASS.

Upon completion of the six week Signal Corps officers Basic Course at Ft Monmouth, three officers (Lt. Lee, Lt. Rolefson & Lt.Teti) were assigned to the MASS project. They were joined by one officer (Lt. Bondfield), SFC Bayler and six enlisted men (all Privates). All the officers, and I believe, all the enlisted men held college degrees in Engineering or Mathematics. The exception was SFC Bayler. He was a musician in the Army Band for many years. It is unknown how Lt. Bondfield, SFC Bayler and the enlisted men were selected. The four officers had two year active duty commitments. Some enlisted men had two year and others longer active duty commitments. None had any computer programming or military supply experience.

Training for MASS project included: 1) a 4 week IBM 650 computer programming course. The instructor was from IBM. Believe it was the first ADPS (Automatic Data Processing Systems) course given at Ft Monmouth in April 1957. 2) 4 day tour and briefings at the Decatur Signal Corps Depot. 3) One week at the Pentagon for briefings on current and future army supply management procedures as they pertained to Project MASS. 4) In Germany, 3 weeks of tours and briefings at the 7th Army Stock Control Center and a couple of Direct Support Units (DSU).

Initial computer programming efforts.

The transition from learning to converting the newly acquired knowledge to productive programs proved to be very challenging. The first two months of effort was a repeated trial-failure-correction process. For example, the first attempt to test several very small programs on an IBM 650 Computer at the IBM German plant at Sindelfingen, Germany was a complete failure. The computer would not load any programs. A precious scheduled test time period was lost. And it didn't help that the computer console was in German. The failure to load programs, it was learned later, was due to one missing wire in the IBM 533 Card Reader control panel. There was one additional test period that was successful.

During this period two persons were added to the programming group. Lt Friedman was a member for about five months until his rotation to the U.S. in December 1957. Roy Hoch was an IBM Customer Engineer who brought a much needed program development process experience. He would be part of the group for about one year.

The first productive computer programs basically combined several Electrical Accounting Machine (EAM) steps from procedures currently used. The IBM 650 was essentially used as a faster IBM 602 calculator. The capability to process and print on the IBM 407 Printer in one operation was a significant process time improvement.

The IBM 650 Computer arrives at the 7th Army Stock Control Center (7th Army SCC).

When "Our 650" arrived in November 1957 about ten programs were ready to test. The computer, as first installed, included the 650 Main Frame, 655 Power Unit, 533 Card Reader-Punch, and 407 Printer. The delivery of a fifth and final unit, a 537 Card Reader Punch, was delayed for over a month. The "Computer Room" was a refurbished tank shed. Power cables connecting the five computer units laid, in the open, on the floor. There was no air conditioning.

Program testing also proved to be a repeated trial-error-correction learning process. But "Our 650" was available 24/7 and the Programmers spent many hours on the console "debugging" their programs. Also learned was that a "working Program" did not necessarily mean that it met the job processing requirements. Procedure changes and a failure to fully understand the processing requirements caused most of the problems. The 537 Card Reader Punch delivery delay also caused some problems because the ability to punch into a card just read was used in several programs. Those programs could not be tested until the 537 was on line.

As more programs become productive and an integral part of the 7th army SCC processing routine, there was less time available for program testing on the computer. In addition, Programmers usually spent time as Computer Operators "running" the programs that they created.

Upgrading the IBM 650 Computer capability

In early 1958, we learned that the 7th Army SCC would be moving to Zwiebruchen, Germany and that six IBM 727 Magnetic Tape Units would be added to "Our 650". The programming group now faced a new challenge. In addition to maintaining and "running" the existing programs how to write programs using the 727 Magnetic tape units had to be learned. After a study of the 727 programming manual two things were apparent. Writing the computer instructions would not be too difficult for there were now more experienced Programmers. But what would change significantly was the overall procedure design and therefore program design because of the enhanced computer capability. There would no longer be a, more or less, direct conversion of EAM procedures to computer processing. Most of the currently productive programs would become obsolete.

A new design strategy

The new design strategy was to view the total processing and information requirements of 7th Army SCC. The new design would center on the primary files (Stock Inventory, Cross Reference, Demand History, etc.) and the frequency of processing (daily, weekly, monthly, etc.) All primary files would be stored on magnetic tape. Once the SCC processing and information requirements were determined, processing runs (Requisition Processing, Stock Status Reports, Re-order Point analysis, File Maintenance, etc.) would be identified. Next computer programs were defined to accomplish the processing runs. Sometimes more than one program was needed per run due to the limited (2,000 instructions) working memory of the IBM 650.

Determining the total processing and information needs (Defining the Problem, as it is now termed) was an extremely difficult exercise. Basically, it was a knowledge and communication problem. The Programmers did not understand enough about supply management and the Stock Managers did not

understand enough about computers. In addition, Stock Managers were from different Technical Services. There were some differences in the ways they managed their inventories. Countless meetings were held to define the requirements. After a 3 to 4 month concentrated effort the requirements were judged complete enough to work on file and general program designs. Writing some computer programs could begin, but with the strong possibility that changes to program would be necessary to accommodate requirement changes. The physical 7th Army SCC move, in spring 1958, to Zwiebrucken separated the Programmers from the Supply Managers for over a month amplifying the communication problem.

In the early summer of 1958, there were two important supply management issues that had a significant impact on file and program design. Further design was not feasible until they were resolved. One was that all stock identification numbers would be in the new federal number format (9 all numeric digits, as I recall). No manufactures part numbers would be used except in the Cross Reference file. The 650 working storage had 2,000 ten digit words. The all numeric 9 digit federal number could be stored in one word. The manufactures number could be any combination of alphabetic and numeric characters and the number of characters could be up to 18. Since it took two digits to code an alphabetic character the number of words needed to accommodate the manufactures number was four words. This four times difference affected file design, but more significant was the impact on the 650 working storage space for instructions. In several cases this meant two programs instead of one due to the number of instructions exceeding the storage space. The second issue involved which technical service depot or depots would stock a part. Some Technical Services wanted to stock a commonly used item at their own depots. Both issues were resolved. Federal and manufactures numbers could be used. A part could be stocked in only one location.

In mid-summer we learned about MOBDIC (Mobil Digital Computer). It was in the test stage and the Salvania Engineers were interested in the processing and information requirements. They were several meetings with the Engineers reviewing the requirements and file designs. They were also informed of significant changes. MOBDIC was scheduled to replace the IBM 650 in early 1960s.

A concentrated programming effort

In mid-summer 1958 the requirements and overall design were "frozen". There were about twenty computer programs to write and test. Some programs, like converting card files to magnetic tape files, were relatively small. But most of the main processing programs were very large. The upgraded IBM 650 with magnetic tapes was due to be installed in September 1958. The objective was to have the main file conversion and maintenance programs ready to test when the computer was ready. The Inventory Program that carried the stock balance, processed requisitions, receipts and depot picking tags was to be "operation ready" once the files were converted.

The "original" programming group, who would write the programs, now numbered nine (4 officers, SFC Bayler & 3 enlisted men). One of the enlisted men was dedicated to wiring control panels. The other "original" enlisted men were now Computer Operators. Lt White was an addition to the Programming Office, but his responsibilities were all related to the ongoing computer and EAM operations and move of equipment from Vaihingen to Zwiebrucken. Roy Hoch was replaced by Ashton Klug, another IBM Customer Engineer.

The first programming effort focused on file and transaction design. Since the same files and transactions could be used by multiple programs, it was essential they be defined before coding began. There were a few required file content and format changes, as I call, that did affect program changes – but none seriously. Two Programmer “teams” were assigned to write and test the main processing programs. The team would also create the file conversion and maintenance programs associated with their programs.

Programming the main programs was much more challenging than anticipated. They were not only larger, but the processing and decision logic was more complex. In addition, as program details were developed processing questions and contradictions would occur. Getting answers took time. The IBM 650 instruction limitation was a critical program design consideration. Sometimes it was necessary to not only write computer instructions to do a task, but to find ways to accomplish the task with the least number of instructions.

The four month (August thru November) period saw a concentrated programming effort with Programmers working 60 to 70 hours per week. After the computer was operational, in late September, the weekly work hours increased to 80 and more. In addition, the computers availability for testing often resulted in irregular hours.

Installation of the IBM 650 with six Magnetic Tape Units

The upgraded IBM 650 was installed and ready to test programs near the end of September 1958. The facility that housed the 650 was a great improvement over that at Vaithingen. All the units sat on a raised floor and all power cables were hidden under the floor. There was air conditioning and an air filtering system to remove dust.

The main Inventory Run, involving several programs, was online processing requisitions and producing depot picking tags by early November. Other programs would follow. By the middle of December the initial group of programs (about 20) were all operational. Overall the conversion from mostly EAM processing to mostly computer processing went quite well, as I recall. The one exception was the Cross Reference Run. It was a daily run against which all requisitions were matched against a file with nearly 400,000 records. The run was too slow. The solution was to create group records – five records in a group. The programs were rewritten. This solution reduced the processing time by over four times. Unfortunately, the only solution for updating the file was to maintain the file on punched cards and then recreate the magnetic tape file periodically. It seemed to be the only way given the instruction limitations of the IBM 650. Fortunately the Cross Reference File did not require frequent maintenance.

The IBM 650 was “powered up” 24/7 almost from the day it was installed. The only time it was not available for production was for 4 to 6 hours Monday mornings for routine maintenance. The “up time” reliability of the IBM 650 was generally good. When a failure occurred there were “on site” IBM Engineers to repair it and a small room filled with repair parts. There were two significant IBM 650 operation failures. One was due to a German supplied, power failure. The power failure caused both computer and air conditioners to stop circulating air which caused the computer units to overheat. The entire magnetic drum unit (the “heart” of the 650) had to be replaced as were other components. The IBM 650 was “down” over a week. Two large diesel electric generators were soon installed to furnish the power. The other problem involved the 727 tape units. It occurred when the unit would shift from high speed rewind to the much slower read-write mode. That operation would occasionally put a 4 to 6 inch

long diagonal crease across the one inch wide magnetic tape. This would destroy some data. There were two remedies to correct the data error. One was to restart the run from the beginning. An OK option if the run had just started, but sometimes it occurred well into a five hour long run. The other remedy was to reconstruct the damaged data by referencing printed documents, coding the data in machine language and entering the corrections, a word at a time, through the console. It required a Programmer to make the correction. And it seemed to occur most often just after midnight on the 5 to 6 hour file sorting runs. The IBM Engineers eventually fixed the problem.

Personnel Changes

Near the end of December 1958, three of the "original" officers (Lt. Lee, Lt. Teti & Lt. Rolefson) would complete their two year active duty commitment and leave. The fourth officer (Lt Bonfield) would leave in April. Two of the "original" enlisted men had already left and more would be leaving shortly. Only one or two would remain beyond a year, as I recall. Additions to the programming unit were Lt Johnson in December 1958 and Capt. Hartley in April 1959. Neither had programming experience. Several enlisted men, with limited experience, were also added. I was given a six month active duty extension to provide continuity until my replacement, Capt. Hartley, would arrive.

The need for Computer Programmers and Operators was apparent. So a training process was begun at the SCC. New personnel arrivals at the SCC were tested using the IBM Programmers Aptitude Test. (Don't recall if it was required). The test was also offered to some existed SCC personnel. Those with high scores were offered the opportunity to attend a programming course. An IBM 650 Computer Programming Course, similar to that given at Ft. Monmouth, was developed and given at SCC. The instructors were Ashton Klug and SCC Programmers. Capt. Hartley, Lt. Johnson and about ten enlisted men attended the first course in April 1959. About one half of those who completed the course were assigned to programming and the other half to computer operations. In a letter from Capt. Hartley, dated 17 Oct 1957, he stated that they had run another programming course and that there were now 27 Programmers in the Programming office. And that they were very busy writing programs to meet the Stock Managers information requests.

In March, Lt Col Hoffman assigned a task to write a description of my job as Chief, Development Office. He said that an MOS was being developed for ADPS Officers. I have not seen the description for the 2402 MOS, but guess I would be one of the first officers to have it.