System Product Review

Alpha Micro System Revisited

by Hank Kee

Background

The Alpha Micro system was originally introduced in December of 1976. It has been around for so long that many of us have tended to overlook the system as the first 16-bit system available on the S-100 bus. This system is often used as the benchmark for all other microcomputer systems. It was originally advertised and promoted to the hobbyist in various microcomputer journals. However, they now are no longer selling "direct" to the general public but prefer to sell through dealers. The main thrust of their dealers' selling efforts today is to the "small" commercial business user.

There are well over 5,000 Alpha Micro systems running; last year the company reported sales of over 21 million. There is also a very active Alpha Micro users group called AMUS (c/o Steve Elliot, Front Range Computer, 1966 13th St., Boulder CO 80306).

The system is based on the conceptual architecture of the LSI series designed by Digital Equipment Corporation. The smallest basic configuration (eight systems are available) consists of a two-board CPU (AM-100), a six port serial I/O board (AM-300), and a floppy disk controller (AM-210) interfacing to CDC drives. A hard disk cartridge system (CDC Hawk or Phoenix) could be added for greater disk storage capacities (360 Mbytes maximum). Additional available equipment includes 8.5 Mbyte Winchester and 9 track 1/2" tape peripherals. There are now variations of these boards with different options. Further, both serial and parallel pointers (300, 600 or 900 LPM) with two spoolers are supported. This review is necessarily confined to their original product offerings only because of limited access to their hardware.

Overall Architecture

The AM-100 CPU consists of two boards populated by a five chip set micro-encoded processor manufactured by Western Digital. Western Digital was the original manufacturer of the LSI series for DEC. The AM-100 CPU contains hardware floating-point math. The mnemonic code of the AM-100 is essentially the same as the LSI series, but they differ at the object code level. The Alpha

Micro has an improved instruction set compared to the LSI. Assembler source code from the LSI can be easily converted onto the Alpha Micro. A separate 8 to 10 VAC is required to generate the real-time clock pulse. This could be easily tapped off the power supply of the main frame transformer prior to it being rectified into DC.

The AM-210 is the floppy disk controller which has the addition of a Z80 processor. This allows for an interrupt driven operating system. Unlike many other micro based disk systems, interrupts on the Alpha Micro need not be disabled during disk operations. The user can key-in ahead instead of waiting for the system to poll for character input. The original system I worked on interfaced to either Persci 277 or Wangco 76 8" drives. The floppy disk system currently offered by Alpha Micro uses CDC drives and the AM-210 controller. The CDC's are dual-sided double density units. The current floppy disk systems offered by Alpha Micro now has over 2MBytes available to the user.

The functions of I/O are handled by the AM-300 six serial port board. An AM-310 is also sold to those who wish to interface synchronous as well as asynchronous devices to the Alpha Micro.

To complete the basic system, a Piiceon 64K dynamic memory board is available. Up to eight memory boards may be installed for a maximum of 512K of memory. This board has optional parity checking features. I have tried numerous other bank select dynamic memories. Only the Piiceon, which was recommended by Alpha Micro, works. An alternative is to use static memories with bank select. Memory boards need not be rated any faster than 450 nanoseconds. Each additional concurrent user requires about 32K of memory. As the number of concurrent users increase, so will the number of memory boards. The use of static memories tend to cause system heat build-up.

Alpha Micro also offers the CDC Hawk cartridge hard disk system on the AM-500 hard disk controller. The drive comes with 5Mbytes of fixed and 5Mbytes of removable storage. Winchester technology without removable media is high risk on small business systems. Alpha Micro does not sell their AM-500 hard disk controller card separate from the CDC Hawk drive. Many owners contract with CDC for monthly service maintenance of

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the Hawk drive, but would prefer owning an extra disk controller card for the purposes of backup. Konan now sells a compatible disk controller (KNX-500). Instead of using the Z80 for data transfer functions, the Konan board uses the 8085. I have found the Konan controller to be an acceptable substitute.

All Alpha Micro manufactured boards, with the exception of the AM-100, can be used with existing S-100 boards for CP/M operation. (Alpha-Micro does not support CP/M on their systems.) BIOS Coding is generally available. The Konan KNX-500 is also supplied with BIOS coding.

Other "foreign" S-100 boards can be successfully included as part of the overall configuration. You will need an Alpha Micro system, though, to initialize other devices. Alpha Micro has included as part of their software, drivers for boards of many other S-100 manufacturers. Non-Alpha Micro boards, however, tend to be non-interrupt driven. The easiest and most efficient configuration is the basic system as offered by Alpha Micro. Originally the Alpha Micro was designed to work with the Tarbell disk controller along with the Imsai SIO or Processor Tech VDM boards.

Alpha Micro has since introduced the AM-100T (about a year and a half ago). This CPU uses a 16-bit address structure, as opposed to 8-bit address architecture. It run substantially faster than the AM-100.

It is possible to interface as many as 22 concurrent users onto the system using their hard disk systems. But I have found degradation of response becomes significant when there are more than a half-dozen or so users on the system. The size of available user storage decreases as the operating system increases to reflect the greater number of concurrent users.

Software Availability

The greatest asset of the Alpha Micro system is that the software is bundled with the purchase of hardware. Many of their software systems are excellent. The AMOS (Alpha Micro Operating System) includes a superb multi-user AlphaBasic in either interpretive or compiler mode, AlphaPascal, AlphaLisp, and a screen oriented editor (VUE). Rather than dwell on how the operating system works, it suffices to say that it is equivalent to a DEC system running RT-11. For those of you who are familiar with CP/M, it works very much like CP/M. Since CP/M is a variant of RT-11, it might be more equitable to say that AMOS and CP/M are similar to DEC's RT-11.

AMOS assigns disk space by project ID's. The operating system ID contains all the system level commands. The user may elect to add customized calls or eliminate others from this space if they are not referenced. This allows for a very small kernel operating system to be resident in memory. Commonly accessed system modules such as the Basic runtime package can be made resident in memory and available to all users. The Basic compiler and runtime modules are reentrant. The typical operating system would use about 32K bytes of memory. Only 64K of memory can be referenced at any one time by the user, including space required by AMOS. AMOS, in its design, permits shared reentrant code. Most of Alpha Micro's software can be made resident and reentrant. Basic generates reentrant user code.

There is password control on the Alpha Micro for each user of the system. A master account is available for unrestricted access. Instead of comparing this to CP/M, it is really a superset of MP/M.

Basic for the Alpha Micro is very powerful. The compiler can generate reentrant code for access by multi-users. It even tells the user how much time it took to compile a program. Available on this system is the capability to "MAP" variables, very much like COBOL. This allows the programmer to reference overlay areas of the same field with ease. Basic can also be used in interpretive mode. Variable names are not limited to two or three characters. They can be defined to be much more meaningful since up to 31 characters may be used.

Some Alpha Micro dealers have since added the capability to accept data from CP/M or IBM floppy disk formats. Utility programs are provided to perform these functions. Similar routines have been included to transform AMOS oriented formats into CP/M or IBM compatible data structures.

The Alpha Micro system has an excellent method for systems generation. A SYSTEM.INI file is created by the user defining configuration to be generated at dynamic boot-time. It is very easy to modify the operating system to include additional equipment. Having worked with CP/M, AMOS is superior to implement. AMOS also has facilities for running a modified system initialization without affecting the original SYSTEM.INI file.

The Alpha Micro System is the Rolls Royce of S-100 systems.

Alpha-Pascal is an enhanced UCSD Pascal with multi-user, multi-tasking features. Alpha Micro also offers LISP. FORTRAN, COBAL and APL are available from other sources and Alpha Micro dealers. I have not had an opportunity to explore these systems.

If you are interested in running packaged business software, your choices are limited. Alpha Micro offers an Accounting Package which includes the functions of accounts payable/receivable, general ledger, payroll, and inventory and order control.

Almost everyone I know who has implemented this "system" indicates that modifications are very extensive. It is not what one would call an easily adaptable turnkey business application system.

With the exception of the Alpha Micro Accounting System, the abovementioned software comes with the purchase of hardware. A variety of legal, medical, and other type packages are available from Alpha Micro dealers.

The software documentation supplied with the system is very good and quite complete. It is relatively easy to understand. The program reference materials are not tutorial in nature. These were meant to be of assistance to users who have a first-hand working knowledge of programming systems.

Reliability

The system has certain quirks. When running the Alpha Micro in multi-user mode, it is possible for one user to

bring down all other users due to addressing of out-of-bounds memory or hardware "bus" failure. There is no form of hardware protection. In general, running production programs in multi-user mode will be of no problem. But it is advised that application development should not be running concurrent with production processing. During the past two years, I have experienced various board problems with the system. These are typical of past experiences I have had with other microcomputer boards. The only difference is that the repairs require returning the malfunctioning board(s) to an Alpha Micro dealer for servicing. Schematics are not available to the end-user. This arrangement is not always practical in terms of turn-around time. For business environments, it is almost mandatory to configure an overall system with sufficient back-up boards. This is expensive and sometimes not possible.

Conclusion:

The Alpha Micro system is the Rolls Royce of S-100 systems. The manufacturer's selling and maintenance policies however, are restrictive. Small business systems have been successfully designed around the Alpha Micro, but one must almost duplicate a total system to insure continual processing of business. For high performance, it will compete on its own against typical "minicomputer" suppliers. For the general hobbyist, the Alpha Micro may tend to get a little too rich.

Prices for the system are set by dealers and vary depending the configuration and value added by the dealers. Prices range typically from $10,000 to $15,000. ∎