

# XEROX

## Whole ALTO World Newsletter

For Xerox internal use only  
Published and edited by Ron Cude  
Message <CUDE.PA> or call Intelnet 8\*823-2465

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TECHNOLOGY AND TOOLS FOR THE FUTURE

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November 16, 1979

### SPECIAL ANNOUNCEMENTS

#### **WAW MEETING A SUCCESS**

October's *Whole Alto World* meeting went extremely well. I'd like to thank everyone who attended for their contributions and comments. I'd also like to extend thanks to our co-hosts, Darwin Newton and Jim Iverson. The next meeting will be in February, 1980. The exact date and location will be announced as soon as possible.

#### **WELCOME TO XRCC**

Joe Wright, Xerox Research Centre of Canada, has announced that their Gateway is up and running. Their message registry is **.XRCC**.

### GENERAL NOTES

#### **NEW BOOTFILES DIRECTORY**

David Boggs has moved [Ivy]<BootFiles> bodily to [Maxc]<BootFiles> and destroyed the directory on Ivy. <BootFiles> is where almost all of the boot files that one gets from boot servers are kept. Exceptions are DMT.Boot and NewOS.Boot which are kept on [Maxc]<Alto> for historical reasons. The reason for the move is to allow the University Grant people access to them.

*Submitted by David Boggs*

#### **NAME DIRECTORY UPDATE POLICIES**

The following policies will govern maintenance of the Alto Network Name Directory by the Webster Network Support organization:

1. Routine updates will be done each Thursday afternoon (Eastern time). Confirmation will not be sent, unless you request it.
2. Emergency updates will be done within 4 hours, if at all possible; an emergency update may be, for example, one required because a server has failed, and another unit needs to be substituted.

3. All routine requests should be sent to <NetSupport.WBST>. Requests sent elsewhere will have to be re-routed, possibly causing delays.
4. Requests for emergency updates may be phoned in directly. At the present time, for dire emergencies, call Art Axelrod at 8\*222-5811. For non-dire emergencies, message <Axelrod.WBST>. In the very near future, other persons will be available. A notice will be sent at that time.
5. As a general rule, requestors should give a second choice name. The directory is now so large that duplications are becoming a problem. Otherwise, in the event of a duplication, a numeral will be appended to your chosen name, e.g "Frodo-II". Alternatively, you are invited to examine PupNetwork.txt to determine whether your pet name is already taken. PupNetwork.Txt currently resides on [Maxc]<System>, but is scheduled to move. A notice will be sent when this occurs.

Don't forget to include your office or lab room number. It is helpful to the maintenance people at your site.

*Submitted by Art Axelrod*

### **GSD ANNOUNCES NEW MAIL SERVICE**

On November 12, the GSD Mail Center in Monroe County will initiate an experimental Laurel Hardcopy service for non-Laurel Users.

This enables Alto users located virtually anywhere to send messages via Laurel to any Xerox employee in Monroe County by addressing the message to: **Employee Name Mail Stop** <MCMail.WBST>. When using the "cc:" line, copy recipients in Monroe County may be identified by typing: **Employee Name Mail Stop**. Please note, <MCMail.WBST> should not be shown on the "cc" line, otherwise only <MCMail.WBST> will appear on the hardcopy instead of the employee's name and mail stop.

For example:

To: David Lang 209C<MCMail.WBST>  
cc: Jim Ferro Conc., Joe Solan W102

Each day, Monroe County Mail personnel will periodically query Laurel for new messages, invoke the requisite "*Hardcopy*" command, and deliver the hardcopy messages. Names and locations on distribution lists containing addresses should be visible. The "Get" command should be used for expanding such .dl's by selecting them and entering "G Esc."

If any message is undeliverable, the Mail Center will notify the sender specified in the "From:" line, via Laurel, with an explanation. Delivery of messages will have a maximum overnight turnaround.

Please direct any comments to Jim Ferro at <MCMail.WBST>, Rochester, Xerox Square Concourse, or INTELNET 8\*223-3492.

*Submitted by Jim Ferro*

## **MARKET PLACE**

Market Place provides a forum for Alto users to make offerings and requests for Alto related hardware and software. To place an "ad" or offering, send the text to the coordinator, Ron Cude, in El Segundo, message <CUDE.PA>, or phone Intelnet 8\*823-2465.

### **ALTO WORKSTATION MULTIPLEXERS**

PARC/ADL has a need for at least one Alto Workstation Multiplexer, two if possible. They are prepared to buy 2 new ones but *Cybernex*, the manufacturers, will build only a minimum quantity of 10. Therefore if anyone would like one or more, please let Dave <Cronshaw.PA> know and he will try to get a batch order together. Prompt replies would be appreciated in order to make this years capital budget. Message Dave or call him at Intelnet 8\*823-7279.

### **KEYSETS FOR SALE**

Carol Williams, ED/SPG, has announced the availability of 20 Alto Keysets. Anyone who needs a Keyset or two should message <CWilliams.PA> or call Carol on Intelnet 8\*823-1654 for more information.

### **RUSHMORE OFFERING**

Rushmore, a module allowing the Alto to be linked to a variety of peripheral interfaces, is announced. A rough draft of the technical manual and ordering information can be found beginning on page 10.

### **STRING SEARCH ROUTINE NEEDED**

Dave <Cronshaw.PA> at PARC/ADL is in need of a string search routine that can find if one string exists within another string. If anyone has, or knows where any such a procedure exists in BCPL, Dave would appreciate hearing about it.

### **DOES ANYONE NEED A NEW CLOCK?**

Bob Lyon of ASD has come up with a new analog clock for the Alto. The run file is at [IBIS]<BLyon>Clock>Clock.Run.

## **TOOLS**

### **HARDWARE**

#### **XEOS ANNOUNCES TWO NEW INTERFACES**

XEOS has announced the availability of two new Alto interfaces: an interface between an Alto and a Linotron 202 phototypesetter, and an interface between an Alto and an Optronics drum scanner. Both interfaces make use of the HyType port and hence don't require any modifications to the Alto. Software is available but has not yet been released. Interested parties should contact Chuck Hains at XEOS for details. Message <Hains.EOS> or call Chuck at Intelnet 8\*844-2423.

## MAINTENANCE NOTES

### IC CHANGE ON THE TRIDENT CONTROLLER

It appears that, depending upon the manufacturer, certain 74161 IC's are a bit slower than others. This can cause occasional Trident Controller read and write problems. If you have been experiencing this problem try changing all of the 74161's on the Trident Controller to 74LS161's. This should eliminate the timing problems associated with the slower 74161's. The chips that should be changed are A-13, A-14, A-17, A-27, A-59 and A-61.

*Submitted by Phil Hoffman*

### TRIDENT DISK ROUTINE ERROR

"The Trident disk routines have discovered an unrecoverable disk error." Have you ever wondered what to do when faced by this enigmatic Swat message? Well, try the following approach.

Type xxx + 12 ↑O (while still in swat. xxx is the offending disk command block)

	-- this is the cylinder that caused the problem
LF TAB	-- this is the head, sector of the problem
LF	-- this is the offending drive

Now, wasn't that easy?

*Submitted by Bruce Malasky*

## SOFTWARE

In general, the subsystems, packages, and documentation indicated here will be available from your local File Server under the directories <Alto> and <AltoDocs>. If they are not available, or if you are in doubt as to the version, they may be retrieved from [MAXC] (same directories). Files stored under other directories are on [MAXC] unless otherwise indicated, e.g. [ISIS].

### NEW RELEASES

#### ★ BRAVOX 3.6 ★

The *caveat emptor* release of BravoX version 3.6 is announced. BravoX is a menu-based, modeless document management system that includes facilities for creating, editing, formatting, filing, transmitting, and printing office documents for correspondence and other purposes. It is similar to Bravo but, being menu-based, is much easier for new users to learn.

To create a BravoX disk with OS 17 and it's related files, retrieve [OLY] or [IBIS] <ASD-Software>XOIS>3.6>OlyMakeXOISDisk.Cm (or IbisMakeXOISDisk.Cm as appropriate) and then do the following:

type @OlyMakeXOISDisk.Cm (return)

This command file will rebuild your disk with a new OS, FTP, and DMT. It will then InstallSwat, retrieve the appropriate BravoX related files and install them. If you are installing BravoX on a disk that has Bravo on it, be sure to delete all Bravo related files before executing the command file.

On [OLY] (or [IBIS]) <ASD-Software>XOIS>3.6>DOCS> you will find several press files. They are:

XOIS-RefManual.Press (551,424 bytes, 143 printed pages)  
XOIS-RefManualSupplement.Press (147,968 bytes, 51 printed pages)  
TrainingManual.Press (303,104 bytes, 100 printed pages)  
Conversion.Press (21,504 bytes, 8 printed pages)

As you can see, the Reference Manual is quite long. It is unlikely that every BravoX user will need their own copy. Perhaps one or two group copies to be used on an as needed basis would be sufficient. The Reference Manual supplements detail the most recent changes to version 3.6 including the new advanced *margins* and *table* menu's.

*TrainingManual.Press* is a copy of ASD's customer training materials. It will make an excellent reference document and will probably answer most of your questions regarding detailed operation. The practice documents mentioned in the Training Manual can be found on <ASD-Software>XOIS>3.6>TrainingDocs>Document-1, Document-2, Footnote-Exercise, Formats, Fundamentals, Placement-Exercise and Sample-Memo. Please keep in mind that the training document is oriented towards classroom training. However, most experienced Alto user's should find it totally adequate for self-training.

*Conversion.Press* deals with changes between BravoX and Bravo 8.5. Please read it. It should help clear up a lot of confusion and smooth your conversion process. Most of the differences between BravoX and Bravo 8.5 are also applicable to Bravo 7.4.

And now for the caveat's. This is a development system. Although it is quite robust and is being used extensively, if you choose to use BravoX it is *totally at your own risk*. Old Bravo files can be read into BravoX using the *Command G* option; documents created with BravoX cannot be read into old versions of Bravo. For this reason, during your learning process, don't cast anything in concrete. Please do not bother anyone in ASD with bug reports, questions or any kind of problem. Instead, please send any comments to <ASD-Support.PA>. This account will be queried periodically and the messages dealt with appropriately.

### RE-RELEASES - SUBSYSTEMS

#### ★ PREPRESS 1.10 ★

Version 1.10 of Prepress is released as the newer versions of the files:

[Maxc1]<Alto>Prepress.Run  
[Maxc1]<AltoSource>PrepressSources.DM.

The old versions will stay around for a while.

There are three new features. First, there is a new window in the top portion of the main menu that displays the type of the current source file, that is, Chars, OrbitChars, Splines, or Widths. There is a new command called DeOrbitize, which converts a bitmap font file from Orbit format (in which the successive scan lines are not aligned on word boundaries) to vanilla \*.AC format (in which the scan lines are aligned; AC= AlignedChars, get it?). Finally, there is a new command called ReadAL which will take an Alto font in the \*.AL format as input, and produce the corresponding vanilla \*.AC file, suitable for use with Prepress. ReadAL tries to guess the family name, point size, and other font data from the name of the \*.AL file, which often works. If it doesn't work, you will have to use ReName on the the result. There is also a performance comment: most \*.AL files will fit in core, in which case ReadAL will run reasonably rapidly. If your \*.AL doesn't fit in core, ReadAL will still work, but it will go much more slowly.

There are also minor changes: this version can use the Trident under OS17, and uses a newer version of the floating point microcode.

The documentation has been brought up to date; a new 31 page manual is stored on

**[Maxc1]<AltoDocs>PrePress.Press,**

or, if you prefer Bravo format, retrieve the two files

**[Maxc1]<AltoDocs>PrePressA.Bravo  
[Maxc1]<AltoDocs>PrePressB.Bravo.**

*Submitted by Lyle Ramshaw*

### ★ BRAVO 7.4 ★

With help from Charles Simonyi and Greg Kusnick, and with source files rescued by Bob Lansford, Ed Taft has succeeded in generating a new version of Bravo from the sources. The principal motivation for this release is to adapt to two important environmental changes: the introduction of the new Alto file creation date standard, and the imminent existence of more than 32 networks in the Xerox Internet. (The latter event will cause all earlier versions of Bravo to die horribly during the Hardcopy command.) File servers will be converted to use the new standard in the near future. (See <AltoDocs>FileDates.Press for further information.)

This Bravo should be functionally identical to the previously released Bravo 7.3, but with a few bugs fixed and loaded with the current Pup package (so it won't break when the 33rd network comes up). It is upward-compatible from version 7.3; all earlier versions are hereby obsolete.

Bravo 7.4 also incorporates a few other improvements, most notably the ability to create documents containing color (a feature contributed by Bob Lansford of XEOS). It should be emphasized, however, that Ed Taft is not undertaking regular maintenance of Bravo; please do not report bugs to him unless you can demonstrate that they are newly introduced in Bravo 7.4.

A memo describing the changes in more detail is available in <AltoDocs>Bravo74.Press, which you should send to a color printer if you have access to one. To retrieve the new Bravo itself, you should retrieve the file:

**<Alto>Bravo.Cm**

and then issue the command:

**@Bravo@**

(Bravo consists of the files Bravo.Run, Bravo.Error, and Bravo.Messages; it is important that you obtain all three.)

Alto users in Palo Alto may obtain these files from Maxc; if you are outside Palo Alto you should await a local announcement and then obtain Bravo from your local file server.

*Submitted by Ed Taft*

### ★ DRAW ★

A new version of Draw.Run has been released on [Maxc]<Alto>. It corrects a problem that caused it not to work under OS 17.

As usual, people outside Palo Alto should await a local announcement and obtain the new version of Draw from their local file servers, not from Maxc.

Submitted by Ed Taft

★ IFS SCAVENGER ★

A new version of IfsScavenger, dated November 2, 1979, is released. Get it from [Maxc]<IFS>IfsScavenger.Run and .Syms. This version cures the "No VMem buffers" bug and a bug in [1-5] having to do with changing the logical unit number when editing Ifs.Home. It requires OS17.

Submitted by David Boggs

★ SIL ★

[IVY] and [MAXC]<SIL>SIL.Run/.Syms contain an update that is purported to correct the stack overflow problem when doing output to a new file. The release date is October 22.

[MAXC1]<SIL> and [IVY]<SIL> clean-up is done. Normally RUN-files, Libraries, Dictionaries, Manuals, Memo's, and DataSheets (press files) are kept in [MAXC1]; the sources are kept in [IVY].

<SIL> has a new program, called *EDBuild.Run*, which is modified from *Build.Run*. The differences are many files created as the result of the *EDBuild* process have revision letters attached with the file names. For example, the wiring list created by *EDBuild* is *Card-C.wl* not *Card01.wl* (if the card is revised from version *B* to version *C*), and the add-delete list is called *Card-BtoC.ad* not *Card01.ad*. See *EDBuild.Memo* for operating instructions. For those who have used *EDBuild* before, please beware that the back-up template file name has been changed from *BuildBackUpTemplate.Cm* to *EDBuildBackUpTemplate.Cm*. This is necessary because *BuildBackUpTemplate.Cm* existed already (it's used by *Build.Run*). As usual, edit *EDBuildBackUpTemplate.Cm* for your own needs.

Submitted by Chuck Thacker & Tom Chang

★ BRAVO 8.5 ★

A revised Bravo 8.5 and Error Processor is released.

The only changes to Bravo 8.5 are to allow it to operate safely under any OS version, 15 or later.

You may find these programs at:

[Ibis]<Bravo>Bravo.Run (Bravo 8.5)  
[Ibis]<Bravo>8.5>ErrorProcessor>Error.Run (Error Processor)

After retrieving these files, please execute:

Error/I  
Bravo/I

to get them installed properly.

Submitted by Martin Haerberli

★ FTP ★

A new version of Ftp dated 6 October 79 is released. This version automatically retries OPEN commands every five seconds, contains minor bug fixes and improvements but no significant

changes. It is not guaranteed to run under OS16, though it probably will unless you use a Trident. The new version is on [Maxc]<Alto>Ftp.Run. A new version of Ftp.Boot is available from the NetExec. This version is about 25% smaller, which means it is 25% faster to EtherBoot, and it should work correctly with all Alto file system configurations.

Alto users outside Palo Alto: please await an announcement from your local IFS administrator, and then get these subsystems from your local file server.

*Submitted by David Boggs*

### **RE-RELEASES - PACKAGES**

#### **★ OS 17 ★**

Version 17 of the Alto Bcpl Operating System is hereby released. You can update your disk automatically (make sure you have at least 300 free disk pages) by the following steps:

Use FTP to retrieve [Maxc]<Alto>NewOS.Cm.

Type @NewOS

The principal change in this version is that file versions have been removed. Courtesy of Ed Taft, looking up a file is now about 10 times faster. Page 33 of the OS manual [Maxc]<AltoDocs>OS.Press gives details on the other changes.

This material is also available as [Maxc]<AltoDocs>OS17.Tty for those users who don't need the whole OS manual.

*Important Note:* Mesa programmers should be aware that certain types of Mesa image files have a problem that causes your Alto's clock to stop when you run them under OS 17. This problem may be corrected by re-binding and re-executing Makelimage. Contact SDsupport for further information. Laurel is not affected by this problem.

*Submitted by David Boggs*

#### **★ SWAT ★**

Version 28 of Swat, the BCPL debugger, is released. This version contains minor bug fixes and improvements, but no major changes. Retrieve [Maxc]<Alto>InstallSwat.Run.

*Submitted by David Boggs*

#### **★ NEPTUNE ★**

Courtesy of Keith Knox, Version 3 of Neptune is also released. Neptune is now also available as a boot file from the NetExec. This version will definitely not run under OS16.

*Submitted by David Boggs*

#### **★ IF ★**

The IF subsystem, which stopped working under OS17, has been fixed. The new version is on [Maxc]<Alto>IF.Run.

*Submitted by David Boggs*

## TECHNOLOGY

Featured each month will be articles and papers on technologies affecting or affected by by Altos, new technologies and directions developing within Xerox, and discussions of the work-in-progress within specific organizations.

Included this month is a report by Ginger Engstrom on her recent trip to the 6th. Information Management Exposition and Conference (INFO '79). This interesting paper can be found beginning on page 15.

Also included, as mentioned before, is a rough draft of the Rushmore Technical Manual. See page 10.

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The Whole Alto World Newsletter is a monthly publication for Xerox employees that use the Alto. It is not to be shown to non-Xerox people. Copies are available on [MAXC]<AltoDocs>WawNewsM-YY.Press or may be obtained from the editor, Ron Cude, ASD Field Support, by messaging <CUDE.PA> or calling Intelnet 8\*823-2465.

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- ★ High turnover
- ★ Government reporting
- ★ Communication cost (especially USMail)
- ★ Increasing litigation
- ★ Increasing complexity in large, diverse companies

They have found that 80% of all costs in an office are associated with supervisory and management positions, while only 20% with clerical. Savings in an office must come by making the supervisory and management segments more productive. This will be done by providing timely, quality information in formats flexible enough to respond to the complex and rapidly changing business environments.

**What do they want in a system?** Probably the major concept wanted in a automated system is INTEGRATION, the ability to pass data from one function/application/system to another without consciously thinking about it. I believe this to be a major change in user thinking that will make the Star architecture invaluable in the industry; **"The world is really ready for us"**.

A system must also be interruptable; the ability to start multiple functions without terminating previous ones and returning to them when desired.

All the companies represented felt the need to be able to build future OIS systems on existing office systems. It is not cost effective for a company to replace an entire Telex network, an IBM or DEC mainframe, a 9700 or a Mergenthaler printer with vendor specific solutions to their problems. Corporate ITT has selected Wang as their vendor because of its ability to interface with many external protocols and devices but more importantly because of its programming ability to write interfaces when none exist. The following applications are specific to ITT, but are typical of the other companies.

- ★ Corporate speech writers inputting text, sharing files and doing research using remote timeshare databases.
- ★ Administrative secretaries inputting parameters for organization charts via a high level user interface program on a Wang WP System for input to a 9700 via the IBM mainframe.
- ★ Creation of the text portion of the annual report on a Wang WP system for final input to a Compugraphics typesetter.
- ★ An electronic mail system 'HOBBIT' running on the IBM mainframe outputting to Wang, Telex, Datapoint terminals, other WP systems and other networks.
- ★ Customer service clerk inquiring into an existing microfiche database via a Wang WP System.

Following is a composite list of tasks that most users feel are required in an integrated office environment:

- Text Editing - Initial inputting
- Text Processing - Revision & formatting
- Electronic Mail - Interface with other networks and other terminals.
- Electronic Filing - Cross Indexing and multiple keywords
- Records processing
- Data Entry
- Communication - Pass thru capability (3270)
- Programmer Development Tool (offload TSO)

Calendar Management  
Correspondence Tracking  
Tickler/followup  
To do lists  
Phone Messages  
Diary  
Bulletin Board  
Decision Making Aids

Graphics/color  
Help  
Security  
Integration  
Interruptability

It is interesting to note that these large users are not expecting an OIS system to replace their existing DP equipment. Interfaces are required but they recognize a need for both areas. DP is oriented to running structured volume jobs. OIS systems are expected to supply the flexibility required in current office environments. At ITT, their telephone directory application is maintained on the Wang WP System, sent to the IBM main frame for sorting and then to the 9700 for formatting and printing. When the entire application was performed on the Wang system using an impact printer, time to complete was 8-10 hours. The current application takes less than 1 hour.

**What has been implemented?** Most of the companies have installed probes and/or pilot departments. The most popular vendor is Wang because of their broad sales coverage (national & international) and their wide range of products and interfaces. Electronic mail systems are running in most of the companies using packages like Hobbit and ComNet on main frame computers. As I mentioned earlier a successful mail system must interface with existing terminals and mail systems already installed. Many companies have corporate databases of correspondence, reference material and historical data. These also have been implemented on their central mainframe with cross indexing and elaborate keyword structures. The Wang systems have been programmed to access these systems. Office aids, including calendar, scheduling, etc. are currently being integrated using in-house programmers.

It was the general feeling among the users that it would be five years before they were effectively utilizing the hardware and software available today. The basic problems in implementing an office of the future are:

1. Lack of qualified people. Qualified people are defined as trained systems people without a DP orientation. One user explained this qualifier in the following manner. "DP people are trained to deal with structured input and output and use hardware efficiently, OIS people must deal with unstructured input and output and use people efficiently".
2. Lack of vendor support. The general attitude towards vendors is; plan to do everything yourself and believe nothing they tell you.

While most users are buying existing systems and integrating them into their environment, Security Pacific is taking a different approach. They have talked to all the leading vendors and realize that the equipment being designed today is oriented around a traditional keyboard and text-editing systems. For true acceptance by the professional environment they feel that it is necessary to design equipment specifically for the management of information.

In conjunction with California Design Institute, they are designing a terminal with the following specifications:

Cost of \$2,000  
 Compact - desktop  
 Speaker Telephone with auto dial of selected numbers  
 Electronic Calculator  
 Date & Time Display  
 Voice Message Recorder  
 Function Keyboard  
 Alpha Entry Capability

Software available on the system will incorporate electronic mail, electronic filing, document retrieval, calendar, tickler, telephone aids and many other office functions.

## EQUIPMENT

It was interesting to note that the vendors who exhibited at Info overlap tremendously with those exhibiting at WP shows; text editors, dictation and fax have joined the larger computers, timesharing systems and software houses.

As of today, no one is providing all the features/tasks that the leading users feel they need. Star comes closer than anyone to fulfilling those needs especially in the areas of integration and interruptibility. Our weak areas appear to be interfaces to foreign equipment and user programming.

New and/or interesting products at the show included:

### IBM Electronic Typewriter 75

IBM announced a new super typewriter that falls between their 50/60 and their memory typewriters. Based on a high density 36,000 bit random access memory chip, the unit can provide 7,500 or 15,500 characters of storage. The cost is \$2075/110 for the basic unit and \$2300/\$120 for the expanded model. It provides document and phrase retrieval, revision capabilities and formatting.

### QYX Level One Plus

QYX, not to be outdone by the IBM announcement, announced their Level One Plus providing 8,000 characters of storage for \$2,100. It distinguishes itself from the IBM offering through its optional display and communications capability.

### CPT

CPT, one of the more popular stand alone text editors, recently announced a shared resource system consisting of up to 8 stand alone systems connected to a central processing systems with 25MB or 50MB Winchester disks. Besides offering expanded file capability it provides additional 'background' capabilities for sorting, merging, printer queue management and other tasks requiring minimum operator interaction. With this announcement, CPT joins Lanier in following the successful Wang building block sales strategy; "Start anywhere within our product line and enhance the hardware and software as your needs grow." CPT also announced their CompuPak capability which will allow qualified software houses to supply support, application packages and compilers to their customers. This provides Basic, Cobol and Fortran interfaces for their systems.

### Lanier

Lanier has also moved into the shared-resource market, allowing their No Problem systems, with or without disk drives, to be attached to a CPU capable of supporting

additional disk storage, printers, OCR, photocomposition and electronic mail. Intelligent and dumb terminals may be mixed on a system. Peripherals may exist at a user station or be attached at the CPU. According to the press announcement, a user now has more than 1,000 systems combinations to choose from to meet the needs of small, medium and large sized firms. Again a user can buy small and grow big without replacing hardware.

### **Artec Dual Display**

Artec was displaying a prototype of their new dual display. The full page screen is attached to the Artec single line display system. The single line can be used as a prompting area, background processing window or as an aid for data entry. The full page screen is extremely clear and stable showing proportionally spaced justified copy as well as bold and super/subscripts. The two displays, keyboard and processor cost 11K. The components can be mixed and matched in a number of ways; the display keyboard can function as a complete input and editing system or it can be combined with the full page module for more powerful formatting and editing functions. Up to 8 stations can be configured to share a central file manager.

## RUSHMORE TECHNICAL MANUAL - (Rough Draft)

October 1, 1979

### Introduction to the Alto Interface

This card links an Alto computer to a variety of peripheral interfaces. The design basically consists of a Z-80 microprocessor with up to 16K bytes of dynamic RAM, several special purpose peripheral interfaces accessible as memory locations by the Z-80, and a facility to allow the Alto to directly read and write any location in the Z-80 memory address space. Thus, the Alto has direct access to all the control and data words for each peripheral, and may also communicate with the Z-80 by direct access to locations in the RAM. In the later case, the Alto can load the RAM with programs and data which will make the Z-80 work as channel controller. From the viewpoint of the Alto programmer the interface consists of several dedicated locations in the Alto memory space, through which are transferred data consisting of command words, status words, addresses in the Z-80 memory space, and byte pairs to be read or written at that Z-80 address.

The peripheral interfaces are:

- ★ an RS-232C interface with both primary and secondary channels, hardware assist for the receive data, and distinct programmable baud rates for transmit and receive;
- ★ a CBS-compatible phone interface using a filtered DAC to generate tones, and can also be used as a general purpose programmable analog output;
- ★ a complete IEEE-488 bus interface, with hardware assist for the talker/listener/controller enables, and this can be used as a general purpose 8-bit port suitable for driving a Summagraphics BITPAD device;
- ★ an external Z-80 bus which will support DMA controllers, and will also support those S100 compatible devices which are not bus controllers, and which may share the same physical wires for input and output data.

In addition to the above, there is a baud rate generator which can be enabled to interrupt the Z-80 at 9600 HZ, and various bus arbitration logic which allows a controller on the external bus to directly access any Z-80 memory location in the system. Also, the Alto may directly perform various tasks such as reset of the interface card, testing and setting dedicated flags, and enabling a task WAKEUP signal which can be asserted under program control by the Z-80.

The interface card has been designed to work in one of the Alto memory interface slots (5 and 6) of the Alto mainframe, and requires only four additional wires on the backplane. Connectors on the exterior end of the card support separate cables for each of the four peripheral interfaces. A jumper on the card may be used to change one bit of its Alto address, so that two such interface cards may be used simultaneously.

The main Z-80 memory is dynamic RAM, which is automatically refreshed by the Z-80 when it has control of the bus. For RAMS which have a maximum refresh time of  $r$  ms., there should be an average of no more than  $22.5 * r$  Z-80 T-states, or  $45 * r$  Alto microcode cycles, between the starts of Z-80 instruction fetches.

## Interface Card -- Common Control

The address space of the interface card can be accessed from any one of three sources: the Z-80, the Alto, or a Z-80-type controller on the external bus (X-bus). Only one of these sources has control of the (data buses), (address buses), (memory control signals) at one time. Logic drawing sheet (LDS) #11 contains the arbitration and timing logic for handling bus requests from the Alto and from the X-bus: if the X-bus does not already have control, and the Alto requests control, then the Z-80 releases the bus to the Alto. If the Alto requests control while the X-bus is in control, then control will transfer directly to the Alto when the X-bus is done, without the Z-80 regaining control. When the Alto is not requesting or using the bus, then the X-bus request can force the Z-80 to yield control at any time in the usual manner. Note that refresh of the interface card dynamic RAM occurs only while the Z-80 has control. This feature, along with the specified maximum wait for an Alto access, implies that any X-bus DMA device steal only single memory cycles. The bus-acknowledge signals are appropriately clocked so that they can be used to enable data and addresses onto the busses during the necessary decode, setup, and hold times of the data transfer. The X-bus acknowledge is clocked so as to prevent a glitch occurring when the Alto has just finished using the bus, the Z-80 has not yet established control, and the X-bus has just sent a bus request. In this case the Z-80 will perform one machine cycle before going control to the X-bus.

### Alto Access

The Alto can read or write any two-byte location in the interface card address space. To facilitate this, there is a 15-bit address register and a 16-bit data register, and a read/write flag which can be loaded directly from the Alto. There is also a 16-bit data register which can be directly read by the Alto.

To perform a read operation, the Alto directly loads the 15-bit address register, while simultaneously setting the read flag. Loading the address register sets the Alto bus request flag. When the Alto obtains control of the bus, a memory sequencer circuit begins generation of signals which emulate two memory read cycles of a Z-80; one cycle for each of the two bytes which are loaded into the Alto data buffer register. When the second memory read cycle finishes, the Alto bus request is reset, and the Alto may directly read the data buffer register at any later time. A write operation is similar. The Alto loads the data register with one 16-bit word, then loads the address buffer while setting the write flag. The Alto bus acknowledge is again set, then reset when the second byte of the data word has been written out to memory. The data register for input is physically distinct from the output register; however, they are each accessed at the same Alto address. The logic which emulates the Z-80 memory timing signals generates a write strobe, AWR, which is gated to the common interface control bus only during an Alto write operation. If the Alto logic is doing a two-byte read operation, this strobe is used to clock the data into the buffer registers for latter access by the Alto. During both read and write operations, the address is switched to that of the odd byte at the trailing edge of the first AWR strobe pulse. However, during a write operation the even byte is kept on the data bus long enough after the trailing edge of AWR to satisfy hold and skew times at the device into which the data was written. This data transfer timing logic tests the common WAIT signal in a manner identical to the Z-80.

The Alto may also directly write a command word to the interface card, and may directly read a set of 8 status bits.

### Main Memory 4K (16K) Dynamic RAM

The main memory does a RAS cycle whenever there is a memory operation in progress on the main bus, even if the address is not specifically the internal RAM. The only exception to this is when RESET is enabled. Since giving a short RAS pulse may damage the contents of the RAM, it is advisable for the DMA controller on the X-bus to always provide an MREQ signal of not less than the minimum RAS width of the memory chips being used. (For this same reason,

when RESET is requested by the Alto command bit, it is held back from becoming active while a memory cycle is starting.)

A memory cycle always begins with the low order address bits (row address) gated to the RAM chips through a multiplexor. If the total address is to the RAM, and it is not a refresh cycle, the upper address bits (column address) will be switched onto the chip address lines on the clock after RAS begins. An R-C time delay is provided to make sure the CAS pulse is correctly delayed from the row/column address switch.

At the row/column multiplexor, a high order address bit is jumper selected so that when using 4K RAMs instead of 16Ks, one of the row address bits may be used as a column address bit.

The memory data inputs are asserted low and are not suited to directly driving the bus, so the outputs are routed back to the common data bus through an inverting multiplexor. The other input of the multiplexor is a constant Z-80 HALT instruction. The select input is the halt flag which is loaded by an Alto command write, so the Alto can force the Z-80 to receive a HALT instruction during a normal instruction fetch.

### External Bus X-Bus

Bidirectional bus transceivers are used to interface the internal and external data and address lines. The address transceivers are always enabled, with their direction dependent only on whether the X-bus is in control. The data transceiver is enabled to drive a bus only when an external X-bus controller must access a location on the interface card, or when either the Z-80 or the Alto wants to access a memory location on the X-bus, or when the Z-80 is doing an I/O operation. The direction control for data depends on whether the operation is input or output, and from which side the request was generated. The Alto can access the X-bus memory address space exactly as the Z-80 does, but may not do I/O (not-memory-addressed) accesses on the bus. An X-bus controller may access any memory location internal to the interface card, but may not drive any I/O port access controls on the card. (All locations internal to the interface card are addressed as memory locations, not I/O ports.)

The system will support any Z-80 compatible controller on the X-bus, but S-100 compatible (8080 type) controllers can be connected only if they do not require DMA capability, and they can work with physically connected input and output data lines. Some of the X-bus control signals are always enabled, while others are enabled only for S-100 signal mode or for Z-80 signal mode. Since there are four Z-80-only signals which use the same physical bus lines as four S-100-only signals, the design does not, in general, support using both Z-80 devices and S-100 devices on the X-bus at the same time. The Alto can select which set of signals are enabled by setting a flag with a direct command write. No internal vectored interrupt is implemented, but if an interrupt address is provided by the Z-80 or S-100 peripherals, a vectored interrupt mode may be used.

The interface board memory data transfer is controlled by three lines MREQ, RD, and WR. Either the Z-80 or the Alto memory timing logic can drive these internal lines directly when in control of the bus, and they are enabled onto the X-bus. These lines are also address inputs to a 32X8 PROM which derives the corresponding S-100 signals, which can then be enabled onto the X-bus. When a Z-80-type device on the X-bus is in control, it drives the external Z-80 control signals, which are enabled onto the corresponding internal control lines, permitting an external Z-80 type controller to access all the memory locations on the X-bus, as well as those on the interface board.

The S-100 signals  $\emptyset/1$  and  $\emptyset/2$  are generated so as to minimize skew with the internal Z-80 clock, as shown an LDS #1.  $\emptyset/2$  is opposite in phase to the Z-80 clock, and an RC delay is used to switch  $\emptyset/1$  high about one half Alto clock period before  $\emptyset/2$ .  $\emptyset/2$  is gated by  $\emptyset/1$ , so they will not overlap unless due to excessive signal skew on the bus. With a Z-80 cycle time of 340 ns., and with typical tolerances in the electrical characteristics of the time delay circuit, the  $\emptyset/1$  and  $\emptyset/2$  signals are suitable for driving an 8080A-1, but may not correctly drive the slower 8080 types.

The interface card generates a PSYNC pulse at the beginning of each memory or I/O port signal, and enables it to the S-100 devices on the X-bus with the basic control signals. Since the interface care Z-80 or Alto logic causes PSYNC to be started later in their cycle than would be generated by an 8080, the PSYNC pulse is used to make an artificial "wait" signal for one cycle, so as to give the external S-100 device time to respond to the access request. This automatic wait can be enabled/disabled by a flag set by an Alto cammand write. Both the PSYNC wait and the normal WAIT are disenabled when the address is not external.

### EIA RS232-C : PHONE INTERFACE

The EIA drivers will use +/-9.0 volts, rather than +/-12.0 volts, in order to keep the chips' power dissipation low. Two of the signals, Off-Hook and Data Terminal Ready, are inverted in sense at the data register so that when the power-on-reset clears the register, the signals are forced to their OFF state. For the transmitted EIA data, one bit is clocked into a flip-flop, which is then synchronized to 9600 Hz to reduce jitter. One bit in the command word is the EIA Transmit Clock enable. In asynchronous mode this bit can be always turned off. In synchronous mode, we assume that the Alto has set a flag with a command write which enables the Z-80 to be interrupted on the positive edge of the 9600 Hz signal. Depending on the speed of transmission, the Z-80 can either enable the Transmit Clock for one negative pulse in the middle of the data period, or (for 9600 Baud) he can leave the clock always enabled, so the ON to OFF transition occurs between data value transition.

The 7524 is an 8-bit DAC, whose output drives a filter amplifier for signal conditioning. Two input lines are shared between the RS232-C and the phone signals. We are assuming that only a CBS type DAA will be used. Two of the inputs, SH and line current sense, are read through the memory location reserved for the Alto status word.

### ORDERING INFORMATION

From: Ted Stollo

Deliveries of Rushmore Cards should be approx 1Q80. The items are expensed according to the definitions of Corp Research Control although their cost is >\$500 per unit. You may want to check with your local controller for a reading on this. However, for people in corporate research, it seems clear that orders will come out of 1980 operating/expense funds.

**The Delivery queue is intended to be first in/first out. It is therefore worth getting your orders in soon.**

If you are ordering from PARC, simply fill out a blanket order release with Systems Concepts Inc. as the vendor using the attached PO for price info. If you are from Xerox but not PARC, observe the following instructions.

From: Mike Levitt (SYSTEMS CONCEPTS INC)  
Date: October 1, 1979  
Subject: Placing orders for RUSHMORE cards

This is a list of all the information which Systems Concepts Inc will need to properly process an order for RUSHMORE cards. A brief explanation has been included for each item. Please reference the Xerox PARC PO number for consolidation purposes and alignment with terms/conditions/prices, and quantity discounts.

1. Date of order
2. Purchase order number (to be used as a reference for invoicing, etc.)
3. Quantity (number of cards being ordered)
4. Release schedule (desired delivery date for each card ordered)

5. Purchasing contact (name of individual handling contractual details)
6. Purchasing address (mailing address and phone number of contact)
7. Shipping contact (name of individual who is to receive card)
8. Shipping address (complete address including any special mail stop, etc.)
9. Shipping instructions (will ship all items UPS unless otherwise specified)
10. Billing contact (name of individual who will process invoice)
11. Billing address (complete address including any special mail stop, etc.)
12. Special instructions (anything not covered by nos. 1 through 11 above)

**Please be aware that the minimum release is 10 (ten) units, delivery is FOB origin, and our terms are net 30 days.**

Please address purchase orders to

David Renton  
Systems Concepts Inc  
520 Third Street  
San Francisco, Ca 94107  
415-442-1500 or 415-941-2221