

PIPELINES

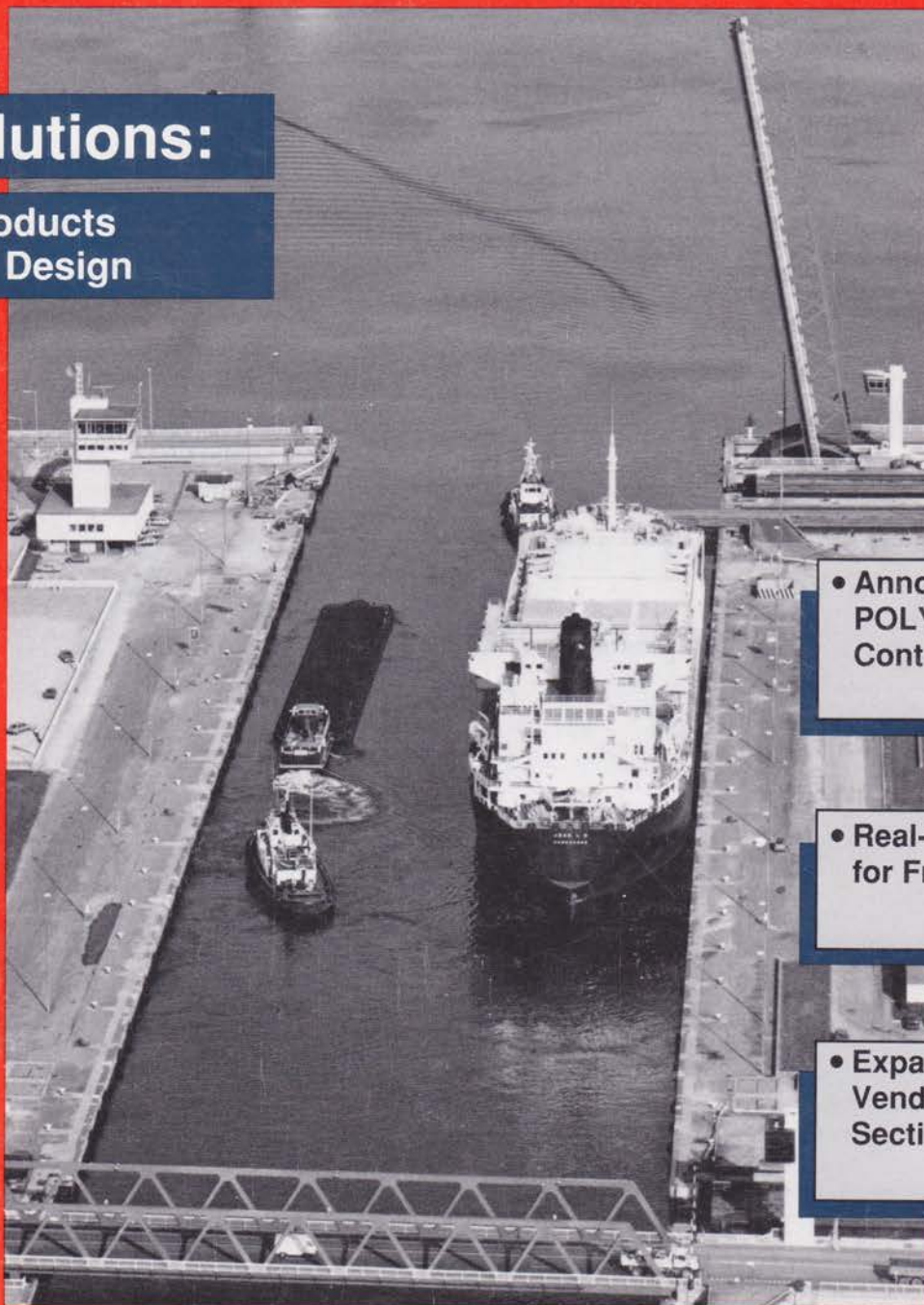
Volume 6 Number 3

Covering Microware's Real-Time System Solutions

Fall 1991

Total Solutions:

Microware Products
for Real-Time Design



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PIPELINES

Fall 1991

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Do You Have New OS-9 or OS-9000 Products?

IF YOU HAVE NEW HARDWARE OR SOFTWARE products that run under OS-9 or OS-9000, please submit a press release and black & white photograph of the product for consideration for publication in PIPELINES. All materials should be sent to the Editor of PIPELINES at the address above. For more information, call Steve Simpson at (515) 224-1929.

Call for Comments, Suggestions and Articles

MICROWARE ENCOURAGES PIPELINES readers to write us with comments and suggestions about our magazine. We also accept articles for consideration for publication in PIPELINES. If you have a unique application, new procedure or comments about Microware products, please submit an outline of your article to the Editor of PIPELINES.

On The Cover

THE FRANÇOIS I LOCK IN THE PORT OF Havre, France, is monitored and controlled by an OS-9 system. See the story starting on page 6.

Watch Us Grow



Ken Kaplan,
Microware's President

"MORE CHOICES. MORE OPTIONS. TOTAL Support." This is more than just a message placed on all our advertising. It's a commitment to our users that we're living up to. This issue of PIPELINES is full of examples of how we're meeting our commitment.

This is a banner year for growth in Microware's product line. The products we've introduced this year clearly demonstrate our commitment to providing more choices and options to users. POLYTRON's Version Control System and PolyMake have just been released to give our users a powerful source code control system and enhanced *make* utility.

POLYTRON Version Control System Now Available



REGARDLESS OF THE SIZE OF YOUR REAL-time software development project, source code management is critical. The integrity and maintainability of a project's source code can be easily compromised without an effective source code control system. The POLYTRON Version Control System (PVCS) addresses the need for control by allowing you to implement a robust source code control system under OS-9 or OS-9000.

By using PVCS, the evolution of your software is detailed in a project archive file. The PVCS archive lets you retrieve the latest version of your software at any time. Or, you can reconstruct any prior version in a matter of seconds. PVCS can tell you when each change in the code was made, why it was made and

which versions of the software contain the change. In a multi-user environment, PVCS transparently resolves concurrent changes to files and provides a high level of security.

The PVCS Architecture

PVCS consists of a set of ten integrated program modules that provide complete control over the evolution of a software development project. PVCS allows you to create a project archive file, or "logfile," for each project. The logfile contains descriptions and current revisions of all components that make up the project, as well as a complete history of all modifications. The individual components described in the logfile, or workfiles, may be program source code (written in any language), object code, libraries or project documentation.

Earlier this year, we announced our support for the X Window System. We now have OS-9/X Server packages that allow you to implement X Servers on your OS-9 systems. The release of the OS-9/X Server Support Pak and Port Pak round out Microware's X Window product line.

An example of the growing support for Microware's operating systems is our expanded *New Vendor Products* section. We've doubled the size of this section due to the phenomenal number of new products our customers are developing for OS-9 and OS-9000. Third-party vendors are designing new boards and powerful software that are increasing the value of Microware's products to users. This is a wonderful demonstration of the

proliferation of Microware's software in the real-time arena.

Microware's staff and facilities are also growing. We highlight our new employees in every issue of PIPELINES, and this issue is no exception. Of course as our staff grows, so must our facilities. We are building a new addition here in Des Moines that will add more than 25% to our current space.

In coming months, our product line will expand even more to provide the choices, options and support you and developer's like you are looking for. We think you'll find these upcoming products exciting.

—Ken Kaplan

OS-9/X Server Packages Now Available

TWO NEW OS-9/X WINDOWS PACKAGES provide support for X Servers under OS-9. X Servers provide the mechanisms for displaying X Clients on a variety of graphics terminals.

Drop-In Package

The OS-9/X Windows Server Support Pak provides a drop-in, binary copy of OS-9/X Server configured for the Vigma MMI-100 and MMI-250 VMEbus graphics controller boards. By adding this package and one of the Vigma controllers to a disk-based OS-9 system, any X Client application running locally or across a TCP/IP network can use the OS-9 system as the X Server.

X Server Port Pak

The OS-9/X Windows Server Port Pak gives developers the tools they need to create an OS-9/X Server for unique video display hardware. The package includes the source code for Microware's OS-9/X Server for the Vigma MMI-100 and MMI-250 graphics controllers. Installation instructions are also included.

For more information on OS-9/X Windows packages, contact Microware or your authorized Microware representative. MSC



The POLYTRON Version Control System provides security and productivity tools for source code and other files in a multi-user environment.

Each PVCS module interacts with the logfile and workfiles to provide specific control and development functions. The primary PVCS modules allow users to add or retrieve revisions of the software from the logfile and detail differences

between each revision. The remaining PVCS modules perform administrative tasks, set up file access security and regenerate PVCS control information.

OS-9/PVCS

Please turn to Page Nine



X Server shown running on an OS-9 system.

Practical Notes for PVCS Users

by Warren Brown and Ric Yeates
Microware Systems Corporation

MICROWARE RECENTLY INTRODUCED the **POLYTRON Version Control System (PVCS)** as detailed in this issue of *PIPELINES* on page two. Microware engineers are already using PVCS to organize their software projects. Here are two diverse examples of the ways PVCS can be used on single-user and multiple-user projects.

PVCS for Individual Developers

Ric Yeates, a senior software engineer, develops code under a single-user PVCS configuration.

I use PVCS on my projects for several reasons. First, every time I check out a source file, PVCS essentially provides me with a backup of the original file in the form of a logfile. This gives me the chance to make some changes and test the new software. If everything is OK, I check the file back in with a new revision number. If something didn't work, I can scrap my changes and try again.

Second, experimentation requires greater documentation. PVCS is a big help. When a file is returned, or checked in, PVCS prompts for a description of the changes. I feel compelled to justify the changes I've made. If, at some point, those changed are called into question,

the description gives me one more piece of documentation to justify my changes.

Finally, PVCS lets me easily rebuild previous revisions of my software. This is handy if a bug is found in an older revision or someone needs an older revision for some other purpose. If I know the needed revision number, it's easy to tell PVCS to check out that revision. If I don't know the revision, I can use the *pvlog* utility to track down the right number, then check it out.

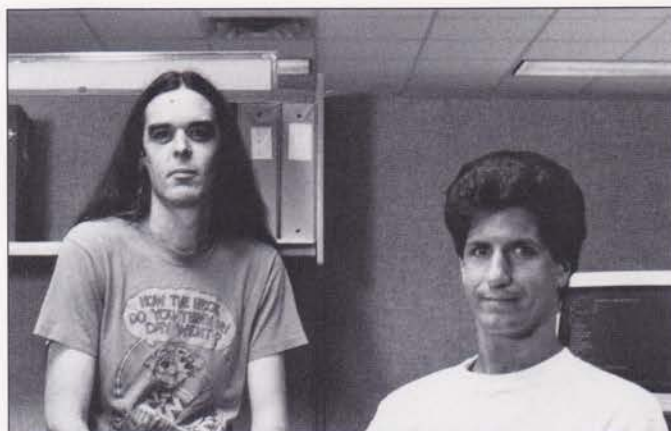
PVCS for Multiple Users

Warren Brown is the manager of Microware's OS-9 Operating System Group and uses PVCS to oversee multi-user development of several projects.

PVCS is touted as a method of providing "security." I like to think of the security features also as tools to encourage communication. I've developed a list of who can access the files under my group. If someone outside that list needs a file, they just have to ask me and tell me why. I'm not watching over their shoulder, but PVCS has encouraged that person to talk to me about the changes they need to make. It gives us a chance to share ideas about other improvements to the software as well.

I also have the capability through PVCS to build entire versions of a software project. PVCS will go out and find all logfiles with a particular version label. The appropriate revisions of each module are then checked out and made available for use. That's a powerful tool when your project includes dozens of files.

One of the most powerful features that I've used is branching. Branching lets me set up concurrent development paths for the same software. For example, if a customer wants a customized version of software that will be updated when the



Warren Brown (l.) and Ric Yeates are two of the Microware engineers using PVCS to organize software projects.

mainline software is updated, PVCS gives me the tools to do this.

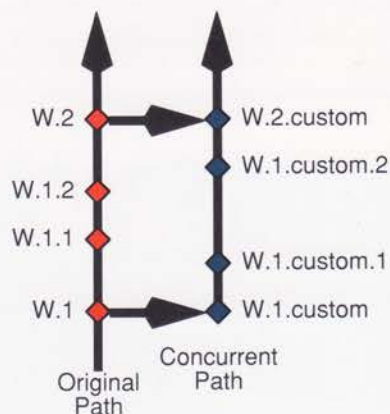


Illustration of the branching feature under PVCS.

The original file (W.1) is checked out and the first round of customization is performed. The file is then checked in as a subset of the original revision (W.1.custom). The original development path is progressively maintained (e.g., W.1.1, W.1.2) and the custom path is maintained (e.g., W.1.custom.1, W.1.custom.2). Revisions may be made to each path separately or at the same time. When the software reaches a new release (W.2 in my example), the original path changes can be merged with the version on the concurrent path. The custom software maintains all the appropriate changes made to the mainline software, as well as any custom changes along the concurrent path.

MSC

OptImage: Ready for Launch

*An interview with Bob Sorensen
President of OptImage*

THIS FALL, PHILIPS CONSUMER Electronics will launch Compact Disc-Interactive (CD-I) to the consumer market. OptImage Interactive Services Company LP, a Philips and Microware partnership, has been firmly entrenched in the development of CD-I. OptImage was founded to develop the software tools necessary for authoring CD-I titles, and has found markets with both industrial and consumer title publishers.

In the following interview, Bob Sorensen, president of OptImage, talked with us about OptImage's growth as the consumer launch approaches and how the company's products are impacting title development.

MSC: *What's up at OptImage?*

Bob: Business, mostly. We've seen a tremendous boom in the level of interest in CD-I publishing. This has led directly to a boom in sales for OptImage as we develop authoring tools to meet the needs of the industry.

We've been out helping spread the word about CD-I, too. We've been to several tradeshows and have placed some business-to-business advertising. Plus, our toll-free telephone line hasn't stopped ringing since we put it in.

MSC: *What kind of growth has this meant for you?*

Bob: OptImage started with just four employees less than three years ago. Today, we have 24 permanent employees plus a number of consultants. And we're still growing.

Our product line has grown as well. Our flagship product is **MediaMogul**. We've also developed bridges between the CD-I development platform and Macintosh, PC-DOS and SUN platforms.

MSC: *Tell us about MediaMogul.*

Bob: Imagine a single product that lets you pull video and audio into an interactive title. Make it easy to use, yet sophisticated enough for demanding developers. That's the idea behind MediaMogul.



Bob Sorensen, OptImage's President

We took our initial product, the **CD-I Starter System** and let some developers poke around with it. Then, we listened to what they wanted. Their ideas were incorporated into MediaMogul. We've developed a fully integrated package of three components that allows a designer to sit down and put a title together rather easily. And, our users are having great success with MediaMogul.

American Interactive Media (AIM), for example, used MediaMogul recently in the development of a consumer CD-I ti-

tle. The entire project was completed in just 12 weeks. That's dramatically faster than development would have been without MediaMogul.

MSC: *How will the CD-I consumer launch affect OptImage?*

Bob: Well, it already has. CD-I publishers have developed quite a library of consumer titles in anticipation of the launch. OptImage has been supplying the tools to many of these publishers like AIM.

We'll start up another growth curve after the consumer launch. First, though, consumers will have to come to understand what "interactive multimedia" is all about. Industry has been tossing the term "multimedia" around for a few years, but, consumers have very little concept of what it really means. The closest product they have right now is Nintendo.

Once consumers begin seeing home players and start to fully understand the concept, we'll see CD-I sales climb. Then, publishers will be lined up at OptImage's door for the latest authoring tools.

MSC: *What's next for OptImage?*

Bob: We plan to have MediaMogul and our other products continue to evolve as the CD-I publishing industry takes off. Then, we will ride the wave of CD-I's success, as well as push the current by putting powerful tools in the hands of title publishers.

For more information, contact OptImage at 1-800-CDI-5484 (U.S. only) or (515) 225-7000. MSC

Microware Co-Sponsoring CD-I Conference

Microware will co-sponsor the *First International CD-I Publishing and Developer's Conference and Exposition* together with Philips, Sony and others.

In preparation for the consumer launch of CD-I, this conference will give developer's a chance to explore the possibilities available through CD-I. Microware's president Ken Kaplan will address the conference about future directions of CD-I. Microware will also participate in presentations about CD-I authoring, assembling CD-I production teams and developing corporate programs.

A large exposition will also be available with feature exhibits by conference co-sponsors. Attendees will be able to get hands-on demos of CD-I titles, as well as meet with the people that are at the forefront of CD-I development.

The First International CD-I Publishing and Developer's Conference and Exposition will be held October 31st and November 1st at the Westin Bonaventure Hotel, Los Angeles, California. For more information, contact Stephen Vickery at Microware, (515) 224-1929.

Microware France: Real-Time Solutions for French Industry

MICROWARE SYSTEMS FRANCE IS located near the Mediterranean coast in a 17th Century castle. Even though its location sounds like a vacationer's paradise, Microware France's business is anything but leisurely.

"The French economy is in a bit of a slump right now, though we haven't really noticed it," says Nick Rainey, manager of Microware France. "We are noticing that as spending cuts continue, developers are looking for more economical alternatives to their existing software. Since OS-9 is priced less than our competitors, we think the slump can be beneficial to us."

Microware's position in the French real-time arena is increasing. The interest in Microware is evidenced by Microware France's recent Open House. "We had over 100 guests attend from throughout France," said Rainey. "One attendee had recently

visited a similar event held by a competitor. He pointed out these facts that show the growing interest in Microware. Our competitor drew 100 visitors on over 9,000 invitations. We had over 100 people with just 900 invitations. The visitor was quite impressed."

Microware France was established in the fall of 1989 to develop a foothold in this growing market. The office now employs five full-time employees to provide sales and technical support to French customers. The following are examples of some Microware France customers and the types of applications they are developing.

Fully Automating the François I Lock

The Port of Havre provides an important connection for French industry to the English Channel. The François I



The François I Lock in the Port of Havre is one of the world's largest locks and is controlled by an OS-9 system.

Lock in the Port of Havre is one of the largest in the world at 1974 feet (401 meters) long, 220 ft. (67 m) wide and 79 ft. (24 m) deep. When filled, the lock holds almost 23 million cubic feet (643,000 cubic meters) of water.

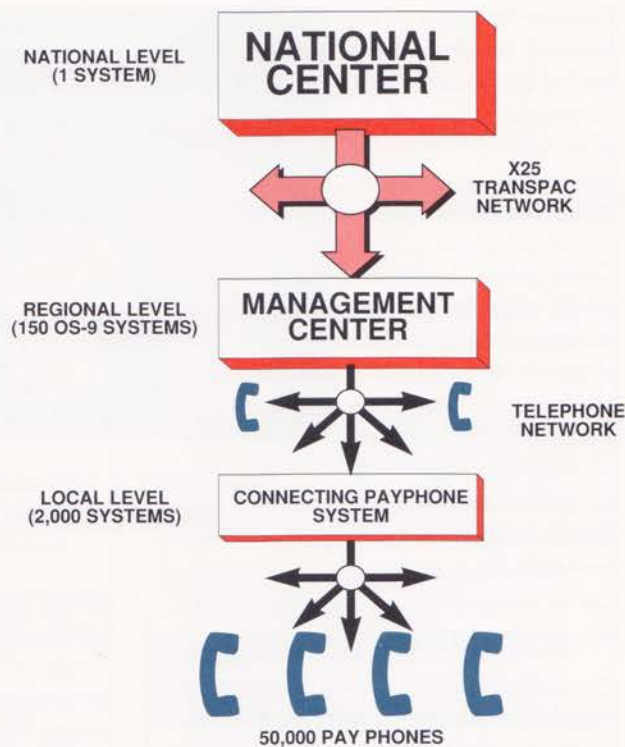
At the heart of the François I Lock is an OS-9 system from COTEM (Le Havre, France) that controls the total operation of the lock. The system is responsible for controlling the actual lock, as well as the automobile bridges across the lock. On the lock, the system controls the movement of the lock gates (the photo shows the nearest of four gates fully closed) and the navigation of the vessels. The filling and draining of the lock is monitored and controlled as well.

Automobile traffic is also controlled by the COTEM system. In the photo, the far bridge is raised and the near one is lowered. The COTEM system controls the operation of the bridges and traffic signals along the roadway, and directs traffic to the appropriate bridge.

The system is built around an SPS7 system from Bull S.A. (Meylan, France). The François I system consists of two CPU boards with 4M of memory each, 4M of shared memory, a 150M hard drive and four terminals. The system is managed by an OS-9 software package from COTEM called **Cotempac**. Cotempac provides a set of forms that graphically represent the processes on the system. The forms are then used to manipulate the processes and monitor the system.

Pay Phone Management Systems

The Monetel Telecommunications Department in Valence is responsible for more than half the French pay phone market, including both coin and credit card pay phones. Two management sys-



Schematic of Monetel Telecommunications' pay phone management system.

tems have been developed to monitor and control card phones and pay phones on France's high-speed train system, the Train à Grande Vitesse or TGV. The company is currently developing a system for radio-based stations to serve as connecting points in France's mobile phone network.

The current management systems were developed for remote data collection from pay phones, to transfer billing information to a national processing center and to monitor phones for failure or breakdown. More than 50,000 card pay phones are now monitored by 150 regional management systems. "Our management systems need to react quickly when they receive calls from pay phones or the national center. We chose OS-9 for its speed," according to Paul Colomb of Monetel.

The regional management systems are multiprocessor VME systems controlled by OS-9. Each system features 8M of DRAM, 4M of which is used as RAM disks, a 120M hard disk drive, a 1.2M flexible disk drive and 20 asynchronous I/O lines. Monetel has developed their applications under OS-9 using the re-

gional management systems as their development hosts.

OS-9 Well Suited to Image Processing

Thomson-CSF Laboratoires Electroniques de Rennes (TCSF-LER) is the central research unit of Thomson-SA. The unit was created in 1973 and specializes in electronic imaging. Its applied research is conducted primarily with electronic systems for defense applications, professional and consumer television, and telecommunications.

"Although development trends and project requirements have tremendously increased, the Microware product family offers a complete palette of tools for applications ranging from embedded real-time control systems to full-sized development systems."

Philippe Lemonnier
Thomson-CSF

"Due to the very specific nature of image processing equipment," stated Philippe Lemonnier, a research engineer at TCSF-LER, "the criteria for selecting a real-time operating system was drastic. The operating system had to offer very short interrupt latency, task preemption, interprocess communications and high reconfigurability. OS-9 met our criteria."

"Although development trends and project requirements have tremendously increased," Lemonnier said, "the Microware product family offers a complete palette of tools for applications ranging from embedded real-time control systems to full-sized development systems."

MSC

New Employees at Microware

Jeff Ames recently joined Microware as director of the CD-I Publishing Department. Before coming to Microware, Jeff was president of Take One Productions (Des Moines, Iowa), a film and video production company. He holds a Bachelor of Arts degree in journalism from Drake University (Des Moines), and enjoys photography, and writing songs and screenplays.

Kris Hoffmeyer joins Microware's "Hotline" as a technical support engineer. Kris comes to Microware from NCR Corporation's Software Services Division (Dayton, Ohio) where he provided support for AT&T UNIX tower systems. Kris holds Bachelor of Science degrees in computer science/math and Spanish from Buena Vista College (Storm Lake, Iowa). He is a member of the American Taekwondo Association, and enjoys aerobics and listening to music.

Michael Martin recently joined Microware's Production Department as a production assistant. Prior to coming to Microware, Michael worked for United

Parcel Service (Des Moines, Iowa) and attended Des Moines Area Community College (Des Moines). Michael enjoys playing sports and modifying mini-trucks.

Carter Moss (not pictured) spent the summer working as a software duplication technician at Microware. Carter is working on his Bachelor of Science degree in computer science at Iowa State University (Ames, Iowa). In his spare time, Carter enjoys bicycling, playing basketball and developing computer games.

Garry Pshonik (not pictured) worked at Microware through an Iowa State University internship. Garry is a junior at ISU working on his Bachelor of Science degree in economics. While at Microware, he studied export regulations related to Microware's international business. Garry enjoys playing the guitar and piano, and boxing on the ISU Boxing Team.

Stephanie Watson joins Microware as a "Hotline" receptionist. Before coming to Microware, Stephanie worked for CDI (Des Moines, Iowa), a temporary service



Pictured left to right: Jeff Ames, Kris Hoffmeyer, Stephanie Watson and Michael Martin.

agency and as a substitute teacher. She holds a Bachelor of Science degree in home economics education from Northwest Missouri State University (Maryville, Missouri). Stephanie enjoys traveling and reading.

Cindy Gin (not pictured) recently joined Microware's Western Regional Office as a software engineer. Prior to Microware, Cindy worked for Everex Systems, Inc. (Fremont, California). Cindy holds a Bachelor of Arts degree in computer science from the University of California at Berkeley, and enjoys reading, dancing and traveling.

MSC

New Addition To Microware's Building

MICROWARE IS ADDING ON TO ITS Des Moines headquarters to give us room to grow. The 5,250 square foot addition will give Microware almost 26,000 square feet of office space.

The new addition will provide space for approximately 30 people from Microware's R&D Department, as well as a new conference room. Construction is expected to be completed in early November.

MSC



This 5,250 square foot addition to Microware's building is to be completed in November.

OS-9/PVCS

Continued from Page Three

The PVCS program modules and their respective functions are listed below.

Name	Module Function
<i>pget</i>	Retrieve, or check out, a revision from one or more logfiles
<i>pput</i>	Check in or add a revision to the logfile
<i>pvc</i>	Create and/or modify logfiles
<i>pvdif</i>	Compare differences between two files
<i>pvlog</i>	Print summary information about a logfile
<i>pident</i>	Display all PVCS keywords existing in a text or binary file
<i>pregen</i>	Recreate a file from a "delta differences" script and a reference file
<i>pvdcl</i>	Delete a revision from the logfile
<i>pvrml</i>	Display information from the PVCS journal file
<i>pvmrg</i>	Merge two sets of revisions into one revision

PVCS uses a technique known as "reverse delta storage" for storing the changes made between different revisions of the software. This technique allows PVCS to minimize disk storage requirements and speeds the retrieval of different revisions of the software. At any time, PVCS can rapidly recreate any version of the software, from the most current copy to the original version.

Providing Project Security

PVCS also provides extensive control over user access to the logfile and workfiles. File access can be assigned to individuals or groups according to the requirements of the project. Beyond file access, PVCS also defines the PVCS functions that each user may invoke. This allows the project manager to specifically assign accessibility to users based on their activities.

A project manager can configure PVCS to incorporate any level of security desired and can change the security structure at any time. The PVCS installation procedure also allows the administrator to embed site-specific information into every project file to insure that all devel-

opment groups adhere to company-wide development standards.

The PolyMake Utility

Microware's PVCS package includes a copy of PolyMake—an enhanced *make* facility that automates the task of building programs from their source components. PolyMake provides a host of features that are not found in most *make* utilities including:

- Support for conditional constructs
- Full dependency and script file generator
- Rich set of predefined macros
- Sophisticated library management
- Complete debugging facilities

PolyMake also understands the PVCS logfile structure. This allows PolyMake to query logfiles and extract the right version of each software component transparently. Together, PVCS and PolyMake make it easy to produce consistent, accurate executables.

UNIX and DOS Compatibility

Microware's implementations of PVCS and PolyMake are fully compatible with UNIX and PC-DOS versions of these products. All logfiles and makefiles created under OS-9 or OS-9000 can be used with PVCS on other systems without modification.

PVCS is designed to be installed on a disk-based Professional OS-9 development system running OS-9 Version 2.4 or greater, or a disk-based Professional OS-9000 development system running OS-9000 Version 1.2 or greater. A minimum of 1MB of RAM and 1MB of free disk space is recommended for proper installation of PVCS.

Put PVCS to Work for You

OS-9/PVCS is now available and OS-9000/PVCS will be available later this year. To order your PVCS package or to obtain more information, contact Microware or your authorized Microware representative.

MSC

FORTRAN 77 from Absoft Now Available for OS-9 Users

ABSOFT CORPORATION (ROCHESTER Hills, Michigan) is the leading developer of FORTRAN 77 tools. The company now provides a full OS-9 implementation of their FORTRAN 77. **Absoft FORTRAN 77** for OS-9 is a globally optimizing, full ANSI X3.9-1978 and ISO 1539-1980 implementation of the programming language.

Absoft FORTRAN 77 includes most popular VMS statement extensions and supports all VAX intrinsic functions. These extensions make the OS-9 implementation compatible with mainframe-based FORTRAN programs.

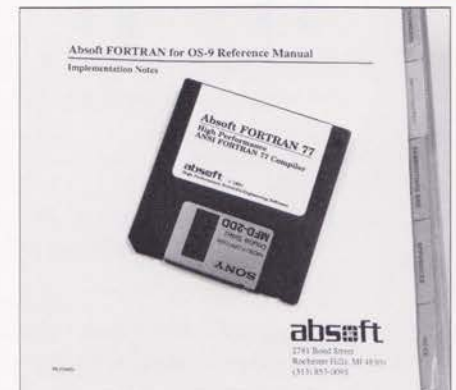
Absoft's implementation has a natural C interface and is compatible with the OS-9 C Compiler and other OS-9 development tools.

Absoft will market the compiler and development tools, as well as provide technical support.

To use the newly supported FORTRAN tools, developer's need OS-9 Version 2.3 or later running on a 68020/68881 or better system with at least 2M of RAM.

For more information, contact Absoft at (313) 853-0050.

MSC



Absoft now offers FORTRAN 77
for OS-9 users.

ON THE C SIDE

Pipes

by Ric Yeates

Microware Systems Corporation

PIPES ARE A CONVENIENT, EFFICIENT METHOD FOR PROCESSES TO pass data from one to another. They are most convenient when the data being passed has a single destination (data modules work much better for data broadcast). For example, a manufacturing system may have a process whose duties are displaying information about the current work in progress and interacting with the user (perhaps with a RAVE interface). This process might communicate with sub-processes by setting up pipes. It could set up two pipes for each sub-process: one for data destined for the master process and one for data destined for the sub-process. Using this method, along with `_gs_rdy()` and `_ss_ssig()`, the master process can asynchronously perform all of its duties.

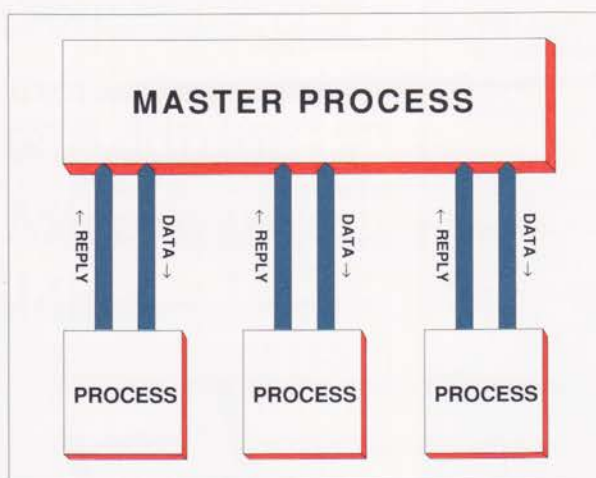


Illustration of OS-9 pipes with the Master Process communicating with sub-processes.

The example programs demonstrate this sort of set-up. We have a producer process generating some pseudo data and a consumer process that gets the data and regulates the producer. The general flow of the processes is this (assuming *produce* runs before *consume*):

- produce*
 - creates pipes called */pipe/data* and */pipe/reply*
 - waits for a "start message" from the consumer
- consume*
 - opens the pipes created by *produce*
 - sends a start message to *produce*
- produce*
 - checks the reply pipe for a message from *consume*
 - if a message is found, it is read and acted upon
 - generates the pseudo data (a counter value)
 - writes the data into the data pipe
- consume*
 - reads an item of data from the data pipe
 - determines the number of waiting data items
 - sends a "slow down" or "speed up" reply to *produce* if necessary

Produce and *consume* continue looping until *consume* has read 1000 data items. This arrangement keeps *produce* from overwhelming *consume* with data. This keeps the data in the pipe "fresh" in the sense that when the consumer slows down (for some reason or another) the producer is also told to slow down.

To compile and run the programs:

1. Type each program into files named: *procon.h*, *common.c*, *produce.c*, and *consume.c*.
2. Compile the common code with: `cc -r=. common.c`
3. Compile and link *produce* with: `cc produce.c common.r -f=produce`
4. Compile and link *consume* with: `cc consume.c common.r -f=consume`
5. Run the programs from the shell: *produce & consume*

Consume will output the data it receives and the replies it sends to *produce*.

```

/* procon.h */
/* Header file shared by produce.c, consume.c, and common.c */
/*
 * $Log: /h0/USR/RIC/C/PIPELINES/PVCS/procon.h_v $
 *
 * Rev 1.0 19 Aug 1991 15:24:48 ric
 * Initial revision.
 */
#include <modes.h>
#include <errno.h>

#define UPDATE_MODE (S_IREAD|S_IWRITE)

#define DATA_LEN    sizeof(int) /* size of data items
                                (data pipe) */

#define MSG_LEN      sizeof(int) /* size of messages
                                (reply pipe) */

#define START_MSG    0x60606060 /* start sending data */
#define STOP_MSG     0x00000000 /* stop sending data */
#define FAST_MSG     0x00000001 /* produce data faster */
#define SLOW_MSG     0xffffffff /* produce data slower */
#define EOF_MSG      0xe0fe0fe0 /* EOF on read */
#define NO_MSG       0xe0000000 /* none-of-the-above */

#define TRUE        1 /* boolean values */
#define FALSE       0
  
```



```

/* common.c */
/* Common routines shared by consume.c and produce.c */
/*
 * $Log: /h0/USR/RIC/C/PIPELINES/PVCS/common.c_v $
 *
 * Rev 1.0 19 Aug 1991 15:26:56 ric
 * Initial revision.
 */
#include "procon.h"

int get_pipe(name)/* create/open a pipe with given name */
register char *name;
{
    int path;

    if ((path = open(name, UPDATE_MODE)) == -1)
        if ((path = create(name, UPDATE_MODE, UPDATE_MODE))
            == -1)
            exit(_errmsg(errno, "can't open or create '%s'\n"));
    return path;
}

void read_pipe(path, buffer)/* read from path into buffer */
register int path;
register int *buffer;
{
    register int num;

    if ((num = read(path, buffer, sizeof(int))) == -1)
        exit(_errmsg(errno, "pipe read error - "));

    if (num == 0)
        *buffer = EOF_MSG;
    else if (num != sizeof(int))
        exit(_errmsg(errno, "pipe read count error - "));
}

void write_pipe(path, buffer)/* write from buffer to path */
register int path;
register int *buffer;
{
    register int num;

    if ((num = write(path, buffer, sizeof(int))) == -1)
        exit(_errmsg(errno, "pipe write error - "));
    else if (num != sizeof(int))
        exit(_errmsg(errno, "pipe write count error - "));
}

```

```

/* produce.c */
/* Data production process, regulated by consume.c */
/*
 * $Log: /h0/USR/RIC/C/PIPELINES/PVCS/produce.c_v $
 *
 * Rev 1.0 19 Aug 1991 15:23:54 ric
 * Initial revision.
 */
#define MAIN
#include "procon.h"

main()
{
    int data_path, /* "data" pipe path */
        reply_path; /* "reply" pipe path */
    int delay_time = 20, /* initial delay time */
        data = 0; /* data to send */
    int reply; /* reply received */
    int done = FALSE; /* done flag */

    /* open/create data pipe */
    data_path = get_pipe("/pipe/data");
    /* open/create reply pipe */
    reply_path = get_pipe("/pipe/reply");

    /* wait for start message */
    do {
        read_pipe(reply_path, &reply, MSG_LEN);
        if (reply == EOF_MSG) tsleep(2);
        /* other process hasn't started yet */
    } while (reply != START_MSG);

    while (1) {
        if (_gs_rdy(reply_path) != -1) {
            /* check for data in reply pipe */
            read_pipe(reply_path, &reply); /* read the data */

```

Continued

```

        switch (reply) {
            case START_MSG: break; /* already going */
            case EOF_MSG:
                exit(_errmsg(E_EOF, "reply pipe EOF error - "));
            case STOP_MSG: done = TRUE; break;
            case SLOW_MSG: delay_time++; break;
            case FAST_MSG: if (delay_time > 0)
                delay_time--; break;
            default:
                exit(_errmsg(1, "strange reply message - "));
        }
    }
    else
        /* check for fatal error */
        if (errno != E_NOTRDY)
            exit(_errmsg(errno, "reply pipe error - "));

    if (done) break; /* leave loop if finished */

    data++; /* simulate acquisition of data */
    /* sleep current delay time */
    if (delay_time) tsleep(delay_time);
    /* write data to consumer */
    write_pipe(data_path, &data);
}

```

```

/* consume.c */
/* Consumes data generated by produce and
   regulates production */
/*
 * $Log: /h0/USR/RIC/C/PIPELINES/PVCS/consume.c_v $
 *
 * Rev 1.0 19 Aug 1991 15:23:26 ric
 * Initial revision.
 */
#define MAIN
#include <stdio.h>
#include "procon.h"

main()
{
    int data_path, /* "data" pipe path */
        reply_path; /* "reply" pipe path */
    int data, /* data buffer */
        reply, /* reply buffer */
        count, /* loop counter */
        avail; /* remaining available data */

    data_path = get_pipe("/pipe/data");
    reply_path = get_pipe("/pipe/reply");

    reply = START_MSG;
    write_pipe(reply_path, &reply); /* send start message */

    for (count = 0; count < 1000; count++) {
        /* get data from "producer" */
        read_pipe(data_path, &data);
        printf("%x ", data); fflush(stdout);

        /* determine number of messages remaining in pipe */
        avail = _gs_rdy(data_path); avail /= MSG_LEN;

        /* see if we should tell producer to slow down
           or speed up */
        reply = NO_MSG;
        if (avail < 10) { /* less than 10 more? */
            reply = FAST_MSG; /* speed up */
            printf("FASTER "); fflush(stdout);
        }
        else if (avail > 20) { /* more than 20 more? */
            reply = SLOW_MSG; /* slow down */
            printf("SLOWER "); fflush(stdout);
        }
        if (reply != NO_MSG) write_pipe(reply_path, &reply);
    }

    reply = STOP_MSG;
    /* tell producer to stop */
    write_pipe(reply_path, &reply);

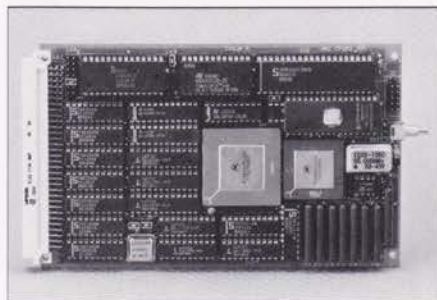
    /* read data until EOF_MSG */
    do { read_pipe(data_path, &data); } while (data !=
        EOF_MSG);
    printf("\n");
}

```


New Vendor Products

HM Computing
Pro-Log Corporation
Microprocess Systèmes
Radstone Technology
Micro-Link
MATRIX Corporation
PEP Modular Computers
EKF Elektronik
Mizar Inc.
Bradbury International
BVM Limited
Syntel Microsystems
Dynatem
Datacube, Inc.

HM Computing Offers MC68EC030 SBC



68EC030-based SBC from
HM Computing.

HM Computing Ltd. (Worcester, England) now offers the CPU03, a 3U VME SBC built around Motorola's MC68EC030 CPU running at 25 or 33 MHz. The board is optionally available with a 68030 CPU. The CPU03 features 1M or 4M 32-bit wide DRAM with one

wait-state at 33 MHz. The board also features two serial lines, a real-time clock, 2K nonvolatile RAM and a 32-pin ROM socket.

For more information, contact Andy MacBeth, HM Computing Ltd., 26 Severn Terrace, Worcester WR1 3EH, England. Phone: (44) 905 27185.

Pro-Log Introduces Two Industrial Computers

The BusBox/68030 and Node-Box/68030 from Pro-Log (Monterey, California) provide high-speed performance for industrial applications. The modular STD Bus systems are based on the 68030 running at 25 MHz. The systems also feature solid state semiconductor disks and up to 4M of RAM.

The BusBox/68030 features seven expansion slots and six I/O panels in a $17\frac{1}{2} \times 12\frac{1}{2} \times 7$ inch ($444.5 \times 318.8 \times 177.8$ mm) form factor. The Node-Box/68030 includes eight expansion slots and three I/O panels in a $11\frac{3}{4} \times 12\frac{1}{2} \times 7$ inch ($299.7 \times 318.8 \times 177.8$ mm) form factor. Users can easily add a range of networking interfaces, communications, display devices and other I/O.

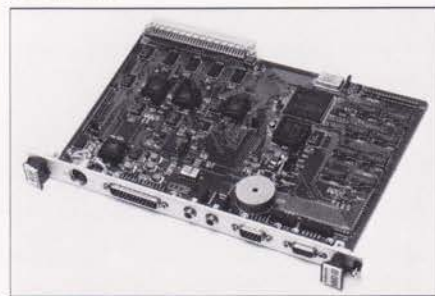


Pro-Log's BusBox/68030.

For more information, contact Pro-Log Corporation, 2555 Garden Road, Monterey, California 93940. Phone: 1-800-538-9570 (U.S. only) or (408) 372-4593. Fax: (408) 646-3517.

RAVE Boards from Microprocess Systèmes

Microprocess Systèmes (Courbevoie, France) recently introduced their E32DE MMD00 and E32CF VFG00 video boards. Both boards support Microware's RAVE (Real-Time Audio/Video Environment), a graphical user interface development tool. The E32DE MMD00 is a 6U VME man/machine interface motherboard that features a VSC 66470 video controller, PC/AT keyboard interface, mouse interface and up to 1M RAM. The board offers resolution up to 768×560 pixels.



RAVE board from Microprocess.

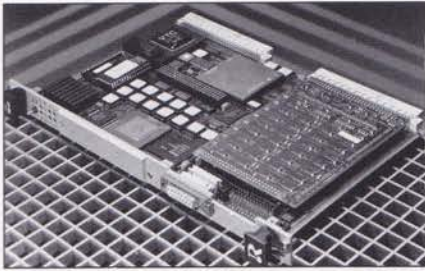
The E32CF VFG00 is a daughterboard to the E32DE MMD00 and allows input from either a video camera or video recorder (VCR). The board offers digitization resolutions of up to 384×560 pixels.

For more information, contact Michel Girault, Microprocess Systèmes, 97 Bis, Rue de Colombes, B.P. 87, 92405 Courbevoie, France. Phone: (33) 1 47.68.80.80. Fax: (33) 1 47.88.97.85.

68040 SBC from Radstone

Radstone Technology (Towcester, England) has recently introduced three new products for OS-9 users. The 68-42 dual-processor SBC features a 25 MHz 68040 CPU with up to 32M multi-port DRAM with cache-burst-fill support. SCSI and Ethernet interfaces plus four RS-232/422/485 serial ports are under the control of a dedicated 68020 CPU with 1M or 4M of on-board RAM. The 68020 acts as an intelligent I/O processor using Gateway and Datapath ASICs to initiate DMA-type data movements between the two CPUs. The SCSI interface has a 53C700 single-chip host

adapter with a SCRIPTS processor. The on-board Ethernet interface conforms to Ethernet 2.0 or IEEE 802.3 specifications.



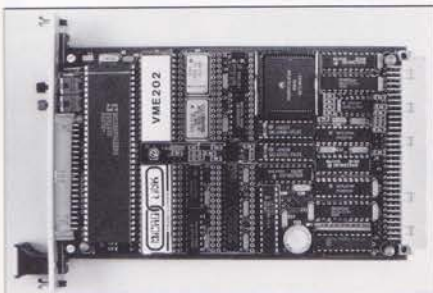
68040-based dual-processor SBC from Radstone.

Radstone's 98-08 VMEbus analog input board provides 64 single-ended or 32 differential channels for data acquisition. The 98-08 offers 12-bit resolution with programmable gain selection, channel selection and sampling rate. The board features up to 64K of dual-ported RAM to store both channel sequencing information and converted analog input data. An enhanced version of the board, the 98-08B, additionally incorporates two 16-bit analog outputs.

The PEX-6 ARCNET module is designed to be used with other Radstone boards and will support up to 255 nodes communicating at 2.5M/sec. The nodes may be in either star or bus network topologies, or a combination of both.

For more information, contact Janet Jenner (68-42) or Colin Neal (98-08 or PEX-6), Radstone Technology plc, Water Lane, Towcester, Northants NN12 7JN, England. Phone: (44) 327 50312. Fax: (44) 327 359662.

Micro-Link Introduces 68HC000 SBC



New SBC from Micro-Link.

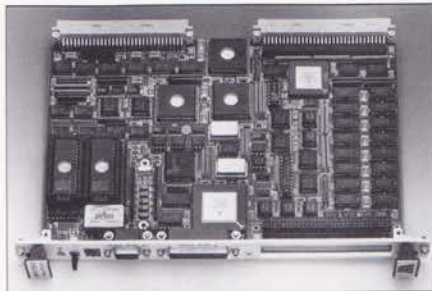
Micro-Link (Carmel, Indiana) recently released the VME202 single board com-

puter. The VME202 includes a 16 MHz 68HC000 or optional 68000, up to 2M EPROM, up to 2M battery-backed SRAM, eight RS-232 asynchronous channels, four 16-bit interrupt timers, a battery-backed calendar/clock and a watchdog timer.

For more information, contact Jan Collins, Micro-Link Products Division, SEA-ILAN, Inc., 14602 North U.S. Highway 31, Carmel, Indiana 46032. Phone: 1-800-428-6155. Fax: (317) 848-2254.

New Products from MATRIX

Four products were recently released by MATRIX Corporation (Raleigh, North Carolina). The MR-CPU330 is a rugged 68030-based CPU board for use in harsh industrial or near-military environments. The MR-CPU330 features a 25 MHz 68030 CPU, up to 8M DRAM, two serial ports, Dbus-68 interface and optional 68882 FPCP. Industrial quality and extended temperature range versions are also available.



MATRIX's MR-CPU330 is designed for harsh environments.

The MSX-CPU220 is a 3U VMEbus board for use in extreme temperatures. The board offers a 16 MHz 68020 CPU, 1M or 4M of DRAM, two 32-pin EPROM sockets, EEPROM, two EIA-232 ports, battery-backed clock and an optional 68882 FPCP. The board is designed for use in areas with temperature ranges of -40°C to 85°C.

MATRIX's Series 40 VMEbus enclosures are designed for harsh environments where systems must be protected from extreme temperature and vibration. The one-piece welded enclosures provide 80% vibration isolation at 30 Hz, and can withstand 20 gs of shock at 11 ms. A two-stage active cooling system

isolates internal components allowing reliable operation from -40°C to +85°C.

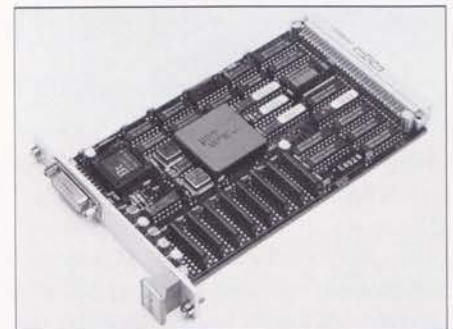
The FanPack from MATRIX combines three five-blade fans in a low-profile unit that can be mounted for up or down airflow on a 19" rack-mounted system.

For more information on MATRIX products, contact MATRIX Corporation, 1203 New Hope Road, Raleigh, North Carolina 27610. Phone: (919) 231-8000. Fax: (919) 231-8001.

PEP Expands Product Line

PEP Modular Computers (Carnegie, Pennsylvania) has added six products to its line in recent months. Their VDOUT-2 is a 16-channel digital output board for the VME bus. The board occupies two 3U VME slots with 16 opto-isolated digital output channels and full CMOS technology for low power consumption.

The VGPM-2 is a 3U VMEbus digital graphics processor module which uses a 20 MHz 83782 processor from Intel. The board supports display resolutions up to 1024 x 768 pixels with an on-board color lookup table (CLUT) device that offers 256 colors from a palette of 16.8 million. The VGPM-2 is available with 1M or 2M zero wait-state DRAM and consumes 4.5W of power.



PEP's VGPM-2 graphics controller.

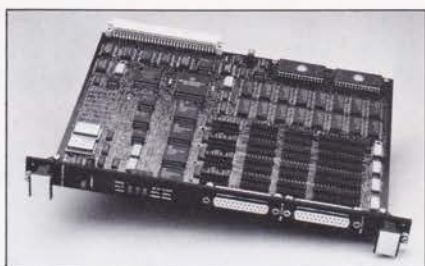
PEP's VSBC-2 and VSBC-3 single board computers are built around a 16.67 MHz 68HC000 CPU and include up to 1M SRAM, up to 1M ROM, seven-level interrupt handler, single-level bus arbiter, a watchdog timer and a real-time clock. The VSBC-2 offers up to six RS-232 ports. The VSBC-3 features four serial ports, 20 parallel TTL I/O lines and a 24-bit timer.

The enhanced **VM20** is based on a 68020 CPU and offers up to 2M ROM, up to 8M CMOS DRAM, two serial ports, a real-time clock and a watchdog timer. It is also equipped with a MAX 696 for reduced power consumption.

The **PEP V386** is a complete PC/AT on a 3U VMEbus board. The board includes an i386 microprocessor, optional 16 or 20 MHz 80387 FPCP, LCD flat-panel interface, CIRRUS VGA graphics, and a flexible and IDE hard drive interface. The LCD interface offers resolution up to 640 x 480 with 64 grey scales available. The board features up to 8M RAM, 2M EPROM/Flash EPROM, 64K dual-ported RAM, real-time clock, two serial ports, Centronics interface and keyboard interface.

For more information about these products, contact Greg Tomsho, PEP Modular Computers, Inc., 600 North Bell Avenue, Carnegie, Pennsylvania 15106. Phone: 1-800-228-1737 (U.S. only) or (412) 279-6661. Fax: (412) 279-6860.

EKF Releases New Boards, New Compiler



New intelligent serial communications controller from EKF.

EKF Elektronik-Messtechnik (Hamm, Germany) has released several new boards, as well as a compiler for programmable logic controllers (PLCs). **GALASM** is a logic assembler/compiler for popular families of programmable logic controllers such as PALs or GALs. GALASM is a two-pass assembler and is optimized for different operation modes of standard GALs (series 16V8/20V8). The compiler accepts Boolean equations as data input and generates standard JEDEC-format files as output. While stepping through PLC source code, GALASM marks and comments all

syntactical errors and checks physical restrictions of the chosen device.

EKF's **VME68510-COMCO** is a 6U intelligent serial communications controller. The board features a 16 MHz 68HC000, 512K no wait-states SRAM, up to 128K EPROM, eight DUART serial interfaces, eight V.11/RS-422/485 ports and eight V.24/RS-232 ports.

Other new products from EKF include:

- VME68570-LAN 6U IEEE 802.3/Ethernet/Thinwire LAN controller
- VME68370-POS 6U four-axis position controller featuring 33 MHz 68020 CPU
- VME78240-PTO 6U digital I/O and timer board (VME68240-PTO for 3U)
- VME68210-PIA4 3U 80 TTL port board
- VME78340-PDACT 6U four-channel programmable DAC board with timer (VME68240-PDACT for 3U)
- VME78550-SI 6U four-channel serial interface (VME68550-SI for 3U)

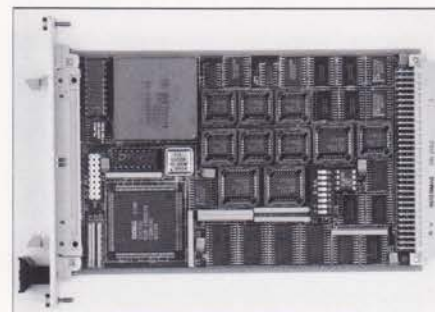
EKF has moved to a new location and can be contacted at EKF Elektronik-Messtechnik GmbH, Philipp-Reis-Strasse 4, 4700 Hamm 1, Germany. Phone: (49) 23 81/68 90-0. Fax: (49) 23 81/68 90 90.

Mizar Releases Low-Cost SCSI and Ethernet Board

Mizar Inc. (Carrollton, Texas) recently announced their **MZ 8554** intelligent 3U VME Ethernet and SCSI board. The board provides a SCSI interface based on the NCR 53C700 SCSI I/O processor and an Ethernet interface based on the Intel 82596 Ethernet coprocessor. Both interfaces provide direct memory access (DMA) to 128K of on-board buffered memory. The MZ 8554 OS-9 driver supports SCSI SCRIPTS which allows the 8554 to process SCSI I/O with minimum CPU overhead, similar to intelligent SCSI controllers.

For more information, contact Mizar Inc., 1419 Dunn Drive, Carrollton, Texas 75006. Phone: 1-800-635-0200 (U.S.

only) or (214) 446-2664. Fax: (214) 242-5997.



Mizar's MZ 8554 intelligent I/O board.

Driver Suite for OPAL Graphics Controllers

Bradbury International (Thatcham, England) now offers the **OS-9 Driver Suite** for their line of OPAL graphics controllers. The Suite consists of two drivers and four subroutine libraries, and supports communication over the VMEbus in either serial character format or serial block format. The Serial Character Driver allows ASCII sequences or 8-bit binary sequences to be sent to the controller as standard file devices. The Serial Block Driver uses a display record format to pass data via the VMEbus to the OPAL controller.

For more information, contact Brett Matthews, Sales Manager, Bradbury International, Pipers Lane, Thatcham, Berkshire RG13 4NA, England. Phone: (44) 635-71891.

PC Interface for OS-9 Users From BVM



PCLINK from BVM connects OS-9 systems to PCs.

BVM Limited (Southampton, England) announced their **PCLINK** package recently to allow the transfer of data from

PCs to OS-9 systems. PCLINK's server program emulates the OS-9 Sequential Character File Manager (SCF for serial terminals) to provide multiple windows on the PC screen, and the OS-9 Random Block File Manager (RBF for disk drives) allowing the OS-9 system access to the PC's file structure. PCLINK runs on a PC equipped with the **BVME410** Ethernet controller.

The SCF emulation separates tasks running in multiple windows on a number of PCs, making each window appear as a different device to the OS-9 system. This allows each window to be concurrently connected to the same or different OS-9 clients.

The RBF emulation allows remote access to the PC's file structure, which is dynamically remapped to OS-9's RBF structure as I/O requests are made. This allows the OS-9 system to send data to the PC. The data can then be manipulated on the PC using PC-DOS applications.

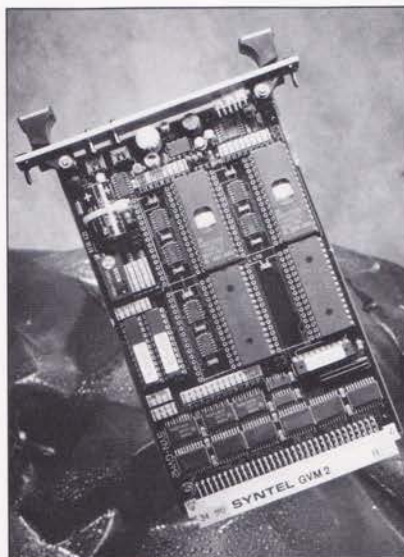
BVM also offers a new SCSI controller and memory module adapter. The **BVME130** is a 3U VME high-speed SCSI and advanced flexible disk controller. The SCSI interface uses a WD33C93A controller and a 68440 DMA controller for transfer rates in excess of 3M/sec. The flexible disk controller is based on the Intel 82077 controller chips and fully supports new perpendicular recording modes. Perpendicular recording allows for the use of extra high density devices which have capacities of up to 4M and transfer rates in excess of 1M/sec.

The **BVME630** is a 3U memory module adapter designed for harsh environments that accepts any Fujisoku or ITT-Cannon "credit card" memory modules. The board includes a card lock feature that prevents the memory card from detaching from the adapter, an on-board interrupter that warns of imminent card removal and an LED that warns about imminent battery failure.

For more information about PCLINK and other products, contact Rod Clarke, BVM Limited, Flanders Road, Hedge End, Southampton, Hampshire SO3 3LG, England. Phone: (44) 703-270770. Fax: (44) 489-783589.

Flash EPROM Support, G-64 Graphics from Syntel

The **SYN-GVM2** memory card from Syntel Microsystems (Huddersfield, England) supports up to 2M of Flash EPROM. The board can alternatively support up to 8M EPROM, up to 4M SRAM or EEPROM or a combination of EPROM and SRAM/EEPROM. The 3U VMEbus board features integral Vpp generation allowing the use of +5V, +12V or +12.75V Flash devices. Eight 32-pin JEDEC sockets are provided in two blocks of four.



Flash EPROM board from Syntel.

The **HGM4** is a high-performance G-64 graphics processor board. The board is built around the AMD95C60 QPDM graphics processor chip and dual-ported video RAM. The HGM4 is capable of displaying block copy at up to 16 million pixels per second and filling rectangles at up to 50 million pixels per second. The board offers resolution up to 1024 x 768 pixels and a CLUT with 16 colors available from a palette of 4096.

For more information, contact Paul Wilson, Syntel Microsystems, Queens Mill Road, Huddersfield HD1 3PG, England. Phone: (44) 484 535101. Fax: (44) 484 519363.

Dynatem SBC for Harsh Environments

Oettle+Reichler's **VCPU-20**, distributed by Dynatem (Irvine, California), was recently released for harsh industrial environments. The board incorporates full CMOS design and is available for extended temperature ranges of -40°C to +85°C.

The 3U VMEbus SBC features a 33 MHz 68020 CPU, up to 2M dual-ported SRAM, up to 8M dual-ported DRAM, up to 2M EPROM, optional 68881/2 FPCP, two RS-232/422 ports, real-time clock and watchdog timer.

For more information, contact Mike Horan, Dynatem, 15795 Rockfield Boulevard, Suite G, Irvine, California 92718. Phone: (714) 855-3235. Fax: (714) 770-3481.

Image Processing from Datacube

MaxVideo 20 from Datacube, Inc. (Peabody, Massachusetts) is a new-generation pipeline image processing system that features 20 MHz processing, 640 MHz aggregate pipeline bandwidth and a custom image processing chip. MaxVideo 20 occupies two 6U VMEbus slots and is compatible with the latest imaging cameras and sensors.

ImageFlow is an object-oriented software environment for control of MaxVideo image processing modules. ImageFlow produces optimized, event-driven code which fully supports real-time operation. ImageFlow includes an error handler, a configuration file reader, graphics functions and generalized input functions.

Datacube also offers **MaxVideo-UP**, a special program developed to support universities and colleges. For more information on Datacube products or their MaxVideo-UP program, contact Susan Snell Solomon, Datacube, Inc., 4 Dearborn Road, Peabody, Massachusetts 01960-3851. Phone: (508) 535-6644. Fax: (508) 535-5643.

MSC



Fall Schedule

IN THE COMING MONTHS, MICROWARE will offer training seminars in Des Moines, as well as several regional locations. The OS-9 sessions consist of two



days of **Intermediate Topics** and two days of **Advanced Topics**. Students may sign up for the entire four-day session, or either of the individual two-day sessions.

Two-day **RAVE Technical Sessions** will be held in California for designers that are either using or considering using Microware's RAVE (Real-Time Audio/Video Environment).

Microware staff is also available for on-site training for your company. On-site training is designed for companies that have five or more students, and allows users to learn more about OS-9 or OS-9000 for their particular applications.

To sign up for Training and Education sessions or for more information, please call Microware's Kristin Doane at (515) 224-1929. **MSC**

OCTOBER 22-25
OS-9 Intermediate/Advanced
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OCTOBER 21-24
OS-9 Intermediate/Advanced
MELBOURNE, FLORIDA

OCTOBER 29-NOVEMBER 1
OS-9 Intermediate/Advanced
SAN DIEGO, CALIFORNIA

NOVEMBER 4-5
RAVE Technical
SAN DIEGO, CALIFORNIA

NOVEMBER 5-8
OS-9 Intermediate/Advanced
TORRANCE, CALIFORNIA

NOVEMBER 7-8
RAVE Technical
SAN DIEGO, CALIFORNIA

NOVEMBER 12-15
OS-9 Intermediate/Advanced
CHICAGO, ILLINOIS

DECEMBER 10-13
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